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Resilience and Productivity
Mark Paine, Anne Crawford and Ruth Nettle

Resilience is a relatively recent concept that is being applied to the planning and analysis of farming systems, with interest stemming from the seemingly unpredictable nature of ‘shocks’ to farm businesses. The concept of resilience has its basis in ecology, with Holling (1973) being one of the first to develop the concept in sufficient detail to guide ecological studies. It has since developed further to include social and economic dimensions. This expansion and development has meant it has become an increasingly relevant concept for extension.

We provide a definition of resilience in respect to farming systems, consider what affects the resilience of existing farming systems, and explore the implications for future RD&E in rural industries. We propose six key areas of focus to improving resilience: learning from the past, people factors, technology evaluation, integrated designs, strong participation by farmers and information systems. The purpose of submitting this chapter is to stimulate debate, not to suggest that we have definitive answers.

Defining Resilience and Resilient Farming Systems
Holling (in Walker and Salt, 2006) defined resilience as ‘the capacity of a system to absorb disturbance and still retain its basic function and structure’. We adapt this thinking to rural Australia to arrive at three defining characteristics of resilient farming systems:

- The amount of change the farm-system can undergo and still function under its current basic structure;
- The degree to which the farm-system is capable of adaptation;
- The ability to build and support farmer learning and flexibility.

Resilient farming systems are those which can cope with change and maintain productive capacity under conditions of variability like changing commodity prices, climate, regulations or access to inputs (e.g. water). It is the human dimension of these systems that imparts an adaptive capacity to cope and maintain functionality.

Resilience is an emergent property, not a physical component of a system per se, which makes it difficult to measure and manage (Fletcher & Miller, 2006).

Extension supports this adaptive capacity, primarily through the use of learning relationships with farmers (Nettle and Paine, this volume). From a risk perspective, extension performs a knowledge management function as part of a strategy to provide flexibility to handle adverse events.

This methodological challenge is particularly pertinent to extension which appreciates farming systems as an integration of the social and the technical.

But how do we move beyond ‘resilience’ in the metaphorical (e.g. Carpenter et al., 2001) to develop a framework for harnessing industry know-how that helps farmers adapt their farming systems? We will approach this development challenge by first looking at how resilient our current systems have been, identifying the people factors that underpin the adaptive management capacity of our farmers and conclude with a discussion of farmer participation in the development of more integrated system designs in the future.
**Resilience and Extension**

It can be argued that some technological advances over the last 30 to 40 years have reduced the inherent resilience of our farming systems. Examples might include the increasing reliance on nitrogen fertilisers or breeding programs that select yield over pest and disease resistance. Other technologies and production techniques have improved system resilience such as conservation tillage. These developments are due to increasing specialisation in the pursuit of greater production efficiency, resulting in systems that are more finely tuned and that typically have less room for error or shock. In general, the vulnerability of farms to outside variables like climate and market variations has increased over the past five decades.

**The long term economic cost to the farm of risk**

In an environment of a big shock (the drought in south-eastern Australia) and a big threat (climate change and the possibility of more heat, less rain and more frequent extreme events for some regions of Australia), farmers are saying, ‘To what extent can our systems (i.e. our current trajectory) cope with the threats associated with climate change? Do we sail on with the systems we have and hope for the best, or do we need to be trading off some productivity/profit in the good years for a more reliable, long term outcome?’

Farmers face four main variables that can and do ‘shock’ their businesses: climate, government regulation, market specification and milk price volatility. It is the responsibility of those of us involved in extension, technology development and farm system design to factor in the cost to the farmer of managing the risks of these shocks when we evaluate where to put resources to develop new technologies.

Present and future challenges to the future of Australian and New Zealand farming systems include developing sustainable water management strategies within increased climate variability, fluctuating commodity prices, increasing input prices, animal welfare, biosecurity and land management issues. Increasing land prices, labour shortages and negative public perceptions of rural industries are additional pressures impacting on the viability of farm businesses. Most extension workers encounter some or all of these issues as part of their routine interactions with farmers.

There is a general consensus that climate change is expected to continue, with the majority of debate now centred on the extent of this change (IPCC, 2007). Actual changes at local and regional levels are difficult to predict because of the complexity of the climate system and uncertainty about future greenhouse gas emission levels. Climate change in Australia however is likely to include higher temperatures and altered rainfall patterns (Agriculture and Food Policy Reference Group, 2006). Agriculture is expected to be affected more significantly than other industries by climate change because of the inherent reliance on the natural resource base, and subsequent vulnerability to change and variation. Also, as the primary contributor of methane and nitrous oxide to the increased global atmospheric levels, it is expected that demands for mitigation will also be significant for the agricultural sector.

In the shorter term, possible solutions to improve farming systems resilience could include diversifying crop and livestock varieties and modifying farming practices such as time of calving or feeding system. Improving farm business resilience may be achieved by better long-range weather forecasting, policy instruments such as Farm Management Deposits, or recognition of the land stewardship role that farmers play through payment for ecosystem services. Over the longer term, biotechnology may assist with speeding up the development of new drought resistant pasture and crop varieties or more adaptable livestock. Climate change, coupled with public pressures around resource management and allocation, may eventually force the relocation or cessation of some farming activities.
The ‘best’ farm response to a new shock is probably more dependent on the individual situation than it is on the nature of the new shock. For example, a farm with 100% equity, running a less intensive production system and employing no permanent labour may have little difficulty managing its way through a drought shock, yet the same drought could be ‘fatal’ for a farm with 50% equity that is running a more intensive production system and that employs five permanent workers. In other words, the extra resilience to cope with a shock such as a drought is dependent on how much ‘resilience’ has already been traded away in the push for higher productivity.

Resilience and Rural Industries

Resilience is important to our rural industries at several levels. Not only is there the resilience of an individual farm business, there is also the resilience of the rural industry as a reliable source of food supply and the competitiveness of that industry relative to other food sources. Issues such as systems diversity, geographic spread, and availability of imports and role of regulation can all impact on an industry’s resilience (Offutt, 2005). Such attributes may increase the robustness of the industry at an overall scale, but for individual farm businesses or specific regions, an adverse event can be catastrophic. Some of the different elements of resilience at industry and farm level are summarised in Table 1.

The absolute collapse of farming as a production system is an extreme expression of a lack of resilience and is an unlikely outcome given the adaptiveness of human endeavour and technology. More likely manifestations of the lack of resilience will be the gradual decline in the competitiveness of a particular farming system or food industry relative to other foods. That is not to say that lack of resilience of individual farm businesses will not have significant negative impact on the individuals and the rural communities concerned. However, lack of resilience of individual farm businesses will only impact the industry significantly if the farm is lost to efficient production, rather than being bought by a more efficient operator. The trap in all of this is that it can appear to be a very negative response to change. This is not what we are talking about. We will argue that the search for alternative systems will require a joint effort from a number of disciplines, not one of which holds a solution independent of the others.

Table 1: Some features that comprise a resilient industry and a resilient farm.

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<th>A Resilient Industry</th>
<th>A Resilient Farm</th>
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<td>Has effective industry level structures that mitigate on-farm impacts and inform farmers about key issues and likely shocks;</td>
<td>Is profitable (goes without saying);</td>
</tr>
<tr>
<td>Supports a range of farming systems (including geographic diversity) because different systems respond differently to the same shock, and through this diversity, the ability to capture more opportunities than competitors;</td>
<td>Is sustainable in terms of natural resources, animal resources and people resources;</td>
</tr>
<tr>
<td>Is growing, and therefore can attract more external support, including government support and service industries;</td>
<td>And in addition:</td>
</tr>
<tr>
<td>Uses forecasting and planning to keep production and manufacturing capacity aligned;</td>
<td>Can effectively manage variation (in climate, water availability, product price, feed costs, etc.) primarily through:</td>
</tr>
<tr>
<td></td>
<td>o Understanding the interactions between production resources, natural resources, financial resources and people resources;</td>
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<td>o Maintaining flexibility with respect to changing inputs;</td>
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Developing Resilient Farming Systems

To improve the resilience of our farming systems, we need to understand the key drivers for change and view the farm business and rural industry as a complex adaptive system that is constantly changing and adapting to a changing environment. It is about stepping back and identifying the current trajectory as well as the options and opportunities.

To assist with this, we propose six key areas of focus. These areas have been identified through experience with large farming systems projects (e.g. $1-3M per annum) over the last seven years in Australia and a review of farming systems literature from industrialised agricultural countries.

**Learning from the past**

When considering a new paradigm such as resilience, the assumption is often made that previous farming systems RD&E has not been resilient. This is not necessarily the case. Such systems could well have had the attributes of resilience but not actually be tested by a significant shock.

There is a wealth of farming systems RD&E that has been undertaken across Australia and New Zealand in the past decade. What opportunities exist to data mine using a resilience lens? For example, can research outcomes and recommendations be revisited with consideration to the conditions in which they hold up, under average rainfall, under 25% less rainfall or 50% less rainfall? Our previous data sets (e.g. from component and farmlet research) usually do not have an ability to look at whole-farm resilience because they lack a vital ingredient – the farmer. This limits usefulness, but reviewing past RD&E can provide valuable lessons for the future and assist with identifying key opportunities for change.

The Resilience Alliance has compiled case study examples to demonstrate thresholds and alternate states in ecological and social-ecological systems (http://www.resalliance.org/185.php). They describe the examples in terms of system, form of change, type of resource use, ecosystem services, scale, variables, triggers and reversibility amongst other descriptors. Such thinking can help to identify different trajectories in advance and galvanise a response in preparation for the inevitable, or alternatively foster an alternative approach which may avoid a bad outcome. Many groups are currently engaged in work to better understand what the tipping points are for individual farm businesses and for rural industries.

**Incorporating people factors**

Boxelaar et al. (2006) identified seven attributes of individuals that contribute to resilience. These are:

- willingness to face ‘reality’ of uncertainty and ambiguity;
- ability to make meaning of events in a way that builds bridges to the future;
- a concept of self that is compatible with the current structural changes in agriculture;
- sense of self-efficacy;
- inventiveness;
- social and institutional connectedness;
• environmental efficacy (Boxelaar et al., 2006).

However, the authors warn against using these attributes to develop a ‘typology’ of resilient farmers as these characteristics are highly variable between farming situations, but they do provide a framework for considering farmers’ resilience within the social context surrounding a particular situation. The social context needs to be stitched into each farming systems project to improve our appreciation of the situational diversity that surrounds the development of new farming systems for each region or landscape. It is necessary to design projects in collaboration with social researchers if we hope to identify new adaptive capacities and resilience in our farming systems.

In Far North Queensland, on the Atherton Tablelands, an industry development project (Grow Malanda) was established to help the local dairy community take charge of its future development by rebuilding dairy business viability, developing and up-skilling the capabilities of dairy industry business to meet the new challenges and re-establishing regional confidence and capability. Twelve months into the project, the region was struck by a cyclone. This had a significant impact on the farmers and farm businesses of the Tablelands region, in turn affecting their capacity and motivation to respond to the Grow Malanda project (Crawford et al., 2006; Crawford & Paine, 2007). With the region coming out of several years of drought, the cyclone tested the resilience of the farming population physically, socially and economically.

Physical impacts included loss of power for several weeks on some farms, inability to milk for several days, damage to farm infrastructure such as dairies and laneways, and pasture damage (loss of quality and quantity). Continual rain over the following five months hampered recovery efforts, raised prices of feed inputs and reduced feed quality. The impact on dairy herds was also substantial with reports of increased mastitis, reduced milk production, poorly grown heifers and calves aborted.

Extension played a vital role: first by coordinating recovery efforts; then facilitating the rebuilding farm businesses by support farmers during the emergency response grant process; and ultimately by using the crisis recovery as an opportunity to establish a whole farm planning process that aligned with the regional development goal originally established through Grow Malanda.

Technology assessment

Tools, such as modelling, provide significant opportunities for extension workers to learn from the past and look to the future. Appropriate use of models enables extension to fast track the ‘catch-up’ required to come abreast of top farmers. This is achieved by appreciating the dynamic behaviour of farming systems, something that farmers have acquired over many years of trial and error learning. A model can compress much of this learning by simulating production using many years of climate and production data. The extension work can observe how the system behaves under different conditions and ‘experiment’ with different interventions before committing to a particular course of action. In this way, an effective use of models enables the development of project designs that better represent the complex interactions operating in farming systems, explaining confounding effects, improving the cost effectiveness of systems experiments, and enhancing the predictive capacity and utility of extension interventions. This raises a number of challenges for farming systems RD&E, especially in the area of analysis and interpretation specifically. Whilst opportunities to improve the integration and use of modelling exist, this needs to be achieved in a convincing manner.

Modelling allows us to re-analyse past research, run scenarios and assess outcomes through a ‘resilience’ lens. For example, Kenny and O’Brien (2007) used weather data from 1956-2006, together with the biophysical model (DairyMod) to examine total pasture production and seasonal variability for this period for two southern Victorian locations, Ellinbank and Terang. They concluded that no distinct change in annual pasture production in southern rain fed regions has occurred over the last 50 years, but that it did support the observation that climate variability is a source of great uncertainty in the industry.
At a more complex level, conceptual and mathematical models have been developed in an attempt to integrate social, economic and ecological drivers of resilience, but it is challenging and difficult with new methodologies just beginning to be applied in the field (Fletcher and Miller, 2006).

There are few examples of resilience put into effect for Australian and New Zealand agricultural ecosystems with some work done by Kaine and Tozer (2005) and work underway by Fletcher and Miller, amongst others. Kaine and Tozer simulated a steer fattening enterprise based on a phalaris and sub-clover pasture in the Northern Tablelands of New South Wales, Australia, and then examined resilience under ‘shocks’ to the system in the form of droughts of varying severity. Production and cash-flow were examined, amongst other attributes. They concluded that such an approach can provide ‘insights into the dynamic properties and sustainability of agricultural systems, insights which are extremely time consuming and costly to obtain through real world experimentation’ (Kaine & Tozer, 2005). But it is difficult to integrate meaningful social drivers of change in such models and, as such, they should always be complemented by regional ‘know-how’ and interdisciplinary approaches that harness local knowledge from farmers.

Integrated designs

New farming systems project designs are seeking to integrate knowledge across the technical and social dimensions of adaptation. As an example, FutureDairy is a farming systems project developed to help Australia’s dairy farmers manage the challenges they are expected to face over the next 20 years, investigating the issues associated with large increases in forage and milk production/ha along with new technologies to improve labour efficiency and lifestyle (Garcia and Fulkerson, 2005). The research design involves technical research at one site and several commercial dairy farms as research ‘partners’ (spread geographically across south-eastern Australia). These commercial ‘partner farms’ are linked to the specific research modules and their involvement has also included their local advisors and/or peer support groups. The research and management team for the project involves dairy scientists, a principal extension officer and a social researcher. The intended outcome from the project is the co-development of knowledge (and practice) around improving farm and industry productivity (Nettle and Kenny, 2006).

This project, and others like it, has not been established to focus on resilience per se but in addressing future challenges to the dairy industry. It can help identify systems’ abilities to absorb shocks. The combination of technical research with economic analysis and modelling capacity linked with commercial farms provides a solid basis to explore ‘what if’ scenarios. By including social research and placing an emphasis on extension’s developmental role, the FutureDairy project is also well placed to explore the learning challenges associated with human adaptive capacity.

Strong participation by farmers

Recent farming systems projects have sought farmer contribution to technological innovation, especially through the development of learning partnerships and the use of commercial farms for research purposes (e.g. Langeveld et al., 2005; Crawford et al., 2007b).

Keys to success in learning partnerships include:

- shared responsibility for negotiating expectations;
- monitoring must be defined and negotiated as part of the learning partnership;
- technical researchers need to be able to better articulate their explicit learning needs;
- extension workers guide the choice of tools and approaches, and require significant brokering and negotiating skills (Crawford et al., 2007b).
Involving farmers in the extension of farming systems projects will improve the assessment of mitigation approaches and also provide insight into how farm businesses cope with variability and fluctuations in their system. By nature, farmers are adaptive and innovative.

**Information systems**

We can view increasing resilience as a form of risk management, which has implications for the way we use information as an industry. We, as an extension community, are learning more about improving the resilience of our rural industries when there is an increasing likelihood of significant events (or shocks to our farming systems). It is our responsibility to extend these insights in a meaningful and useful way. This includes having good information systems in place, assisting with rapid response and recovery following significant shocks. ‘Good communication married to a good understanding of options and consequences is a key part of preparation for... many of the unforeseen disruptions we can expect as part of modern life.’ (Offutt, 2005).

**Applying this in practice**

How do we anticipate these six areas of focus will work themselves out in extension practice? We believe the sixth of these, communication systems, is the start point for building more effective partnerships between farmers, extension and researchers. These partnerships will be vital for the evolution of resilient farming systems. They will need to combine knowledge from each of the disciplines in a progressive way. We refer to the experience in New Zealand regarding the proposed methane tax to illustrate our point.

The impact of dairy production on the environment and the policy and legislation to mitigate these effects are a potential source of ‘shock’ to dairy farm businesses. Consider, for example, the increasing community concern about greenhouse gases and climate change. As a signatory to the Kyoto Protocol, New Zealand is required to reduce its greenhouse gas emissions to help slow global warming. New Zealand produces fairly low levels of methane but half of the total comes from livestock and the pasture-based diet of the national herd (compared with grain) makes for more methane in comparison to other countries. In 2003, a methane tax was proposed in New Zealand which would penalise contributors of greenhouse gases. The planned tax was announced by the New Zealand Government to offset the cost of emissions to the environment and fund research into mitigation approaches. Farmers were to have been charged 60 cents per cow and eight cents per sheep.

In response, research is underway to identify more effective feeding systems in both New Zealand and Australia. Intensification is proposed by some as increasing the use of highly digestible feed such as grain or high-quality pastures increases milk production per cow and reduces methane emissions. However, the Farmers Federation argued that the NZ marketing advantage of ‘clean and green’ agriculture would be diminished if there was a move away from grass-based feeding systems, reducing international competitiveness of the industry. Other options include rumen modifiers, use of dietary fats, change in carbohydrate type (e.g. more perennial ryegrass and clover, less sub-tropical pastures), forage processing and vaccination against methane-producing microbes, yet there are still questions around the cost-effectiveness and practicality of these options, as well as other unintended effects such as a reduction in consumer confidence in dairy products due to the increased use of antibiotics or use of GM technology (http://www.greenhouse.crc.org.au/greenhouse_in_agriculture/dairy.cfm). Exploring these different options needs to be undertaken in a whole systems sense so that the outcomes, both intended and unintended, can be understood. Farmer participation is critical to help ensure practicality of the research outcomes and improve uptake. Too often, this is treated like the $50,000 add-on to a million dollar project. In future, we will need to involve farmers in a way that fully values their contribution to highly complex issues like resilience. By this, we mean each discipline focuses on its unique contribution to the question of resilience. For the discipline of farming, they will need to be involved in the formulation of research questions, contribute to data collection, critique the interpretation of results and evaluate recommendations in terms of industry trends.
Conclusion
We have developed farming systems which are highly tuned but in many cases also more susceptible to shock. It is wrong for us to assume that systems have not been resilient previously, but they will need to be resilient in the face of new issues now. However, we also need to be sure that we do not overshoot the mark. There is no point in developing a system that is more resilient than the climate requires, so scenario analysis and risk assessment are important as well as participative approaches to identifying key vulnerabilities. To assist with this, we can use the resources and information we already have and build on the components of adaptability, governance, leadership, social networks and trust (Walker et al., 2006). It is in this area of information use that extension has a vital role to play. We anticipate extension workers will make greater use of models while also developing new skills that strengthen their work with farmers, harnessing farmer knowledge as an adaptive management partnership.

We also provide a note of caution. If we focus too narrowly on the capacity of people and farms to ‘bounce back’ after a disturbance such as drought, we may miss opportunities to make a change to a more resilient state – a fundamental transformation of our farming systems that could lead to a more sustainable future. We propose that now is the time to act and the first step is to question our current work with respect to the six key areas outlined in this chapter.

References


(http://www.resalliance.org/185.php)

(http://www.greenhouse.crc.org.au/greenhouse_in_agriculture/dairy.cfm)


The Origin of Extension
Jess Jennings

This chapter looks beyond contemporary structures and conventions within agricultural extension to identify why, how and when extension came into being. This long-run historical investigation of the fundamental causal factors that led to the origin and subsequent development of extension practice is traced back to the early Middle Ages of European history. The developmental path of extension practice and its institutionalisation within book publications and various forms of practice, including state governed agendas and tertiary research and education, is assessed in terms of the on- and off-farm domains of agriculture.

The emergence of farming and extension in history
Firm evidence supports the hypothesis that southeast Europe witnessed some of the earliest instances of farming in Early Neolithic times with farming sites identified in Greece dated around 6000 BC, Bulgaria (5000 BC), and the region of the former Yugoslavia (4700 BC). These Early Neolithic sites contain evidence for the earliest local use of pottery, polished stone artefacts, and domesticated crops and animals (Cowan and Watson, 1992, p76, cited from Dennell, 1992).

Although interesting, several possible instances of the earliest practice of extension do not qualify as a form of extension practice that is relatable to contemporary times. These include Egyptian (agricultural advice in hieroglyphics), Greek and Phoenician (agricultural writings), Roman (Latin texts on agriculture, 200BC-400AD) and Chinese (agricultural publications during Han Dynasty, 25-220AD; Sung and Yuan Dynasties, dated 960-1368) (Jones and Garforth, 1997; Russell, 1966). A major factor in the failure of these examples to relate to extension as we know it today, is the lack of a clearly defined off-farm domain of agriculture, particularly in terms of major cities, trading markets, institutional frameworks, defined industry structures and the rise of the nation state which emerged much later than the above examples.

Jones and Garforth (1997, p3) cite that the first known example [of extension] was in Mesopotamia (roughly, present-day Iraq) around 1800 BC ...[where] archaeologists have unearthed clay tablets of the time on which where inscribed advice on watering crops and getting rid of rats – important for mitigating any potential loss of taxation revenue from farmers. This example demonstrates intent to benefit the public good by securing the tax base revenue of the community, but the technology of stone tablets provides too weak a link to the comparatively monumental capacity of contemporary agricultural communications to consider this the origin of extension.

Without an off-farm domain, there is doubt that the above mentioned extensionists were operating a link between the on- and off-farm domains of agriculture. That is, most community activity was predominately rural by nature with no scientific reasoning, discussion or informed debate available from the off-farm domain. Without a clearly identified off-farm domain, it is problematic and indeed impossible to attribute public benefit beyond the farm gate, thus making it unacceptable to consider that these early examples of extension were operating a linkage between the on- and off-farm domains of agriculture.
European origins of extension

Societal transformation during the European Renaissance was significant and exerted major influence on the origin and development of extension. In particular, rational enquiry and the decline of feudalism provided necessary conditions for extension to emerge on a scale, in a form, and within a societal context that we can relate to present day extension. Jones and Garforth (1997, p4) support this estimation, stating that:

*The direct antecedents of organized agricultural research and dissemination of its results which occurred in nineteenth century Europe and America can be traced back to the ‘renaissance’ which began in the fourteenth century. ... Between 1300 and 1700, European society became transformed from its medieval feudal forms into recognizably modern social systems. ... Along with the growth of national states and European exploration and ‘discovery’ of the rest of the world was the ‘new learning’. This involved not only a fresh appreciation of rediscovered classical writings and art forms, but also many novel ideas and activities, a spirit of humanism, and rational inquiry.*

These historical developments within Europe realised several societal transformations and benefits, including the invention and increasing utilisation of the printing press. Prior to commercially printed editions of their work, authors relied upon laborious, multiple handwritten manuscripts, which were (obviously) limited in their production. In the origination of extension, the role of the printing press was critical because it served to create a new intellectual canvas and space for dialogue, referred to here as the off-farm domain.

As acknowledged by Jones and Garforth (1997), the invention of the printing press by Gutenberg (approximately 1450) with its moveable-type technology was a major historical moment in extension’s origin and development. Its commercialisation and quick dissemination across Europe created the first opportunity for widespread information and knowledge transfer throughout all sections of society, including agriculture. This increased capacity to communicate which stemmed from the Renaissance period is directly traceable to contemporary extension practices.

Several boundaries were readily crossed by print media, not only geographically but linguistically, culturally and across religions, as demonstrated by some early examples of agricultural publications. The earliest recognised European agricultural text of the Renaissance was *Liber Ruralium Commodorum* by Pietro de Crescentius in 1304, originally in Latin but translated into Italian and French, and first published by printing press in the 15th century (Prothero, 1912). Another title was translated from German and re-published in England, called *Foure Bookes of Husbandry*, by Heresbach with an extra 16 pages contributed by the translator Barnabe Googe, Esquire, in 1577 (Prothero, 1912; Jones and Garforth, 1997; Fussell, 1947).

Growth in agricultural authorship and publication

Despite real barriers to publishing, including low education levels, low stocks of writing skills and limited resources to publish, the number of successful contributors to the stock of knowledge by the 16th century (in Britain at least) was significant and ever increasing. Not only were the quantities of publications improving dissemination but the quality appeared to be of value to many farmers and their industries.

Across Europe, agricultural literature that focused on the improvement of farming was emerging, with authors such as Tarello and Crescentius in Italy, Heresbach in the Low Countries, Charles Estienne, and Bernard Palissy in France, as well as the production of the encyclopaedia (1751-70, Prothero, 1912). In Tudor England, John Fitzherbert published the first (allegedly) printed agricultural text in his 1523, *Book of
Husbandry (with several later editions), while Thomas Tusser published his first and highly popular edition of One Hundredth Goode Pointes of Husbandrie in 1557 (Prothero, 1912).

Porter (2000, p306-307) points to evidence of the emergence of what, in contemporary terms, would be considered print-based agricultural extension material:

From early works such as John Houghton’s periodical, A Collection for the Improvement of Husbandry and Trade (1692-1703), and Timothy Nourse’s Compania Foelix, or a Discourse of the Benefits and Improvements of Husbandry (1700), agricultural improvement was publicised by a vast new instructional literature.

By 1800, approximately 200 agricultural authors were published in Great Britain (Prothero, 1912; Swanson and Claar, 1984). By and during the 17th century in England, a whole new body of literature emerged, spelling out in unprecedented detail the techniques and benefits of improvement (Wood, 2002).

Although it is difficult to gain an accurate insight into the volume of agricultural books that were published since the advent of the printing press, Fussell (1947, 1950, 1983 and 1984) lists the growth of English farming books. Growth of English farming publications 1523 to 1860:

1523 – 1730 approximately 400 titles in approximately 200 years
1731 – 1793 approximately 500 titles in approximately 60 years
1793 – 1839 approximately 400 titles in approximately 50 years
1840 – 1860 approximately 400 titles in approximately 20 years

This rate of increase in agricultural publications for England alone suggests that the number of publications (titles not print run) rose from an average of two per year in 1523 to around 26 per year by 1860, or put another way, agricultural publications per year increased 13-fold from 1523 to 1860. One can only wonder what this figure has come to be in the 21st century across the western agricultural world alone. This cumulative increase in publications indicates that the volume of information being circulated to farmers rapidly exceeded farmers’ capacity to absorb it, which in turn led to a need for alternative extension mechanisms other than published books.

Publication rates and hence circulation levels in Britain and later Europe were spurred by copyright laws which established that after a maximum of 28 years text became part of the public domain, which led to the collapse of publishing cartels; while in the early 1700s London lost its monopoly on printing. On these factors, Porter (2000, p86) concludes... thus, more made its way into print more cheaply.

Original extension practice and the off-farm domain

The attempt by authors and scientists to make their work and results understandable to lay farmer audiences through some degree of on-farm contextualisation marks a major step in the origination of extension. Significance lies in the fact that these authors recognised the need to select from and summarise their findings to re-express them within a framework of farming practices and production targets that were meaningful on-farm. The complete scientific or research process was not documented in full to farmer audiences but rather the practical uses and farm management changes required to tap potential on-farm gains were conveyed.
A critical point about the content of printed extension material is that the context from which an agricultural author drew his/her results was moving increasingly further away from its traditional on-farm context. Agricultural authors began to investigate other intellectual arenas such as chemistry, and bring this understanding to agriculture, as Bacon had done and others such as Phillip Emanuel von Fellenberg in Switzerland (Jones and Garforth, 1997). Increasingly, authors no longer relied solely upon direct or personal on-farm experiences and experiments or trials to advance agriculture. This departure (by authors from direct on-farm experience) was possible because of economic conditions supported by rising agrarian capitalism (including land enclosure) and the growing bank of information emerging from the scientific enlightenment that, together, facilitated regular trans-disciplinary forays by agricultural authors into off-farm domains of intellectual pursuit and exchange (Wood, 2002).

Although the immediate impact of the commercial printing press during the early to mid-Renaissance period was moderate, the critical point is that the onset of print media as a communication tool caused a separation between authors and their audience of farmers. The advent and growth of commercial publication created the initial separation that continued to increase the relative physical, social, intellectual and economic distance between farmers and authors. This separation is supported by Porter (2000, p87) who identifies a new breed of critic that can readily be transposed to describe agricultural authors:

*The print boom bred new varieties of men of letters.* ‘In opulent or commercial society,’ observed Adam Smith, theorist of the division of labour, ‘to think or reason comes to be, like every other employment, a particular business, which is carried on by a very few people.’ Among the emergent breeds was the critic, that self-appointed judge, censor and reformer.

Further evidence of innovative agricultural thinking having become a detached, off-farm, and somewhat exclusive process is noted (albeit negatively) in the comments of David Hume who maintained (in 1741, Porter 2000, p88) that:...

‘the separation of the learned from the conversable world’ had been ‘the great defect of the last age’; learning has... ‘been as great a loser by being shut up in colleges and cells’, while philosophy had gone to ruin ‘by this moping recluses method of study, and became as chimerical in her conclusions, as she was unintelligible in her style and manner of delivery’. Where lay the fault? Thinking had been monopolised by self-absorbed academics ‘who never consulted experience in any of their reasonings, or who never searched for that experience, where alone it is to be found, in common life and conversation.

This division between farmers and authors is key to a long run understanding of the origins of what has become a great divide between the on-farm and off-farm domains or in terms of professions, between practitioners of agricultural and/or NRM extension and ordinary farmers.

An additional impact of newspapers and magazines that cannot be overlooked is the fact that the relentless demands of newspapers and magazines for copy turned authorship into a trade (Porter, 2000, p82). Without doubt, this had been made possible by the liberating effects of agrarian capitalism originating in England that enabled a growing proportion of the population to sustain themselves through means other than agriculture (Wood, 2002). By 1700, the phenomenon of *author by profession* had emerged as a new position within the range of occupations in England (Porter, 2000).
One way of further demonstrating and hence better understanding the separation of farmers and authors is to assess how each could understand the other’s perspective (after the rise of print publication). Early agricultural authors, with their agricultural backgrounds and often being landowners, were (still) able to identify with the plight of farmers and their on-farm concerns. This contrasts greatly with farmer’s perspective on authors. Farmers seldom knew the personal and professional experience associated with authorship, the intricacies of research, the demands of the role of giving advice, and perhaps above all, the author himself, who to most farmers remained a faceless entity.

The new off-farm domain of agriculture provided a forum in which authors exposed their ideas not only to end-users (farmers) but to their peers; thus initiating debate and the subsequent revising and re-publication of the best agricultural techniques and methods available. The advent of this public forum for debate forged a type of iterative interaction that was analogous to the process of scientific research that ultimately led to a path of continuous improvement. The emergence ofrationally-based, scientific content within agricultural texts began to appear, with an early example being Francis Bacon in the early 1600s who based his observations and scientific experiments on his estate north of London - which in fact marked the beginnings of the application of science and scientific method to agriculture (Russell, 1966, p16-17). Many followed Bacon’s lead, as evidenced by Porter (2000, p307) when he observes:

> Agriculture looked also to science. George Fordyce, a pupil of the Edinburgh professor William Cullen, produced ‘Elements of Agriculture and Vegetarian (1765)’, promoting the chemical aspects of farming. Dr Alexander Hunter, another who trained for medical practice in Edinburgh, set up the York Agricultural Society and edited ‘Georgical Essays’, a collection of papers on agriculture published in four volumes between 1770 and 1772.

**Content of early agricultural publications**

The subject matter contained within many agricultural publications was bound to be of use to farmers who physically worked the land. A brief survey of the issues upon which agriculturalists wrote included preferred ploughing animals, ploughing machinery, weeds, sewing methods, pasture species, crop and forage species, cultivation methods, estate establishment and management, enclosure farming, fertilisation and soil conditioning, feeding regimes, breeding regimes, and herd health. One typical example of improved practice concerns the sowing of wheat below the surface of the soil instead of broadcasting, which incidentally was reportedly discovered by the ... accident of a silly wench who mistakenly put wheat into carrot seed holes (Prothero, 1912, p90)!

An interesting aside is the style in which books were written to increase the effectiveness of delivery of technical information to farmers. Fussell (1947) reported that Tusser’s popular works were arranged in calendar form and written in doggerel verse, probably with the idea that rhyme would be of assistance to the supposedly sluggish brains of the rural community who would be glad to have this kind of help from mnemonics. This approach can itself be considered a form of extension as it aims to better communicate the technical message in a manner that most suits the farmer.

**Forms of agricultural extension beyond published books**

So far this chapter has focused upon the origin of extension primarily through the rise of published books written by agriculturalists. This aspect of the print revolution in agriculture is significant but must be seen alongside other forms of both printed media and the social institutions that utilised them. By the late 18\textsuperscript{th} century, newspapers and periodicals had made an impact on British agriculture as had the formation of
various social conglomerations, which together provided forums for intertwining and combining an array of extension practices.

Print media, other than books, in pre-industrial Europe encompasses a wide range of forms including periodicals, journals, published lectures, chronicles of societies, advertising, and newspapers. By the 1850s, the agricultural newspapers and periodicals circulating in Victorian Britain were considered by several sources to have been a significant factor in hastening farming advances (Goddard, 1983, p116). Given the velocity and geographic spread of their circulation, it seems hardly surprising that earlier claims (dated 1810) credited print media with having overcome the isolation of farmers. Several newspapers and periodicals existed prior to the close of the 18th century, although it appears that significant market penetration levels were not achieved until the mid-late 1800s. Over the period from 1768 to 1879, over 73 titles of newspapers and periodicals were recorded (in Britain), each with varying lengths of publication (Goddard, 1983).

In America, agricultural journalism first appeared in the form of a periodical in 1748, although only a small handful of companion periodicals came about until 1819 when *American Farmer* emerged from Baltimore. The ensuing century saw the rise (and often shortly after, the fall) of approximately 3,600 farm periodicals (including Canada), with approximately 450 journals and farm papers in circulation in America in the year of 1913 (Scott, 1970).

Since the 17th century, western print media has been bolstered by improved printing technology and particularly electronic media including radio, television, video, computers and internet communications. In combination, these modes of knowledge-transfer and communication represent a phenomenal path of growth and industry development to arrive at today’s immeasurably high levels. Contemporary Australian examples include agricultural newspapers and magazines, agricultural journals, industry-specific journals, discussion forums, private and public websites, industry project forums and publications, radio programs, television programs, and national and regional e-mail discussion forums.

**Extension by fairs and societies**

Agricultural societies became prevalent in the 18th century in Europe and North America, the first major one being the Society of Improvers in the Knowledge of Agriculture founded in Scotland in 1723 (Swanson and Claar, 1984). Earlier European examples are traceable to 1548 near Milan, with others emerging later in Germany (1764), France (1761), and Russia (1765).

In England, agricultural improvement was a major pre-occupation of the Royal Society, which brought together some of England’s most prominent scientists, [such as Isaac Newton and Robert Boyle], with some of the more forward-looking members of England’s ruling classes, like the First Earl of Shaftesbury, mentor of the Philosopher John Locke, and Locke himself, both of whom were keenly interested in agricultural improvement (Wood, 2002, p81). In addition, the agricultural committee of the Royal Society of Arts (1754) gave prizes for innovations, and enthusiasm for progress found expression in the foundation of agricultural societies such as occurred at Bath and West of England (1777) (Porter, 2000, p308).

Across the Atlantic, the American Philosophical Society had engaged in agricultural topics since 1744. This organisation preceded a steady stream of ensuing societies and clubs that supported agricultural improvement in the United States. Agricultural fairs were most popular in America during the 1850s to 1870s, although their existence can be traced to the first quarter of the same century with the fair movement [following] hard on the heels of the frontier as it retreated westward (Scott, 1970, p16). Similar
fairs or festivals existed in Europe, such as those held at Fellenberg’s experimental farm named Hofwyl (Jones and Garforth, 1997). In Australia, these events persist today but are often referred to as field days such as the annual Tocal Field Days in New South Wales.

**Institutionalising the off-farm domain: tertiary agricultural education**

Possibly the earliest proposal for the establishment of a formal educative agricultural institution came through Britain’s parliament in 1723 by Lord Molesworth (Prothero, 1912). A more significant development in British agricultural research and education was the establishment of the first English-speaking Chair of Agriculture at Edinburgh University in 1790 (Richards, 1985). As the new Chair, Dr Andrew Coventry’s lecture syllabus was *Discourses Explanatory of the Object and Plan of the Course of Lectures on Agriculture and Rural Economy* (Richards, 1985). This position brought with it an undergraduate course on agriculture that attempted to combine the relevant aspects of knowledge and theory from the Faculties of Medicine and Chemistry into practical applications for contemporary farming practices.

In the following decades, various colleges were set up in conjunction with Edinburgh University and the demand for agricultural institutions of varying types has sustained their existence to the present day. The first Continental academy of agriculture (probably) emerged in Florence in 1753 as the *Academio Dei George*, and the first Continental Chair of Agriculture was in Padua in 1764 (Falvey and Mathews, 1999).

In America, the first agricultural professorship was formed at Colombia College in 1792 (Scott, 1970) and was combined with the subject areas of natural history, chemistry and agriculture. The well known Land-Grant system was later introduced (in America) under the Morrill Acts of 1862 and 1890, under which agriculture was a major stream of education for a deliberately targeted larger portion of working class Americans. Land and resources were granted to each state to establish colleges as well as agricultural experiment stations, while extension was explicitly promoted as a mechanism for disseminating technological improvements through the Cooperative Extension Service as of 1914 (NASULGC, 1999).

**The rise of tertiary agriculture**

Put simply, science-based research represents knowledge, while the university system represents a major form of institutional power within society. When agriculture joined the university system (for example, the first Chair of Agriculture at Edinburgh University), both sides entered a long and unbroken relationship.

Institutionalised tertiary agriculture placed its proponents (university employed agriculturalists) in a position of authority within agriculture and society. The source and strength of authority came not only from the status and respect accorded to tertiary publications and training but also from the reputation, resources and influence exerted by universities as institutions within society. Tertiary level agriculturalists received the benefits of being formally aligned with universities from the moment of their appointment.

The newly evolved echelon of tertiary agricultural research and teaching quickly required the full-time employment of tertiary agriculturalists to keep pace with research programs and teaching commitments. This decisively increased the already wide physical, intellectual and social gap between ordinary farmers and tertiary agriculturalists. Prior to tertiary agriculture, published authors generally relied on their farm (or farms) as a source of income (for example Bacon, Fellenberg, Fitzherbert and others). This literal grounding of agricultural development processes to the on-farm domain was severed by the alternative career path and income source provided by universities and publication royalties, and can perhaps be metaphorically conveyed as the cutting of the an umbilical cord between on-farm management and off-
farm research activities that enabled the off-farm domain to grow increasingly independently of the on-farm domain.

Today, agricultural academics, researchers and extensionists rarely personally practice farming to sustain themselves, except perhaps in a hobby capacity. Within agriculture generally, sub-industries of research, agricultural development and extension have emerged that support large numbers of constituents, all of whom have members with skills relevant to agriculture but few members who actually live and work the land to sustain themselves or others.

The Australasia-Pacific Extension Network (APEN) is a good example of the absolute segregation and institutionalisation of the extension sector from farmers. Although APEN recognises that its members are largely employed to service the on-farm domain (farmers), it is clear that APEN itself exists to support extension agents working in the off-farm domain. APEN’s overall objectives (below) reveal no explicit references to farmers or their needs but are directly aimed at supporting extension professionals, who in general are not farmers.

*APEN’s vision: APEN is the peak body for change management professionals.*

*APEN’s role in contributing to the above vision: To provide a platform for networking, professional development and representation of members’ and the profession’s interests* (APEN 2004).

This chapter presents an historical account of the origin of extension that is not well documented in existing literature. The aim of this research is to establish a better understanding of how contemporary extension came into being and is currently practiced in all its forms. Given that no single account of history and historical events can be considered the only view, it is hoped that readers and colleagues in extension are prompted to further investigate, explore and contribute to the fundamental and formative building blocks of the field of extension for both agricultural and improved NRM practice.

**References**


Enabling Change in Rural and Regional Australia
Frank Vanclay and Greg Leach

Preface to this chapter

Greg Leach and Frank Vanclay were jointly responsible for drafting the following discussion document, which constitutes this chapter, on behalf of the State Extension Leaders Network (SELN). The document incorporates feedback from all SELN members and from a range of other stakeholders.

This chapter was published by the State Extension Leaders Network (SELN) in August 2006 under the title *Enabling Change in Rural and Regional Australia*. SELN is a gathering of state government extension leaders and influencers from each state and territory of Australia. SELN arose at the suggestion of APEN, and its member representatives are all members of APEN. The APEN President is an invited member of SELN.

The discussion document was originally developed by SELN in order to influence the understanding of key people – especially senior managers, CEOs, ministers and the like – about extension and its potential role in achieving desired outcomes. Unfortunately, ‘extension’ is a word that does not immediately convey meaning to many people, and even where people have a vague idea of its meaning, they are often confused by past (and usually outdated or incorrect) notions. The current document is an attempt to forge an Australian-wide understanding, in contemporary political-speak, of extension and to make its value proposition clear. Even though we may see extension in broader and sometimes different terms, our political masters see extension as a policy instrument, a tool that they can utilise in its own right and in combination with the suite of other tools at their disposal in order to achieve desired ends.

The document is regarded as a discussion document (intended to facilitate discussion) and as a working document (in that it can change over time). But it is also intended as a ‘walking’ document in that it is a resource to accompany a conversation that might be had to ‘induct’ a new key stakeholder.

By being a SELN publication, by having no identifiable individual authorship, by being endorsed by all state governments (note the authorised use of logos on the back cover), and by its formatting/design/professional makeover, it is intended to be an authoritative statement.

Although there is always room for intellectual discussion, what is sometimes needed politically is not semantics but certainty. Extension is there now. For us, extension is a discipline that has a history and a future. As a discipline, it has accumulated experience in the form of theory and practice. Extension has undergone much change as theories improve, practice improves, philosophies change and has responded as paradigms have shifted in other disciplines. We have tried to represent that in the expanding bubble figure that appears on page 6 of the document. This diagram depicts the process of paradigm change,
revealing the changing philosophies and expanding concerns of extension as it addresses wider issues and a
greater array of stakeholders.

Extension by its very nature is a continuously improving, self-reflexive discipline, thus inviting
improvements in practitioner thinking and practice. But while re-invention in the form of renewal and re-
relevance is necessary, care must be taken not to throw the bath out with the bathwater. These
improvements need to be reflected in extension policy. Stakeholders need to realise that extension as a
discipline persists, even when old paradigms and old practices are discarded.

While there have been many definitions of extension, none have achieved national standing. This
document presents a definition of extension it proclaims should have national standing: Extension is the
process of enabling change in individuals, communities and industries involved in the primary industry
sector and with natural resource management.

The challenge forward is to engage other stakeholders in embracing and continuing to improve extension
as a policy instrument for enabling change at national, state, regional and local scales.

Policy instruments available to pave the way to sustainability and productivity

Extension is the process of enabling change in individuals, communities and industries
involved in the primary industry sector and with natural resource management.

As a process of bringing about change, extension is a strategic policy instrument for enabling profitable
primary industry value chains and sustainable natural resource management (NRM) across Australia.
Extension is useful in its own right but also has a vital role to play in conjunction with other policy
instruments for achieving desired objectives.

Extension may well be a necessary precondition for the effectiveness of many instruments. In times of
discontinuous change, it is important to continually review the use of policy instruments and their
combinations to facilitate effective change in urban, regional and rural communities. A sustainable
productive future is heavily reliant on improved community capacity building, new ways of interaction and
more efficient use of resources.

The pressures on the primary industries sector to implement profitable production systems continue to
increase. Urban demands on Australian landscapes are escalating. While many social and economic
indicators are improving for most Australians, there is substantial evidence of declining social, economic
and natural capital in rural areas.

Our resource management practices must change if we are to achieve sustainable landscapes, livelihoods
and lifestyles. The needed changes will not take place on their own. Intervention is required to facilitate
and shape the practice changes required to achieve the desired on-ground outcomes.

A range of strategies (policy instruments) can be developed and implemented to influence and accelerate
these changes. The selection of effective policy instruments and the appropriate mix of instruments are
crucial for achieving desired outcomes. There is a real opportunity to recognise and use extension in
conjunction with other policy instruments to optimise their inherent potential to meet desired outcomes.
Extension differs from Public Relations (PR) and marketing in that it uses a wider range of methods, has a different theoretical base, and responds to stakeholders’ needs at all stages of the adoption process (i.e. not just awareness-raising). It differs from education and training by facilitating the social interactions critical for progressing learning and negotiation through to practice change.

Suasion is one of the methods used by extension, but extension often shows that new technologies or practices are in the potential adopters’ best interests. Extension and capacity building are highly interconnected, with capacity building being an important component of extension activities.

**Policy instrument:** a method or mechanism used by government, government agencies as well as other institutions including business to achieve a desired effect.

**Extension has a new meaning**

Extension is the process of enabling change in individuals, communities and industries involved with primary industries and natural resource management (NRM). Extension is concerned with building capacity for change through improved communication and information flow between industry, agency and community stakeholders. Extension seeks outcomes of capacity building and resilience in individuals and communities. Extension contributes to protecting, maintaining and enhancing the landscapes, livelihoods and lifestyles of all Australians.

Extension is a significant activity across Australia in both the public and private sectors, and involves thousands of extension practitioners who reach out to all landholders and community members. Extension seeks both public good and private good outcomes. The service delivery base has transformed over the last two decades becoming more diverse with private industry playing an increased role.

The achievement of public benefit outcomes is the responsibility of government. Therefore, public extension service delivery largely targets the sustainability aspects of production and NRM. While the Commonwealth and State Governments have remained significant players, industry programs, regional NRM bodies and private practitioners have taken an increased role in working with individual producers and natural resource managers:

- Private benefits such as increased profitability and competitive industries are increasingly targeted by private sector providers;
- Private sector extension providers are also available to deliver public sector programs under contract;
- Not-for-profit organisations, such as Greening Australia and regional NRM bodies, are increasingly undertaking extension services, and;
- Public sector agencies are also providing some services on a competitive basis with private deliverers.

It is clear that as the relationship between society and natural resources has broadened to focus on issues of sustainability, and as knowledge of the ways to influence people has increased, we need to rethink and adapt our ideas about the role and meaning of ‘extension’.
### Policy Instruments for supporting change

<table>
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<tr>
<th>Instrument Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Regulation, Enforcement and Compliance</td>
<td>Statutes, laws and regulations provide institutional guidelines and specify agency responsibilities for enforcing minimum standards, prohibiting certain practices and regulating resource use in policy areas such as land use planning, vegetation management, water allocation and development control. Enforcement and compliance of regulatory frameworks facilitate changed practices. A major risk is that ‘command and control’ approaches limit effectiveness in achieving more than minimum standards.</td>
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<tr>
<td>2. Direct Investment</td>
<td>Sometimes when specific on-ground outcomes are desired, the most effective mechanism is direct investment – to employ a contractor to deliver a specified outcome.</td>
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<td>3. Covenants and MoUs</td>
<td>Voluntary but official agreements and contracts for performance of a particular activity can support change processes. Examples include conservation agreements tied to property title.</td>
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<td>4. Common Law, Duty of Care, Stewardship</td>
<td>Common Law refers to a system of law based on custom and general social principles that are embodied in centuries of legal case history judgements. Common Law recognises social norms, community values and rights as key enablers of effective and sustainable practice. Within Common Law there are notions of a Duty of Care that each person has to ensure that they do not create harm. Potentially this Duty of Care extends to the environment.</td>
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<tr>
<td>5. Formal Agreements</td>
<td>There are a variety of formal mechanisms that can be used between governments and other entities to facilitate action. Governments can commission regional NRM bodies, local government and/or NGOs to provide certain services or deliver certain outcomes.</td>
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<tr>
<td>6. Research and Development</td>
<td>R&amp;D increases the stock of knowledge through basic and applied research. The implementation and adoption of R&amp;D outcomes contributes to practice change and the achievement of sustainable and productive outcomes.</td>
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<tr>
<td>7. Monitoring, Evaluation, Benchmarking and Adaptive Management</td>
<td>All policy implementation needs monitoring and evaluation. While many NRM goals are specified, without monitoring progress towards these goals cannot be established. In many cases, especially with NRM issues, the baseline state of the issue being considered is unknown. Evaluation of methods used to create change is necessary to enable fine-tuning of the instruments through adaptive management.</td>
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<td>8. Assessment Procedures</td>
<td>Structured assessment procedures enable change. Procedures such as environmental impact assessment (EIA), social impact assessment (SIA), health impact assessment (HIA), strategic environmental assessment (SEA), lifecycle assessment (LCA), triple bottom line accounting (TBL) and sustainability assessment all have goals of improving environmental and social outcomes. By providing information about sources of harm and opportunities for improvement, these procedures actively assist in bringing about sustainable development.</td>
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<tr>
<td>9. Self-Regulation</td>
<td>Codes of practice, codes of ethics, professional standards are approaches that encourage stakeholders to change their own practices in order to meet commonly accepted standards of practice. The process of development of these codes and awareness of them, leads to practice change.</td>
</tr>
<tr>
<td>10. Quality Assurance processes, EMS and Ecolabling</td>
<td>Encouragement of the implementation of Quality Assurance processes (such as Environmental Management Systems and Farm Management Systems) creates change because it encourages continuous improvement, reflexive practice, monitoring and benchmarking against world’s best practice. Ecolabeling is a market based mechanism where the establishment of an ecolabel potentially provides competitive advantage to products produced under this label and compliance is created via the competitive advantage that exists. Ecolabeling is in effect a code of conduct that mandates the quality assurance of environmentally sound practices.</td>
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<tr>
<td>11. Public Relations, Marketing and Advertising</td>
<td>The achievement of change can sometimes be facilitated by a public relations or marketing campaign utilising advertising. Awareness of an issue or of practical solutions is sometimes all that is required for change to occur.</td>
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<tr>
<td>12. Formal Education and Training</td>
<td>Public, targeted formal education and training programs enable instruction at a specified kind or level. The aim is to use education and training to improve knowledge</td>
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</table>
Various definitions of ‘extension’ have been developed over the years, with each being a product of its time. Extension necessarily is a continuously evolving system of practice and theory. Extension models have shifted from methods of technology transfer of expert knowledge to processes that support the co-creation of knowledge and the empowerment of stakeholders. Current extension projects utilise a range of methods:

- **Group Facilitation/Empowerment** is the process of providing support for rural, regional and urban stakeholders to define problems and opportunities, and to seek avenues to address them.
- **Programmed Learning** recognises the knowledge already held by participants and encourages experiential learning as they engage with new information in a learning event.
- **Participatory Technology Development** supports participation and multiple stakeholder approaches for development of technologies.
- **Information Development and Access** supports decision making processes through the provision of appropriate information at different stages in the decision-making process in forms that suit individual needs.

<table>
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<th>Methods</th>
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<tr>
<td>13. Suasion</td>
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<tr>
<td>Suasion refers to appeal to the right thing to do. It refers to campaigns that urge action because of what ought to be done, what is socially or morally desirable.</td>
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<td>14. Extension</td>
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<tr>
<td>Extension is the process of enabling change in individuals, communities and industries involved in the primary industry sector and with natural resource management. While extension seeks to improve communication and information flow between industry, agency and community stakeholders, it is primarily concerned with building capacity for change.</td>
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<tr>
<td>15. Participatory Approaches</td>
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<td>Solving complex, unstructured problems requires inclusive institutions and participatory processes of mediation, negotiation, dispute resolution and other deliberative mechanisms with community and industry stakeholders. Participatory approaches contribute to collective ownership of an issue and to a willingness to take action and to change practice.</td>
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<tr>
<td>16. Market-based Mechanisms</td>
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<tr>
<td>Market-based mechanisms include a range of methods for encouraging change usually involving the assignment of property rights to goods that are not normally traded through a market.</td>
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<td>17. Economic Incentives</td>
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<tr>
<td>Economic incentives refer to a range of financial inducements that attempt to change behaviour through monetary reward or penalty including: taxes on bad practices, use charges, tax deductions and/or rebates/credits, rate relief, subsidies and co-funding arrangements and penalties for poor practice.</td>
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<tr>
<td>18. Conditionalities</td>
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<tr>
<td>Conditionalities refer to the conditions that can be imposed on a business in conjunction with the granting of a licence to operate. This may include stipulations on emission levels, offset compensation (such as vegetation regeneration in one area to compensate for clearing in another location) and/or performance bonds.</td>
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<tr>
<td>19. Institutional Arrangements</td>
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<tr>
<td>Responsive institutional environments are necessary for enabling other instruments, policies and management. The capacity of institutions to change is essential for improving inter-organisational outcomes.</td>
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<tr>
<td>20. Change other policies</td>
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<tr>
<td>Actions to influence and/or distort policies or statutory objects can induce change processes. Examples include: ineffective subsidies; conflicting policies; misplaced statutory objects.</td>
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<tr>
<td>21. Reasoned Inaction</td>
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<tr>
<td><em>Doing nothing</em> is also an instrument for influencing change. Non-response is valid where justified by due consideration, e.g. allowing market forces to prevail.</td>
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</tbody>
</table>
- Individual Consultant/Mentor involves effective learning relationships between client and consultant to improve the skill base of the client, and to solve immediate practical problems.

In addition to these accepted approaches, further methods are developing:

- Multi-stakeholder Negotiation supports collective decision making in complex multiparty situations (e.g. in public good issues) using facilitation approaches that build on the enthusiasm of participants, target creativity and innovation as well as enabling effective participation of interested parties.
- Institutional Development supports the facilitation of network building, learning and negotiation processes within and amongst institutional stakeholders, programs and networks.

These different extension methods are complementary and all are necessary for effective capacity building. Extension is not just a matter of decisions about what is the best method, but rather what is the appropriate mix of methods to best achieve a particular purpose. The ability of these methods to achieve effective outcomes needs to be continually reassessed, improved and reinforced. Although there is much extension activity being undertaken in Australia, capacities within the extension system are limited, and support for professional development is lacking. Extension practitioners require professional development support.
4. Extension adds value to investment

All policy instruments have a role to play in achieving desired outcomes efficiently and effectively. Extension is a crucial contributor to investments in rural, regional and urban development, providing a bridge between science, policy and community stakeholders to facilitate changed practice. Historically, ‘agricultural extension’ raised the awareness and in many cases transferred technologies and science from research institutions to rural clients.

Agricultural extension targeted the adoption of new technologies to achieve improved production efficiencies and rural development outcomes. More recently, the focus of extension has widened to include the challenges faced by all communities including urban dwellers, land managers and primary producers as well as those faced by the very organisations that seek outcomes through investing in service delivery. This wider focus is essential for facilitating change in regional systems as well as addressing single issues.

Separating agricultural and other forms of extension in operation across Australia from other policy instruments is problematic. Extension projects cannot be considered in isolation from other interventions occurring in a community, industry or issue. Extension has been regarded for centuries as a policy instrument in its own right; however recent developments demonstrate that extension provides an integrator, facilitator and support function for other policy instruments.

The achievement of positive return on investment for each policy instrument depends on effective communication and information flow, and on the coordination and integration of associated intervention mechanisms. Further effort is needed to clarify extension’s integrator function and other emergent roles that add value to investment in sustainable and productive rural and regional futures.

5. A coordinated approach is needed

The development of a coordinated extension approach to better organise and gain value from public and private extension services is essential. This coordinated approach is needed to underpin cross-sector and political dialogue leading to improved professional development, coordination and extension policy in Regional, Industry, State and Australia-wide service delivery systems.

The focus of extension has moved from its original agricultural and rural development mandate to include environmental and other concerns of the wider society. A broad range of stakeholders are making increasingly competing claims on rural communities, natural resources, the rights of land managers and on production systems.

Extension needs to be considered as an effective policy instrument in its own right and in combination with other instruments. Ongoing commitment to funding the professional development of extension practitioners is necessary to provide the needed capacities for achieving institutional and policy developments as well as on-ground change.

6. Concluding comments

The achievement of effective and sustainable outcomes in primary industry value chains and improved natural resource management practices in Australia requires understanding that:
- Extension is a useful policy instrument.
- Extension can be used in its own right and in conjunction with other policy instruments.
- The meaning of extension has changed from problem-based technology transfer to the process of enabling change in individuals, communities and industries involved in the primary industry sector and with natural resource management.

Extension is most valuable for achieving effective outcomes when used alongside and in combination with other policy instruments. Establishing a common understanding of extension in Australia will assist the many stakeholders influencing the creation of world class, competitive primary industries and the achievement of sustainable natural resource management.

**Glossary (to this chapter)**

**Capacity building:** involves externally and internally initiated processes designed to help individuals and groups appreciate and manage their changing circumstances by increasing access to skills and resources.

**Community engagement:** the process by which the target group actively participates in planning, development, implementation, decision making and evaluation.

**Extension:** the process of enabling change in individuals, communities and industries involved in primary industries and natural resource management.

**Market failure:** refers to situations when the free market does not result in an optimal outcome or when a desired outcome can not be provided by the market, as is often the case with public goods. Market failure is often regarded as a justification for government intervention.

**Natural resource management (NRM):** refers both to the management of natural resources and also to the issues themselves. NRM includes a broad range of issues that affect primary production and habitat protection including salinity and declining water quality and quantity; pest, weed and feral animal issues; and land degradation.

**Participation:** the process of actively involving stakeholders in the development and delivery of projects and programs.

**Policy instrument:** a method or mechanism used by government and government agencies as well as other institutions including business to achieve a desired effect.

**Public benefit:** refers to the advantages of an activity or practice that are created for the community as a whole, even if there is also a private benefit. Thus, when a farmer plants a highly profitable tree crop in place of grain crops, they may generate both private benefits (greater commercial returns) and public environmental benefits.

**Target group:** a subset of the community that has been identified as the intended beneficiary of the project or program.

**References and Key Extension Resources**


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Theories and Approaches of Extension: Review of Extension in Capacity Building
Jeff Coutts and Kate Roberts

In this chapter, we are concerned to demonstrate how the five models of extension:

(1) The Group Empowerment and Facilitation Model;
(2) The Training Model;
(3) The Technological Development Model;
(4) The Information Access Model; and
(5) The Consultant/Mentor Model

can be used to evaluate capacity building and engagement in extension activities (Coutts et al., 2005). The purpose of this chapter therefore is to provide some insight on the characteristics and requirements of each model and to show that each model requires a different approach in practice. In particular, we outline the elements of each of the five models of extension, identify the type of evaluation data that would need to be collected for each model, and define an appropriate range of methods to evaluate projects associated with each of those models. However, before turning to an analysis of the five models, it will be useful to examine some of the concepts underlying extension.

Extension is a significant activity across rural and regional Australia in both the public and private sectors. It involves thousands of extension workers and facilitators and tens of thousands of landholders and community members. However, extension activities cannot be considered in isolation to what else is occurring in a community, industry NRM or issue context. As Macadam et al. (2003) pointed out, effective capacity building establishes a common agenda and a shared willingness for collaboration among communities of practice.

Many debates have gone on about the term, theory and role of ‘extension’. However, the focus of this chapter is not on the history or different paradigms of extension; rather we focus on the purpose or the outcome of extension. We argue that the outcome of extension is building the capacity of individuals and communities.

The original research that led to this chapter was carried out as part of a flagship project funded by the Capacity Building for Innovation in Rural Industries Co-operative Joint Venture. This flagship project was in three parts. They were (a) to find out what works and why carried out by Coutts et al. (2005); (b) to find out what were the institutional arrangements that favoured the building of capacity carried out by Macadam et al. (2004); and (c) to find out what fosters involvement in learning (Andrew et al., 2003).

The focus of that research by Coutts et al. (2005) was to seek out and review a range of extension and education projects directed primarily at the rural sector. We were looking to go across industry, issue and
community barriers as well as across different regions and states. Having undertaken a comprehensive review of a range of extension/education projects in Australia, we found that in general, extension/education projects tend to fit into one of five models. Undertaking such a review was a deliberate attempt to look ‘over the fence’ to see what is happening across industries and to collect the learnings that might have some direct benefits and applicability to another’s situation. We argue that the five models of extension we distilled from that review process provide a valuable framework for developing, assessing and evaluating capacity building in extension/education projects across a range of contexts.

**Extension – Historical Development**

While the meaning and definition of extension has undergone a series of changes over time and the discipline continues to evolve, it is possible to chart some significant historical developments in extension theory and practice which have moved from a strong focus on disseminating technical know how to a focus on increasing people skills. This shift has also reflected an increasing complexity in the situations extension is now used to address (Coutts, 1994, p7).

**Linear Transfer – TT 1960s**

Extension in the 1960s was based largely on the technology transfer model (linear transfer of information) whereby innovations for primary production were diffused to landholders through top down methods of information dissemination and provided with a theoretical basis by writers such as Rogers (Coutts, 1997, p23). Scientists or those with expertise undertook specific research to develop particular innovations and their findings and recommendations would be delivered to farmers by extension agents. This approach was reflected in many developed countries and was institutionalised by the World Bank with their Training and Visit system (Jiggins, 1989 in Coutts, 1997). This approach fits the persuasive mode of extension in that it seeks to change the behaviour or knowledge of farmers but can be paternalistic in its delivery style.

**Problem solving – FSR 1970s**

The technology transfer model however was not always successful in bringing about change in farming practice and in the 1970s a new style of extension began to take shape. Farming Systems Research was a response to the perceived failures of the technology transfer mode of information delivery and used farmer discussion groups to shape and inform extension research priorities. This was an attempt to align research priorities with the needs and interests of farmers and in many cases the research was undertaken within a farming context (Coutts, 1997; SELN, 2006). Extension became a method of problem solving in that it provided a way of assisting farmers to find specific technical or management solutions. This approach sought to ensure that extension was not only practical but relevant.

**Systems thinking – 1980s**

In the 1980s, systems thinking approaches began to influence extension practice. During this period, extension underwent further changes as it ‘became increasingly concerned with landholder needs and solutions’ (SELN 2006, p6). Systems thinking approaches established a more holistic approach to looking at a farm and hence to extension and further developed the participatory role of farmers that emerged with Farming Systems Research groups. During this phase of extension practice, methods such as action learning and adult education principles were incorporated into helping farmers better understand their own situations and to make the decisions they needed to improve their situation.
Pluralism – 1980s
By the 1990s, there was a broad range of extension theories, methods and tools on offer. This period of extension history has been described as ‘pluralism’ in that this range of approaches meant extension ‘was increasingly able to deliver outcomes while meeting diverse client needs’ (SELN, 2006, p6). By this time, extension agents were working with a broader range of clients in a more diverse array of settings. However the focus continued to be on human development in the form of social learning and participatory approaches as the ways to bring about practice change in primary production and NRM.

Capacity Building – 2000s
Since 2000, extension has been strongly interconnected with capacity building and community engagement. While institutional shifts have meant that state governments are no longer the main providers of extension in Australia, this has given way to new kinds of public/private partnerships and a stronger presence from the private sector in extension delivery. Regional organisations involved with the management of natural resources such as the Catchment Management Authorities have also emerged as significant stakeholders in extension delivery.

Much of the current work in extension reflects the five models we outline in this chapter. However, while these models are currently widely used, many of these models have their roots in the historical development of the discipline. For example, it is easy to see how the Training model has been shaped by the early technology transfer model or to trace the evolution of participatory modes of extension practice through farming systems research and the introduction of adult learning principles. In fact, many of these significant developments in extension theory and practice can still be found in current practice. The most critical aspect among these different extension approaches however is their inherent complementarity and that rather than there being one best method, there is an almost endless combination of approaches which can be tailored to suit specific situations or generate particular outcomes.

In looking at improving institutional arrangements for extension, Macadam et al. (2004, p xi & xii also one of the flagship projects already mentioned) put forward a number of criteria to determine whether an (extension) activity was genuinely building capacity. The criteria were:

- Effective capacity building maintains a focus on outcomes as improvements in the stock of capital sought by stakeholders. It strives for consistency between outcomes sought and the nature, design and conduct of interventions.
- Effective capacity building defines and engages the relevant communities of practice. In doing so, it encompasses a diversity of interests and world views, and avoids the losses associated with marginalisation of potentially significant people.
- Effective capacity building creates a common agenda and a willingness to collaborate among members of the relevant communities of practice.
- Effective capacity building depends on political and institutional commitment to the goal of capacity building programs, and the alignment with it of strategically important organisations.
- Continuous enhancement of capacity building depends on availability of skilled practitioners on their reflective practice and on research into all its aspects.

From our perspective, this highlights the need for a multi-pronged approach to capacity building, drawing from each of the models of extension as needed as well as on-going institutional support.
Extension for capacity building is, therefore, occurring on many fronts and there is no one particular definition or model that captures what extension is. Therefore, we identify capacity building projects as those that contribute to: providing a facilitative framework for groups seeking their own learning (Group Facilitation/Empowerment Model); providing specific packaged training when it is desired/required (Training Model); using a range of processes to tackle a specific technological or management need (Technological Development Model); providing ongoing, easy information access to support individuals and groups in informing decisions (Information Access Model); and the use of consultants and mentors to assist in decision making (Individual Consultant/Mentor Model).

The Five Models
In examining extension projects, their underlying philosophies and the way they operated, we found that most of these projects fell easily under a number of models proposed earlier by Coutts (1997). These models operated across industries and communities, with each playing key and complementary roles within a capacity building framework. They are outlined as follows:

I. The Group Facilitation/Empowerment Model: This model focuses on increasing the capacity of participants in planning and decision making, and in seeking their own education/training needs based on their situation. The project will often provide or fund a facilitator to assist groups to define their own goals and learning needs, and to help them realise these.

The Training Model: This model is about delivering specifically designed training programs/workshops to targeted groups of landholders or community members to increase understanding or skills in defined areas. These can be delivered in a variety of modes and learning approaches.

The Technology Development/Problem-Solving Model: This model is about working with individuals and groups to develop specific technologies, management practices or decision support systems which will then be available to the rest of the industry or community. It often involves local trials, demonstrations, field days and on-site visits.

The Information Access Model: This model is about providing a range of information that individuals and groups can access at a time that suits them. It can be based in a library, information centre, on a website, or other centralised location.

The Individual Consultant/Mentor Model: This model is about individualised one-on-one support. It may be a technical expert visiting and providing advice, diagnosis and recommendations. It may be an ongoing facilitating mentor relationship which provides a sounding board for decision makers.

Two further developing models have been suggested by the state extension leaders (SELN, 2006):

Multi-stakeholder Negotiation supports collective decision making in complex multiparty situations (e.g. in public good issues) using facilitation approaches that build on the enthusiasm of participants, target creativity and innovation as well as enabling effective participation of interested parties.

Institutional Development supports the facilitation of network building, learning and negotiation processes within and amongst institutional stakeholders, programs and networks.

These additional models are directed at the institutional arrangements within which extension works. For our purposes, we will focus on the original five delivery models.

Analysis has shown that these different extension/education models work well together as a suite of complementary capacity building avenues. We discovered that projects that came under the Group Facilitation/Empowerment model, for example, relied on Training model projects to provide training when it was appropriate to the individuals or group involved. Likewise, many of the participants in Training
model projects were people involved in projects under the Group Facilitation/Empowerment model and the Technology Development/Problem-Solving model. Each of these models depended on initiatives following the Information Access model for information support and follow-up. Individuals involved in group extension processes often need to work with mentors or consultants to see how to appropriate learnings to their own situation.

This means that a project initiated under the Training model needs to consider how it will provide ongoing access to information support for participants attending the course or link into an initiative that does. The projects under the Group Facilitation/Empowerment model need to consider how they – or others – will support appropriate technological development when groups and communities see a need to focus in a certain way.

Another way of visualising this complementarity is the Capacity Building Ladder:

Figure 1: The Capacity Building Ladder

A central leg of the ladder is the Facilitation/Empowerment model – an ongoing process to maintain motivation and a framework for development and change management. Information access is critical so that individuals and groups can access the type of information in the form that they require when they need it. Mirroring the ongoing facilitation and information access is the third leg – projects that deal with specific technology development – incorporating learning and information into changes in new technology and practice. The left rungs show the need for ongoing specific training/education products (Training) to allow individuals/groups to move to the next level. The right rungs indicate the value in individual enterprises having iterative consultant/mentoring support for incorporating changes at an enterprise level.

The Group Facilitation/Empowerment model provides an alternative extension demand creating a delivery platform (institutional arrangement) to government departments. The emphasis of projects under the Group Facilitation/Empowerment model is on facilitating a platform for participants to arrive at their own information, learning and skill needs. Projects under the Training model and groups involved in Technology Development/Problem-Solving model projects provide a ready source of training access for participants who see the need for it when it best suits them as a group.
It is critical that all types of models should be developed and supported within an industry, community or issue context. They cannot work in isolation from each other. While they do not all operate concurrently all the time, their influence is ever present.

In the next section, we describe each of the five models in detail including their underlying philosophies and the attendant practical considerations associated with each model.

How are the Models Applied?

I. The Group Facilitation/Empowerment Model

In the Group Empowerment and Facilitation Model, participants increase their own capacity in planning and decision making and in seeking their own education and training needs based on their situation. The main focus is to build the skills of individuals.

In the 1980s and early 90s, much was written in the rural education literature about empowering rural people and using bottom-up processes to achieve change. Bloome (1991) described one facet of extension as ‘human development’. Coutts (1994/5) described rural education as a means:

...to facilitate and stimulate individuals and communities to take the initiative in problem definition and seeking solutions to individual and societal concerns/opportunities. The assumption is that given the opportunity and interactive framework, individuals and communities will, and can, best improve their situation.

Jules Pretty (1997) and Sherry Arnstein before him (1969) developed a ‘Typology of Participation’. For Pretty, the strongest participation he called ‘self mobilisation’. He described this as where people participate by taking initiatives independently of external institutions to change systems. It was noted that self mobilisation can spread if governments and institutions provide an enabling framework. Clark developed the best practice model (Clark & Timms, 2001) to assist people to move through a process of continuous improvement and so determine their own needs and this was based on the action research model of reflection.

The National Extension/Education review (Coutts et al., 2005), unearthed a number of projects that reflected the philosophy and practice of the Group Empowerment and Facilitation Model.

A key underlying philosophy of this model of engagement is that rural industry participants are best served by a facilitative framework which allows them to define their own problems and opportunities and to seek their own avenues to address these issues. This is about ownership and responsibility – but it is also a pragmatic understanding that it is the people in a specific situation that are best able to understand and act on issues directly concerning them. It is assumed that by encouraging people to work together in this way, more lasting and sustainable solutions will result. This is because participants develop problem solving, planning and reflection skills which they can apply to new situations that emerge. This can be described as stronger human capital. Likewise, the increased networking, stronger relationships and group skills further develop social capital.

This is a model that requires serious understanding and support consistent with the philosophy. There is no room to be half-hearted. A supporting framework that allows it to be participant-driven and not a platform to fulfil a specific technology adoption agenda is needed. Long term facilitation support is needed.
while encouraging an increasing contribution from group members to cover facilitation costs in time as well as other group learning and on-farm activities. Facilitators could include contributions to their own costs when putting in funding applications for projects for the group. Facilitators need to be selected (preferably by the group) based largely on their facilitation strengths and require strong support, both in terms of training in industry issues and in methods of supporting the empowerment process.

There is a need to be clear about the (broad) boundaries/requirements for ongoing funding and to let the groups decide if they can live with them and how they will deal with funders’ needs. Appropriate monitoring and evaluation criteria consistent with the self-empowerment philosophy need to be built into the project – for example, the process used, the decisions made and reasons for them, changes against group developed benchmarks, extent of networking, confidence and enthusiasm, etc. Early training may be needed for group participants in group processes (including conflict management), planning and evaluation.

Given that it is a model that brings about empowerment then at some point there is an expectation the participants will be empowered. Research by Roberts and Coutts (2007) found that there are skills needed (to the level of mastery) in about six areas before participants feel empowered. These are:

<table>
<thead>
<tr>
<th>SKILLS NEEDED FOR EMPOWERMENT</th>
<th>ABILITY TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking</td>
<td>Analyse and reflect, to think 'outside the square'. Synthesise and provide examples of how problems / issues can be addressed. Evaluate and make judgements on about situations.</td>
</tr>
<tr>
<td>Planning skills</td>
<td>Understand the planning process. Take oneself or a group through a planning process and cycle.</td>
</tr>
<tr>
<td>Communication skills</td>
<td>Listen; Be assertive; Manage conflict. Communicate with others – institutions, community, government, etc. Transferring information. Level of comfort/ confidence/ competence interacting with others</td>
</tr>
<tr>
<td>Networking skills</td>
<td>Contact with others – individuals and groups. Have a diversity of the contacts</td>
</tr>
<tr>
<td>Facilitation skills</td>
<td>Understand the principles and processes of facilitation. Taking a lead in facilitating family/ group/ industry/ community processes</td>
</tr>
<tr>
<td>Leadership</td>
<td>Understand and implement leadership principles</td>
</tr>
</tbody>
</table>

The indicators of empowerment are when people:

- Have faith in own capabilities and approach difficult tasks as a challenge rather than a threat;
- Have knowledge of self;
- Recover after failure;
- Have a commitment to truth;
- Are collaborative and open in communication;
- Respect others; and
The Training Model

In the Training Model, specifically designed training programs and workshops are delivered to targeted groups of landholders, community members, government personnel and others to increase understanding or skills in defined areas. These can be delivered in a variety of modes and learning approaches. The main focus of the model is to deliver learning. It has a specific set curriculum and learning objectives in comparison to the open objectives of the Group Empowerment and Facilitation Model.

In contrast to the notion of extension as informal education, we found that projects in Australia that used this model were increasingly coming under the formal Vocational Education and Training (VET) system where participants can seek accreditation for learning undertaken and build towards awards of certificates and diplomas.

This is where the issue of ‘top-down’ extension is raised. Few of the participants have had direct input into the need for such learning events, the content and the process. However, their participation reflects that they have a need for gaining knowledge in the topic areas. However, as pointed out in the previous subsection, participants of groups under the Group Empowerment and Facilitation Model also seek out suitable learning opportunities as determined by their groups. Such ‘Training’ projects are often based on extensive market research and a response to industry or community demand.

For example, the Meat & Livestock Australia (MLA) EDGEnetwork has provided significant leadership in Australia in terms of managing a suite of projects to develop and deliver Training workshops and courses across Australia. These events are based on extensive market research, involve pilot testing and evaluation and cover a range of topics from production to environmental management and marketing. A key feature has been the alignment of courses to the VET accreditation system. Such Training projects can be delivered with good adult learning principles and be based on experiential learning.

The rationale for developing such projects is a belief that workshops or courses can be developed and packaged in such a way that they can be taken across regions or states and be applicable to a large number of diverse participants. Most extension projects developed for this purpose also incorporate an ‘adult learning philosophy’ which acknowledges the knowledge already held by participants and encourages experiential learning as they engage with new information brought to them through the learning event.

Significant projects developed under this model for primary producers and community members can and should be effectively linked into the National Training Framework. Developers, deliverers and participants need guidance in ensuring that accreditation issues are understood and that pathways are clear. Many participants do not understand the accreditation pathways and how a particular training course may contribute to accreditation, hence the need to make this clear. Further, the use of pilots to test packages is a critical step to the development process and is part of the effective framework for undertaking market research, and developing and delivering training products. It is evident that small to medium businesses may require support to overcome time and resource limitations in implementing learning from training. Finally, grounding learning in real cases and local examples has been shown to be an important part of assisting with understanding, relevance and motivation to change. Follow-up support between and after workshops or workshop series is also important to maximise learning and uptake.

The Technological Development/Problem Solving Model
In the Technology Development/Problem Solving Model, individuals work together to develop specific technologies, management practices or decision support systems which will then be available to the rest of the industry or community. It often involves local trials, demonstrations, field days and on-site visits. The focus is to work together to do something such as develop a product, carry out a trial, and solve a problem.

The Technological Development model emerged out of the strong participative development approaches that were developed through the broadening of farming systems research in the 80s and 90s. Hamilton (1995), in his book ‘Learning to Learn with Farmers’ describes the Technology Development/Problem-Solving Model by concluding that (projects)

...by being participatory,...allow participants to direct what is being learnt based on their own need to know. ...all participants’ knowledge is valued and accorded similar status.... Collectively, the total amount of knowledge brought to bear on a problem is increased. As past experiences are deemed important, the approach utilises experiences in the process and utilises the process to generate experiences. By generating an activity, participants are learning and teaching each other.

Where this model differs from the Group Empowerment and Facilitation Model is that a specific management/technological outcome is envisaged. This may be to have improved water use efficiency in the irrigation industry, to have a cleaner river catchment, or to have improved management of greenhouses for horticulture production, for example.

This model is about working with individuals and groups to develop specific technologies, management practices or decision support systems which will then be available to the rest of the industry through Training projects or ongoing information access. It can generally be classified into two broad categories: management or research models. The former is designed to use knowledge about a system to test the outcomes of various management strategies while the latter is used for increasing knowledge and understanding about a system.

A key underlying philosophy is that specific technological (including managerial, landscape and environmental) change requires a focused effort and should involve all stakeholders in the process. The technologies or practices that can be effectively developed in isolation and handed down to a waiting industry or community are rare. Participation and multiple approaches appear to be fundamental to projects in this model.

The analysis has indicated that extension/facilitator skills and activities are critical in addressing technological development issues in a region or industry. Another aspect is that addressing people issues in terms of understanding, motivation and confidence are important elements in facilitating technological changes. Regional issues were found to require safe forums for people from different industries and community situations to discuss and work through contentious issues. Facilitating information sharing between participants is seen to be a critical element of acceptance and adoption of new approaches and technologies.

It was clear that producer leadership and ownership of projects aimed at technological development/implementation is critical in obtaining broad support and acceptance. On-farm and local trials emerged as important in aiding understanding and acceptance of new approaches and benchmarking was important in documenting change and providing ongoing encouragement and motivation. Proactive on-farm support
was found to be necessary to bring about change in a relatively short time period, assisting learning in both the extension staff and participants. Another element suggests that linking in with local commercial expertise is important in terms of bringing about sustainable change processes.

The Information Access Model

The Information Access Model is where individuals and groups can access a broad range of information from a distance at a time that suits them. It can be based on a website, information centre or other centralised locations. The main focus of this model is to provide a repository of information. The main attributes of this model include:

- A focus on the growing role of the internet, information CDs and distance learning;
- Approaches to establish databases, websites and call centres to deal with individual information seeking needs from a distance;
- Includes information centres and community learning centres.

A review of information exchange mechanisms by Woods et al. (1993) identified the need to have an information ‘repository’ for project results to be captured for use by others in different places and at different places. Projects in the Information Access Model to some extent mirror this concept and need. A key underlying philosophy is that people require different information at different stages of their decision making processes in a form that suits their individual needs.

Our analysis indicates that despite the variation in size, type and clientele of information access projects, there are some common practical considerations that assist in success. This includes developing clarity on objectives and clientele, providing pathways for individuals to search for their own specific information needs, and continuously monitoring and responding to needs and feedback from those who seek and access information provided.

This limited cross-analysis of projects has also shown that projects under this model do not need to be resource demanding or complex and that there are creative ways to link people with information relevant to their needs.

The Consultant /Mentor Model

The Consultant/Mentor Model can be defined as a mentor or consultant working over time with an individual or community to improve their managerial, technological, social or environmental situation. The main focus of this model is to build a relationship.

There is a lot of evidence gathering that agricultural consultants are becoming an increasing force in supporting managers of agricultural enterprises across Australia. This is despite a longstanding history and culture of having free advice provided through government agencies.

The tentative conclusion in the national extension review (Coutts et al., 2005) that agricultural consultants play a critical role in assisting managers to integrate wider learnings into their specific farming system appears to be borne out. Those producers, who are seeking to remain at the top of their industry and be sustainable in an increasingly competitive and complex business as farming, are finding high value in having an outside professional provide expert input into strategic and operational planning and management in their enterprises.
The profession, however, largely relies on the informal advisory approach that is the legacy of the public extension system. Few consultants appear to have formal written agreements with their clients, although many negotiate and renegotiate their services and role on a face to face basis. Likewise, the reliance on informal networks and recommendations mean that many potential clients do not get to hear about the profession - what they can achieve for them and how to engage with an appropriate consultant.

It is clear that experience to date, from both consultants and their clients, has a lot to offer those entering into such relationships or seeking to maximise the effectiveness of the consultants’ time and expertise. The consultant provides support for individual clients so that they can make the difficult decisions and be confident that they are basing those decisions on good advice. The client makes the decision, not the consultant, but the consultant is expected to provide the advice. The consultant is expected to be there for the long term and build a relationship with the client. The consultant is expected to be a sounding board for clients and help develop good ideas. It is expected that consultants are paid for. This expectation is not so strong for mentors.

Issues of cost, quality of advice, and building a strong, long lasting relationship were the factors mentioned most often with regard to the practicalities of this model.

**Conclusion**

An important factor to remember is that these five models are just that: ‘models’. They are an artificial mechanism to help us gain insights and to have discussions within common frameworks. Some projects may not fit neatly into any of these models and others may have components which relate to more than one model. All of these observations are accepted. Allocating projects to the ‘models’ that we feel they best illustrate is just a mechanism we have used to bring out the richness and develop a greater understanding of developing and undertaking extension and education projects in Australia.

Engagement occurs in a number of ways between these models of extension as well as within these models. The engagement, however, all had the purpose of... increasing the abilities and resources of individuals, organisations and communities to manage change (Cooperative Venture News No. 1, March 2003) – that is, to increase capacity.

The models outlined here are helpful constructs in thinking about different and complementary approaches to extension and capacity building. These different models and approaches offer a suite of options which can assist groups and individuals to progress in their dealing with issues and taking up opportunities. Further, they provide a basis for thinking about elements to incorporate when developing projects under each model and managing them. They also provide a basis for those funding organisations to better understand the rationale and place for projects in the total extension and education environment, and elements to consider when assessing the rigour of projects submitted.

Innovation is happening in extension and education projects, and model guidelines based on past projects should inform, rather than constrain, this innovation. This overview has sought to outline the ways in which each model of engagement makes its contribution to capacity building in industries, individuals and communities. Projects under each of the models are critical to ongoing capacity building. Extension, as the process of engagement with individuals, groups and communities, plays a critical role in capacity building in Australia and beyond.
Engagement is also dependent on the propositions talked about by Macadam et al. (2004) and that is to focus on outcomes, agree on an agenda, have properly skilled people carry out the engagement, engagement with communities, and having the appropriate institutional arrangements. It is also dependent on the capabilities of the engaging audience (farmers and extension staff) and the social relationships established between them (Andrew et al., 2003).

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To be completed
The Worlds We Create: Designing Learning Systems for the Underworld of Extension Practice

Ray Ison and David Russell

The presenting problem

Our starting point is to conceptualise extension as an aspect of a ‘Research, Development and Extension system’ in which consideration of any part in isolation can lead to unintended consequences. In this chapter, through the lens of the myth of Hercules, we explore the first order as well as the second order dimensions of extension practice. We argue that extension has evolved into a mostly first order enterprise where knowledge of decision making, market forces and knowledge management is the sought-after ideal. It can be understood as a system designed to get an important job done. Most often, let us say 11 times out of 12, the skills and attitudes inherent in achieving success are transparently appropriate to the task of dealing with first order challenges. There is little or no dispute around what needs to be done. However, on one occasion out of 12, these very same skills and attitudes prove to be ineffective with second order issues; for instance for facing the more systemic challenges of achieving sustainable livelihoods to which agriculture contributes.

The aim of this chapter is to show how the dominant mode of practice, by its very effectiveness for overcoming first order challenges, can hide the logic of relational capital — a practice founded on the complexity and ambiguity of dynamic relationships. We argue that this second order logic can be a powerful tool for energising individuals and communities dealing with systemic challenges such as climate change and achieving sustainable agriculture.

The Herculean task

In order to offer a sequence of images that imaginatively express this problematic situation, we invite you to attend to a mythological story that was popular in ancient times and is no less popular today. Hercules, the national hero of ancient Greece, was immediately adopted by the Romans as part god, part folk hero and, above all, is loved throughout our Western culture for his particular prowess. Hercules always got the job done no matter how impossible it may have been judged by the average person.

As a measure of his prowess, just consider the 12 tasks (the labours of Hercules) that he was required to do as a consequence of offending the goddess Juno. He strangled a huge lion with his hands when his club and arrows were found to be useless. He slaughtered the 12-headed hydra that was ravaging the countryside. He went on to do battle with a gigantic boar; birds with cruel beaks and sharp talons; the famous Cretan bull and, the unimaginable, flesh-eating horses. He had to travel the length and breadth of the known seas where he fought the Amazons; the bull monster with three bodies and, one of the most difficult of all, was the robbery of the golden apples of the Hesperide. These above-world events are what we have called, elsewhere, first-order R&D systems with first-order problems (Ison and Russell, 2000/2007). These are characterised by a ‘fix’ mentality where (i) the problem is known and there is merely a mismatch between what science/research has to offer and what is current practice; (ii) a belief exists that there is a ‘better’ system; that can be gained by a technological solution (but without debate as to what constitutes better); and (iii) social and political insights can be just added to the R&D equation (the linear, transfer of technology model) (see Russell and Ison, 2000/2007 p12).
Hercules’ 12th exploit was to bring back Cerberus, the three-headed watchdog, the hound of Hades, which guards the entry to the underworld. What is so different about this 12th task was that Hercules was not able to use any of his skills and armaments that had proved so successful in the above-world: his bow and arrow, his slingshot, his sword, even his hands. Of course he initially believed them to be useful and tested each of them against each under-world phantom, believing that they were the same sort of reality as found in the above-world. Hercules’ muscular talents were useless in the underworld. His companion Mercury, the divine guide and go-between, had to remind him that the terrifying face in the realm of shadows was nothing but an empty appearance, an image, and did not have a form or substance. This was something Hercules was not used to and for which his above-ground prowess was totally unsuited (see Kerényi, 1959).

In Roman/Greek mythology, a journey into the underworld is no Sunday picnic as we are talking about the division of the universe since the beginning of time. Sword-waving Hercules had to unlearn the ways of the above-world in order to learn the much more subtle ways of the underworld. For it seems, following the ancient texts, that in the realm of the ‘dead’, only gentle wrestling and stone throwing was of any avail. Hercules so wanted to shed blood but, instead, was challenged to a ghostly wrestle. The ‘gentle wrestling’ is a metaphor for the struggles inherent in new learning: the mindset of looking with new eyes; listening with new ears; exploring the various contexts that give shape to the experience; engaging in new relationships; telling one’s stories; and challenging one’s taken-for-granted assumptions. Eventually, after much unlearning, Hades, the king of the underworld, gave Hercules permission to lead the hound with him up into the above-world. The notion of a Cerberus-on-a-leash is suggestive of the interdependency of the two worlds, the two ‘orders’ of the one system.

In terms of the story of Hercules, the totally new ‘underground’ situation is akin to what we have called ‘second-order R&D’ (Ison and Russell, 2000; 2004; 2007). The term ‘second-order’ only has meaning in relation to a first-order system and is suggestive of a system based on a different ‘language’ and following a different rhythm or flow of emotions. Just as the underground context makes no sense isolated from the above-ground, the second-order makes no sense if considered independently of a first-order system.

**Conceptualising an RD&E system**

The thesis of this chapter is that two manners of engagement with a situation, together, constitute an RD&E system. Each manner of engagement can be considered as if a conversation – from the Latin, *conversare*, meaning to turn together. From this perspective, a conversation is a form of action because one of the implications of being human and living in language is that conversation is the primary means by which we coordinate our behaviours. In a first/second-order R&D system, each manner of conversation can be usefully expressed as a metaphor, and underpinning each metaphor is an epistemology (or theory of knowledge) that has implications for understanding and action. A first-order engagement is based on the conversation between the stakeholders which is shaped by an emotion of satisfying a known need (information transfer to solve a first-order problem). In biological terms, this is the ‘seeking’ and ‘reward’ sub-system. The root metaphor in this case is a hunger/feeding relationship – the need to satisfy some espoused need. The second-order of the system is identified in the conversation between stakeholders that is shaped by a very different emotion, namely, the desire to honour the other’s world-of-experience as ‘other’. The overarching metaphor in this case is the dance-ritual metaphor which is characterised by:

- continuity and repetitiveness;
- its cooperative nature; and
• its after effect... it is individually satisfying to all participants (see Russell & Ison, 2005).

In epistemological terms, the second-order system builds relational capital and follows a second-order logic. This implies that the professional working in the field needs to be fluent in the two ‘language’ systems and the two emotional-flow systems in order to be able to deal with both first- and second-order issues.

Our critique is of an industry and professionals that privilege the praxis of a monolingual system when, in the lived experience of dealing with the issues of the day, it is essentially bilingual. It is our argument that failing to address the second-order aspect of the overall system leads to serious blind spots, not the least of which is not being able to recognise and respond appropriately to a system-determined problem (see below).

**Researching for change within an RD&E system**

There are six characteristics of working in the second-order domain which we tested empirically in our work in the NSW Western Division (Ison and Russell, 2007) and in subsequent consultancies, managerial practice and research (Russell and Ison, 2004; 2005). Enacting these can bring a second-order R&D system into being.

**History/Historicity**

The first of these is the realisation that any event is the outcome, over time, of a certain organisation of action: the history or historicity of the event. There is a story behind the advent of any experience that is a story about the relations of power and the way in which people affect each other.

The researcher/practitioner also has a history, which we have called a tradition of understanding out of which they think and act. In the heat of the moment of our actions, it is this understanding that comes to the fore but we can attempt to unpack and be more aware of our history of understandings and engagements with context (e.g. Ison, 2000/2007). The intellectual and practical implications that are the consequences of not seeing or hearing (because one is blind or deaf to them) constitute a system failure (see Russell and Ison, 2000/2007). The failure is particularly apparent when attempts are made to critically examine the effectiveness of the system (Russell et al., 1989).

**Exploring the context**

The second characteristic of the second-order domain is the multifaceted context that brings meaning to the system. Meaningfulness is not a given that can be readily accessed with the application of common sense. Rather, it is a socially constructed outcome of the dynamic relationships that together make up the context. There is an inevitable uncertainty about both the historical and current meaning of our experience. The inherent ambiguity of meaning is not a reason to quickly ‘move on’ to application but rather an encouragement to scepticism about our own certainties. The psychological attitude - an openness to change - is the pragmatic consequence of an appreciation that all meaning is context dependent. Leverage for change is to be found in the acknowledgement that each individual is an agent of meaning making and that a network of meaning is the interactive milieu which gives purpose to any event or experience. Practices for exploring contexts are diverse. In our own work, we have drawn on fiction, archival material as well as designing encounters with local people across transects (e.g. see Mackenzie, 2000; Ison, 2000).

**Relationship building**
Every relationship is shaped by at least one emotion. Human emotions are the very building blocks of experience together with what we might want to refer to as ‘outcomes’. While it is more common to talk about a ‘flow of emotioning’, the metaphors of building block or corner stone are suggestive of the critical role that emotions play in providing the very substance of relationship building. There is an essential verb quality to ‘relationship building’; relations are not passive events as if one found oneself ‘in relationship’ or one ‘arrived upon’ a relationship. Each of our relationships is shaped by a particular emotion. It is a human capacity to be able to determine or take responsibility for the utilisation of a particular emotion in order to underscore the architecture of a specific relationship (see Russell & Ison, 2004) i.e. we have some agency in configuring the underlying emotions of our engagement with others. The desire (emotion) to achieve a predetermined outcome and to win the debate over a contested strategy of implementation sets in play very different relationships compared to a desire to achieve mutual respect for divergent views and, as a consequence, move to a place of cooperation or co-research. Only some conversations (relationships) lead to communication. By being aware of and actively taking responsibility for the emotion that one brings into play, one participates in designing the conditions under which conversation takes place. As a consequence, a network of communication (mutually beneficial conversations) is generated. An understanding of how conversations determine the character of any R&D experience offers insight into the absence or presence of a network of ongoing communication as a second-order variable.

**Cultivating the ground for narrative**

Our human environment contains not just the physical and biological objects of climate, landscape, living beings, but words. Words are, in Daniel Dennett’s understanding of cognition, what we ‘readily incorporate, ingesting and extruding them, weaving them like spiderwebs into self-protective strings of narrative’ (Dennett, 1991, p417). We manage and organise our worlds not only by building dams and roads but by telling stories that serve to control, expand and explain our lived universe. Dennett suggests that our narratives are so ‘naturally’ generated that we neither consciously nor deliberately plan them; they just happen because our cognitive structure rooted in our nervous system makes them happen. Humans are designed to tell stories and be situated in stories. Becoming increasingly aware of how our narratives shape the particular experience of any event and how each narrative is a display of relationships governed by a dominant emotion is an opening to another level of understanding and action. Russell and Ison (2005) relate how a mapping of these emotions constituted research data for a leadership development program, and how, when the emotions and the metaphors carrying the emotions were combined into a novel narrative, change could be facilitated.

**Theory guided action**

While it is generally accepted that everyone has an epistemology (a framework of assumptions about how we get information and form what we call knowledge) and that we are usually unaware of its architecture, in our daily professional practice, we rarely see the need to preoccupy ourselves with exploring the implications that arise in its usage. Being aware of the consequence of our theories-in-use is critical to any systemic change. It was Gregory Bateson (Bateson, 1972) who famously reminded us of how the ‘pathologies of epistemology’ trick us into certain erroneous propositions about the nature of knowledge and the nature of the universe. Such errors are not easily detected and often are reinforced by ‘common sense’; typically one is only forced to confront one’s epistemology when faced with a system failure.

Our work together has some features that might be associated with juggling – in enacting a second-order R&D system there is a need to keep an eye (and an ear) on the implications of theory (what does theory
suggest we should do here?) and situation (what is the nature of this situation and is our theory adequate to deal with it?). Of course there is a sting in the tail of this conception – we often see only what the theories we have internalised allow us to see!

**Creating publicly accountable ‘knowledge’**

In our work with pastoralists in the NSW Western Division, we were faced with a particular difficulty – that of creating the circumstances to bring forth what we could confidently claim to be ‘publicly accountable knowledge’ (in other words: to provide a service that was judged to be valuable by those who funded it and for whom it was meant to benefit). We live in a world with particular demands for evidence without realising how explanations function in the social realm (see below) and that what constitutes ‘evidence’ is socially constructed. These dynamics also give rise to concerns about ‘whose knowledge counts?’ The most common way we have developed in our society to address the concerns of ‘evidence’ is to engage in processes of stabilisation or reification – to make knowledge as ‘some thing’ out of our explanations.

How did theory help here? Well our theoretical position was that knowledge is better understood as ‘the gift of an other’ – i.e. as arising in social relations rather than as a commodity. In our study we offered back to the grazier families a mapping, over time, of their research actions: what was the driving force or the concern needing attention, what was the action and what was the usefulness of the action.

Our book (Ison and Russell, 2000) was of course another means to produce publicly accountable knowledge. As described below and as evidenced in the reviews of our book, what we had to say clearly resonated with some people whilst many others either missed the point or were unable to engage (and this process itself is a good example of the social construction of knowledge). With these six characteristics as background, we provide a guide for engaging with our work.

**Being and doing in the underworld**

Within the theoretical framing provided by the biology of cognition as developed by Maturana (see Maturana and Varela, 1987; Fell and Russell, 2000; Russell and Ison, 2004; Maturana and Poerkson, 2004), being and doing might be considered a Janus phenomenon. Janus was the Roman god of gates, doors, doorways, beginnings and endings. What the Romans realised in admitting Janus to their Pantheon of Gods was the eternal flow and connectedness that is central to our world as well as the idea that there is always an upstream and downstream perspective. The Janus Principle, as articulated by Arthur Koestler, takes the metaphor further by proposing the concept of a holarchy – the systemic idea of the part-whole relationship – or the idea of connectedness between two different but related levels (Koestler, 1978).

Thus, the human being in terms of its nervous system is organisationally closed. It is the history of the organism (specifically its nervous systems and other interrelated factors that give rise to cognition or consciousness) and its resultant ‘network configuration’ that determines what is admitted as triggers giving rise to action (e.g. when a dog is kicked, it is the history - and internal network - of the dog that will determine what happens, not the kicker!). Whilst alive, any organism conserves this autonomy, its being, associated with organisational closure. At the same time, it is always coupled (Maturana refers to it as structurally coupled) to its environment – the materiality of the world, other people or organisms, as well as the language(s) we live in – the domain of doing.

**What is it that we do when we do what we do?**

In writing up our work based in the NSW Western Division (Ison and Russell, 2000), we followed Watzlawick (1976) in distinguishing between ‘system determined problems’ and ‘problem determined
systems’ – this was a distinction that family therapists also operating within the second-order cybernetic tradition had found useful (Anderson, Goolishian & Winderman, 1986). To those outside the family therapy field, it is easy to imagine that a question such as ‘what is it that you do when you do what you do?’ might be a useful one to ask and unpack. It is probably less apparent why such a question is relevant to doing R&D.

Anderson et al. (1986) wanted to change how family therapy was done to improve outcomes. To do this, they argued for a shift away from practice that could be described as a system determined problem to one better described as a problem determined system. So what is it that is done when a ‘system determined problem’ is generated in the doing of R&D? Simply that what has gone before determines what is done. Typically, it is practice based on a common acceptance of ‘that is how we do things’ rather than practice that involves stakeholders in the situation bringing the system for action, the problem or issue, into existence. A ‘problem determined system’ arises when the historicity of ones thinking and acting are appreciated, and the process of engagement (exploring the context) generates the issue or problem (or opportunity) and thus the rules of the game, norms, etc. that are required to act – often to change the situation for the better. Recent research as part of the SLIM project (see Ison et al., 2007; Steyaert and Jiggins, 2007) exemplifies some of the factors, or variables, that have been shown to affect the generation of ‘problem determined systems’ (Figure 1). Figure 1 is purpose designed as a ‘heuristic tool’ – something which aids understanding and practice, and through its use can facilitate changes to both in context sensitive ways. For the heuristic value of Figure 1 to be fully realised requires us to accept that the figure is inhabited by people and things and their interactions – in other words it requires an explanation about cognition, and thus learning and social action.
Metaphors of human communication

There are many different modes of communication and each mode can be usefully expressed as a metaphor. Underpinning each metaphor is an epistemology (a basis for knowledge) that has implications for understanding and action. In other words, each presents a theory of communication (Russell and Ison, 2005).

Krippendorff’s (1993) summary of the six most pervasive metaphors of communication in everyday life shows how the conversational model stands apart from all the rest because of a number of key features or entailments. Krippendorff’s six metaphors were: the container metaphor - discrete messages are exchanged that contain information, feelings, etc.; the conduit metaphor - bodies of information flow in
channels; the control metaphor - communication instructs/causes specified outcomes; the transmission metaphor - messages are coded and decoded; the war metaphor - arguments are won or lost; and finally, the dance-ritual metaphor - in which the doing of the action is what matters. He suggested three entailments of the dance-ritual metaphor: firstly, that it highlights continuity and repetitiveness, 'The purpose of being in conversation is to keep it going' (Krippendorff, p12); the second entailment is that it 'makes communication a cooperative and communal activity'); and thirdly, that it 'is both individually satisfying to all participants (and at no one’s expense) and leaves something recognizable behind').

The predominant metaphors/models of communication have entailments that imply that the meaning is in the message, that messages can be instructive or influential, and that the goal of communication is to arrive at a predetermined outcome. In education, as in applied agriculture and rural development, the dominant belief is that knowledge is transferable. The effective educator/communicator could ‘get under the skin’ of the other or package the ideas into words so ‘persuasively’ that information would be transferred. Underlying this conviction is the root metaphor alternatively imagined as the hypodermic or a conduit (see Ison & Russell, 2000b, pp. 18-23). In a second-order learning system, the designers and stakeholders inform their approach to learning and their orientation to those participating, by consciously attending to the image of conversation and less to that of conduit or hypodermic.

Explanations
To fully appreciate what happens within a social domain, it is useful to have an explanation for explanations. Ison and Schlindwein (2006) ask: ‘When is an explanation an explanation?’ Humberto Maturana (see Maturana & Poerkson, 2004) draws attention to the role that explanations play in the lives of human beings: As young people, we seek explanations; inquisitiveness is a feature of children raised in supportive contexts, and explanations are something we find satisfying or not; they thus trigger emotional reactions. This is an important qualitative feature that rises from the explainer-listener-explanation relationship.

From this perspective, explanations arise in social relations and in many ways they are constitutive of social relations and a consequence of living in language. For example, in Figure 1, the variable ‘ecological constraints’ cannot be determined ‘objectively’ – what we accept as an ecological constraint, or not, is a matter of human judgment, and thus on the nature of the explanations we accept, or not (in many ways what is, or is not, an ecological constraint is more a matter of epistemology than ecology!).

What can we be responsible for?
Responsibility is not something that can be given away but it is all too easily robbed from people. Some make the distinction between rights and responsibilities but our arguments are concerned with the recursive relationship between responsibility and response-ability (see Fisher, 2006). Our experiences of this recursive relationship arise from our own practices as teachers/educators concerned with creating the circumstances for ‘students’ to take responsibility for their own learning. This is the ‘ultimate goal’ for theorists of adult learning, but it is very hard to do. Think perhaps about your own role as a parent or mentor and the extent to which you have taken responsibility compared to creating the circumstances for ‘an other’ to take responsibility. This dynamic concerns the facilitation variable in Figure 1. The other variables can undermine responsibility because they deprive the individual or group from being response-able! Sometimes this may be associated with resources such as money but more often than not it will be connected with institutions, history and alienation (a lack of stakeholding – see Figure 1b). Another
constraint is the widespread lack of appreciation of the diversity of theories associated with learning and thus how explanations of learning are often confused or poorly understood.

In the next section we use a vignette from the reflections of a practicing extensionist who has attempted to embrace and enact the first and second-order R&D system as the duality or ‘whole system’ we describe. The account highlights some of the factors extant within current Australian extension practice that militate against enacting such a system i.e., that constrain response-ability.

Conserving a second-order praxis as part of an RD&E system?
The mainstream first-order approach has proven remarkably resilient despite evidence that it does not always work well. From its origins in extension practice within agriculture, the ‘knowledge transfer’ metaphor has fled to many other domains such as environmental policy implementation and as overt policies and practices of universities. Within this context, answering the question of what has to be conserved in order to conserve a second-order praxis (incorporating first-order) is not easy to answer. The experiential base on which to draw is not great. The following vignette reveals some of the factors at play (Box 1).

Box 1

<table>
<thead>
<tr>
<th>Building and conserving a second order R,D&amp;E praxis – experience from the field</th>
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<tr>
<td>I attempted to apply the alternative model for RD&amp;E described by Ison and Russell. I bought four Ison and Russell (2000) books; one for each district office in my region and one for the head office library. They still have that characteristic look of a book not opened very often. Every now and again I check the copy in our head office library to see how many and who has borrowed it. It is not well read. My wife, who has a Ph D in social anthropology also finds the book hard to read. She is also a lover of poetry and literature. It is hard for me to appreciate why I found the book a revelation and could not put it down and others, whether qualitative or quantitative researchers or extensionists, seem to find it challenging. Despite this, I set about trying to put it into practice:</td>
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<td>● I re-worked each piece of the Ison and Russell model to fit my district and when I had finished, I was quite daunted by the facilitation abilities and degree of self-awareness that would be required. I knew I would be pretty much on my own trying to implement this model.</td>
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<td>● It seemed that every molecule of our institution was programmed to carry out its work in a way that was foreign to a model that intended to develop the capacity of individual producers and the industry as whole, to take eventual control of their individual and collective destiny. A dependency model was deeply ingrained in everyone and everything....</td>
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<td>● I did not have the time or the resources to do it [implement the second-order approach] thoroughly and found that just about everything and everybody in the workplace was unconsciously geared to maintaining the existing power imbalance between the department and the ‘clients’. To single-handedly turn that around was an impossible challenge and I seemed to have little impact.</td>
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<td>● I formed a district advisory group from all the elected chairs of the different industry bodies. I used this as a steering group to advise on project identification and design and whenever there was an issue that needed industry input. That aspect worked quite well but it was often undermined by everything else that was going on in the department around me. There were a few exceptional industry leaders who understood what I was trying to do and that kept me going.</td>
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<td>● A more disciplined and pragmatic person with better time management skills may have been able to do it but I found it very difficult. There was always too much to do in my regular project work. It always seemed such a daunting challenge and I felt very isolated. My energy seemed to be sapped by having to always be ‘going against the tide’ of the institutional forces in many of the activities I pursued. Everything seemed to be geared against</td>
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implementing a process of working WITH the local producers. Nonetheless, there have been a few victories and these are enough, together with some industry support and my optimism, to keep me persevering.

The reader will interpret this vignette out of their own experiences – their traditions of understanding. In terms of the concepts of this chapter we identify (i) the triggering of enthusiasm (see Russell and Ison 2000b) by (ii) the encountering of a satisfying explanation (one that makes better sense than others on offer) and which leads to (iii) an attempt to build a second-order praxis (a journey to the underworld) in a context which is not conducive because of a lack of (iv) institutional (in the institutional economics sense) constraints including a lack of facilitation (Figure 1b). This vignette suggests that current institutional arrangements for extension practice, including organisational arrangements, are inimical to the creation and conservation of a second-order R&D system.

One of our responses to these concerns has been to argue the case for forms of praxis concerned with the design and enactment of a learning system, but these too require a conducive institutional setting. Another is to change the boundary to a system of interest.

What next: designing and experiencing a learning system?

The professional activity of an extensionist concerned with developing a praxis based on our understandings can be likened to that of a chorographer and a choreographer (Russell and Ison, 2005). The theoretical underpinnings and the practical outcomes of our work create the groundwork for understanding and engaging in the relational networks that constitute organisational life. We contend that in contemporary society it is primarily within our organisational and associated institutional life that the worlds we create arise – it is our ways of doing that determine the quality and nature of the relationships that are realised with the biophysical world, the environment, with each other and with other species.

The term ‘chorographer’ has been traditionally used for the professional skilled in the systematic description of geographical regions. The role for the neophyte extensionist as chorographer can be likened to that of above-world Hercules, finding out the espoused facts of the matter, exploring the context, or getting the lay of the land using his established prowess (Russell and Ison, 2005). But, through our engagement with the metaphor of Hercules, we have suggested that the chorographer can expand their repertoire to cover the mapping of histories, understandings and relationships showing how the display of each relationship is governed by a dominant emotion. With a new sensibility, some of the practices useful to the over world can be adapted to the underworld context (as in mapping stories or discourses). But the means by which they are employed changes when one adopts a second-order sensibility. This shift can be likened to being both chorographer and choreographer.

The extension of the role of chorographer to that of choreographer, from mapping to active intervention in an organisation, is conceptually straightforward. The solid (theoretical) ground on which we stand asserts that change takes place in the relational space including the space of one’s relationship with oneself. In this latter case, the researcher and the researched is the same and in the process one is open to self-change – to an unfolding of responsibility and response-ability (Fisher, 2006). Russell and Ison, (2004; 2005) outline a procedure designed to engage with the desires, wishes, fears, interests (the full gamut of emotions) of the participants (who could be oneself) with the aim of achieving an experience of systematic reflection by which there is either (i) a change in the emotion shaping particular behaviour or set of
behaviours, or (ii) there is maintenance of that behaviour because there has been no change in the emotion. Having a ‘choice’ is understood as choosing between alternative emotions.

The practices outlined in this chapter when systematised (as in the seven steps proposed by Russell and Ison, 2005) constitute a design for a learning system (Ison and Russell, 2000b); whether a learning system is realised or not depends on how its enactment unfolds in practice – each case is context specific and thus a product of praxis (theory informed action that happens in context). Our invitation is to reflect on how and when a second-order RD&E praxis is required, how capacity can be built and how an ongoing conversation can be conserved about its place in the repertoire of future extensionists.

Purposefully addressing boundary judgments entailed in a system of interest can also generate a second-order sensibility. Take the term extension itself. Elsewhere we have argued abandoning the term whilst acknowledging the intellectual lineages on which contemporary understandings are built (Ison & Russell, 2000). The formation in Western Australia of a Sustainability Practitioners Association (see http://www.spa.asn.au/) exemplifies practice which through boundary changing action has the potential to realise new understandings and new practices (Figure 1).

References


This chapter outlines the first attempt in Australia to define the rural ‘culture’ using the Myers Briggs Type Indicator. The data was sourced over 15 years from 1992 and involved over 3000 farm/property managers and employees working in six major agricultural industries across Australia.

A distinctly different ‘culture’ is identified in six major agricultural industries in Australia. This was established through the application of the Myers Briggs Type Indicator (MBTI), which accurately identifies the preferences of those attracted to and employed in agriculture. Broadly, the ‘culture’ identified is traditional, job oriented and conservative. It is largely introverted and in modern terms may lack ‘Emotional Intelligence’. All are important considerations for an extension service working in a rural environment. Some strategies are suggested.

The Myers Briggs Type Indicator*

The MBTI reflects individual preferences for the direction of a person’s energy (Extroversion and Introversion), information gathering (Sensing and Intuition), decision making (Thinking and Feeling) and lifestyle (Judging and Perceiving). The assessment tool was developed by Katharine Briggs and Isabel Briggs Myers, who combined their observations with the work of Swiss psychotherapist Carl Jung. Following more than 50 years development, the inventory is now one of the most widely used psychological tools in the world. Sixteen unique and different personality types result from the combination of the four MBTI preference scales. The MBTI helps individuals understand their personality type and the relationship of their preferences to the way they interact with others. Applications for MBTI results include individual coaching, career development, team building and management training.

Temperament

People differ in terms of their values. It is also clear that individuals have a high degree of consistency in their attitudes and behaviour, so that their differences are stable rather than random. While the MBTI provides a comprehensive means of understanding human personality, based on the 16 Types a sub-set

* Myers Briggs Type Indicator and MBTI are trademarks of Consulting Psychologists Press Inc
known as Temperament (Keirsey, 1987) is an abbreviated, but surprisingly powerful tool in its descriptive and predictive ability.
Abbreviations and acronyms for this chapter:

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<thead>
<tr>
<th>MBTI</th>
<th>Myers Briggs Type Indicator</th>
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<tr>
<td>SJ</td>
<td>Sensing Judging – ‘Traditionalists’</td>
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<td>SP</td>
<td>Sensing Perceiving – ‘Troubleshooters’</td>
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<tr>
<td>NT</td>
<td>Intuitive Thinkers – ‘Visionaries’</td>
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<tr>
<td>NF</td>
<td>Intuitive Feelers – ‘Catalysts’</td>
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<tr>
<td>ESTJ</td>
<td>Extrovert, Sensing, Thinking, Judging</td>
</tr>
<tr>
<td>ISFJ</td>
<td>Introvert, Sensing, Feeling, Judging</td>
</tr>
<tr>
<td>ISFP</td>
<td>Introvert, Sensing, Feeling, Perceiving</td>
</tr>
<tr>
<td>ESFP</td>
<td>Extrovert, Sensing, Feeling, Perceiving</td>
</tr>
<tr>
<td>ESFJ</td>
<td>Extrovert, Sensing, Feeling, Judging</td>
</tr>
<tr>
<td>INFP</td>
<td>Introvert, Intuitive, Feeling, Perceiving</td>
</tr>
<tr>
<td>ENFP</td>
<td>Extrovert, Intuitive, Feeling, Perceiving</td>
</tr>
<tr>
<td>ENFJ</td>
<td>Extrovert, Intuitive, Feeling, Judging</td>
</tr>
<tr>
<td>INTJ</td>
<td>Introvert, Intuitive, Thinking, Judging</td>
</tr>
<tr>
<td>INTP</td>
<td>Introvert, Intuitive, Thinking, Perceiving</td>
</tr>
<tr>
<td>ENTP</td>
<td>Extrovert, Intuitive, Thinking, Perceiving</td>
</tr>
<tr>
<td>ENFJ</td>
<td>Extrovert, Intuitive, Thinking, Judging</td>
</tr>
</tbody>
</table>
There are four Temperaments – 'SJ', ‘SP’, ‘NT’, and ‘NF’. Temperament is used in this analysis in order to identify some distinctive features of the rural ‘culture’ across the board. This analysis considers the impact of the dominant ‘SJ’ Temperament in agriculture that has been identified and the contrast with the general population.

![Figure 1: The Four Temperaments as a percentage (%) of the general population and corresponding MBTI Personality Types](image)

<table>
<thead>
<tr>
<th>SJ (38%)</th>
<th>SP (38%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTJ</td>
<td>ISTJ</td>
</tr>
<tr>
<td>ESFJ</td>
<td>ISFJ</td>
</tr>
<tr>
<td>NT (12%)</td>
<td>NF (12%)</td>
</tr>
<tr>
<td>ENTJ</td>
<td>INTJ</td>
</tr>
<tr>
<td>ENTP</td>
<td>INTP</td>
</tr>
<tr>
<td>ESTP</td>
<td>ISTP</td>
</tr>
<tr>
<td>ESFP</td>
<td>ISFP</td>
</tr>
<tr>
<td>ENFP</td>
<td>INFP</td>
</tr>
</tbody>
</table>

**Industry profiles**

For the purpose of comparison, MBTI data from a sample of the Australian population held by the Psychological Type Research Unit and reported by Ball (2005) are shown in Figure 2. This contrasts significantly with the profiles of persons working in selected rural industries and presented in Figure 3 (Beef); Figure 4 (Cropping) and Figure 5 (Intensive industries—Dairy, Pig, Feed-lotting).
A feature of the data is that all industry groups have a greater representation of those with preferences for both ‘S’ Sensing and ‘J’ Judging suggesting a dominance of those with an ‘SJ’ Temperament – Beef (57%); Cropping (52%); Intensive Industries (57%) compared with the Australian sample (42%) (Refer Figure 6).
The relatively higher numbers of persons exhibiting an ‘SJ’ Temperament in the rural industries suggests a more traditional and conservative ‘culture’. Keirsey (1987) and Kroeger and Thuesen (1988), when referring to those with an ‘SJ’ Temperament, describe the ‘SJ’ Temperament as valuing social stability, security, right order, loyalty, industry and belonging. Further ‘SJ’ Temperament is seen as cautious, careful, steady-paced and reliable. Their special skills include attention to detail, being dependable and keeping deadlines. They may see little value in change for its own sake – resulting in their comfort in consolidation. They tend to resist change. This has major implications for rural extension.

Employees with the above attitudes and values tend to be promoted into supervisory or management roles. This is illustrated in Figure 7, which shows the Personality Types of managers and supervisors (Headstockmen) employed in the beef industry across northern Australia. This sample shows that nearly 60% record an ‘SJ’ Temperament. Those employees who have ‘risen to the top’, understandably, have significant influence on the decision making processes within a business and a direct influence on others in the workplace.
A second feature of significance is that it would appear that rural industries may attract persons with a preference for Introversion (Beef 62%; Cropping 58% and Intensive Industries 63%) when compared with the Australian sample (55%). The author has observed that low levels of effective communication can be a major issue in some rural workplaces and needs to be taken into consideration in extension planning. The challenge facing rural extension is that persons expressing a preference for Introversion are not attracted to attending meetings. Moreover, if they do they may have difficulty becoming involved in the absence of skilled facilitators.

Another feature of significance is the lower representation in the rural sector of those with a preference for ‘F’ (Feeling) – Beef (21%), Cropping (25%), Intensive Industries (23%), compared with the Australian sample (37%). This finding suggests that many managers may lack ‘people skills’ and that the rural on-farm working environment could be ‘tough’ and not conducive to the expectations of the younger ‘X & Y Generations’ of employees. This is a significant development confronting rural extension when a more stable workforce on-farm would be more desirable than an environment where staff shortages and increasing turnover is now a major issue facing management.

**Implications for rural extension**

From the data presented, it is probable that on-farm management and decision making is largely influenced by those with a traditional or conservative ‘SJ’ Temperament. This finding describes a ‘culture’ that is more likely to resist new ideas and where change may take place within a less than desirable time frame. Those decision makers with an ‘SJ’ Temperament need to be convinced of the need for any change. Some of the approaches currently used by the extension services may need to be reassessed.

A common strategy has been for extension operators to collect and analyse data on, for example, farm production, costs and profit, and to extend this information to clients. This strategy assumes that farmers have identified their problems and needs. It also assumes that learning is a passive process of information transfer. Such a ‘directive’ approach to extension would be generally inappropriate for the rural ‘culture’
described above. This would be especially true for those engaged in animal industries, where traditional methods of animal management are too often part of a deeply held value system. The more ‘directive’ approach would only result in more positive outcomes in crisis situations such as drought or disease outbreaks, when penalties for non-adoptive would be more obvious.

**The adult education approach**

The description of a distinctive farm ‘culture’ highlights the need for change in the traditional approaches to rural extension and places an even stronger focus on the principles of adult learning. As a group, ‘SJ’ adults tend to define themselves by their experience and they have a deeper investment in its value.

As a general rule, extension needs to become more active in determining what the farmer/s are seeking to know rather than have the extension service ‘tell’ the farmer/s what they think they ought to know.

Time is the essence of successful adult learning programs. For this reason, the author believes that a short half or one day field day or meeting with a farm group can often have a negative outcome for many in attendance. They would prefer to participate in learning experiences in a safe environment, where their ideas may be freely expressed, listened to, shared and appreciated, before new information is introduced for their consideration. Such a preference for learning points to the value of the two to three day ‘live-in’ forum or seminar which allows for more opportunity for active participation and reflection by the farmer. Often this approach will be enhanced by the identification of natural social groupings to participate. This is one successful way to help the introverted participants feel accepted, respected and supported. The adoption of the adult learning approach, as briefly discussed here, is often judged as too expensive and time consuming. However, as we gain a better understanding of the learning styles of farming communities, these ‘barriers’ may need to be addressed.

**References**

Ball I (2005) Under The Southern Cross (Part2)—Type Distribution in Australia by Age Gender and Occupation. Australian Psychological Type Review 7:1


Strachan R T (2003) Using The MBTI in Management Training for Agricultural Employees--- Australian Psychological Type Review 5:1

Power affects us all. It is part of our daily existence no matter who we are, where we live, or what we do. We suffer it, create it, enforce it, love it and hate it. It is at work in all our relationships, and has many manifestations — yet for all these, we sometimes fail to notice it; often, we barely understand it.

Power relationships within contemporary Western societies are changing profoundly. Economic rationalism, the market and globalisation now influence policy formation and the ways in which our land is managed. At the same time, forums, both international and Australian, commit us to principles of equity and natural justice; and approaches that encompass partnerships, community engagement and participation are in the ascendancy. Yet, frustration and cynicism with governments are rife (Edwards 2002). Young (2000 p. 4) points to the paradox of everyone favouring democracy, yet “apparently few believe that democratic governance can do anything”.

Changing power relationships have implications for participatory approaches. Communities are more actively involved in land management programs. Governments around the world are devolving power to local communities. Several authors have highlighted changes in power relationships, including Lockie:

> Power is not viewed in poststructuralist sociology as a one-way, hierarchal concept, but as one which is continually challenged and negotiated. (Lockie 2001 p. 27)

Questions about how power relations influence community participation need to be addressed. Nikolas Rose (1996a) suggests that profound change is occurring in our way of thinking and acting. As Rose explains:

> The subjects of government, the human beings who are to be governed ... are now conceived as individuals who are to be active in their own government. Their responsibility was no longer to be understood as a relation of obligation between citizen and society ... rather it was to be a relation of allegiance and responsibility ... Each subject is now located in a variety of heterogeneous and overlapping networks of personal concern and investment — for oneself, one’s family, one’s neighbourhood, one’s community, one’s workplace. (Rose 1996a p. 330–331)

New networks with very different groups of people are evident in Australian land management. Alliances, even “unholy” alliances, between previous antagonists are forming to overcome problems. In the Australian land-use management arena, the first well-known alliance was created in the 1980s when the
Australian Conservation Foundation and the National Farmers Federation initiated the Landcare movement (Campbell and Siepen 1994; Toyne and Farley 1989). The regional arrangements for funding initiated under the National Action Plan for Salinity (NAP) and the National Heritage Trust, Stage 2 (NHT2) are indicative of the power being conferred onto these new alliances (Commonwealth of Australia 2003). New frameworks and supportive processes are needed, along with further critical analysis.

Clearly, new alliances require negotiations about power, if the partners are to work together for mutual satisfaction. Within land-management agencies and rural communities in Australia, and elsewhere in the world, people are struggling to understand these new alliances and their associated power relationships. A better understanding of power relations is important if we are to achieve effective social and environmental change based on greater community participation.

The problem – unmasking power relationships
Power issues are often overlooked within agricultural extension and rural development in Australia. Landholders, government institutions and other agencies rarely use the word power explicitly. Language often masks the importance of power, but the concepts relating to it often underpin how participatory programs operate.

Communities now are involved far more with contemporary government than in previous centuries, and in different ways. In community participation, power issues are pervasive, yet not always obvious. Whatever the context, power relationships in natural resource management (NRM) are often contentious and fraught with emotion.

Power struggles within community participation groups tend to be overlooked, even though power is considered a major issue in the participation literature (Chambers 1999; Cooke and Kothari 2001; Guijt and Kaul Shar 1998; Higgins and Lockie 2001; Pretty 1999). A theoretical understanding of power is lacking, both in the literature on participation and in the practice of community participation in land management in Australia.

In NRM in Australia, power is rarely discussed, particularly in comparison to other aspects of participatory processes. At an organisational level, power is not widely discussed as it draws people into the critical consideration of roles and responsibilities, and ultimately resources. Individuals and organisations “in control” often do not wish to change the status quo. Unmasking these power relationships allows for a more equitable and just outcomes. A deeper understanding the meaning of power and its implications for individuals and groups working together in participatory processes is vital.

The meaning of power
Power is multi-faceted: there are many different perspectives on, and definitions of, power — just as there are many different perspectives about participation. The perspectives on power depend on the context, and the debate is underpinned by premises that reflect the philosophies of the people involved.

In Western thinking, power is usually meant to mean the capacity of someone or something to influence others — the power to “make a difference” (Hindess 1996; Dryberg 1997). Having power is seen as important, yet, the implications of power are not always considered: “People know what they do; they frequently know why they do what they do; but what they don’t know is what they do does.” (Foucault 1982b p. 187). The assumptions underpinning the different meanings of power provide some understanding about why the influence of power relations so often remain hidden.
**Divisions in Western thinking**

The philosophical thinking about power has tended to focus on two main traditions, founded on the work of Habermas and Foucault (Dryberg 1997; Flyvbjerg 2001; Hoy 1981). Theoretical debates about power have raged since the time of Aristotle and Plato, and it is from their ideas that these two basic conceptions of power have emerged (Flyvbjerg 2001). The dominant tradition has developed from Plato, through Hobbes, Dahl and others to Habermas, while the alternative tradition has developed from Aristotle through Machiavelli and Nietzsche to Foucault (Flyvbjerg 2001; Foucault 1972; Machiavelli 1984; Nietzsche 1968).

Each tradition is defined by the way power is conceptualised: the dominant tradition sees power as a tool or instrument; thus power is the capacity to act or influence others. Within the Foucauldian tradition, power exists only when exercised in relationships; power is described as the structure for relationships: “it is the way in which some act on others” (Foucault 2003b p. 137). Some selected concepts and a few of the many writers whose work fits into these two traditions are listed in Table 1.

**Table 1: Concepts of power from the two traditions**

<table>
<thead>
<tr>
<th>Dominant tradition</th>
<th>Alternative tradition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power is defined as a tool or instrument, the <em>capacity</em> to do something, or exert power over someone/something</td>
<td>Power is defined as a structure (techniques &amp; procedures); as “games of strategy” in relationships</td>
</tr>
<tr>
<td>Power is cumulative, power can be quantified</td>
<td>Power is everywhere, power is not quantifiable</td>
</tr>
<tr>
<td>Power is usually negative</td>
<td>Power can be creative and positive</td>
</tr>
<tr>
<td>Legitimate and illegitimate power</td>
<td>Multiple rationalities</td>
</tr>
<tr>
<td>Rationality is based on the idea of one universal truth</td>
<td>Truth is created, based on whose knowledge is dominant within the discourse of the time</td>
</tr>
<tr>
<td>Discourse ethics</td>
<td></td>
</tr>
<tr>
<td>The collective</td>
<td>The particular</td>
</tr>
<tr>
<td>The state</td>
<td>The individual</td>
</tr>
<tr>
<td>Control</td>
<td>Circumstance</td>
</tr>
<tr>
<td>Directives</td>
<td>Deliberation</td>
</tr>
<tr>
<td>Sovereign power</td>
<td>Individual power</td>
</tr>
<tr>
<td>Consensus (Flyvbjerg 2001)</td>
<td>Conflict (Flyvbjerg 2001)</td>
</tr>
<tr>
<td>This tradition encompasses the ideas of Weber, Hobbes, Dahl, Parsons, Arendt, Lukes, Habermas.</td>
<td>The work of Foucault, Nietzsche, Rose, Miller, Lacan, Mouffe and Rabinow fit into this tradition.</td>
</tr>
</tbody>
</table>
Concepts from the dominant tradition

Power as capacity
Power is commonly seen as a simple quantitative capacity. Individuals can possess a certain amount of power, sometimes more and sometimes less. Power gives one the capacity to act, or to influence something. By and large, there are many definitions of power all of which emphasise slightly different aspects of power (Table 3.2).

Table 2: Definitions of power

<table>
<thead>
<tr>
<th>Authors and key concepts</th>
<th>Descriptions of power</th>
<th>Examples related to NRM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weber</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) power is associated with action, as well as about influencing others</td>
<td>(a) “The chance of a man or a number of men to realize their own will even against the resistance of others who are participating in the action” (Weber 1978 p. 926).</td>
<td>Extension officers act by providing information to landholders; by their actions, they have the power to influence others, even if indirectly. Participants may, or may not, respond to information provided.</td>
</tr>
<tr>
<td>(b) power is rarely absolute</td>
<td>(b) While A may exert power on B, B may not always capitulate (Weber 1947).</td>
<td></td>
</tr>
<tr>
<td><strong>Hobbes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power to achieve outcomes</td>
<td>The power of a man is his present means to obtain some future apparent good” (Hobbes 1968 p. 150).</td>
<td>Extension officers act to obtain better land management.</td>
</tr>
<tr>
<td><strong>Dahl</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power over others</td>
<td>“A has power over B to the extent that he can get B to do something that B would not otherwise do” (Dahl 1957 p. 80).</td>
<td>Landholder A would not muster feral goats unless their neighbour B told them to do so.</td>
</tr>
<tr>
<td><strong>Lukes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduced notions of control, dependency and inequality</td>
<td>“It is commonly assumed that power must involve the use of threat or deprivation”; but it can occur though incentives (Lukes 1991 p. 87-88). Differential capacity means inequality: “power as inequality is measured by determining who gains and who loses – that is, A’s ability to gain at B’s expense” (Lukes 1991 p. 87–89).</td>
<td>If a farmer does not do something, such as spraying weeds, their neighbours will refuse to help fight fires (i.e. deprivation) or the Council will spray the weeds and send them an account, forcing them to pay (i.e. retribution).</td>
</tr>
</tbody>
</table>
(a) Power is associated with action; as such, power is a condition of human agency.

(b) Power has a capacity for transformation, rather than being a resource per se.

A farmer with more money has the power to purchase more cattle; an extension officer can exercise power through scientific knowledge.

If power is a capacity, the capacity develops from a particular base. One of the classic works on power is that of French and Raven (1959), who outlined different types of power bases (Table 3). These describe different ways in which people have power over others or have the power to influence others.

**Table 3: Different power bases in the dominant tradition**

<table>
<thead>
<tr>
<th>Power base (French and Raven 1959)</th>
<th>Explanation</th>
<th>Examples (This thesis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coercive power</td>
<td>Where negative consequences can be handed out or consequences removed</td>
<td>If landholders do not participate in one event, the government will ignore them in future, and they will have limited opportunities to participate.</td>
</tr>
<tr>
<td>Reward power</td>
<td>Where positive consequences can be delivered or negative consequence removed</td>
<td>Landcare sometimes offers rewards through incentives; if people undertake high priority activities, they get funding.</td>
</tr>
<tr>
<td>Expert power</td>
<td>Where someone is seen as having special knowledge or skills and as being trustworthy</td>
<td>Scientists are often seen as having specialist knowledge in a particular field, such as veterinary skills or plant identification expertise.</td>
</tr>
<tr>
<td>Informational power</td>
<td>Where people believe that someone has information that will be useful to them in accomplishing their goals</td>
<td>Government staff may have knowledge about grant schemes that will provide useful funds to assist landholders achieve their goal of fencing a sensitive conservation area.</td>
</tr>
<tr>
<td>Referent power</td>
<td>Where people respond to someone because they identify with, respect, or want to be liked by this person</td>
<td>A rural leader may be well respected in a region, with a public image and charisma, and thus others go to him/her for advice.</td>
</tr>
<tr>
<td>Legitimate power</td>
<td>Where people ought to have influence because of their positions or special role; e.g. policeman</td>
<td>The Chair of the Catchment Committee or the government Minister has power because the position or role he or she holds, often</td>
</tr>
</tbody>
</table>
All of these bases are evident in NRM and community participation, as is indicated by the examples in the right-hand column. Generally, rural communities place greater value on referent power than on legitimate power; the positions that people hold are rarely seen as being particularly important. Often, people remain in positions for a few years and then move on, someone else taking their turn. Sometimes more than one base of power may be operating simultaneously. For example, landholders often go to meetings because of the status of the speaker rather than the content of the talk. The speaker may be liked because of his or her charisma (referent power), or expert knowledge (expert power).

Lukes highlighted different aspects about power (see Lukes 1974, 1986, 1994). He categorises the various debates about power by using three concepts — who held power, private versus public power, and hidden versus visible power (Table 4). All belong to Flyvbjerg’s dominant tradition of power.

**Table 4: Lukes’ views of power**

|------------------------------------|-------------|
| Pluralist group One-dimensional view | Distribution of power is *unequal*, but not concentrated in the hands of a few. Power can be identified only if there is overt conflict (Hindess 1996; Lukes 1974)  
— exemplified by Dahl (Dahl 1961; Lukes 1974) |
| Elite or Reformist group Two-dimensional view | Includes both *public power and private* power, which is covert; controls the agenda and prevents some groups being heard, (Lukes 1974, 1986).  
| Radical group Three-dimensional view | Based on *coercion*, an insidious power occurs when individuals or groups, who are excluded from political debate, do not even recognise that their interests are at risk (Lukes 1974; Hindess 1996). Gramsci’s view is that the consent of the popular classes to bourgeois rule is possible only because they are unaware and do not understand the implications of capitalist domination (Hindess 1996 p. 6, p. 18)  
— includes Marxists; exemplified by Habermas and Gramsci (Hindess 1996) |

Luke’s concepts are important in participatory resource management; the unequal nature of power relations can influence the outcome. Consent is not given freely, but unknowingly. Still, the concept of consent remains inherent in this form of power.
Sovereignty
The idea of sovereignty is prevalent in the development of modern political thought since Hobbes (1968; 1st published 1651) and Locke (1988; 1st published 1689) and, more recently, Giddens (1984, 1994). Sovereignty is the view that political power should be located in the state to protect civil society, as advocated by the “New Left” (Latham 2001).

In modern Western society, sovereign power no longer relates to a monarch, but is exercised through democratic processes. Democracy is linked to government institutions, which prescribe rules for the regulation of society by writing constitutions and laws that are enforced through the judiciary.

Rationality and discourse ethics
In the dominant tradition, the idea of rationality relies on a basis of a universal truth. An understanding of truth develops when people communicate and reason with each other; then the “force of argument” draws people to a consensus in thinking.

Habermas recognises the plurality of people’s lifeworlds, influenced by their social conditions. Nonetheless, this view is tempered by the philosophy of intersubjectivity (Hindess 1996 p. 90), where individuals can communicate successfully and share their understanding of the world with others. Habermas believes that people are “autonomous individuals”. Such autonomous individuals are free to make decisions if the interfering effects of power can be controlled.

Habermas devised an idealised set of principles which he called discourse ethics, which aimed at mitigating the negative effects of power. Within a situation governed by these principles (Table 5), people can debate in a rational manner with impartiality. This principle is at the basis of discourse ethics – given the right situation people will act and argue ‘rationally’.

Table 5: Five key principles of discourse ethics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Generality</td>
<td>No party who is affected by what is being discussed should be excluded from the discourse.</td>
</tr>
<tr>
<td>2 Autonomy</td>
<td>All participants should have equal possibility to present and criticise validity claims in the process of discourse.</td>
</tr>
<tr>
<td>3 Ideal role taking</td>
<td>Participants must be willing and able to empathise with each other’s validity claims.</td>
</tr>
<tr>
<td>4 Power neutrality</td>
<td>Existing power differences between participants must be neutralised such that these differences have no effect on the creation of consensus.</td>
</tr>
<tr>
<td>5 Transparency</td>
<td>Participants must openly explain their goals and intentions and in this connection desist from strategic action.</td>
</tr>
</tbody>
</table>

(Habermas 1990 p. 65–66)

For Habermas, these principles of communication are the effective way of promoting equality and alleviating power disparities. He says:
Such a discourse is a gathering of people with the intention of reaching rationally motivated consensus on moral norms that will be universally valid. In the process, agents learn from each other to see what their common interests are, while all interests are judged impartially; only those norms can claim validity that are able to meet the agreement of all concerned. (Habermas 1983 p. 103, in van Es 1998 p. 2)

Habermas believes that people will always tend to search for commonalities, thus striving for consensus. The principles of discourse ethics are admirable, and are often promoted as being good practice by government extension officers working with communities. The attractiveness of this schema is that it provides governments with ethical guidelines for community engagement. While few practitioners have never heard of Habermas, many of these principles are now internalised into participatory policy and practice (Queensland Government 200211; COAG 2000; New South Wales 2004; IAP2 2007). Consensus is seen as desirable.

However, only in an ideal lifeworld can we find autonomous, free-thinking, rational individuals uncorrupted by power (Hindess 1996). Additionally, there is a concern about the focus on consensus building:

At public and collective events, PRAs [Participatory rural appraisals: one form of participatory activity] tend to emphasize the general over the particular (individual, event, situation, etc.), tend towards the normative (what “ought to be” rather “what is”), and towards a unitary view of interest which underplays difference. In other words, it is the community’s “official view” of itself which is projected. (Mosse 1994 p. 510)

A diversity of interests and views is common place, and having multiple goals and interlinked strategies to achieve more effective outcomes for these various stakeholders. Similarly, the processes used to achieve multiple goals may differ according to the context. This leads to the question of whether or not the community should be involved in determining the procedures by which they participate in decision-making.

Process or content
The procedures of community participation are often “detached” (Flyvbjerg 2001 p. 91), because the community is not involved in determining the process. Habermas (1984) argues that the participants should be in control of the communication agenda; while the government facilitators or government staff — the experts” determine the procedures. Foucault is different in that he favours bottom-up approaches, with community involved in both process and content (Foucault 1991c; Flyvbjerg 2001 p. 103). Therefore, in participatory processes designed within a Habermasian approach, the community would be involved only in discussions about an NRM or land management topic, whereas in a Foucauldian approach, the community would be able to influence the way the discussions were undertaken, as well as the topic itself.

An alternative way of thinking
Foucault conceptualises power in a way that is fundamentally different from that of many others. This is a strength, as it provides new insights; it is also an impediment, however, as it makes him difficult to understand. As Rabinow and Rose (2003 p. vii) point out, he set out to “open up possibilities of thought” by giving words a new sense of meaning. By using words from common parlance, but with new meanings, he helps us to view the world in a different way, and to see inequities, strategies of control and disempowerment that we had previously missed.
Foucault starts from two premises. Firstly, power and knowledge are inextricably linked, like two sides of the same coin. Secondly, all power comes from below because it relies on the compliance of those being ruled; no matter how unequal the power, people still have choices, even limited ones. From this he constructs a model in which society is a dynamic network of ever-changing force relations, between dominant and subordinate people, with associated discourses that justify and reinforce these relations. Foucault clearly separates his conceptualisation of power from the norm (as exemplified in the writings of Habermas and others).

A new meaning of power

Foucault conceptualises power in a new and perceptive way. He specifically says that “power is not something that is acquired, seized, or shared, something that one holds on to or allows to slip away” (Foucault 1981, p. 94); also, “power is not a matter of consent” (Foucault 2003b p. 137). Foucault states that he rarely uses the word “power”; when he does, what he means is the “relations of power” (2003a p. 34). The exercise of power is not simply “a relationship between partners; it is the way in which some act on others” (Foucault 2003b p. 137). He describes this as the “structure of actions” (Foucault 1980 p. 220). Foucault insists that power is manifest in the structures (techniques and procedures) of actions brought to bear on individuals.

For Foucault, power is inherent in all communication. Power is “always present” (Foucault 1988 pp. 11, 18, 34), and communication is at all times penetrated by power (Flyvbjerg 2001 p. 93). It is not a capacity that is possessed in certain quantities by people. Foucault also argues that power cannot exist unless people are free (Foucault 2003a; Hindess 1996 pp. 98–101); freedom in this understanding is not freedom from domination, as in Habermasian thinking. For example, indigenous people in Australia have a history of vilification and oppression. They are not free from domination, yet they are free to express some resistance.

Resistance, struggle and conflict, in contrast to consensus, are for Foucault the most solid bases for the practice of freedom (Flyvbjerg 2001 p.102). People need to be free to express resistance to power when its effects are negative. Freedom in this sense is a freedom that comes from within.

Forms of resistance are multiple and contextual. The interaction between resistance and power can produce changes in power, and resulting changes in resistance (Hindess 1996 p. 101). As power is inherent in all forms of social interaction, so too, resistance exists everywhere. Power relations between individuals are inherently unstable, reversible and ambiguous (Hindess 1996 p. 101).

Foucault’s perspectives add significantly to our understanding of power. In particular his conceptualisation of sovereignty and “governmentality” (Foucault 1991b) is relevant to an exploration of community participation in rangeland management.

Governmentality

While Foucault does not deny the existence of political power based on the idea of sovereignty — the focus of the dominant tradition — he is frustrated by the focus on the state. “The state is ... a mythicised abstraction, whose importance is a lot more limited than many of us think” (Foucault 1991b p.103). He wants to free power from what he sees as an obsession with sovereignty, as epitomised in his famous statement: we need to cut off the King’s head: in political theory that has still to be done (Foucault 1981, p. 89)
For Foucault, sovereignty is but one of the three forms of power that he distinguishes: sovereignty, discipline and government. He conceptualised the emergence of the “art of government” (1991b p. 101). The art of government means that governments have different rationalities, hence the name governmentalities. Governmentality has a broader meaning than government, for these rationalities are “systems of thinking about the nature of the practice of government (who can govern; what governing is; what or who is governed)” (Gordon 1991 p. 3).

Foucault gave three meanings to the term governmentality:

- a particular historical event, formed by “institutions, procedures, analyses and reflections” (Foucault 1991b p. 102)
- a general transition of governance with a “series of specific governmental apparatuses” and ways of knowing or “whole complex of savoirs” (Foucault 1991b p.103)
- a mentality of those governed and those doing the governing (Foucault 1991b).

In natural resource and land management, this idea of the management of self fits well with current processes of government. Self-reliance has been emphasised in government agricultural programs for some years, for example programs such as FutureProfit (Stewart and Armstrong 1998). In the new regional arrangements (COAG 2000), regional community groups are responsible for allocating funding for natural resource management projects, even to the extent that governments submit bids for funds to these regional groups.

This form of power revolves around not only the management of self, but the management of others. Gordon (1991) explains governmentality as the “conduct of conducts”, which refers to the exercise or conduct of power with the intent of influencing the conduct or behaviour of others. In explaining the conduct of conducts Foucault states:

> When one defines the exercise of power as a mode of action upon the actions of others, when one characterizes these actions as the government of men by other men — in the broadest sense of the term — one includes an important element: freedom. (Foucault 2003b p.138)

Many government NRM programs are about the management of others. These programs usually aim to influence the attitudes of landholders, or influence the land management practices of graziers and farmers. Foucault’s reconceptualisation of power as governmentality emphasises the need for ethics. Thus, the government staff, scientists and facilitators involved in programs that aim to influence others should be mindful of their own behaviour and ensure that it is ethical according to all involved. By this means, power relations and relationships between individuals should be conducted with the “minimum of domination” (Foucault 1988 p. 18) with respect and equality in communication. Power relations and relationships between people and governments are changing in today’s society, and Foucault’s style of critique is used by authors such as Rose (1996a; 1996b; 1999a; 1999b) to analyse these changes.

**Changing role of government**

Two of Rose’s ideas are helpful when looking at community participation: government at a distance and the changing role of the expert. Both of these concepts derive from Rose’s view of society and government. In this postmodern era, Rose (1993; 1996a) sees the territory of government as being refigured. Here “the
subjects of government, the human beings who are to be governed ... are now conceived as individuals who are to be active in their own government” (Rose 1996a p. 330–331). The notion of community has assumed a new importance; it is no longer simply the “territory of government, but the means of government” (Rose 1996a p. 325). In such a community, individuals are “active agents” who are free to shape their own lives. Individuals are influenced, and their behaviour modified, more by their communities than by government.

As the state enables consumers to take more control, the idea of government-at-a-distance has grown. This concept was adapted by Miller and Rose (1990) from Bruno Latour’s notion of “action at a distance” (Latour 1987, cited in Miller and Rose 1990; Rose 1999b). The capacities of citizens have become key resources for government. The trend toward greater community involvement, such as through the regional arrangements for NRM funding, are evidence of this new style of government in Australia.

Within this new state, the “experts” have also been transformed, as bureaucrats and government agents no longer have the same influence (Rose 1999a). Rose (1999a p. 154) views experts as espousing norms, or universals, which once allowed them to retain an unwarranted trust and independence as professionals. In today’s government, new norms of accountability have developed; these norms include transparency, observability and standardisation (Rose 1999a pp 153–155).

Such an assessment certainly fits with the current view of governments in the field of NRM and agriculture. Rural people’s mistrust of government seems to be increasing; in community participation, people are suspicious that their information will have little or no effect on policy makers. These new lines of power are perhaps little understood by, and are often obscure to, those who are involved in community participation.

**Linking the two ways of thinking about power**

The two traditions of thinking about power are usually seen as diametrically opposed. The meaning of power is certainly vastly different. However, Flyvbjerg (2001) notes that many of the weaknesses of Habermas are actually and his colleagues are actually the strengths of Foucault, and vice versa.

Foucault has often been criticised for focusing on discourses and for lacking norms; that is, he provides critique but no overall praxis. A frequent criticism levelled at Foucault is his reluctance to provide normative theories, methodological frameworks or guidelines for what should be done. He is bound to the Nietzschean idea of unmasking truth and power, where truth is “imposed by a regime of power” (Hillier 2002 p. 51).

The dominant tradition, based on Habermasian concepts, is often criticised for its moralistic top-down approach to community engagement. The assumptions on which the principles of communication are based are also seen as questionable, idealistic and unachievable. However, their very existence means that this approach is attractive, and many practitioners aspire to achieve such ideals. While striving to improve participatory practices is admirable, it may raise unrealistic expectations, and Foucault points to the dangers of such idealism.

Flyvbjerg (2001) compares the two philosophies. Habermas is criticised for his idealism, but he is strong in universals and generalisations. Foucault is criticised for his avoidance of advocating moral solutions, but Foucault emphasises the particular and contextualism (Flyvbjerg 2001 p. 108). Also, Habermas has well
developed norms, while Foucault is weak in generalised ideals (Flyvbjerg 2001 p. 98), as Foucault (1991c) thinks it improper to pose norms.

Flyvbjerg (2001 p. 88) further suggests that the best of both traditions can be integrated to produce a new common framework for analysing power. This proposal acknowledges that (a) power can be both positive and negative and (b) power relations need to be examined at the institutional and governmental level (Habermas’s focus) in addition to the local context (Foucault’s focus). However, Flyvbjerg (2001) defines power as dynamic and fluid, exercised rather than possessed — the same as Foucault (1979).

Flyvbjerg’s new conception of power, combining some of the ideas of the different perspectives, allows discourse ethics to be seen as a way to manage power, rather than a way to get rid of power (Flyvbjerg 2001). This incorporates Foucault’s idea of power as a regulating mechanism within communication. Such an approach builds on Habermas’s ideas, but does not subscribe to the idea of universals, applicable to every situation.

The literature highlights how power is multi-faceted, so the scope of further research needs to allow the various aspects of power to emerge. The two traditions or ways of thinking about power are, to many, fundamentally different. Flyvbjerg (2001) and Kelly (2005) suggest that each tradition portrays a different perspective about power; each is valuable and together these perspectives provide a rich understanding of power relations.

As Nietzsche (1969 p. 119; 1968 p. 287) suggests, more eyes and different eyes used to observe the same thing can give a more complete perspective. Foucault’s principle process question “How?” adds another dimension of understanding to the questions of “Who?”, “What?” and “Where?” asked by Lukes, Habermas and other critical theorists (Flyvbjerg 2001 pp. 118–119; Foucault 1982a).

**Different conceptions of power within the participation literature**

The literature on participation is generally based on the dominant conception of power as a quantitative capacity. Power is generally assumed to rest with the central elite, or government officers, while the community is seen to be in need of empowerment. Even though power relations and empowerment issues are frequently discussed, theoretical debate about power and associated discourse is uncommon in government circles.

Pretty’s writings (1995, 1999) clarify his interpretation of power within participative projects. In his typology of power, Pretty (1995 Table 1 p. 1252) says that some people “have no power”, which indicates an assumption that power can be possessed. In the same typology he mentions “distributions of wealth and power”. This implies that power is a quantitative capacity that can be divided between different individuals or groups. This view is more like the understanding of power held by Habermas, but contrary to the ideas of Foucault.

Chamber’s interpretation of power also seems confused at times. On one hand, Chambers (1999) emphasises the contextual, dynamic and reversible nature of interpersonal power relations. Here, he quotes Cocks:

*Individual persons can occupy different positions along different axes of power at one and the same time. People are complicated enough, alas, to enjoy the various pleasures of domination while simultaneously suffering all the insults and injuries that sub-ordination brings in its wake.* (Cocks 1989 p. 6)
This understanding fits with Foucault’s conception of power. On the other hand, Chambers argues that power is part of the problem, especially in hindering people’s learning, saying “all power deceives, and exceptional power deceives exceptionally” (1999 p. 76).

The value of adopting a Foucauldian view of power is promoted by several authors, including some feminists (Hailey, 2001; Kothari, 2001; Taylor, 2001), and some research in rural Australia using a Foucauldian approach includes the work of Lennie (1996, 1999), Gibson-Graham (1995) and Jennings (2003). Lennie examines participation and empowerment of women in Australian rural communities using feminist poststructuralism, and is thus based on a Foucauldian model of power.

Other feminists (Gibson-Graham 1995) undertook a comparative analysis of power relations in rural Australia using structural Marxist theory, poststructuralist theory and Foucault. Gibson-Graham argues that different conceptions enable different strategic interventions and visions of social change. A poststructuralist approach has benefits in understanding power as fluid, and therefore liberates women by offering them a multitude of different roles and a variety of possible interventions (Gibson-Graham, 1995 pp. 181–183). Taylor (2001) and Hailey (2001) both use a Foucauldian approach to understanding power in participation, and argue against the formulaic approach to participation.

As Lee (1992) and Kothari (2001) explain, a Foucauldian analysis disrupts the commonly discussed dichotomies, such as macro/micro or powerful/powerless, because it sees all individuals as vehicles of power. A Foucauldian style of analysis of power allows us to:

*shift our concentration from the centre and national institutions such as the state, not because this enables the powerless to speak and be heard, but because those macro-spheres of authority are not necessarily the only focal conductors of power* (Kothari 2001 p. 141)

In this conception “knowledge is culturally, socially and politically produced and is continuously reformulated as a powerful normative construct” (Kothari 2001 p. 141). Such an approach has benefits by emphasising the dynamic and contextual nature of power.

**Conclusion**

Power is a contested concept: there are many different perspectives on, and definitions of, power, while power itself is multi-faceted. These perspectives depend on the context, and to whom one is speaking. The traditions about power are underpinned by assumptions that reflect the philosophies of the people involved. Using ideas from different perspectives gives us a deeper understanding of power relationships. In any participatory activity, it is important to examine how power is expressed, not just by whom; the level of power that is being examined; and where the power is being exercised.

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Capacity Building in Farming Systems
Ruth Nettle and Mark Paine

This chapter argues that increased capacity amongst rural professionals is being demanded from farms in response to greater complexity in our farming systems. The challenge for extension is to support learning and resilience in farming systems in an ever changing and complex environment with more stakeholders and higher stakes!

The chapter includes a review of international literature and case studies highlighting the characteristics and role of professional extension in farming systems. It highlights four main points of significance for the extension professional:

1. The increasing complexity of farming systems and the corresponding demands on farmers from society and government requires extension professionals to focus on their capacity to be a significant contributor to the resilience of farming systems.

2. Increasing the capacity of extension requires a focus on learning relationships between extension and farmers, not just on knowledge production or technology development.

3. A focus on learning relationships is a career-long enterprise that needs to be part of day-to-day extension practice.

4. Building capacity in an ongoing way is the task of the extension professional and requires a workplace research capacity.

The chapter concludes with examples of workplace research methodologies that can assist the practitioner on this journey.

Current and emerging challenges for farming systems and extension
The agriculture sector is under increasing pressure to bridge a growing tension between a neo-classical economic view of farming as a small business food and fibre factory, and a liberal socialist view of farming as one of several ‘multi-functional’ uses of landscapes. The latter view requires land managers to recognise the ecological, social, educational, aesthetic and local economic development attributes (e.g., tourism, food, services, etc.) that at times require the development of sophisticated collective methods in communities (Barrio and Vounouki, 2002). The growing influence of consumers and urban interests in debates about the merits of the food derived from our farming systems and the sustainability of these systems is resulting in more voluntary regulations (through pricing instruments) and compulsory regulations (using legislation) impacting on farming practices. Further, with the growing privatisation of knowledge resources, farmers also find themselves adapting their practices to comply with patents and property right regulations over genetic resources, or to register procedures and maintain individual animal records to meet traceability requirements for market access. These and other issues, such as the use of biotechnology in production systems and global markets for agricultural products, make the prevailing imperative in Australasia to
increase agricultural productivity at a sector scale increasingly complex. This complexity challenges the capacity of farmers, farming systems and the environment (Crawford et al., 2007a; Joly, 2005).

Although many farming systems have developed to be highly productive, they have also become more susceptible to shock. It is significant shocks, such as drought and more gradual changes, such as climate change, that have increased the interest of scientists, policymakers and farmers in resilient farming systems – viewed as a necessary attribute to assist agricultural industries manage through future challenges and shocks. Resilient farming systems are conceived as those which can cope with change and maintain productive capacity in the face of ongoing variability in factors such as commodity prices, climate, regulation and input availability. A resilient farming system will have the buffering ability to absorb and respond to change. Whilst some may view farming systems resilience as purely the function of technical or ecological attributes, we argue that the human capacity to respond, manage and adapt is also a fundamental attribute. A focus solely on the techno-science aspects of farming systems without giving consideration to the social dimension risk, missing key opportunities to understand and add to whole of system resilience (Crawford et al., 2007a). An important social dimension of resilience in farm systems is the need to build and support farmer learning and flexibility (Resilience Alliance, 2007).

Supporting farmer learning and flexibility is not straightforward in farming systems. Work with a group of extension professionals in the Victorian Department of Primary Industries (Markham et al., 2006) identified five levels of farm decision making in dairy farm systems (i.e. product decisions, practice decisions, sub-system decisions (eg. forage system), whole farm decisions, and beyond whole farm decisions). This complexity at the level of farm management has corresponding implications for those working in the knowledge systems that service farmers. Röling (2002) suggests that the challenges of managing the competing interests of productivity growth, environmental concerns, landscape change and societal expectations can only be met through a ‘new’ agricultural science that involves ‘learning and organising to make optimal use of ecological services’, thereby placing human activities (both the individual and collective) with an adaptive (i.e. resilient) character as central to coping with uncertain futures. Wenger (2003) goes further by suggesting that extension professionals are increasingly required to have well developed technical skills across a broad range of farming systems, well developed socio-political perspectives on the place of farming in society, and a competency to debate these perspectives across diverse social forums.

However, some authors are challenging the adequacy of current farming systems approaches for the increased complexity in farming systems. Joly (2005) is particularly critical of the narrow scope of work (i.e. a closed socio-technical system). He challenges those working in farming system approaches to: (a) work with science to monitor and measure farm systems more effectively in order to aid policy decisions affecting farm communities; (b) extend the ‘participation’ focus beyond that of farmer-researcher-extension to community, policy and environmental actors (see also Paine and Beilin, 2003); and (c) to work on farm systems to include value adding of produce and market development.

This places the capacity building challenge for the extension profession into the domains of multi and interdisciplinary work (Leeuwis, 2000; Röling, 2001; Kaboré, 2007), the supply chain and not just the farm ‘system’ (Lubchenco, 1998; Holling, 1995; Rivera, 2000; Drew, 2002) and human ‘capacity building’ as an improving ability to learn and adapt through change (Leeuwis, 2000; Macadam, et al., 2004). The question that emerges from such challenges is: how can the capacity of extension match the challenge of supporting learning and resilience in farming systems across these domains?
Learning processes as a response to the extension development challenge

The challenge of multidisciplinary work, supply chain issues and human capacity building for resilient farming systems requires extension to focus on its practices rather than the production of knowledge (predominantly technical) alone. This is not to undermine knowledge as an important part of dealing with farming systems complexity but highlights the need to think about the type of knowledge required in extension.

Röling (2002) says technical and market knowledge are not enough for the complexity in farming systems with social systems knowledge of equal importance. This type of knowledge focuses on the reasons for people to act and shape their networks the way they do. Applied knowledge and information become ‘building blocks’ for local level innovating involving numerous knowledge ‘transactions’ and exchanges, and not ready-made ‘end-products’.

We suggest that appropriate learning processes are the means by which extension can engage with the different disciplines, knowledge types and practices over time to cope with conditions of complexity in farming systems. We consider learning as a relatively permanent change in behaviour, with behaviour including both observable activity and internal processes such as thinking, attitudes and emotions (Burns, 2002). Learning is therefore viewed as a fundamental process for managing change (Beckhard & Pritchard, 1992) and learning processes as central to the production and utilisation of knowledge.

Although learning theories have been central to the development of extension practice and its tools and techniques, such theories are normally applied in the development of products and services for farmers, rather than a focus for building the capacity of extension itself. This is despite developments in the conceptualisation of experiential learning (Kolb, 1984), professional service provision (Schön, 1983; Schön, 1987) and the role of science in society (Latour, 1987; Pickering, 1992). Learning strategies are central for building capacity of extension in farming systems to meet the challenges of continuous change and complexity.

Learning strategies involve the design of activity systems that foster some form of critical reflection amid the routine work of practitioners and their ‘community of practice’ (Lave, 1988). Such strategies are not ‘off-the-shelf’ products or ‘how-to’ manuals for extension practitioners – but developed using principles of learning processes. This is the capacity building challenge for extension – capacity in farming systems is built through extension engaging in reflective learning activities with peers, farmers and other disciplines. Therefore, farming systems extension is less about ‘new’ knowledge (i.e. tell me something I don’t know), and more about, ‘having the confidence to follow through on what I know I need to do’, or ‘providing the support to implement changes’, or ‘having the flexibility to adapt any good ideas seen on other farms to my situation’. All these orientations to activities culminate in changes on farm (Paine, 2007).

Crawford et al., (2007b) in a study of learning relationships in farming systems projects found that the learning process itself becomes a complex issue as different knowledge types need to interplay with each other in a common purpose from the farming system. Under these situations, extension is challenged to choose and develop processes and learning tools critical in supporting the learning partnership between different disciplines (knowledge types). International studies on advisory relationships support this work. Andersen (2004) found that advisors need to be both reflective specialists and reflective listeners in their routine work and Cerf and Hemidy (1999) found that experimenting on the advisory relationship (i.e. trying different learning processes) supported innovation. Therefore, learning processes and the development of
learning relationships is seen as a crucial resource in farming systems and a key to building capacity in the extension profession. Further, in some sectors, learning has been identified as a sector wide strategy for capacity building of producers and service providers (McKenzie, 2001).

Building capacity in farming systems through learning relationships

There are two key levels of learning relationship that extension needs to consider to build capacity to support resilience in farming systems: the relationship between extension and farmers (i.e. the advisory relationship), and the relationship between extension and other disciplines (i.e. the multidisciplinary relationship). Although the extension professional needs to work at both levels, each level has its unique challenges requiring different strategies to improve the quality of the learning relationship. The next section deals with these levels separately.

The learning relationship between farmers and extension

To build capacity in farming systems requires a good comprehension of what extension does in the learning relationship with farmers. Nettle and Paine (2003b) describe three attributes of extension practice: extension focuses on actions of the farmer; on intentions of the farmer; and it appreciates the worldviews of farmers and others involved in the learning relationship.

Generally, learning begins with some action being taken in the field or farm situation. The relative richness of a learning experience varies with the degree of reflection on the performance of this action. We also know that learners (farmers, extension practitioners) need to establish their own learning challenges. Effective mediation in learning (i.e. the advisory role) therefore depends on an ever-improving appreciation of the farmer’s knowledge, an ever expanding ability to identify farmer learning needs and better position service provision to meet intentional change sought by farmers as learning partners (Nettle and Paine, 2003a; Paine and Kenny, 2002). This is how both farming and extension are changed - through the interplay of professional practices in shared learning experiences (Gremmen, 1993). Case Study 1 provides an example of how the design of a farmer learning experience can also be used to develop extension capacity to create demand for learning through advisory relationships.

Case Study 1: Building farming and extension capacity for practice change in pasture and grazing management

A Dairy Australia funded research project ‘Learning Plans’ was conducted in Victoria in 2002 looking at ways to build relationships between advisors and farmers that impact farming system performance, create demand for learning and grows/matures the capability of both advisor and farmer (Paine and Kenny, 2002). The research was located in the Department of Natural Resources and Environment (now DPI) Victoria and specified a learning process that complemented the technical messages generated by the existing Target 10 program. Five advisors participated in an action research team. A series of workshops and piloting of workshop outputs were conducted by project members as part of their routine extension work. After about 12 months of development work, the team organised their findings into a methodology referred to as ‘Germinator’, a term describing the emergent nature of learning relationships (i.e. like a seed germinating). This methodology was designed to help advisors/extension to better understand farmer learning requirements in terms of: their Worldviews; their intentions with respect to the area of work; their position relative to current and desired practice; their preferences in terms of strategies to bridge the gap between current and desired practice. This methodology provides the advisor with a series of tools organised in a
simple step-wise process that together facilitates the formation of a learning partnership with the farmer (Nettle and Paine, 2003b).

In summary, the Germinator methodology involves four steps:

I. Determine the position of the farmer (with respect to management performance) using a questioning framework;
II. Gain an appreciation of farmer intentions by using a comparative mind mapping exercise;
III. Look for opportunities for improving practice by formulating strategies to close the gap between current and ideal practice (as defined by the farmer for their situation); and then
IV. Extension positions itself in a support role to facilitate this closing of the gap, being cognisant of its resource constraints and professional development challenges.

The work with this group demonstrated that the steps in Germinator were relevant and workable in the field, the process made a difference to the nature of the advisory relationship (the focus moved beyond just a technical exercise between the advisor and the farmer), and it promoted reflection (i.e. how is the farmer seeing things?) (Paine and Kenny, 2002).

Four key messages about the capacity of extension in farming systems from this case study emerge:

I. Learning partnerships operate at three levels of practice (action, intention and worldview);
II. Change is negotiated at each of these levels;
III. Change encompasses the learner, the farm system and the learning partnership;
IV. Effective advisors employ strategies that are effective across all these levels and modes of change.

Case Study 1 demonstrates the type of professional capacity required by extension for effective relationships that result in change in farming systems. The question becomes, can this notion of capacity building through learning partnerships be applied at a sector scale as a response to complexity in farming systems? Case Study 2 provides an outline of extension research that investigates the advisory relationship as a strategy to support sustainable change and improvement in milk quality at a dairy sector level.

**Case Study 2: Building farming and service sector capacity for sector wide milk quality management**

In 1999 the Countdown Downunder program was instigated to promote best practice mastitis management on farms. The main aim of the program was to have all milk supply below 400,000 cells/mL and 90% of supply at less than 250,000 cells/mL. The difficulty in effecting change in milk quality is that high cell counts are due to mastitis and are caused by a number of different bacteria that infect the udder and cause disease. The best dairy farmers will aim to prevent mastitis infections and it requires them to follow quality procedures, getting many small things right every day of every year. If a mastitis problem does develop, then identifying the underlying cause can be complex and time consuming. It can involve a range of different professionals including vets, milking machine technicians, factory advisors and others. Prior to Countdown Downunder, farmers complained that the people advising them often gave confusing and inconsistent advice – they didn’t work as a team to solve the farm problem. Therefore, underpinning the program a holistic approach was taken that involved a team of farmers, farm workers and external advisors working together in a co-ordinated fashion on mastitis problems on farms.

As part of the strategy, the program team developed Farm Guidelines (Brightling et al., 1998) - providing recommendations to farmers and advisors on mastitis management on farms. This was available to all
farms and advisors and formed the basis of the ‘Farmer Short Course’ – supporting participants to take control of their farm systems by having the confidence to use resources available to them (such as advisors) and building a ‘Mastitis and Milk Quality Action Plan’ (MAP) for their individual farms.

High levels of participation and exposure to the Countdown resources resulted in substantial improvement in industry milk quality (Brightling, 2005). However, after five years of program delivery, the program team wanted to explore the sustainability of on-farm improvement and milk quality and commissioned research to understand the processes involved in achieving sustained on-farm practice change. Eleven case study farms were chosen and followed over 18 months post-course to examine how their action plans ‘worked-out’ over time. Two study farms are reported here to highlight the role of advisory capacity in sustained improvement.

**Farm 1:** Steve and Carla milk 150 cows and are relatively new to dairying. Their farm is at a development stage and they are very keen to seek out lots of information. It was their vet who suggested they attend the Countdown Downunder Farmer Short Course. As a consequence of their actions, straight after attending the course they halved their bulk milk cell count, yet still had difficulty lowering the number of clinical mastitis cases at calving. They were having trouble prioritising critical elements to success in reducing clinical cases, and with so many farm development needs, they were choosing easily implemented but partial remedies. They were not backward in seeking lots of information – however it tended to come from informal ‘chats’ with various service providers and they did not develop a real sense of direction. Their ‘Mastitis Action Plan’ developed from attending the Countdown Farmer Short Course provided a useful framework for action, but Steve & Carla’s challenge is to become more strategic by filtering the vast amount of information gathered to ensure they maintain focus on the milk quality goal. They would benefit from using the frequent interactions with advisors to help review their farm’s performance and prioritise the next steps of the Mastitis Action Plan. Advisors need to be able to identify this form of need and position their service appropriately.

**Farm 2:** Peter milks 470 cows on the family property. He had ongoing bulk milk cell problems – consistently exceeding factory standards and was under pressure to ‘do something about it’. His vet conducted an investigation and a particular bacterium (Strep ag) was diagnosed requiring specific treatment and management intervention to control. His vet recommended he attend the Countdown Farmer Short Course. The course and veterinary interactions helped him to take control and focus his efforts on minimising spread of infection in the herd. He was rewarded by a dramatic reduction in BMCC that was sustained by a lot of hard work. However, mastitis will never be controlled in herds by management plans alone. An ongoing relationship between the farm manager and vet is essential to ensure progress is monitored, milk cultures are used to confirm the presence or absence of the bacteria, the drafting criteria for running split herds are reviewed and critical points of the mastitis control plan are being covered. In Peter’s herd, there was no way of assessing whether the increasingly complex management changes helped improve the Strep ag status of the herd or whether his strategy from 12 months ago remained a cost effective way of staying in premium. The challenge for Peter is to develop a strategy for monitoring progress that enables ongoing review of the situation to ensure efforts are focused and economic. He would greatly benefit from becoming less self-reliant and using veterinary support to maintain the focus and diligence needed to contain Strep ag.

These farm cases demonstrate the importance of a ‘tuned in’ by the advisory sector to service different needs.
Three key elements to effective learning relationships for sector-wide programs emerged from Case Study 1: (1) an effective partnership between education and extension offered professional development opportunities for both farmers and advisors; (2) technical resources were developed so that messages were aligned with real time critical needs on farm; and (3) supported program improvement was achieved using extension research to ‘disclose’ why change was stalling. Programs using a planning approach to achieve change and innovation can benefit from considering these elements.

Case studies 1 and 2 suggest that effective learning relationships between farmers and extension can enhance the resilience of farming systems. For this relationship to be effective, a change in the culture of service provision may be required (Nettle, et al., 2006). Changing a service culture will require a number of strategies: (1) strategic management of farming systems issues will need to be addressed as routine business for a sector; and (2) services will have to be well aligned with the needs of clients (i.e. service management needs rather than just technical or ‘product’ solutions). Further, for farmers to value professional input, advisors will have to identify what individual farms need in terms of processes and support to achieve the goals of the farm, demonstrate the benefits and risks of making changes, and convey their capacity to work at this level.

The learning relationship between extension and other disciplines – linking with other professions to cope with complexity

The farmer-extension relationship is central to increased capacity to deal with complex farming systems, however extension is also required to work with other disciplines. Knowledge for improving farm and industry performance and environmental management does not reside in any single discipline, it resides in many disciplines and improving farm and advisory practices relies on suitable connections existing between disciplines (Nettle & Kenny, 2005). Extension can be viewed as the professional intermediary between science and practice (Campbell, 2001) and a central profession in the interplay between groups of people influencing farm management (Parminter, et al., 2000). Extension is being challenged by farming systems research to be integrated into the research process and to initiate interdisciplinary coordination (Paine et al., 2004). This section of the chapter highlights case studies of multidisciplinary work in farming systems and the role and capacity of extension in this intermediary role.

For the extension professional, mediating and brokering other professions to improve situations increases the need for skills like (a) negotiation (negotiating goals, roles and expectations of disciplines); (b) creating effective learning environments; (c) designing and using appropriate learning tools; (d) critical questioning skills; and (e) high level facilitation competence. The stakes are high. Recent research suggests that effective learning processes contribute directly to the management of complexity (Crawford et al., 2007b) – extension as the profession responsible for effective learning processes needs to get it right!

Extension’s role in multidisciplinary endeavour is a challenging one. Klein (1990) argues that multidisciplinary thinking requires a new discourse be established and a ‘set of language games with rules and practices’. Janssen and Goldsworthy (1996) believe that multidisciplinary approaches in NRM often end up being an ‘ad hoc’ compromise between practical problem solving and scientific problem analysis. They suggest that the composition of disciplines present in multidisciplinary approaches depends on how problems are defined at the outset and problems often turn out to be less specific than originally presumed. They add that there is also little understanding or recognition of the conceptual and practical implications of multidisciplinary work.
One of the catalysts or cues that extension can use to facilitate the alignment between farming systems research and extension is systems thinking itself because it is shared by both practices. However dealing effectively with complexity in farming systems requires participating disciplines to be changed or enriched, not just able to work together, no matter how beneficial and cumulative working together may be. Nettle and Kenny (2006) suggest extension can play a key mediating role to increase the capacity of all disciplines (including their own) to innovate together, expand the boundary of each discipline and fast-track research outcomes. (See Case Study 3)

Key features of the role of extension in multidisciplinary work have been identified (Crawford et al., 2007b; Kaboré, 2007). These include:

I. Supporting clarification of the orientation and purpose for learning together;

Facilitating multidisciplinary teams in selecting rules and patterns of behaviour that help decision making and action in real time; and

Designing effective communication cycles for multidisciplinary teams to develop and retain new repertoires for managing complexity.

Extension therefore plays a significant role in the outcomes of multidisciplinary work and focusing on these areas to build capacity of the profession to work in this domain is essential for increasingly complex farm systems situations. Case Study 3 provides an example of the challenges for extension in multidisciplinary work and the strategies employed by extension in the context of a national farming systems project.

Case Study 3: Building capacity in multidisciplinary learning relationships

A large multidisciplinary research, development and extension (RD&E) project in the Australian dairy industry called ‘FutureDairy’ represents a formalised ‘knowledge partnership’ between farmers, researchers and extension and is examining social, technological and scientific solutions to improved productivity (Nettle and Kenny, 2006). Findings from extension research in the project suggest that the potential gains from knowledge partnerships depend on the management of the relationship between disciplines in an active way – a key role for the extension profession. However key challenges were identified for extension to effectively broker knowledge partnerships and these required innovative strategies.

I. Tailoring the establishment of knowledge partnerships to regional requirements. A localised, regional approach was important for fast-tracking the credibility and perceived relevance of research work amongst local farmers and service providers. A key strategy for extension was to use regional gatekeepers to contextualise the work and champion the project.

Managing power dynamics around the research topics. Extension had three roles here: (1) continually reinforcing the equal role of farmer knowledge in contributing to the overall project objectives; (2) positioning the role of technical research appropriately, requiring negotiation of its relative importance to the multidisciplinary research questions. This places extension in a powerful position in the knowledge partnership; and (3) reflecting back to farmers evidence of their contribution to addressing the research questions. A key strategy for extension was to use regular workshops between the partnering commercial farms, extension and researchers to co-construct research findings.

Utilising crisis points in project activities to reinforce new ways of operating. Working to resolve crises and using such junctures to realign objectives and expectations among participants became a key strategy of extension’s multidisciplinary work.
This case study highlights some of the professional development challenges for extension in multidisciplinary teams. (For a full description see Kenny and Nettle, 2006ab; and Kaboré, 2007).

The previous section has highlighted the key elements of capacity building for resilient farm systems. These elements differ based on the different learning relationship within which extension is involved (i.e. with farming or in multidisciplinary teams). Figure 1 summarises these capacities.

**Extension requires its own research capacity**

The preceding sections are based on the assumption that increasing the capacity of extension is central to building an effective professional. It requires a level of reflection on practice, a continual questioning of activity and a search for continuous improvement.

These features of extension capacity are not innate. For example, skilful facilitation of learning processes needs to be part of the typical dialogue surrounding on-farm activities. Effective facilitation enables farmers to work with others (researchers and advisors) to better adapt to their farming systems.

Figure 1: A summary of extension capacities required for supporting resilient farming systems.

<table>
<thead>
<tr>
<th>Domain of work of extension</th>
<th>Learning processes</th>
<th>The extension-farming learning relationship</th>
<th>The extension-other disciplines learning relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capacity building</td>
<td>Build learning partnerships across the levels of actions, intentions and worldviews of farmers. Consider the learner, their farming system and the partnership in interventions</td>
<td>Understand the farmers’ knowledge of their farming system. Create demand for learning. Negotiate change at each level. Position extension services to intentional change sought.</td>
<td>Negotiation Creating effective learning environments Designing and using learning tools Critical questioning skills Facilitation competence Support clarification amongst disciplines of the orientation and purpose for learning together Support the selection and development of rules and behaviour within the multidisciplinary team Design effective communication cycles for disciplinary contributions to learning and change.</td>
</tr>
<tr>
<td>Multidisciplinary work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Chain</td>
<td></td>
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</tbody>
</table>

**Methodologies of reflective practitioners**

For many extension professionals, ‘research’ was an endeavour left behind at university, in preference for doing something more ‘practical’ and a desire to have a direct effect or impact in a farming or NRM community. As outlined in the chapter so far, increasing complexity in farming systems has increased the stakes for extension, requiring ongoing learning and change on the part of the professional, and requiring a
capacity to reflect, plan and take new action in professional practice. A research capacity (formalising learning) can assist this as well as demonstrate professionalism to other disciplines.

We suggest two main approaches for such research activity: action research and workplace research. Extension research can be assisted by support from social researchers. We provide two case studies of extension research in practice to provide insight into the nature of the work of the reflective practitioner.

**Action research**

Action research is a research methodology that pursues both action and research outcomes within a single approach. The researcher researches ‘with’ and not ‘on’ other people and does not treat people as objects or sources of data. The method of action research has become codified into a cycle of planning, acting, observing, reflecting, with the cycle repeating. In each cycle there is an emphasis on action and then critical reflection on the process and outcomes. Action research aims to contribute to the practical concerns of people in an immediate problematic situation.

Action research approaches for practitioners have the following features:

- It is performed collaboratively and enhances the competencies of the respective practitioners whereby people reflect on and improve (or develop) their own work and their own situations and where people collaborate as a ‘critical community’.
- It generates theory, not only about practice, but through practice.
- It integrates action (change) and research (explanation, understanding).
- It challenges a scientific method of inquiry based on the authority of the outside observer and the independent experimenter.
- It is primarily applicable for the understanding of change processes in social systems.

(after Winter, 1987)

For the extension researcher, building capacity in farming systems through action research is assisted by having a reliable strategy for its implementation amongst a work group. The following list summarises elements of an action research strategy for extension research work.

I. Establish a Formal Research Agreement: (i.e. informed consent of participants, authorisation from organisations involved, funding to support and provide legitimacy for the research effort).

II. Develop a Theoretical Problem Statement: (i.e. a premise or context for the research, research questions, definition of the focus and boundary for the research process, scope, the effort and time required). To provide the vision for the research team, this process is best constructed collaboratively.

III. Plan Data Collection Methods: Action research is empirical though the collected data is typically qualitative and interpretive. Data can be collected through audio-taped observations, interviews, action experiments and participant written cases. Researchers or teams may also keep structured diaries or learning journals.

IV. Maintain Collaboration And Learning: Action research requires careful preservation of collaboration with people involved in the process. Each person has key knowledge, both of theory and the practical setting, which is critical to the discovery of important aspects of the theory or research question under test. Leaders in the action research process need to avoid dominating the diagnosis and action planning phases.

V. Promote Iterations: Action research is typically cyclical. Action failures (in terms of the immediate problem situation) are as important as action successes. Action should continue until the immediate problem situation is relieved and this can demonstrate the practical effectiveness of an underlying theory.
Generalise Accordingly: it is important to spend time in interpreting the extent to which findings can be applied to other settings or extension practice. (Ref after Baskerville, 1999)

**Challenges in action research approaches for practitioners**

Action research involves advisors in a dual role of practitioner and researcher. While this methodology enables advisors to share the construction of the research questions, engage with each others learning, and interact around the writing up of the work, the effort is intensive and can at times be stressful. Although such intensive action research in capacity building (i.e. where the research effort resides fully on a project team) may be more suited to development work (i.e. extension developing, testing or piloting new extension approaches or capacity building efforts) rather than project work (i.e. delivering practice change outcomes in a particular time frame), there are some suggested techniques for supporting advisors in the dual role of practitioner and researcher. These include:

I. Learning processes helped and supported by the use of mentoring in the field using a buddy system (i.e. another advisor as a critical friend). (See Paine, 2007)

Support from experienced social researchers to aid in facilitation, research design and de-briefing. (See Nettle, et al., 2006).

Embedding the research process as part of a projects’ design.

Action research has proven to be an effective method for investigating advisory work operating on whole farm system issues, particularly amongst extension teams (See Case Study 4).

**Case Study 4: Building farming systems capacity amongst advisors using action research**

*The Target 10 Farming Systems Group in the Victorian Department of Primary Industry was supported by the Dairy Extension Centre to, ‘develop, trial and launch the farming systems learning group concept, whilst building farming systems extension capacity through reflective practice and collaboration with dairy industry service providers’. To achieve this end, five farming systems development groups were established across the three regions of Victoria. Each group involved a Target 10 Farming Systems extension officer and a group of farmers working on farming systems issues (e.g. post-drought recovery) over a 12 month period. Each group constituted a case study in the overall project design.*

*The advisors were balancing two things when managing groups as part of the action research process. On one hand they were attending to the needs and practical expectations of the farmers, and on the other hand, they were trialling and modifying the frameworks and learning processes of extension in farming systems work to answer research questions. Advisors were active participants in systems level technical discussions while also managing group direction and focus to ensure achievable outcomes from Farming Systems Groups.*

*A further demand on the advisor was to keep abreast of the need for resources from other projects, whether experienced colleagues or sub-contracted expertise to expand the access to skills to address the specific topic of the group. Yet the frameworks developed by the Target 10 Farming System project provide extension workers with tools to aid knowledge management in highly unstructured group learning situations. They are particularly useful in aiding the process of farmer to farmer knowledge transfer.*

*A key aspect of this work for the extension worker is to resist the pressure to move too quickly through the stages of needs analysis to selection between options for farms dealing with complex and uncertain situations (drought management and sustainability). A sound knowledge of what constitutes a well*
developed need assessment guides an advisor at this point in the group process. Used effectively a framework enables the advisor to focus on the development of their technical knowledge base in tandem with skills in managing the group learning process.

The challenge for building both these capabilities in a balanced way requires an active management of an advisors’ own professional development. Achieving a balanced development of these skills will assist leadership, that is, the ability to help others augment their decision making.

For a full report on this work see Paine (2007).

Workplace research

Although action research is a common methodology for extension practitioners researching and improving their practice, an alternative but aligned approach involves using more traditional social research methods to reflect on extension practice in the context of a particular project that an extension professional is working in. We call this ‘workplace research’ emphasising that research is conducted in the everyday work of the practitioner and focuses on the everyday issues of the practitioner (e.g. improving ‘my’ practice; investigating alternative extension approaches, understanding farmer decision-making in a particular project context). It differs from an action research approach as it focuses on the extension professional and their practice, which can be shared with others (See Case Study 5).

Case Study 5: Extension research to improve outcomes from irrigation extension activities – workplace research in action

An irrigation extension officer with the Department of Primary Industries in Victoria was looking to improve their effectiveness in achieving their program goals. Part of their strategy was to run irrigation courses for farmers to assist them use water more efficiently and reduce issues of salinity and excess nutrients in ground water. The dilemma for the extension officer was that the complexity of irrigation decision making for farmers increased the need to work one-on-one to achieve program goals. However one-to-one work is time consuming and requires justification to funding bodies. Deciding which farms to work with required a way to assess ‘high-return’ extension relationships – for the farmers and extension program goals. Working over 12 months, the extension officer developed a social and technical analysis for extension to get a better insight into farmers’ water and irrigation related needs. This insight then directs the type of extension effort required, the role of other expertise in achieving change, and can be used to report on outcomes from extension efforts to policy and stakeholders.

To build this tool, the extension officer began with two research questions: ‘how can extension make on-farm water resource management changes ‘visible’ at a program or policy level?’, and ‘how does extension effectively prioritise and select farms for one-to-one contact in achieving extension outcomes (e.g. increased water use efficiency, water savings and/or nutrient and salinity regional outcomes)?’ The extension officer, with a social researcher, conducted depth interviews with six case study farms that represented variation in the farming population that the extension officer had to deal with in everyday work. The interviews with farmers were semi-structured and explored:

1. what farmers were doing in relation to water management on their farm and why;
2. how farmers were going about implementing changes on their farm regarding water use;
3. how farmers learnt about and managed water on their farm;
4. how farmers sought and used information and advice regarding water management in their business.

A framework was developed to analyse the interviews to assess the role of extension with the farmers. This analysis was then used to build a tool ‘WaterMAP’ (water management action plan) which emerged as a questioning tool an advisor uses with a farmer which assesses: perceptions of water in the farm business; a physical assessment of their farm water situation; an assessment of capacity to capture opportunities; an advisor assessment of contributions to policy and program goals; an Action plan for farmer and extension.

The extension officer then tested the tool on two more farms to assess its effectiveness for meeting the extension officers’ needs for improving extension effectiveness (e.g. its usefulness in identifying high return farms to work with, etc.). WaterMAP was seen to be able to effectively position the farm and extension response required under certain conditions: i.e. when the farm visit and the results were documented; when a second and/or iterative visit to the farm helped build on the understanding from the WaterMAP appraisal; when it was used to refer the farmer to others in the industry once issues outside specific program goals of the extension officer are reached.

This tool has been documented and is used to improve professional practice of extension work in the irrigation domain. For a full report on this work, see Nettle, et al. (2006).

Conclusion

We position capacity building in farming systems as the oil of the engine of agricultural productivity, sustainability and rural development in land management, and an ongoing responsibility of extension professionals. Adaptive management through learning is the essence of this capacity, requiring reflection on practice, questioning of activity and a search for continuous improvement on the part of the extension professional.

This chapter has outlined the challenge for the extension profession in building its own capacity to respond to the needs of farmers, policy and other disciplines as each adapts and works together to manage increasingly complex and uncertain conditions for farm and natural resource management systems.

It is suggested that the challenge of supporting learning and resilience in farming systems can be met through the profession developing effective learning relationships and learning processes with farmers and other disciplines and focusing on their professional development through an active workplace research culture. The flow on from this, we suggest, is that a highly developed extension capacity will have increased validity and currency at a research and policy level.

Glossary of terms (for this chapter)

Farming systems: Crawford et al. (2003) define a farming systems approach in the context of Research, Development and Extension as:

... an approach that focuses on the farm business and the key interactions that determine the performance of that business. In its ideal form, farming systems R,D and E is multidisciplinary, addresses the social, economic, production and environmental dimensions of the issue under analysis, embraces the use of modelling and innovative learning approaches, and emphasises co-learning for researchers, advisors, investors and farmers.

Disciplines: a particular field of study or enquiry that share common rules, theories, principles and practices.
Profession: a collective vocation or calling involving members who have trained and gained qualifications in a particular field of enquiry, generally within a similar discipline.

Reflective practitioner: professional practitioners (competent in what they do) who are also able to reflect on their actions as a means of improving their competence.

Action research: Action research is a methodology in the social sciences whereby action (change) and research (explanation, understanding) are integrated within a planned intervention or project.

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Social Principles for Agricultural Extension to Assist in the Promotion of Natural Resource Management

Frank Vanclay

An understanding of social issues, the social nature of farming, and the social basis of adoption is needed if agricultural extension is to be effective in addressing natural resource management issues, and in promoting sustainability in its triple bottom line conceptualisation. Twenty-seven principles are presented here, with the key principles being: awareness of farming as a social activity; recognition of the social diversity of farmers and the social drivers in agriculture; and the socio-cultural basis of adoption.

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Prof Frank Vanclay
Tasmanian Institute of Agricultural Research, University of Tasmania
Private Bag 98, Hobart, Tasmania 7001
Phone 03 6226 2618; Fax: 03 6226 7450
E-mail: Frank.Vanclay@utas.edu.au

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Social principles for agricultural extension to assist in the promotion of natural resource management

Abstract
An understanding of social issues, the social nature of farming, and the social basis of adoption is needed if agricultural extension is to be effective in addressing natural resource management issues, and in promoting sustainability in its triple bottom line conceptualisation. Some 27 principles are presented with the key principles being awareness of farming as a social activity, recognition of the social diversity of farmers and the social drivers in agriculture, and the socio-cultural basis of adoption.

Introduction
Agriculture has too long been thought of as a technical issue involving the application of science, and the transference of the outputs of that science via a top-down process of technology transfer. It is not. Agriculture is farming, and farming is people. The survival of agriculture is dependent on the survival of viable rural communities. Sustainability has multiple bottom line implications, containing environmental, social and economic dimensions. The criteria and indicators for sustainability in a physical sense are generally understood. The economic indicators are also well-established, although rather limited. What is lacking is an awareness of the social issues. This paper seeks to outline the key social principles relevant to the promotion of natural resource management issues in agriculture. These social principles should augment technical and economic principles relevant to sustainable agriculture.

The principles were developed out of personal reflection on twenty years of research on the social dimensions of farming particularly as they relate to the promotion of natural resource management in agriculture. This research started with a Masters degree (Vanclay 1986), continued through a PhD (Vanclay 1994), and through subsequent supervision of PhD students including Lockie (1996), Howden (2001) and several that are as yet not complete. It includes work as a research assistant (Rickson et al. 1987), research fellow (Vanclay and Cary 1989), principal investigator or consultant (Lockie et al. 1995; Vanclay 1993; Vanclay 1998; Vanclay and Lockie 1993; Vanclay and Glyde 1994; Vanclay and Hely 1997) and supervisor (Glyde and Vanclay 1996; Howden and Vanclay 2000). Throughout this period, the ideas have changed and consolidated, and they have been aired at many conferences, including some of the first conferences in technical areas to consideration social issues in agriculture and natural resource management (Vanclay 1991a, 1991b, 1992b, 1999). Some of the publications that have come out of this research provide evidence for statements made in this paper. However, in most cases, the principles that are articulated can not be easily substantiated with evidence of the sort that physical agricultural scientists are used to. This is partly because this is a review paper rather than original work, but it also reflects the different epistemological paradigm of the social sciences.
They are called ‘principles’ because they are intended to be regarded as “a general law or doctrine that is used as a basis of reasoning or a guide to action or behaviour” (The Australian Oxford Paperback Dictionary). This status may not be accorded to them by all agricultural scientists, but they do have that status from a rural sociological perspective. It is the argument of this paper that agricultural scientists should accept these statements as principles.

Principle 1: Farming is a socio-cultural practice.

The first principle is to acknowledge that farming is a socio-cultural practice rather than just a technical activity. Farming becomes a way of life, a way of making a living, that acquires a meaning far deeper than almost any other occupational identity. In that sense, farming is a vocation. As a socio-cultural practice, it is governed/informed/regulated by social processes. Being aware of this fact, and reflectively thinking about what this understanding means will assist in the promotion of a sustainable agriculture for Australia’s future.

Principle 2: Farmers are not all the same.

The farming community is not homogeneous. There are many ways in which diversity can be observed within the farming community: rich and poor, big and small, old and young, early in the lifecycle or late in the life cycle, high mortgage and small mortgage, propensity to adopt new ideas (innovator) and propensity to retain tried and true methods (‘laggard’ in extension discourse), pro-chemical (or pro-GMO) and anti-chemical (or anti-GMO). Farmers can be categorised on every single variable that can be logically considered in conjunction with agriculture. This means there are no single problems, no single solutions, no single extension strategies, and no best medium that extension should solely utilise.

Instead of classifying farmers according to demographic or structural variables as has been undertaken by extension researchers in the past – adopter/non-adopter, innovator/laggard, big/small, old/young, valley floor/hillside etc – it may be more meaningful to group farmers according to subcultural groupings representing a conglomerate of social and structural variables. These can be called styles of farming (Vanclay, Mesiti & Howden, 1998; Howden et al. 1998). The concept of styles of farming is an heuristic that allows for an understanding of the range of worldviews about how to farm. Appreciating the existence of a range of worldviews is important. Different farmers have different priorities, different understandings, different values, different ways of working, and different problems. Extension must address the needs of all styles.

Principle 3: Adoption is a socio-cultural process.
Rather than extension being a process of communication between science as the only originator of ideas and farmers as passive adopters, extension needs to appreciate that adoption is a social process. The act of adoption is not an unthinking response to information provided by extension, rather it is a deliberate decision by an individual farmer in response to a consideration of a wide range of issues. But adoption is not a singular act of an individual in an isolated context either. Adoption takes place in a social context, with farmers discussing their ideas with other farmers. Much adoption occurs when the idea or practice to be adopted has become part of the normative concept of ‘good farm management’ (Vanclay and Lawrence 1995; Phillips and Gray 1995).

**Principle 4: Profit is not the main driving force of farmers.**

Contrary to the expectation of many economists, extensionists and agricultural scientists, maximising profit is not the most important thing in farmers’ lives (Vanclay 1992a). Farmers seek to make a reasonable income for a reasonable amount of work taking a reasonable amount of risk – with each farmer defining what is reasonable for themselves. The additional values and virtues of being a farmer, i.e. the lifestyle factors, compensate farmers for when income may be less than what may be achieved by other endeavours. Appeal to economic incentives alone is not sufficient to bring about change.

**Principle 5: It is hard to be green when you are in the red.**

Although profit is not the main driving force, and the promotion of adoption of new technology requires more than just an economic dimension, it true that “it is hard to be green when you are in the red”. Sustainability requires an economic dimension as well as a physical dimension.

**Principle 6: “Doing the right thing” is a strong motivational factor.**

Farmers do what they consider to be the ‘right thing’; they conform to a notion of ‘good farm management’. This notion is a complex entity and includes ideas about farming practice and environmental management or stewardship. But it is difficult to always know what good farm management entails. Social research with farmers shows that different farmers have varying notions of good farm management. Good farm management is a social concept and farmers determine what constitutes good farm management through interaction with other farmers, with extension officers (public and private), through reading farming literature and through exposure to other media. Good farm management is not a singular absolute. Rather it is a dynamic concept that takes into account an individual farmer’s unique situation – their land, soils, debt situation and goals. Farmers’ desire to implement good farm management is responsible for much adoption of otherwise economic environmental management.
Principle 7: Farmers don’t distinguish environmental issues from other farm management issues.

The notion of doing the right thing – of good farm management – is a composite notion. It includes production issues, environmental issues, and also social issues about being a farmer. Although many extension agencies are, or have been, differentiated into production issues or conservation issues, this is a meaningless differentiation for farmers. There is only one farm. Farming practices have both production and environmental outcomes. Extension advice must be integrated.

Principle 8: There is a strong desire to hand the farm on to one’s children.

Most farmers want to pass the farm on to their children in a better condition than they themselves received it. This motivation exceeds any rational economic decision about the level of care to invest in improving the farm because it makes any investment of labour, effort, money worthwhile. A major problem exists when farmers believe that their children will not return to the farm because the motivation for investment in improvement is diminished. It is difficult to know precisely when or if children will return to the farm:

(i) sometimes children who have professional jobs in the city and have said all their adult lives that they will never return to farm, actually will do so when the ageing parents pass away, or announce that the farm is to be sold;

(ii) at other times, even when children make it clear that they are not interested and it may be highly unlikely that they will return to the farm, the parents may still harbour a secret belief that the children will return.

Parents’ desires to have children remain on, or at least return to, the farm are powerful expectations that can cause strong feelings of obligation in farming families. This can be especially so when the farm may have been in the family for generations. These feelings of commitment and obligation mean that there may be very strong feelings to keep the farm, against all economic reason. To give up the farm, or worse still the loss of a farm, are often perceived to be signs of personal failure. These feelings of expectation and obligation can cause a range of problems in successional transfer, especially since many farms cannot support two families – at least not at the level of some people’s disposable income expectation. It has been suggested that succession issues are responsible for much rural suicide¹. Succession planning is probably inadequately undertaken by most farming families and needs to be the focus of more research and increased attention by agricultural agencies and institutions.

¹ This point is frequently made in group discussions on the topic although there is no evidence to confirm or deny this point. One example is the Proceedings of the 1999 Property Management Planning Forum (see http://www.soil-water.org.au/pmp/proceedings/pmpgeneration.htm). Qualitative research with farmers done by Vanclay over many years and by Howden (2001) would support this view.
**Principle 9: Sustainability means staying on the farm.**

Extension and NRM agencies want to promote sustainability in agriculture, but they tend to regard this more in terms of biophysical issues (the environment), and sometimes in terms of economic issues. For farmers, the social significance of farming means that the social dimension of sustainability is central—sustainability is meaningless unless it involves the ability to stay on the farm. For farmers therefore, sustainability means something along the lines of “we as a family, on our farm, in the future”. The physical environmental dimension of sustainability is important, but a continued ability to make a living is more important. Looking after the land, or stewardship, was always part of the notion of good farm management, and so for farmers, sustainability is not a new concept. Only the physical expression of the management practices that sustainability invokes has changed—and many of them are contested.

**Principle 10: Women are an integral part of the farm.**

A farm is rarely the embodiment of a singular individual male farmer. The word ‘farmer’ is a convenience which has an established romanticised meaning that belies the reality of farm management. Farms are often complex partnerships involving many people in financial affairs and in the running of the farm and farm household. Power imbalances and the gender-blindness, if not sexism, that afflicts extension and agricultural science means that the role of women is understated if not unrecognised. In many cases, women have played a major role in farm management. This role has been increasing, and will increase further in the future. Even in individual situations where there has been a strong division of labour, the role of women in the private sphere in the household has been essential to the survival of the farm. Extension needs to acknowledge the role of women on the farm and needs to consider how the needs of women can be met.

The changing structure of agriculture, especially with greater demand for off-farm income to support the farm and an increasing diversity of on-farm activities, means that the role of women is changing, creating new opportunities and also new problems. We need to be aware of these new issues and ensure that they too are addressed. Women are an integral part of the farm, and an important stakeholder for agriculture.

**Principle 11: Stage in the lifecycle of a farming family and family composition are significant factors.**

The stage in the lifecycle of a farm family affects their need for household and disposable income, and this potentially affects finance available for other purposes. But stage in the lifecycle also affects commitment to the future, with young families being more committed to a future on the farm than either families later in the lifecycle, or young single farmers. Stage in the lifecycle is therefore a complicated variable, but it
demonstrates that there are many factors that are involved in decisions about adopting new management practices or new crops, and that adoption is not a simple process of communication.

**Principle 12: Non-adoption is not the cause of land degradation, rather practices actively promoted by extension in the past have significantly contributed to degradation.**

Many extension staff believe that non-adoption of the practices they promote is the main barrier to sustainable agriculture, consequently expressing concern about those farmers who do not adopt tree planting and altered management systems. However, it is adoption of many practices that were promoted in the past – for example tree-clearing that causes salinity and the excessive use of ‘sub and super’ (subterranean clover and super-phosphate) responsible for acidity – that are largely responsible for environmental problems today.

**Principle 13: Marginal farmers are not marginal because of their management ability but rather because of their structural location.**

The concept of ‘the structure of agriculture’ incorporates a number of elements. These include both micro-level features – such as the size of farms, the activities they undertake, and how much income farmers make – and macro-level features – such as the global integration of agricultural production, processing and retailing networks. Current structures did not develop by chance, but through, amongst other things, the interplay of history, government policy, and international patterns of trade. Changing world events and the global economy – and more particularly the Australian governments’ responses to these changing world events – have had enormous impacts on the structure of agriculture, especially at the farm level. This structure has been socially, politically and culturally constructed through settlement patterns, subsidisation and regulation. The size of farms has been influenced by both government regulation and the amount of land required to make a living. This in turn has been affected by the cost of living in rural areas, which has itself been affected by the extent of subsidisation of rural life through both public ownership of important utilities and services, and regulation of private services to ensure that rural residents got a fair deal. The transition to economic rationalist policy in the 1980s, and the ensuing privatisation and corporatisation of government and semi-government entities, as well as deregulation of airlines, banking, telecommunications, and the removal of the agricultural monopoly marketing boards, has had significant effects on rural life (Vanclay & Lawrence, 1995). Considerable structural adjustment has occurred, with increasing minimum viable farm size, a commensurate reduction in the number of farms, and a change in the nature of on-farm work, and the need for off-farm income.

Farmers who are now regarded as marginal were in the past regarded as having a viable land holding. Soldier settlement schemes allocated much smaller parcels of land to returning soldiers than would be regarded as viable today. In the current market situation, farmers with small holdings and who are engaged in the production of traditional commodities can not be earning an income commensurate with most people’s income expectations. While many of them continue to survive by having a reduced need for
income, it must be remembered that they are not marginal because of any personal failure or because a lack of management skills – they are marginal because they were structured to be marginal.

**Principle 14: Farmers’ attitudes are not the problem.**

It is often thought that improved farm management requires an extension and education program to change farmers’ attitudes. But farmers’ attitudes are not antagonistic to the environment (Vanclay, 1992a; Vanclay & Lawrence, 1995). Farmers do not believe that they are 'raping the earth' while driving their tractors. Surveys have shown that they have positive attitudes about environmental management generally. However, they may have different views about what environmental management means, about how to implement it, and they have concerns about whether the agricultural management practices being promoted as sustainable are, in fact, sustainable and/or profitable.

To some extent, this is intuitively obvious. It is not likely that farmers would have environmentally hostile views. The case of land clearing, for example, can be understood from the perspective of many farmers as being ‘land improvement’ – and may even have been required as a condition of the lease. Even if other groups in society (e.g. conservationists, extension staff, agricultural scientists) regard some farming activities as causing degradation of the environment, the understanding of the farmer is different. Thus, the problem is not one of farmers having the wrong attitude, but one of a conflict of views about the right way to manage the farm, and about what constitutes ‘good farm management’.

**Principle 15: Farmers construct their own knowledge.**

It is a mistake to believe that only ‘Science’ (as a social institution) can create knowledge that is transferred to the public via extension. All individuals and groups create knowledge about their own experiences of the world. Thus, information that is transmitted via extension is evaluated against other information, knowledge and beliefs held by each individual. Nothing is accepted without evaluation. As the community is becoming more empowered and more sceptical, ‘authoritative’ information is being rejected. Science does not automatically have credibility and legitimacy.

Farmers create their own knowledge through experimentation and trial, and through their own theorising. The knowledge of Science – that knowledge created by scientists – is used by farmers when it is consistent with their own understanding. Even then it is adapted to fit their own worldview, and so ‘adoption’, itself, represents a form of scientific inquiry (‘science’ as a methodology) by farmers. The knowledge of Science is rejected when it is inconsistent with the worldview of farmers. Thus, farmers are their own scientists, theorising, hypothesising and experimenting to determine what works.

Sometimes the knowledge farmers create through this process is especially adapted to peculiar local conditions. The harnessing of this local knowledge has sometimes substantially improved the applicability of scientific knowledge. Farmers also develop considerable knowledge about their own farm. They know the local history and local conditions and they use that information in their decision making and
management. Within the viticulture industry, for example, it was found that while many agronomic management systems required careful examination of crops for pests and diseases, and extension agencies promoted specific ‘scouting’ strategies, the precision expected in the course of such scouting was rarely undertaken by farmers. Instead of thorough examination of the whole crop, many farmers used their knowledge of local ‘hot-spots’ – locations on the farm where pest and disease outbreaks were likely to occur first – to minimise their scouting effort (Glyde & Vanclay, 1996).

While it is desirable to accept that farmers have (local) knowledge, it is important not to romanticise or overstate the applicability of the knowledge that they do have. Local knowledge is unlikely to provide immediate answers to new problems. Of course, farmers do experiment, and they may develop their own solutions to new problems, and this may help science and other farmers to overcome these problems. But farmers could develop partial solutions that treat the symptom but not the cause, and which could exacerbate the problem over time.

**Principle 16: Effective extension requires more than the transfer of technology, it requires an understanding of the worldviews of farmers.**

Extension has been predicated on the notion that knowledge transfer was uni-directional, that science the only originator of new ideas, and that farmers were passive and non-evaluative receivers of new technology. It also held that all new ideas, if successfully extended, would be adopted. Non-adoption could only mean that information transfer had not taken place (not enough media attention) or there was a barrier to adoption – some reason why farmers could not adopt the new technology, such as a lack of money. This argument is somewhat absurd. Surely, if it really did make sense for a farmer to adopt a new technology, and a commitment to that innovation existed (ie. a thorough belief that the benefits outweighed the costs as broadly defined), a way would be found to adopt. Where non-adoption occurs, obviously a real commitment to the innovation does not exist and non-adoption is a sensible strategy. There are lots of reasons why farmers may not have a real commitment to new technologies, and thus, non-adoption is rational from the perspective of the farmer. Extension needs to be relevant to the needs of farmers, and needs to put their needs ahead of institutional priorities if it is to be successful.

**Principle 17: Farmers have legitimate reasons for non-adoption.**

The reasons given by farmers for not adopting new techniques can be categorised into about 12 legitimate reasons for non-adoption (developed further from Vanclay 1992b).

1. Too complex. In general terms, the more complex the innovation, the greater the resistance to adoption. Complexity makes the innovation more difficult to understand, and generally requires greater management skills. This increases the risk associated with the innovation. Many environmental management practices are complex and require a detailed understanding of physical processes. In some cases, farmers know what is being stated and what is being promoted to address the problem. They simply don’t believe or agree
with the scientific explanation. Farmers are acting quite rationally by preferring to adopt less complex innovations over more complex ones and by not adopting complex practices at all.

2. Not easily divisible into manageable parts. Divisibility allows for partial adoption. Farmers can adopt that part of an innovation that they like or that is consistent with other farming objectives. Obviously, therefore, the more divisible into component parts an innovation is, the more likely it is to be adopted. Under the traditional model of adoption of commercial innovations, partial adoption is thought to inevitably lead to complete adoption. Partial adoption is viewed as a form of trial adoption. Where innovations are not divisible, they are not likely to be adopted, especially if they have other detracting attributes. In this case, farmers must be totally committed to the new innovation before adoption. Such a commitment is unlikely for a range of reasons, and consequently farmers are acting rationally when they do not adopt technologies that are not divisible.

3. Not compatible with farm and personal objectives. Farmers are more likely to adopt innovations that are compatible with other farm and personal objectives. Where innovations are complex and indivisible, they are also likely to represent major changes in the management of the farm and, therefore, not be compatible with other operations on the farm. Farmers’ personal needs for the use of capital and income – such as the education of children, expenditure on household goods, as well as farm requirements such as the purchase of new machinery – may mean that capital expenditure is not consistent with farm and personal goals at that point in time. The desire to maintain flexibility because of uncertainty in the market place means that innovations that are not consistent with this goal are also likely to be resisted. Because of the fundamental changes to agricultural practices associated with most new environmental strategies, most environmental innovations are not compatible with current farm management practices. Non-adoption under these circumstances is rational from the farmer’s point of view.

4. Lack of flexibility. Many new management practices reduce farmers’ flexibility. Farmers like flexibility because it means that they can change commodities in response to market and climatic conditions. Perennial pastures lock farmers into grazing. Zero-tillage systems, with chemical control of weeds, restrict the range of crops that can be grown and the rotations of those crops. Farmers are quite likely to resist the adoption of new technologies that restrict their flexibility. With fluctuating market prices, farmers are acting rationally by wanting to maintain flexibility.

5. Not profitable. Not all management practices that are offered to farmers are profitable, at least not in the perception of each farmer. Even where farmers accept that some new management practice might be profitable for some (such as demonstrated on a departmental experiment station) they can find reasons why their conditions are different and why they would be unlikely to achieve the same results. Furthermore, farmers know that it takes a few seasons to iron out all the bugs and achieve maximum benefit, so there may be a few years of lowered income. Because of the economic situation of many farmers, they simply cannot afford such down-time, and it makes more sense for them to continue with a system from which they are confident that they can get a return, than to invite the uncertainty of change. Some innovations, such as sustainable cropping rotations, do not necessarily return profit in every year, but are alleged to increase profit in gross margin analysis over the whole rotation. Potentially, this requires farmers to forego profit (and absolute income) in some years of a rotation in the promise that profit will be increased in other years. But farmers, or more specially their banks, have requirements of a cash flow in every year. Many environmental innovations rarely provide direct economic benefit to an individual farmer, especially when future discounting techniques are applied (Quiggin, 1987), but are of benefit to the
wider community. If farmers did base their decision solely on economic criteria, there would be very little adoption of environmental innovations. Fortunately, farmers employ a range of criteria in their decision making processes, and do what they consider to be the right thing as much as it is practicable. Nevertheless, it is a truism that the more expensive environmental management practices are (in terms of immediate financial and intellectual capital outlay and the labour required, and in terms of the benefit/cost ratio over time), the less likely adoption will be. If farmers were being strictly rational, little adoption of environmental innovations would occur. They ought not be criticised for not adopting when the economic situation does not warrant it. There is a certain irony in that farmers are criticised for not adopting practices that extension believes to be profitable, but they are also criticised for not adopting environmental innovations which are not profitable.

6. Capital outlay is too high. In addition to the economics of the innovation – in terms of whether or not the innovation will increase profit – it is necessary also to consider the capital required to adopt the new technology. Much innovation requires considerable capital outlay in the form of new machinery, seeds, agrichemicals or earthworks. Often, adoption of new techniques may require the farmer to forego income until the new system is established. In this situation, the farmer must have the resources not only to adopt the new technology, but also to survive the period until the new innovation produces income. In the current period of farm financial crisis, many farmers have negative incomes, and with declining farmland values and equity levels, many farmers have no borrowing power (despite the fact that interest rates are at relatively low levels). In other words, most farmers do not have the capital resources available to them to adopt any new technology that requires a substantial capital outlay. It should be noted that most banks regard farm investment as high risk and charge high risk margins, meaning that farmers may be paying five to ten percent more for their farm loans than the average private owner-occupied housing loan. Despite the current low rate of interest, the interest rate for farm borrowings may still be higher than the return on capital invested on the farm. This means that it is economically irrational for farmers to borrow (or even to be a farmer at all). In addition to the lack of capital to outlay, the farm financial crisis means that most farmers are unwilling to take any risk because failure might have disastrous consequences. Risk taking behaviour is more likely when the farmer can afford the consequences of failure.

7. Too much additional learning is required. In addition to the capital costs associated with the adoption of new technology, there are also intellectual costs. Farmers may have to learn new ways of doing things. Many of the new recommended farming strategies require much greater knowledge about cropping systems and about the chemicals that are used in modern agriculture. This classification is similar to ‘complexity’, but relates to the knowledge base of the individual farmer rather than to an objective measure of complexity. This is not a patronising view of farmers because farmers would not be unique in attempting to minimise the amount of knowledge needed in order to conduct their operations.

8. Risk and uncertainty is too great. Risk is usually associated with commercial innovations because it refers to farmers’ concerns that the capital and other resources invested in adopting the technology will not result in any benefits. However, the concept also refers to environmental innovations, in that farmers need to be sure that the conservation technology or initiative will actually provide the anticipated environmental benefits and outcomes. Farmers could expend resources adopting a new technology, buying new machinery, and altering the management of the farm in order to farm more sustainably, only to find that the new technology fails to solve the environmental problems it was intended to solve. In this sense, the risk is always greater for environmental innovations than for commercial innovation. With commercial innovations the main risk is capital outlay and perhaps the yield of one season. With environmental
innovations the risk includes the capital resources expended – often considerable when production strategies are required to be altered – and the production for that season. These are weighed against the production for future seasons if the environmental degradation is not stopped. While farmers do not necessarily make conscious and sophisticated analyses of the degrees of risk in adopting technology (the information required to do this is seldom available), they are aware of the implications of particular choices. The economic situation faced by farmers tends to promote an aversion towards risk and uncertainty.

9. Conflicting information. No new technology, especially that designed for conservation purposes, is free of debate about its applicability and effectiveness. Farmers receive information from numerous sources and those sources often contradict each other. In a situation where there is already some uncertainty, conflicting information further suggests that non-adoption is an appropriate management strategy.

10. Don’t see that there is a problem (lack of appreciation of the problem). Considerable research has established that farmers are likely to adopt environmental management techniques when, among other things, they consider themselves to be personally at risk from environmental degradation (see for example Vanclay 1992a, Rickson et al. 1987). However, much of the extension literature, conservation literature, and general media reports depict land degradation in its most dramatic forms: deep erosion gullies, salt encrusted pans, or exposed tree roots resulting from wind erosion. The presentation of land degradation in this dramatic form is counter-productive (Vanclay, 1992a). While farmers are made aware of the issue, they do not see the same degree of degradation occurring on their own farm and consequently believe they do not have a problem. They will claim this even when it is known that the problem may be serious in their own locality. Where farmers do experience land degradation in such a severe form, they may feel powerless to address the problem, and adopt a fatalistic attitude rather than undertake any reclamation action or fundamentally change their management practices.

11. Lacking the physical infrastructure. Agricultural commodity production requires certain physical infrastructure, such as handling facilities to enable the crop to be marketed. Historically, that infrastructure was provided by government in the form of commodity marketing boards and other organisations, which together provided a network of silos and railways, as well as extension services to provide advice on issues. The existence of this infrastructure meant that it was largely impossible for farmers to grow anything that was not compatible with that infrastructure. Current concern by government to increase production of higher-value crops, and a perception about the reluctance of farmers to grow new crops, should be tempered by regard to consideration of the history of agricultural production.

12. Lacking the social infrastructure. In the same way that a physical infrastructure exists as a mechanism to encourage production of particular crops, and inhibit others, a social infrastructure also exists. The social infrastructure refers to the social networks of farmers, which provide a knowledge bank for farmers to utilise. The accumulated knowledge of other farmers is usually regarded as a more important source of information than extension services. Except for a few maverick farmers, no individual farmer wants to be the only one doing a particular activity because they would have no social support to discuss their problems.
Principle 18: Top-down extension is inappropriate.

Vanclay and Lawrence (1995) identified five major criticisms of traditional top-down extension. While contemporary extension agencies are moving away from traditional extension practices, the ideology that supported top-down extension persists in subtle forms. It is worth reiterating those criticisms of traditional extension to help ensure that those problems are not manifested in modern extension.

First, extension has uncritically accepted the products of agro-industrial agriscience and agribusiness, and has seen as its task to simply promote those products. Second, this uncritical acceptance of these products, and their adoption by farmers, has led to considerable social and ecological impacts. Third, the adoption-diffusion model is premised on commercial innovation in which it is perceived that farmers would benefit. Thus, it does not cater for environmental innovations, which may not be of benefit to individual farmers. Fourth, farmers’ local knowledge has been marginalised, trivialised, subordinated and ignored. Finally, extension utilised a psychological model of individual decision making and ignored the social, political, cultural and historical context of agriculture and adoption behaviour.

Principle 19: The 80-20 rule is a self-serving delusion.

There is a story in extension circles that 20 percent of farmers produce 80 percent of the agricultural wealth. This view is then used to legitimate the provision of extension services only to the top 20 percent. Sometimes that view is further legitimated by arguing that these 20 percent of farmers provide role models for the remaining farmers and that the ideas extended to the top farmers will trickle-down or diffuse throughout the farming population. In this way, the work of extension officers is undertaken even while they sleep! Even when the trickle-down concept was not applied, the view had support because it was felt that the bottom farmers were recalcitrant laggards who would not change, and who were not part of the future of Australian agriculture.

This view is a self-serving fantasy that is socially inequitable and dangerous from an environmental perspective. It is inequitable because it has legitimised extension to focus on the needs of the top farmers, ignoring the needs of other farmers which may well be different. Thinking about the concept of styles of farmers, it is not necessarily true that the 80 percent would not adopt new ideas – it may be just that the practices being promoted, and the manner in which they were promoted only fitted with the worldviews of some of the styles. Had there been attention given specifically to the needs of a greater range of farmers, perhaps the rate of adoption would have been greater.

The story is damaging to the environment in that natural resource management issues affect all of the Australian landscape. The severity of issues such as salinity mean that we can not be complacent with appealing to change in the practices in a small percentage of farmers. While the potential salinity threat is not evenly distributed over the landscape, the farmers likely to be affected by salinity are not necessarily in the top 20 percent. Environmental issues mean that we need to be concerned about all farmers.
Principle 20: Science and extension do not have automatic legitimacy and credibility.
Many decades ago, Australian farmers placed a great degree of trust in the agricultural research and extension system – at least this was widely believed and accepted. Extension officers felt important delivering useful information to an eager and receptive farming population. Those days have gone, if they were ever true. Today, farmers are sceptical and dubious about the stated claims of practices being promoted. The high credibility the research institutions had has been lost, and farmers no longer immediately accept what is being promoted as being factual.

Principle 21: Representation is not participation.
As a general rule, participation is a good thing. The involvement of farmers on Boards and Committees is desirable. However, there is a danger that representation is simply tokenistic. The main criticism of representation is that it doesn’t necessarily mean participation, certainly not of the full range of farming styles. A major concern is that the farmer representatives are seldom representative of all farmers. Often they are chosen, not because they are farmers per se, but because they are farmers who have considerable experience appropriate to the business activities of the Board or Committee on which they seek to serve. Because of their corporate experience, their worldview and life circumstances are very different from most other farmers. Thus, only certain styles of farming are represented. Therefore, farmer representatives are unlikely to be able to speak on behalf of styles other than their own, except on matters that are common to all (or at least most) farmers.

Farmer representatives are seldom in the majority on any committee, and thus can easily be marginalised. This marginalisation is even greater for any farmer representatives who are not used to the corporate discourse. Farming, although requiring considerable decision making activity, is not an area calling for abstract conceptualisation and articulation in the same way as expected in the corporate discourse. The corporate discourse itself acts to subordinate farmers. The bind is that those farmers who become comfortable with the corporate discourse become ‘bureaucratised’, accepting the hegemonic corporate agenda and thus failing to represent farmers at all. Enabling participation is more difficult than getting a few representatives on a committee.

Principle 22: Promotion of awareness through the use of dramatic images is counterproductive.
Vanclay (1992a) has argued that because of the influence of dramatic images in the general media and in extension literature, farmers’ concern about degradation has become inflated (that is they have increased awareness), but they do not perceive themselves to be at risk because the land degradation they experience is nowhere near as severe as the images being depicted.

Vanclay and Cary (1989) identified that one of the issues in relation to adoption of salinity control methods was the lack of knowledge by farmers of the early warning signs – the salt indicator species. However, the problem with many early warning signs is that they are not unique to a single issue, and can easily be attributed to other reasons. For example, a poor germination rate, reduced prolificness, or reduced species prevalence could be attributed to a lack of moisture, too much rain, hot weather, cold weather, poor seed, pests, diseases, etc. Sometimes, tell-tale signs become so common that they are simply disregarded – for example, few farmers regard muddy dams or cloudy creek water as evidence of soil erosion. It is desirable,
then, that farmers develop an understanding of the land, and that they consider the environmental processes, especially land degradation processes, that may contribute to any feature of the landscape they observe. This has come to be known as ‘land literacy’. People need to be able to read the land for what it is telling us about its health and about the health of our society and our production systems.

**Principle 23: Put degradation into perspective.**

There are many technical definitions of ‘land degradation’. However, what extension officers and scientists regard as degradation is not necessarily perceived as degradation by all farmers. Generally, this discord is perceived by extension as the failure of farmers to develop sufficient ‘awareness’ of the issue. But strictly speaking, degradation is a value judgement made about what is an unacceptable rate. Land degradation occurs because of naturally occurring geomorphological processes. Our fertile farming lands are the result of the same processes that are now regarded as degradation, only having occurred at a slower rate and over a much longer period of time. Farm management practices accelerate the rates of these natural occurring processes, with some practices causing them to occur at a higher rate, and other practices causing the rate to be slower. Since these processes are naturally occurring, they occur irrespective of the farming practices used, and even if the decision is not to farm. Thus, the understanding of these processes as induced degradation, rather than as a natural process, represents a social understanding about the acceptability of the rate of the process. What rate of these processes is acceptable?

Nutrient decline and acidification (at rates believed to be a problem) are virtually inevitable outcomes of all farming activities because of the harvesting of crops and consequent removal of plant material. Structural decline and erosion are possibly also inevitable because of machinery use. Nutrient decline and acidification potentially can be corrected artificially through the application of fertilisers and lime respectively. The socioeconomic issue here is that the cost of rectification may exceed either or both the increased yield to be gained from rectification, and the cost of replacing the land with new land (buying out the neighbour). Farmers are aware of this. Thus, awareness of land degradation occurring on the farm does not mean that it is economically rational for farmers to take ameliorative action.

Economists (eg Quiggin, 1987) have discovered that most ameliorative actions to prevent land degradation are not economically rational, especially when future discounting is applied and the discount rate (interest rate) is high. Fortunately, neither farmers (nor anyone) are economically rational beings. While they can not be expected to do things that are manifestly not economical, the argument put repeatedly here is that economic decisions do not alone determine farming practice.

Further, it could be considered that, if degradation is the loss of productive farm land, then the greatest form of degradation is not salinity or acidity, but the conversion of farm land to non-farm use, usually for urban expansion or rural residential development. The impacts of this for Australian farmers are not only in terms of lost land (which affects Australia as a nation, but doesn’t affect farmers directly), but also in terms of raising the price of land in those areas subject to expansion beyond the reach of farming so that smaller farmers can not expand to deal with cost-prices squeezes and economies of scale. From a sustainable agriculture point of view, we should be concerned about protecting (zoning) our productive farmlands, to protect them from conversion to non-farm use. Whatever attractions rural residential (urban fringe) blocks may have for those people who desire them, they are undesirable from a sustainability point of view. The issue of rural residential blocks causes many other disputes between rural residents and farmers, particularly over issues like pest and weed control, chemical use, odours and noise. This is a complicated issue, and there is potential for creative solutions as well, although they do not appear to be applied in
many cases. However, it does give a different perspective on the question of what is ‘land degradation’, and demonstrates the importance of a social analysis in answering that question.

In terms of other environmental issues, notably water use, farmers are not the only water users. Wasted water in industry and in domestic applications also reduces the water available for environmental flows. Farmers feel that urban users should make a contribution as well.

**Principle 24: The best method of extension is multiple methods.**
One of the more frequent questions raised in extension discourse is what is the best method of extension. The expected answer is usually a singular and simplistic response: facts sheets or farm visits or field days etc. When the diversity of farmers is appreciated, and the socio-cultural basis of farming understood, there can be only one answer – there is no singular best method of extension, multiple methods of extension are required to deliver the message to the diverse range of farmers, and to reinforce the message in different ways.

**Principle 25: Group extension is not a panacea.**
With reduced public expenditures and a concern about private benefits, state governments are having to reduce publicly funded extension services. However, there is still a recognised need for dissemination of an extension message, especially in relation to NRM issues. Group extension has been seen to be an efficient way of communicating that message. Group extension does have many virtues, but it is not a solution to every issue. In the end, each farm is different and farmers use awareness of the differences of their farm as a way of justifying why a certain practice may not be appropriate to them. Individual, one-to-one extension is needed to assist in on-farm issues.

Extension is also a process where the credibility of the person giving the advice is an important factor in the weighting that farmers assign to that advice. Credibility is developed over time through the provision of credible, practical, useful answers that assist farmers in the day-to-day operations. Group facilitators who never provide on-farm advice rarely develop credibility and their ideas are easily dismissed.

Thus, a strong argument can be mounted that group extension requires one-to-one extension, and that the credibility of extension officers in a group setting is enhanced by their one-to-one extension experience.

**Principle 26: Extension is likely to have only a small impact.**
This social understanding of farming and the adoption process creates the realisation that effecting extensive change (large changes and changes to a large percentage of the farming population) is unlikely. This does not mean that extension is ineffective or unsuccessful. It just means that there needs to be realistic expectations about the degree of the change that will occur. When realistic expectations are held, extension has been successful, rather than having been a failure.

**Principle 27: Farmers need to feel valued.**
In terms of natural resource management, Australia is asking its farmers to make a significant personal investment for what is largely a public benefit. Because of notions of stewardship and the concept of good farm management, most Australian farmers are prepared to make their contribution. But they need to know that this contribution is appreciated and valued by the broader community.
Although tax relief schemes do not benefit most farmers (as they have low taxable incomes), and many grant schemes don't necessarily achieve their intended objectives or have implementation and administration difficulties, some form of co-funding is important because it demonstrates to the farming community that the urban community cares, and is prepared to pay for the environmental benefits they ask for. Evaluations of these schemes need to consider the effect of farmer commitment to natural resource management in general, and should not be evaluated strictly against narrow criteria.

**Conclusion**

Farming is a social and cultural activity. Farm management practices are physical manifestations of cultural expression which are loaded with social meanings and significance, they are not solely technical. Farmers want practical advice, but that advice needs to be based on a social understanding. A key aspect of that social understanding is that diversity in agriculture should be conceived of in social, rather than merely in physical or structural terms. Understanding farming from a social perspective will greatly assist in the promotion of sustainable agriculture.
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This chapter looks at extension in terms of the facilitator role and describes how the concept of social capital and a Sustainable Livelihoods Approach (SLA) can offer great advantages in improving the effectiveness of extension and government natural resource management (NRM) programs.

This chapter examines the evolution of government support to landcare practice and the facilitator concept from a national level and highlights the role that facilitators have played in the extension chain. The contentions put forward also provide a rationale and guidance for a reconnection between government and landcare practice communities.

**Background**

During the late 1980s and early 1990s, a number of state departments adopted a landcare model approach targeting NRM outcomes across farming landscapes. The success of these state programs prompted the setting up of the Federal Government’s National Landcare Program (NLP) from 1990, administered by the then Commonwealth Department of Primary Industries & Energy. Facilitator positions were set up as a new form of extension change agent in the late 1980s in a number of states, and later nationally, after the commencement of the NLP.

During the life of the NLP, there have been three phases of delivery using the landcare model based on funding rounds and policy and program changes.

During the first phase, facilitator positions facilitated change processes and coordinated local activities rather than providing ‘top down’ advice as had been the traditional method of extension prior to this time. Initially, they assisted with the development of farmer and pastoral based landcare practice groups and facilitated community development processes using action learning approaches which incorporated social learning and participatory methodologies. Enlisting this ‘bottom up’ approach assisted in ‘creating an environment for people to build community capacity, that is, to voluntarily learn, share information and experiences, trial new ways for improvement, develop on-ground works or new management practice projects, apply these for the long term and encourage others to become involved. This resulted in people collectively building their skills, knowledge and capacity to change, which ultimately has social capital spin-offs for the wider community across each district, town and region’ (National Landcare Facilitator Project, 2007, p2).

The 1995 Decade of Landcare Plan – Mid Term Review highlighted the significant on-ground outcomes during the first phase (Standing Committee on Agriculture and Resource Management, 1995, p3). These included:

- Raising the awareness of land degradation and sustainability issues.

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2 The term ‘landcare practice groups’ is used in this chapter to denote any community-based group involved in natural resource management.
- Building skills in both practice and decision-making processes.
- Adopting improved NRM practices on-farm (Australian Farm Institute, 2004, p12).

The significant achievements in the adoption of improved management practices through skills and knowledge development were not acknowledged in the policy pronouncements leading up to the development of the 1997 Natural Heritage Trust Act, with the then Minister for the Environment stating ‘we must move away from an awareness raising phase to on-ground action’ (Hill, 1996).

The second phase of NLP, from 1997 to 2002, involved a change in federal government policy to target on-ground works that maintained or replenished Australia’s environmental infrastructure (Australian Government, 1997). The newly instituted Natural Heritage Trust (NHT) comprised of a number of programs including NLP, targeted investment towards on-ground works projects focused on ‘public benefit’ outcomes.

While NLP remained focused on farming communities, it lost its ‘farmer focus’ niche as primary production related activities were generally interpreted to be for ‘private benefit’ and usually considered ineligible for funding under NHT. Facilitators thus adjusted and broadened their activities to include supporting on-ground conservation works and project management. Due to the broadened focus NHT provided across all landscapes, facilitators worked with a more diverse range of environmental groups including urban and coastal areas.

The Commonwealth’s 1999 national policy discussion paper on ‘Managing Natural Resources in Rural Australia for a Sustainable Future’, proposed that moving to a strategic approach at the regional scale would build on the effectiveness and needs of the landcare approach (National NRM Taskforce, 1999, p15-16).

Investment was changing to focus primarily on NRM biophysical outcomes and away from the important social processes that contribute to achieving these outcomes. At the end of the second phase, the 2000 NHT Mid Term Review Response stated, ‘While the community focus has been necessary to achieve commitment to the Trust’s objectives, it has resulted in funds being spread over a large number of smaller projects that may have less impact than strategically directed larger projects’ (Australian Government, 2000, p7).

The third phase of NLP, commencing in 2002, involved a shift in federal government policy to a regional delivery model based on strategic regional investment funded through the National Action Plan for Salinity and Water Quality and NHT2 Program. NRM regions set up across Australia targeted on-ground works that were based on accredited integrated NRM plans and investment strategies at a catchment and regional scale for outcomes in resource condition change (Australian Government, 2005, p6-9).

The NLP returned to a separate, ‘stand alone’ program status without the previous constraint of NHT’s ‘public benefit’ criterion. Operating alongside NHT2, it targeted all landcare practice groups that had a focus on primary production and enlisted the landcare model to build social capital for sustainable farm practice outcomes. The role of facilitation was seen as an important mechanism for this to progress.

The State Landcare Coordinator Network was established with a focus on practice change in the agricultural sector. With agricultural and NRM backgrounds, they provided guidance to facilitators at regional, sub catchment and local levels as well as landcare practice groups, enabling the development of
action learning projects. These were particularly successful where social, economic and environmental objectives were integrated.

Case studies (for example DAFF 2007) have suggested that one of the key factors for the success of engagement ultimately leading to sustainable farm practice outcomes has been the all-encompassing approach. Multiple objectives such as viable farm businesses, building skills and knowledge, environmental protection and enhancement, and supporting social fabric such as community groups and networks, are all recognized in the activities undertaken.

Yet, the shift in focus by government during NHT2 to strategic regional investment through NRM regions meant that national policy and program designers tended to lose touch with the significance of the landcare model approach and the building of social capital to achieve sustainable farm practice outcomes. This was partly due to the different philosophies between NHT and NLP delivery. This hiatus in focus at higher levels has existed for some time and the framing of social capital building objectives within more recent Australian NRM program and structural investments has at times been inadequate. Within the regional delivery model and the targeting of NRM investments, the social capital building strategies through facilitation extension were incorporated into the Decade of Landcare Plan (Commonwealth of Australia, 1991) while other NRM programs diminished. The consequence is that, in some NRM regions, the previously accrued social capital and the ability of landcare practice groups and networks to build on this community experience is increasingly under threat (Zirkler and Prior, 2006). However, a number of NRM regions have recognized the benefits of supporting community development processes with producer groups to achieve on-ground sustainable farm practice outcomes and have supported this process, particularly through the NLP.

Since 2008, a new fourth phase has emerged as the Australian Government develops and implements its Caring for our Country program. The NLP is now integrated within Caring for our Country and sustainable farm practices are one of the six key priorities. It is important that in making future investment decisions to achieve the six priority outcomes, there is a clear understanding of the benefits of social capital, how it contributes to achieving long term outcomes, and how to enhance it.

Facilitation, operating within a landcare type model, is a proven method of building social capital that provides an effective conceptual approach for those who facilitate farmer and pastoral groups, which remains relevant today. Building social capital in this manner significantly contributes to achieving sustainable farm practices.

**Achieving outcomes using the Landcare model to build social capital**

Facilitator roles across farming landscapes primarily focus on community development processes for sustainable farm practice outcomes, but a major spin-off was the enhancement of social capital (or social capacity). This impact contributed significantly to the success and strength of the landcare model and ultimately the on-ground outcomes achieved.

To understand the significance of this, it is necessary to explain the links between social capital and sustainable farm practices. ‘Social capital’ refers to the features of social organisation and social interaction such as networks, norms and trust, which increase a society’s productive potential. Social capital can help build human capital and vice versa (Coleman, 1988). Within the context of sustainable farm practices, social capital would refer to those aspects of social organisation that lead to better natural resource management outcomes.
Much of the research conducted on social capital in Australia has been located within urban communities, both within metropolitan and rural areas (for example Bullen and Onyx, 2005). Issues examined within social capital studies often involve those related to community health such as feelings of trust, safety and levels of crime. In Australia, until relatively recently (for example Colliver, 2006; Coutts et al., 2005; Thompson and Pepperdine, 2003; Pepperdine, 2000), the concept of social capital has not been as systematically applied to regional groups or rural communities as they confront the challenges of sustainable natural resource management. Nevertheless, within the developing world, the concept of social capital and local institutional development has been frequently explored in relation to agricultural development and sustainable natural resource management over the last few decades (for example, Esman and Uphoff, 1988; Ostrom and Ahn, 2003). Elements of social capacity are incorporated within the National Natural Resource Management Capacity Building Framework developed by the Natural Resource Management Ministerial Council (NRMMC, 2002).

It is as important to explicitly highlight the links between the various components of social capital and how they may contribute to better NRM, as it is to commence to develop measurable indicators for these components. It has been the experience of the authors that, in the absence of this type of analysis, there has been a tendency to dismiss social capital as merely an expression of social well-being and happiness which makes little direct contribution to NRM. Social capacity indicators can be described, measured and quantified (Bullen and Onyx, 2005; Grootaert and Van Bastelaer, 2002; Grootaert et al., 2004).

Targeted NRM investments are more likely to build social capital when social capital building processes and indicators are explicitly built into project funding guidelines and criteria, as well as project outcomes and performance indicators. Ideally, facilitators would seek to build these components into their work with groups. Behavioural indicators of social capacity and NRM also translate into useful strategies or outcomes for facilitators.

The growing literature on social capital has identified a number of important themes and indicators including core concepts (Bullen and Onyx, 2005). Studies of groups involved in NRM have identified additional issues (Prior, 1996, 2002) briefly outlined in the below table.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Sustainable Farm Practice Implications</th>
<th>Indicators (facilitator strategies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in networks: Central to the concept of social capital is the existence of interlocking networks of relationships between individuals and groups.</td>
<td>Participation in networks allows individuals to take advantage of the opportunities provided by group membership including co-learning, attracting larger bundles of resources and services, sharing experiences and the outcomes of on-farm adaptive trials</td>
<td>Number of and quality of horizontal linkages (involving provision or sharing of resources, exchange of information, formation of partnerships etc.) formed with other groups at the same functional level or similar geographic area (e.g. other Landcare or similar groups; schools, local government, agribusiness) Number and quality of vertical linkages formed with other groups at a higher level (e.g. local and state government agencies, Universities, and NRM regions).</td>
</tr>
<tr>
<td>Reciprocity: Reciprocity, or the</td>
<td>Collective actions such as co-</td>
<td>Number and variety of cooperative</td>
</tr>
<tr>
<td>Expression of mutual relations (giving and receiving) between individuals or groups to each other, is also at the centre of social capital.</td>
<td>Operative tree planting, sharing of valuable information and knowledge, loans of equipment, and donations of time and resources, are all based on the principle of reciprocity.</td>
<td>Group works or activities. Extent of sharing of knowledge (for example within property management planning or sub-catchment planning workshops and field days, production benchmarking and cooperative learning activities).</td>
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<tr>
<td><strong>Trust:</strong> Trust is based on the expectation that others will act in mutually supportive ways, or at least will do no harm. Trust engenders a willingness to take risks in a social context.</td>
<td>Trust is a critical issue with regard to natural resource management within participating communities. Once achieved it demonstrates a more mature level of social capital.</td>
<td>Sharing of personal or potentially sensitive information within the group during training or extension activities such as Property Management Planning, sub-catchment planning, production benchmarking, or during farm walks. Exhibitions of trust and the development of relationships between groups and NRM regions demonstrated by such actions as the use of NRM region’s extension and advisory services. Transfer of management responsibility for programs, projects and funding allocation from NRM regions to community groups and networks.</td>
</tr>
<tr>
<td><strong>Social Norms:</strong> Social norms are the standards and patterns of behaviour set by the group or network.</td>
<td>The advantage of positive social norms in relation to NRM is that where groups set high standards of natural resource management behaviour, then there is some compulsion for the group members to at least meet these standards or improve upon them. The group may impose formal or informal sanctions upon those individuals who do not observe the community groups accepted standards of behaviour.</td>
<td>Individual and community NRM works are well-maintained. Group monitors and audits the timeliness and quality of individual’s NRM works. Group rewards appropriate NRM behaviours and penalizes inappropriate NRM behaviours. Innovative NRM project proposals.</td>
</tr>
<tr>
<td><strong>Proactivity:</strong> A critical outcome of the development of social capital is that of personal and collective action.</td>
<td>The advantage of proactive groups and communities are that they are likely to demonstrate motivation and continually ask questions, seek opportunities, and take actions that will lead to better NRM outcomes.</td>
<td>Innovative NRM project proposals. Group strategically plans at the group level, and monitors and evaluates plan implementation.</td>
</tr>
<tr>
<td><strong>Problem or issue identifiers:</strong> High social capital groups or communities have the ability to identify issues or problems at the early stages of their development, then funds and support services can be directed towards addressing these problems.</td>
<td>Where community groups can identify problems or issues at the early stages of their development, then funds and support services can be directed towards addressing these problems. Groups identify and work to address problems or issues in the early stages of their development, or where local awareness or...</td>
<td></td>
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</tbody>
</table>
early stages of their emergence, or even predict future issues or problems before they occur. be allocated to the appropriate direction. recognition of issue is still low e.g. weeds awareness, biodiversity conservation, grazing management. Project proposals seek to address new issues.

| Local resource mobilisers: Groups with high social capital have the ability to mobilise local resources. | Clearly the advantages of a local resource mobilisation with regard to natural resource management are that investments made by governments and other organisations may be multiplied many times once local resources are mobilised. | Level of group contributions in cash or in-kind to projects. Investment multipliers for each dollar of NRM region’s investment. |
| Learning from mistakes and scaling up and extending best practices: High-capacity groups and organisations have the ability to learn from their mistakes, identify successful strategies and technologies, and scale up and extended these strategies and technologies throughout the group and to others outside the group. | Within NRM there is a continual need to improve upon old strategies and technologies and develop new ones. | Evidence of lessons learnt, group learning, successful technologies and best practices being accumulated and documented. Successful technologies, innovative practices and lessons learnt being extended both within the group and outside the group. Field days, seminars and trainings conducted by group for members and non-member |

Those facilitators who have worked with successful landcare practice groups will likely recognise many of these components of social capital. Within this experience there has also been a recognition of this link between social capital and improved NRM.

**Sustainable Livelihoods Approach to Development**

It has long been recognised across community landcare practice groups and networks that natural resource and environmental outcomes must also be linked to economic and social outcomes (Tasmanian Landcare Association, 2002; Landcare Taskforce, 2002; DAFF, 2003; Agriculture & Food Policy Reference Group, 2006, p147). The social dimensions of landcare have also been documented (Cary and Webb, 2000). These three components of natural resource investment: the environmental, economic, and social have been enshrined in the National Strategy for Ecologically Sustainable Development (COAG, 1992) and are sometimes termed the ‘triple bottom line’. Triple bottom line objectives are now embraced by state and federal policy (e.g. Thompson and Heffer, 2000) and are viewed collectively as reflecting farmers’ management decision making environments and their livelihood needs.

Nevertheless, the triple bottom line concept does not provide an adequate analytical tool either for describing the complexity and depth of the community development experience enlisting the landcare model, or for providing a conceptual framework necessary to enable facilitators to undertake the types of development needed by their client groups.

A more useful conceptual framework for the needs of facilitator extension is provided by the Sustainable Livelihoods Approach to development. Over the last decade, the Sustainable Livelihoods Approach (SLA)
A sustainable livelihood approach incorporates:

*...the capabilities, assets (including both material and social resources) for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.* (Dept for International Development, 1999).

The SLA holds that community development must be holistic in its approach, whether it is related to health, environmental or economic outcomes. The SLA attempts to link an understanding of the development problems confronting the family, group or community with the resources it owns or can access. It provides a conceptual framework that recognise that any group or community has seven capital assets. These capital assets are: natural, financial, human, social, physical, political and spiritual.

The SLA recognises that investments targeted at one capital area are more likely to be effective if the other capital assets are strong. Alternatively, investments in a particular asset area may be ineffective if one or more of the other capital assets are poor. For example, investments in natural resource extension are less likely to be effective where groups or individuals are economically unviable. Similarly, investments in human capital (e.g. farmer training to increase agricultural production) are less likely to be effective when the natural resource base is poor. Livelihoods objectives are necessarily holistic. Thus, when taking a sustainable livelihoods approach, integrated NRM strategies must also be explicitly concerned with social, political and economic perspectives.

If utilised by producer groups and their facilitators, the SLA is best employed in conjunction with an appropriate Participatory Monitoring and Evaluation system in order to help groups to reflect upon, assess and build their own capital assets. One of the strengths of such an approach is that the natural resource and environmental assets are seen as integrated into the livelihoods necessary for survival. Thus, a SLA perspective explicitly addresses the concern that environmental or NRM activities may be seen as external to productive agricultural activities.

The following table (below, adapted from Prior, 2002) illustrates some of the components of each of the seven capital assets and illustrates activities that may be undertaken by landcare practice groups and facilitators which may maintain or enhance each asset.

**Components of the Seven Capital Assets and some Maintenance or Enhancement Activities:**

<table>
<thead>
<tr>
<th>Capital Assets</th>
<th>Examples of Components</th>
<th>Activities relevant to Landcare Groups and Facilitators to maintain or build capital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Capital</strong></td>
<td>Soil, water, vegetation, Biodiversity Catchment processes Ecosystem processes Landscapes Cropping and grazing land</td>
<td>Undertake integrated natural resource management activities Use participatory processes to collect resource condition and trend monitoring data Undertake rehabilitation works Develop sustainable management systems</td>
</tr>
<tr>
<td><strong>Physical Capital</strong></td>
<td>Infrastructure Machinery</td>
<td>Construct and maintain relevant infrastructure e.g. fencing, water delivery system, all weather</td>
</tr>
<tr>
<td>Social Capital</td>
<td>Manufacturing and processing facilities</td>
<td>roads, conservation farming equipment</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Cooperative behaviours</td>
<td>Conduct group workshops</td>
<td></td>
</tr>
<tr>
<td>Social linkages</td>
<td>Encourage cooperative and collaborative behaviours (e.g. property management planning &amp; sub-catchment planning workshops)</td>
<td></td>
</tr>
<tr>
<td>Community leadership</td>
<td>Encourage internal and external community linkages</td>
<td></td>
</tr>
<tr>
<td>Consensus seek behaviours</td>
<td>Remove social barriers</td>
<td></td>
</tr>
<tr>
<td>Effective conflict resolution strategies</td>
<td>Recognise and document lessons learnt at the group &amp; network level</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Political Capital</th>
<th>Government (local, state, federal) support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linkages to regional natural resource management organisations (e.g. Catchment Management Authorities)</td>
<td>Seek political support</td>
</tr>
<tr>
<td>Access to political decision making system</td>
<td>Forge horizontal and vertical linkages with other groups</td>
</tr>
<tr>
<td>Community support or conflict status</td>
<td>Policy support for development needs and processes at all levels of government</td>
</tr>
<tr>
<td>Appropriate government policy framework at the local, regional and national levels</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial Capital</th>
<th>Reserves of wealth (cash or in-kind) access to credit and banking system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market availability and access</td>
<td>Improve wealth reserves (cash or in kind)</td>
</tr>
<tr>
<td>Non-farm investments</td>
<td>Improve access to credit and banking system</td>
</tr>
<tr>
<td></td>
<td>Encourage access to credit and banking system</td>
</tr>
<tr>
<td></td>
<td>Encourage savings of project profits for future contingencies</td>
</tr>
<tr>
<td></td>
<td>Funding applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human Capital</th>
<th>Knowledge and educational environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills</td>
<td>Training needs analyses</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Conduct of training and education programs</td>
</tr>
<tr>
<td>Leadership</td>
<td>Introduce Participatory Monitoring and Evaluation strategies</td>
</tr>
<tr>
<td></td>
<td>Recognition and acknowledgment of lessons learnt at family level</td>
</tr>
<tr>
<td></td>
<td>Improve access to health/counselling system</td>
</tr>
<tr>
<td></td>
<td>Build and recognise empowerment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spiritual Capital</th>
<th>Concepts of spiritual health relevant to indigenous and non-indigenous groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional beliefs and practices</td>
<td>Identification of linkages between spiritual and natural capital (e.g. landscape and amenity values; ‘love for the land’)</td>
</tr>
<tr>
<td></td>
<td>Recognition and documentation of traditional beliefs and practices</td>
</tr>
<tr>
<td></td>
<td>Facilitate community and tribal support</td>
</tr>
<tr>
<td></td>
<td>Education of youth in traditional beliefs and practices</td>
</tr>
<tr>
<td></td>
<td>Incorporation of traditional beliefs and practices into social (group) norms</td>
</tr>
</tbody>
</table>

Partners in Sustainable Production, a case study analysis of 14 successful Australian landcare practice groups, illustrates how each group attributed their success to building the types of capital assets included
within the SLA framework (DAFF, 2007). Collectively, these groups mentioned the development of all seven capital assets as being important to them and as key contributors to their success.

The SLA has also gained momentum within International Landcare. For example, the South African LandCare Program is explicitly incorporating the SLA within its national policy framework (Prior and Maltitz, 2004) and has developed monitoring tools to assess livelihoods outcomes at the project and program levels for both evaluation and funding purposes (Prior, 2002).

**Effective pathways to the future**

It is important for future efforts to focus on three areas:

- Continuing to build social capital for sustainable farm practices;
- Developing better conceptual frameworks, such as provided by the SLA, to guide facilitation practice and group development; and
- Providing a policy environment which enables both of the above to occur.

Social capital building is an important objective for NRM extension and it is an area where community group action can demonstrate considerable success.

In building effective pathways to the future, it is important to:

- Recognise the key components of social capital relevant to NRM and develop descriptors and indicators for each.
- Explicitly incorporate social capital building strategies into project funding guidelines and design criteria, and project outcomes and performance indicators utilised by NRM regions.
- Train facilitators in social capital building strategies and assessment.
- Support community groups and networks in identifying and building their social capital assets.
- Explicitly incorporate social capital outcomes into national and state NRM policy frameworks and targets.

To assist with a broader understanding of what has been achieved and how this has occurred, it would be valuable to:

- Document the lessons learnt from the experience so far to inform institutional learning processes within both community groups and networks as well as within federal and state policy.
- Develop targets, standards and performance indicators which accurately reflect social capital building processes and outcomes that are explicitly identified within Federal and state policy.
- Explicitly incorporate these targets and standards into project design and funding criteria.
- Identify clear incentives and rewards that would assist landcare practice groups to undertake group-level plans and projects resulting in landscape level change.

Broadly there are five future challenges for policymakers seeking to enhance community involvement in NRM.

1. Appropriate funding, institutions, strategies and skilled facilitators who are available to continue to build social capital for NRM.
A more rigorous analysis of the Australian experience with respect to the contribution of social capital to NRM. This analysis could seek to identify easily adopted and proven strategies which can be utilised by facilitators in their roles.

Identify effective performance indicators for describing and measuring social capital outcomes to be used within regional NRM plans and funded projects.

Develop a conceptual and analytical framework for better sustainable farm practice within the livelihoods strategies of farmers.

Understand how natural capital and the other capital assets interact with each other in helping to maintain rural livelihoods, resist external shocks, and lessen vulnerability at both the household and group level. The SLA provides us with a useful starting point for developing this framework. It also offers a valuable extension tool for facilitators to help farming families and groups undertake self-analysis of their NRM-related livelihood strategies for both individual households and the group.

Conclusion

Extension can take many forms and is not necessarily a direct transfer of information from the source to the user. It can also be a facilitated process that engages on the user’s terms and is part of a community-driven approach. There are options available that can strengthen the community approach to NRM as well as enhance government investment and accountability.

The concepts of social capital and sustainable livelihoods have the potential to effectively underpin national efforts in sustainable farm practice across Australian landscapes. Investment in the employment and training of facilitators with conceptual and practical livelihood enhancing strategies and tools can further the development of sustainable farm practice. The development of robust social networks can assist in the challenges of rural social decline, natural resource management issues and the need for rapid local adaptation of agricultural systems to climate change into the future.

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Much of the focus of government policy for land and water conservation is on changing the behaviour and management practices of rural landholders. However, these policies often neglect the large body of evidence about what it takes to achieve such changes. This paper is a selective review and interpretation of the literature conducted by a team from three relevant disciplines: agricultural and resource economics, rural sociology and social psychology.

Adoption is based on subjective perceptions or expectations rather than on objective truth. These perceptions depend on three broad sets of issues: the process of learning and experience, the characteristics and circumstances of the landholder within their social and economic environment, and the characteristics of the practice. These three elements are considered in detail in the following three sections. The last section discusses the implications of the review for various stakeholders: researchers, extension agents and policymakers.

The process of learning and experience to inform adoption decisions

Adoption is a learning process with two distinct aspects. One is the collection, integration and evaluation of new information to allow better decisions about the innovation. Early in the process, the landholder’s uncertainty about the innovation is high and the quality of decision making may be low. As the process continues, if it proceeds at all, uncertainty is reduced and better decisions can be made (Marra et al., 2003). At least for relatively simple innovations, a landholder’s probability of making a good decision – one that best advances their goals – increases over time with increasing knowledge of, and perhaps experience with, the practice.

The other aspect of learning is improvement in the landholder’s skills in applying the innovation to their own situation (Tsur et al., 1990). Most farming innovations require a certain level of knowledge and skill to apply them in practice and there can be a wealth of choices in the method of implementation (e.g. timing, sequencing, intensity, scale). Through learning-by-doing, as well as by reading, listening and watching, the necessary skills can be established and enhanced.

The dynamic learning process has been broken down into stages or phases in a number of different (though similar) ways. One typical description of the sequence follows:

1. Awareness of the problem or opportunity.
2. Non-trial evaluation.
3. Trial evaluation.
Adoption.
Review and modification.
Non-adoption or dis-adoption.

Prior to trialling, the landholder’s assessment of a technology or practice relies strongly on information from outsiders. At this stage, social and information networks would be important influences on the decision to proceed to trial, but after trialling has commenced, personal experience is likely to be the main influence on further decisions (Dong and Saha, 1998; Marsh et al., 2000).

There is no guarantee that a landholder’s subjective beliefs will ultimately lead them to a final decision that is actually the one most likely to best achieve their goals. Reasons include that some conservation practices are relatively complex and that the benefits and costs of some conservation practices are not clearly observable. An example of a prominent conservation-related learning failure is provided by Pannell et al. (2001). They noted that many landholders (as well as scientists and policymakers) came to believe that successful prevention of dryland salinity on a farm would generally depend on cooperation from neighbours. While this is true in some cases, in many it is not.

Social, cultural and personal influences on adoption decisions

Although, for convenience, we will often refer to the (singular) landholder or farmer, the reader should bear in mind that for many decisions, particularly larger ones, the decision making unit can be a team, so that individual perceptions and goals influence a consensus rather than leading directly to a decision.

Phillips (1985) found that a typical dairy farmer may embark on anything up to 30 learning projects in one year. A landholder (or landholding family) has limited learning time, and each project must compete with the others for that limited time. A minor decision will receive minimal information time, sufficient to achieve an acceptable solution, which is not necessarily the best possible solution. For more important decisions, the dairy farmers in Phillips’ (1985) study sought information from up to 40 people.

The goals of landholder families or individuals are heterogeneous and can include the following: (i) material wealth and financial security; (ii) environmental protection and enhancement (beyond that related to personal financial gain); (iii) social approval and acceptance; (iv) personal integrity and high ethical standards; and (v) balance of work and lifestyle.

One issue of longstanding discussion and debate has been the relative importance of economic factors as drivers of adoption. The debate started early, with contributions by some of the first researchers in the area (Griliches, 1960; Havens and Rogers, 1961). To this day, not surprisingly, economists tend to put greater emphasis on the influence of economic factors than do sociologists. In our judgment, there are several important influences on adoption, and economic benefit (broadly defined) is one of them.

When adoption is viewed as a social process, it becomes clear that one should expect adoption behaviour to be influenced by the personality of the decision maker, their social networks, personal circumstances and family situation. It seems that in the empirical literature every measurable characteristic of farms and farmers has been found to be statistically related to some measure of adoption of some innovation (e.g. Rogers, 2003). This reflects the heterogeneity of adoption study settings, the very large size of the literature, and the variable quality of empirical studies (as noted, for example, by Lindner, 1987; Vanclay, 1986).
Personality may potentially play a major part in the style of decision making used by landholders, though because of measurement complexity, it has rarely been studied. Important personality traits may include the ‘locus of control’ (an individual’s degree of belief in their own ability to influence the circumstances of their lives), attitude to risk, and introversion-extroversion. Shrapnel and Davie (2001) examined the personality profile of a sample of Queensland graziers. Of 14 general personality styles expected in the wider community, graziers were found to generally fall into a limited suite of five styles. ‘Our findings indicate that they are indeed a special breed, with characteristic[s] that set them apart from members of an urban community’ (Shrapnel and Davie, 2001, p177). These characteristics include a tendency to introversion and discomfort within group situations.

A widely discussed and longstanding concept is categorisation of people across a spectrum from innovators to laggards (Rogers, 2003). People do indeed have personal characteristics that influence their adoption decisions fairly consistently. However, the concept of adopter categories suggests that innovativeness is a personal characteristic that people apply equally to every adoption decision that they make. This is not so. People who adopt one innovation early are not necessarily early adopters of all innovations. It may be that the innovation in question is particularly attractive in their individual circumstances, whereas the same decision maker when considering a different innovation that is less attractive to them than to others may behave as a slow adopter or non-adopter.

Several aspects of the linkages between landholders and others may affect the adoption decision:

- The existence and strength of landholders’ social networks and local organisations (e.g. Sobels et al., 2001) and membership of organisations such as catchment groups;
- The physical proximity of other adopters (e.g. Hagerstrand, 1967; Ruttan, 1996);
- The physical distance of the property from sources of information about the innovation is important (e.g. Lindner et al., 1982);
- A history of respectful relationships between landholders and advocates for the innovation, including scientists, extension agents, other landholders and private companies (e.g. Marshall, 2004, 2005; Anderson, 1981);
- Ethnic and cultural divisions within a landholder population (Stoyles, 1992);
- Extension, promotion and marketing programs by government workers and/or the private sector.

Demographic and situational variables are judged to be important because they will influence the goals of the landholder and potentially influence the capacity to adopt an innovation. Some examples of these variables are listed below.

- Lack of financial viability would be expected to inhibit adoption of innovations by reducing the capacity to adopt, rather than the benefits of adopting (Cary et al., 2001).
- Access to and reliance on off-property income may increase financial security but also may decrease the tendency to adopt some practices that would involve greater management demands (Kebede, 1992).
- Property size is often, but not always, related to innovation adoption – larger areas tend to increase the overall benefits of adoption of beneficial innovations and so increase the likelihood of adoption.
- The evidence of a relationship between adoption and age, stage of life or experience is mixed. The most extensive meta-review of socioeconomic factors influencing adoption found both positive and negative relationships between age and adoption (Rogers, 2003).
There can sometimes be relationships between education and the adoption of conservation practices (e.g. Feder et al., 1985), although the evidence is again somewhat mixed (e.g. Marsh et al., 2006).

The reason for holding land (e.g. agricultural production vis-a-vis lifestyle) can influence adoption decisions.

Attributes of practices that affect their adoption
We consider that there are two broad categories of characteristics of a technology or practice that drive its adoption or non-adoption: its relative advantage and its trialability.

Relative advantage
Relative advantage means ‘the degree to which an innovation is perceived as being better than the idea [or practice] it supersedes’ (Rogers 2003, p. 229). Relative advantage depends on the landholder’s unique set of goals and the biophysical, economic and social context where the innovation will be used. Relative advantage is the decisive factor determining the ultimate level of adoption of most innovations in the long run.

Relative advantage depends on a range of economic, social and environmental factors, such as:

- The short-term input costs, yields and output prices of the innovation or of other activities that it affects.
- The innovation’s impact on profits in the medium to long term.
- The innovation’s impacts on other parts of the system within which it will be embedded.
- Adjustment costs involved in adoption of the innovation.
- The innovation’s impacts on the riskiness of production (Marra et al., 2003; Abadi Ghadim et al., 2005).
- The innovations compatibility with a landholder’s existing set of technologies, practices and resources (Kaine and Lees, 1994).
- The innovation’s complexity (Wilkinson, 1989).
- Government policies.
- The cost or profitability of the traditional practice which the innovation would replace.
- The compatibility of a practice with existing beliefs and values.
- The impact of the innovation upon the family lifestyle.
- Self-image and brand loyalty.
- The perceived environmental credibility of the practice.

The crucial role of ‘relative advantage’ as a driver of adoption and the importance of profit as one of the drivers for most farmers has strong implications for conservation practices. Among those farmers with a focus on profit, the farm level economics of a proposed conservation practice will be important. Those conservation practices that are not profitable at the farm level will tend to be adopted only by farmers with stronger conservation goals. Unprofitable conservation practices are likely to be more widely adopted if they are able to generate conservation benefits when adopted at a small scale. Conservation land uses that require adoption at large scale to generate conservation benefits will probably not be adopted sufficiently if they are perceived to be less profitable than the land uses they replace.
Some conservation-related practices have been adopted very widely and over very large areas in Australia, most notably reduced tillage and liming of acid soils (e.g. Mues et al., 1998). These are practices that contribute positively to farmers’ economic goals in the medium term in many locations. This highlights that the relative advantage that drives adoption may not necessarily relate to the environment. Indeed, environmental benefits can often be most readily achieved by developing conservation practices that provide a commercial advantage to farmers.

In contrast to the above examples, the scale of adoption of perennial plants for salinity abatement in low to medium rainfall areas has been much less than needed to significantly reduce the salinity threat (e.g. ABS, 2002; Kington and Pannell, 2003). A recent comprehensive review of the economics of salinity abatement measures available to grain growers provides a convincing explanation for this, as there were few examples of locations and practices where the economics favoured high levels of adoption (Kingwell et al., 2003).

Other factors that tend to reduce the relative advantage of at least some conservation practices are as follows:

- High establishment costs.
- Long time lags between establishment and environmental benefits.
- Riskiness and uncertainty about benefits.
- Complexity of the practice.
- Spillovers from neighbours being perceived as the source of environmental degradation.

**Trialability**

Earlier we discussed a number of social, cultural and personal factors that influence learning about an innovation. Here we consider characteristics of the innovation itself that affect how easily the landholder can learn about its performance and optimal management – in other words, the trialability of the innovation. Trialability does not merely refer to the ease of physically establishing a trial but encompasses factors that influence the ability to learn from a trial, such as the complexity of the issue being addressed.

Trialling an innovation provides information that reduces uncertainty about the relative advantage of the practice. Thus, trialling is important because it can increase the probability of the landholder making a correct decision. Trialling also provides an opportunity for the landholder to learn the skills needed to apply the innovation. The small-scale nature of a trial allows the landholder to avoid the risk of large financial costs if the practice turns out to be uneconomic or fails due to inexperience.

The trialability of a practice is affected by a number of factors, including those listed below. Note that several of these factors were also listed as influences on relative advantage. These factors influence adoption through both channels.

- The divisibility of an innovation refers to its use on a small scale or the use of a sub-component of an innovation package (positively related to adoption) (Leathers and Smale, 1992);
- The observability of results from a trial (positive);
- The time lag between adoption and eventual benefits (negative);
- The complexity of an innovation (negative);
The cost of undertaking a trial (negative);
Risks of trial failure (e.g. due to threats such as drought, diseases, pests and establishment failure) (negative);
Quality of trial implementation (positive);
Similarity in behaviour of the innovation to a familiar practice (positive), allowing the landholder to extrapolate more readily from a small number of observations of the new practice (Abadi Ghadim et al., 2005);
Perceived spillovers from neighbours (negative).

Implications for research and extension
We provide the following suggestions for biophysical scientists to help them achieve greater adoption by landholders of conservation practices being researched (based on Marsh, 1998).

Be conscious of the type of practices that landholders adopt more readily – those with high relative advantage and high trial ability. Appreciate that landholders have legitimate reasons for non-adoption.
Encourage a participatory process. Working with landholders force researchers and extension workers to recognise that their own goals may be different to landholders’ goals, and reduces the risk of them making incorrect or over-simplified assumptions about what landholders’ goals really are. Such interaction also increases landholders’ knowledge of the research and their ownership of, and faith in, the results.
Look constructively at what landholders are doing already. Work with them where possible rather than against them. This suggestion acknowledges the importance of local knowledge in landholders’ decision making and the importance of respecting their personal goals and perceptions.
Adoption of conservation practices by landholders is not solely a biophysical issue, it is also an economic, social and psychological issue, so biophysical researchers can benefit from working closely with economists, sociologists and psychologists, from an early stage in the project.

Given the importance of trialability for adoption of an innovation, it may be useful for researchers and extension agents to consider ways in which landholder learning from trials can be enhanced. One possibility suggested is to provide information about the trial performance of familiar reference land uses or practices that are as similar to the innovation as possible, in conjunction with information about the performance of the innovation. It may be feasible to facilitate physical observation, or at least present results of physical measurements, of important processes that are not readily visible (e.g. groundwater processes). Perhaps it is possible to provide rules of thumb about final yields based on the early growth rates of plants that have long lags before harvest (e.g. woody perennials). Similarly, where a novel land-use requires large-scale adoption to achieve environmental benefits, ways to predict those benefits based on performance in small scale trials may be helpful.

A criticism of traditional extension is that it viewed the extension process primarily as a matter of communication. Lack of adoption was blamed on a failure of the extension communication process. The solution was to better target extension and to improve the methods of information delivery. The assumption was that farmers were information deprived and relatively passive recipients of knowledge. In reality, farmers have excessive information (e.g. from consultants, banks, accountants, agronomists, agribusiness firms, other landholders), some of which is conflicting, and they are almost never passive recipients. Recognising its place within this complex web of information sources, extension needs to be more focused on credibility, reliability, legitimacy and the decision making process. Features of current
conservation-related extension that mitigate against the development of credibility include: short term funding, rapid turnover of staff, the youthfulness and inexperience of many staff and the lack of technical farming expertise of many staff.

Even with the most expert and persuasive extension, landholders are not likely to change their management unless they can be convinced that the proposed changes are consistent with their goals. Therefore, expectations about the extent of change that is likely to result from extension need to be realistic. Large changes made by large numbers of landholders are not likely to be attributable to extension in most cases. For one thing, landholders and their lands are highly heterogeneous. Any given practice only advances the goals of some landholders, and often only on some of their land.

It is likely that the main contributions of extension will be through raising awareness and, to some extent, changing perceptions of the relevance and performance of an innovation. It is much more difficult (and sometimes ethically contentious) to change the goals of people. It seems that the Landcare Movement in Australia has increased the emphasis given to conservation goals by landholders, but the extent of increase has been modest for most landholders.

Extension is unlikely to persuade landholders to make greater use of a practice with which they already have personal experience, unless the extension provides new information about a change that increases the attractiveness of the innovation (e.g. new information about how to better implement the innovation, or about new incentive payments to encourage adoption).

Another important issue for extension (as for science) is that it does not have automatic legitimacy and credibility – these have to be earned. The key determinant of an adviser’s credibility to a farmer is trust. Trust is, in turn, strongly related to the extent a farmer believes that an adviser understands and respects the goals of the farmer.

We note that, while group extension approaches are undoubtedly useful, the swing from individuals to groups in recent years may have gone too far. For example, the introverted personality profiles of graziers described in the work of Shrapnel and Davie (2001) indicate the continued importance of one-on-one extension. Noting the importance of credibility in effective extension, Vanclay (2004, p221) observed that, ‘Credibility is developed over time through the provision of credible, practical, useful answers that assist farmers in [their] day-to-day operations. Group facilitators, who never provide on-farm advice, rarely develop credibility and their ideas are easily dismissed.’

A history of valuable advice relevant to a landholder’s goals is probably the single most important source of credibility, but it can be enhanced to some extent by a wide range of factors, including: (i) authority and technical expertise of the extension agent; (ii) perceived similarity of the extension agent to their audience; (iii) local profile of the extension agent (e.g. local residence); (iv) communication skills of the extension agent; (v) personal relationships between the extension agent and landholders; and (vi) extension agent acknowledgement of/empathy with the circumstances and problems of landholders.

Adviser credibility and trust is a valuable commodity, but it is only earned slowly. Adviser credibility and trust can be easily lost by the support of an innovation or practice clearly unsuited to local circumstances, or through the evangelical promotion of a practice that is clearly in conflict with the goals of landowners. In the past two decades, the role of government extension agents in many states has changed away from that of supporting landholders in making good decisions to achieve their own goals towards encouraging
landholders to make decisions that achieve outcomes for the public good. In many situations, this has the potential to reshape the social contract between adviser and landholder. The importance of this changed social relationship is not recognised by the relevant public agencies, which publicise their programs using the rhetoric of community development, yet place clear requirements for technology transfer outcomes upon their agents.

**Implications for policy and for regional bodies**

Some government officers express frustration at the lack of adoption by landholders of conservation practices and call for additional social research to better understand adoption. Sometimes it can be helpful to better understand the adoption of specific practices, but the influences on adoption in general have been studied intensely and we believe that they are sufficiently well understood. Rather than more research into adoption, the more pressing need is to apply what is already well established in the adoption literature.

If a practice is not adopted in the long term, it is because landholders are not convinced that it advances their goals sufficiently to outweigh its costs. A consequence of this is that we should avoid putting the main burden for promoting adoption onto communication, education and persuasion activities. This strategy is unfortunately common but is destined to fail if the innovations being promoted are not sufficiently attractive to the target audience. The innovations need to be ‘adoptable’. If they are not, then communication and education activities will simply confirm a landholder’s decision not to adopt, as well as degrade the social standing of the field agents of the organisation. Extension providers should invest time and resources in attempting to ascertain whether an innovation is adoptable before proceeding with extension to promote its uptake.

For some environmental issues, the real challenge is to find or develop innovations that are not only good for the environment but also economically superior to the practices they are supposed to replace. If such innovations cannot be identified or developed, there is no point in falling back onto communication. Promoting inferior practices will only lead to frustration for all parties.

Sometimes unattractive practices can be made sufficiently attractive by the provision of financial incentive payments (e.g. through economic policy instruments). However, it is important to be realistic about the potential of this approach. In some cases, the level of payment required to achieve sufficient adoption would be more than can be justified by the resulting environmental benefits (e.g. Pannell 2001). In some situations, the most sensible strategy is not to attempt to encourage uptake of existing technologies or systems, rather, it may be more sensible to attempt to develop better practices (more effective and/or more adoptable), or it may be that research and policy needs to address the task of living with the problem.


**References**


Past and Present History of Extension in New Zealand
Terry Parminter

This chapter provides an overview of the New Zealand experience of extension from the 1800s, which is followed by a chapter on the role of extension in improving natural resource management in New Zealand.

Outline of development of extension services in NZ to present day

Extension in New Zealand evolved out of British agricultural technical services to land owners, and then by the example of extension services carried out by American Land-Grant Universities and more recently by Third World development extension and public good extension in Australia.

Until recently, extension has always been managed as an activity in association with research or agricultural education (Brooking, 1977, p 23). Its history has been largely part of the history of agricultural research in New Zealand. However, many extension activities are now carried out by private and company consultants without being linked to research projects or technologies (Stephens, 2007).

The Department of Agriculture was formed by the then recently elected Liberal Government in 1892 from an amalgamation of the stock and agricultural branches of the Department of Crown Lands (Brooking, 1977, p 17, Stephens, 2007). In the same year that the department was being established, the Agricultural and Pastoral Associations of New Zealand initiated the first of their biennial agricultural conferences. The first conference made recommendations to government for the establishment of regional experimental farms and more agricultural education at secondary and tertiary levels. Prior to 1920, the Department of Agriculture considered developing educational and research facilities modelled on the American Land-Grant system (Stephens, 2007).

Heath’s report in 1926 (President of Royal Society, 1928) encouraged the government to establish separate educational institutions for the provision of agricultural science and general scientific research. Following Heath’s recommendations, the Department of Scientific and Industrial Research (DSIR) was initiated later that year as an umbrella organisation for New Zealand research and conforming to the British science model of the time. The Department of Agriculture however still maintained that its research capacity should be retained separately in order ‘to support its extension function of providing information and advice to farmers and should not be removed from its control’. A compromise was proposed by Heath so that the Department of Agriculture could retain the scientific staff it required to provide the expertise to carry out its extension function (Galbreath, 1998, p60). Heath’s report and the establishment of the DSIR also created the opportunity to establish Massey University in Palmerston North and so resolve industry pressures upon the government for agricultural education at a university level (Brooking, 1977, p47).

Until 1920, the Department of Education had a greater priority for providing agricultural technical advice than the Department of Agriculture and a much more flexible staffing policy. After 1920, these confusions between the departments had been resolved with the Department of Agriculture staff being made fully responsible for farm visits and on-farm extension.
Farm inspectors based in regional and local offices through the country visited farmers in to identify farming practices that could result in poor food quality for processing, animal disease risks and unproductive farming practices. They promoted the use of newly developed farming technologies for land development, weed control, disease control and animal breeding. Although technically they were very capable, there was no attempt being made then to describe the approaches that should be used in extension or the preferred methods that they should have been applying. Inspectors relied upon their own innate skills and those that survived for any length of time were those that had a greater natural affinity for their work than the others (Stephens, 2007).

In 1948, the Extension Division was expanded to assist returned soldiers settling on areas of marginal land that had been newly converted to farming (Stephens, 2007; Farrelly, 1986, p71). Advisors prior to 1950 generally made visits to individual farmers, held field days and organised conferences. In the 1950s, discussion groups were added to the range of activities (McKenzie, 1980).

In the 1980s the on-farm value of agricultural commodities began to fall sharply. Government policy countered this by providing income support, production incentives, subsidies and advice for farmers to increase their levels of production through increased efficiency, greater farming inputs and more intensive land use. The Advisory Service was restructured to provide nationwide industry campaigns such as the Land Development Encouragement Scheme and the Controlled Grazing Scheme (Smith et al., 1976).

By the end of the 1980s, the cost of government support for agriculture in NZ had become economically unsustainable. Almost overnight as a new Labour Government was swept to power, direct subsidies to agriculture were removed. Extension services were no longer to be provided to all taxpayers as a right. Instead MAF’s Advisory Service was restructured to become accountable to central government for achieving measurable public-good outputs (Journeaux, 2007). In the 1990s, the government continued to reduce its public funding for agriculture by removing indirect subsidies such as government provision of research and extension. In 1999, Agriculture New Zealand was further sold to Wrightson's stock and station agency and in 2006 Wrightson's consultancy staff were merged into their sales team.

This century, the New Zealand Government has encouraged primary industries to collect and use their own industry levies to fund industry development including any public good extension services provided by those industries. In addition, the newly developing organic industry was provided in 2006 with a three year government grant for industry development. They have used some of that money to establish an advisory service for growers. Organic Aotearoa New Zealand now provides the only government funded, public good extension agency available to farmers and growers in New Zealand.

References


Role of Extension for Improving Natural Resource Management: the New Zealand Experience
Terry Parminter

New Zealand was once part of the great Australasian continent of Gondwana Land (King, 2003, p21). About 80 million years ago, a movement of tectonic plates in what is now the Tasman Sea began to separate New Zealand from the coastlines of Victoria and New South Wales. After the first 20 million years of rapid movement, there was little further change in the distance of New Zealand from Australia.

The three main islands of New Zealand, approximately 2000km to the south east of Australia, have an area of almost 270 million hectares. They were once covered in subtropical forests from coast to coast, except for some alpine areas of tussock. New Zealand’s primordial landscape was inhabited with ancient creatures including insects, frogs, some dinosaurs, freshwater crocodiles, beaked lizards and ancestors of flightless birds such as the kiwi and the moa. No terrestrial mammals or marsupials were present before the first humans arrived from the Pacific Islands. Some time after 1000 AD, Maori people landed and settled in New Zealand, then Europeans discovered it for themselves in 1750 and also began to colonise it.

The establishment of both groups of humans in New Zealand had devastating consequences for the ecology of the previously uninhabited country. Maori introduced dogs, rats and a suite of domestic plants. They began systematically hunting, fishing, vegetative harvesting and cropping to exploit the resources of their new land and over the first 100 years lit a series of fires that destroyed large areas of the original forest. By the time that Europeans arrived, over 30% of the primeval forest and over 50% of the bird species on the main islands had gone. Particularly, this affected the drier eastern areas of both large islands (Anderson, 2002, p29).

Before the Treaty of Waitangi was signed by Maori and British representatives in 1840, New Zealand settlement by Europeans was largely constrained by Maori customs and the capacity of their hospitality. After that date, European settlement was only limited by their access to land title and the establishment of capitalist systems of trade and economic development (McAlloon, 2002, p66).

Farming usually followed goldmining, forestry and coal mining to become widespread throughout both of the largest islands. By 1909, logging of the indigenous forest was being described by social commentators of the time as a ‘war’ between mankind and the forest. They acknowledged that the countryside was being devastated for the sake of ‘development’ and ‘improvement’ (Wynn, 2002, p100).

Sheep numbers grew to about 20 million and stayed at that level until the early 1900s, but reached 30 million by 1940 and 70 million by 1985 (Brooking et al., 2002, p170). In 1910, 40% of New Zealand’s land area had been cleared for settlement and farming and by 1970 this had increased to 50% (ibid).
The seven natural resource issues now confronting agriculture in New Zealand and described here have developed out of the rapid growth of agriculture during the last century. These are:

- Addressing threats from new and established weeds and pest;
- Controlling areas of soil erosion;
- Maintaining soil fertility and managing areas of chemical contamination;
- Improving water quality;
- Managing water use for irrigation;
- Protecting and restoring biodiversity; and
- Minimising the contribution to world greenhouse gas production and adapting to climate change.

**Resource issues**

**Weeds and pests**

The impact of exotic plants and pests upon New Zealand has been catastrophic to its ecology and economy (Isern, 2002, p234). Rabbits were imported and liberated between 1830 and 1870, at which point their potential to become pests was realised. Rabbit numbers reached plague proportions in the 1890s, 1920s, 1940s and 1980s and their numbers are increasing again (Holland et al., 2002, p80, Parliamentary Commissioner for the Environment, 1998, p5).

The Noxious Weeds Act was passed in 1900 to provide property inspectors that could compel landowners to control specific weeds. It has been estimated that over 70% of the invasive weeds in the country were originally introduced as ornamental plants, 12% were introduced for productive purposes and only 11% came in accidentally (Rahman and Popay, 2001). Over the last 100 years, newly introduced species have become naturalised within New Zealand at the rate of four new species per year.

Australian brushtail possums were brought over from Australia before 1840 and protected by government legislation to encourage the start of a New Zealand fur trade. Possums steadily increased their range in the wild until they now can be found over 95% of New Zealand and their numbers in the 1980s peaked at 70 million (Parliamentary Commissioner for the Environment, 2000, p11).

Farmers can be very successful in limiting and eradicating threatening and noxious weeds and pests.

Weeds such as gorse and thistles are generally controlled on livestock farms through annual applications of weedicides. When environmental and economic conditions are suitable, the areas being controlled expand. When conditions are less suitable, areas in previously productive pasture land can begin to revert back to their original forest cover. Quite quickly (three to five years) the costs of recovering from inadequate weed and pest control may be too great to justify attempting it (Rahman and Popay, 2001).

Pest such as possums, mustelids and rats can be controlled through baiting and trapping programmes. Generally intensively laid out bait stations or 1080 applications are used to achieve an initial population knockdown across a number of neighbouring properties and then the reduced numbers are maintained by more limited but regular control operations.

**Soil erosion**
Early in the 20\textsuperscript{th} century, in areas where farms were being established after recently felled bush and scrub, pasture seed was sown by hand straight into the ash of the forest fires. The ash contained the natural fertility of hundreds of years of forest development but on its own was only able to sustain agricultural production for a short number of decades.

By the 1920s, many areas of hill country farmland were deteriorating, reverting and eroding (ibid, p38). The instructors in the Fields Division of the Department of Agriculture and Fisheries spent most of their time in the 1920s advising farmers about how to develop land from scrub and regenerating forest, using more fertiliser, lime, certified ryegrass and clover seed (ibid, p9; p12). It was not until the 1930s that deteriorating farmland in hill country areas was associated with removal of the original forest cover (ibid, p42). As a result of growing concern, in 1938 the Soil Conservation and Rivers Control Council was initiated to improve the pasture and tree cover on erodable hill country and assist manage water run-off and control river flooding.

New Zealand has been naturally more susceptible to erosion than some other countries because of its geological instability and high rainfall in steep short catchments (Hicks, 1995). Where poor farming practices have added to the natural susceptibility, there has been reduced soil fertility, reduced farm production, increased downstream flooding, reduced water quality in waterways and loss of wildlife habitat (ibid). New Zealand has one of the highest waterborne soil losses in the world (Parliamentary Commissioner for the Environment, 2004, p50). In the 1990s, almost 70% of farmland in New Zealand was affected by some kind of erosion. Although most of this was only slight (Hicks, 1995), almost 10% of the country was suffering severe to extreme erosion (Parliamentary Commissioner for the Environment, 2004, p50).

Farmers can increase erosion problems from windblow, sheetwash and rilling of topsoil by depleting ground cover in their paddocks. Ground cover is lost when farmers cultivate very dry soils, burn crop stubbles, overgraze in very wet or dry conditions. In the Central Otago, the effects of high sheep stocking rates can be acerbated by high rabbit densities and hawkweed invasion (Hicks, 1995).

In contrast, ground cover can be maintained on cropping farms by using minimum tillage, stubble mulching and contour ploughing. Wind breaks can be used to protect soils from wind erosion. Farmers that maintain minimum pasture residuals under grazing and avoid pugging reduce the likelihood of overgrazing. On South Island high country, long spells between tussock burning, added fertiliser and adequate spelling between grazing reduce erosion.

Hill land in high rainfall areas can become susceptible to mass movement (e.g. slipping and slumping) when too many trees have been cleared for forestry or to make new pasture. Farm tracks that undercut slopes can encourage slipping (Hicks, 1995). Space planted trees with interlocking roots reduce mass movement on hill pastures by 50% to 80% and only reduce pasture production by 20% to 40%. Alternatively, erosion prone areas can be taken out of livestock production and allowed to ‘revert’ back into scrub and native bush.

Paddocks with waterways through them where livestock has access to the waterway bank can suffer from bank erosion due to trampling (Hicks, 1995). Bank erosion can be reduced by permanently fencing and planting the riparian (stream bank) area. Temporary fencing can also be used to maintain a thick grass thatch along the bank with periodic grazing for weed control. Temporary fencing may also be used to exclude cattle which are heavier than sheep and more likely to spend time in wet areas.
Debris dams can be established in water courses where gullying has already started to occur with space planted trees added for long term stabilisation.

Soil fertility and chemical contamination
Phosphatic fertilisers have always been important in New Zealand to support the establishment of clover based pastures. After 1919, when Nauru began to be phosphate mine, it became more widely available, helping to encourage a rapid growth in livestock farming. After the development of aerial topdressing in 1949, phosphate fertiliser enabled marginal hill country to be brought into production and stocking rates intensified to levels only previously possible on more easy topographies (Brooking et al., 2002, p170).

In the 1930s, the Department of Agriculture in cooperation with Imperial Chemical Industries began trialling the use of nitrogen fertiliser to boost winter and early spring pasture production on dairy farms. Nitrogen volumes and application rates have been rising since, especially on dairy farms. The use of nitrogen fertiliser has changed from being a tactical practice to cope with unexpected shortfalls in plant growth to a strategic component of intensive farming systems. In many parts of New Zealand, greater farm use of nitrogen has increased nitrates and their effects in groundwater, surface waterways and lowland lakes (Parliamentary Commissioner for the Environment, 2004, p5).

Some past agricultural practices have contaminated soils with toxins and chemicals that are now banned. These have included DDT for control of soil pests, sheep dips, dioxin in weedicides and timber treatment chemicals. New Zealand has joined the Stockholm Convention in 2004 aiming to remove such potential soil contaminants by collecting any examples still in storage (Ministry for the Environment, 2006a, p56).

New Zealand introduced in 1982 a soil fertiliser recommendation service based upon soil tests of the main plant nutrients and years of fertiliser experimentation at government research centres (Cornforth and Sinclair, 1984). Those tests and the associated recommendations are now widely used by farmers in all livestock and cropping industries. The dairy industry accord between Fonterra, Ministry of Agriculture and Forestry, Ministry for the Environment and Local Government New Zealand (Ministry for the Environment, 2003), included nutrient budgeting as a way for farmers to avoid applying excessive fertilisers to their properties. Nutrient budgeting has now been included in a number of regional plans and made mandatory for all dairy farmers from 2007. Field staff in the main fertiliser companies have been largely responsible for advising farmers about nutrient budgeting and they have initiated training courses at Massey University for developing the skills of agricultural professionals and farmers.

Water quality
Water quality in many pastoral catchments has declined a lot in recent years and some lowland streams have sometimes been no longer suitable for swimming because of faecal contamination from livestock, poor water clarity and algal growths caused by agricultural practices. Unfortunately, it can take 20 years or more for polluted groundwater to show up in rivers or lakes (Ministry for the Environment, 2006a, p23).

In some lowland regions, high nitrogen use on intensive dairy and horticultural properties has already increased groundwater nitrate levels above drinking water standards (Parliamentary Commissioner for the Environment, 2004, p45).

The trophic states (water quality and nutrient enrichment) of over 150 lakes are being monitored by regional councils. In 2006, more lakes had improving trophic states than declining states (33% and 19% respectively). However, less had improving ecological conditions than declining ecological conditions (22%
and 50% respectively), due to sediment loads, extra nutrients, and invasive exotic plants and fish (Ministry for the Environment, 2006c, p25). Farming practices on properties in nearby catchments has been shown to influence the condition of rural lakes, particularly if they are shallow.

Almost all regional councils in New Zealand have a regional plan for improving water quality in rural and urban areas. Most point sources of water pollution have now been removed and reducing non-point sources from land uses such as agriculture has become relatively more important.

Councils have detected improvements in many rivers following the removal of direct discharges into waterways from dairy effluent ponds. Instead of pond treatment, effluent is now being spread onto farmland after grazing where it is assimilated by soil processes. Land disposal of dairy effluent is a decision intensive process and regional councils have found that, after a number of years, typically they have achieved only 67% of full compliance with their regulated standards (Ministry for the Environment, 2007).

Livestock farmers can improve water quality by keeping their animals out of waterways with fences and bridging. They can reduce the effects of overland flows upon waterways by planting riparian strips in trees and shrubs, and by maintaining strategic wetlands to trap nutrients.

**Irrigation**

The area of irrigated land in New Zealand has been increasing at a rate of over 50% every 10 years since 1965. Most of it has been along the east coast of the South Island. Irrigation draws upon a finite resource and it also doubles the energy demand and fertiliser use of the farms using it (Parliamentary Commissioner for the Environment, 2004, p42).

The availability of irrigation has increased farm conversions to dairying and expanded the area of intensive agriculture. Populations in communities near to irrigated areas have increased and the influx of younger families has increased school roles. Irrigated farms have generally had additional and more reliable profitability and greater decision making control for the owners. The extra profits have often flowed through to improve the economy of the local community (Parliamentary Commissioner for the Environment, 2004, p115).

Irrigated farms have also had the potential to create adverse environmental effects for some communities (ibid, p117). Abstraction of water from rivers and streams can reduce the flow of those waterways and increase their temperatures. This can reduce fish numbers. The use of irrigation to intensify land use can lead to greater nutrient levels in groundwater and reduce water quality (ibid, p117).

Irrigation systems are most efficient when they have been designed to meet the specific needs of each farmer and their approach to farm management (Ministry of Agriculture and Forestry, 1997). Each system still has to be carefully managed on a daily basis if maximum efficiency is to be realised.

To reduce the likelihood that in-stream water extraction will conflict with the needs of other users and stream ecology, farmers can add seasonal water storage to their irrigation systems.

Farmers can improve the efficiency of irrigation water applications by preparing and following water budgets for each crop on their properties. These determine how much water each crop needs and how much water their irrigation systems need to provide. Farmers can follow a water budget by monitoring their water table, their soil moisture and plant water status. Maintaining irrigation machinery and
equipment helps to obtain best efficiency from irrigation systems (Ministry of Agriculture and Forestry, 1997).

**Biodiversity**

Of New Zealand’s 26 million hectares, 8 million hectares (31%) are under formal ecological protection. This is a greater proportion than almost any other country in the world (Ministry for the Environment, 2006a, p9). Most of the protected area is publicly administered conservation land but about 150,000 hectares are protected in covenants on private land (Ministry for the Environment et al., 2004). Most of the public land is high country and mountain areas and the private land maintains some of the country’s most vulnerable ecological types. One third of the 100 ecological types identified in New Zealand have less than 20% of their original area remaining in indigenous vegetation. One quarter of the 100 ecological types have less than 10% of their area remaining in indigenous vegetation (Ministry for the Environment et al., 2004).

The integrity of ecological functioning is important to maintain habitats for New Zealand’s rare and endemic species but also to maintain ‘ecological services’ such as decomposing and assimilating waste, scrubbing and filtering pollutants from air and water, creating and maintaining soil structure and fertility, climate regulation and the supply of pharmaceuticals and pollination (Parliamentary Commissioner for the Environment, 2004, p22).

Farmers are able to conserve the areas of remnant forest on their properties by fencing them away from livestock and controlling weeds and pests. Other natural heritage areas such as rocky outcrops or areas with unique plants or wildlife can also be similarly protected. Some of these areas may already be identified in regional and district plans and protected by regulations under the Resource Management Act (New Zealand Government, 1991). Landowners can access government conservation subsidies by formally covenanting the effected areas and protecting the covenant in the titles for their properties (Ministry for the Environment et al., 2004).

Farmers have been interested in establishing and protecting areas of native trees on their properties for a variety of reasons. These have included: erosion control, recreation, conservation, improved land value, riparian protection, livestock shade and shelter, personal satisfaction, social responsibility, and timber production (Dodd and Ritchie, 2007, p5).

The Forests Amendment Bill in 1993 permits the harvesting of trees from indigenous forests only if the owners have a sustainable forest management plan approved by the Ministry of Agriculture and Forestry. The plan must take into account the need to maintain ‘a healthy forest and functioning ecosystem’ (Ministry of Agriculture and Forestry, 2002, p5).

**Atmosphere and climate change**

Agriculture adds carbon dioxide, nitrous oxide and methane to the world’s greenhouse gases and the climate change effect. Increases in greenhouse gases are leading to warmer atmospheric temperatures, higher seas levels and greater climate variability. In New Zealand, agriculture contributes over half of the country’s greenhouse gases compared to about 14% across the rest of the world (Ministry of Agriculture and Forestry, 2006, p19).

Carbon dioxide is generated from energy use in the agricultural sector such as that associated with using farm machinery. Nitrous oxide is produced by soil processes of denitrification and nitrification, and
methane production from livestock farms comes from the breakdown of vegetable matter by microorganisms in the rumen.

In the last 15 years, agriculture has increased greenhouse gas emissions 15% above 1990 levels and most of this has been from increasing numbers of dairy cows. Over the same time period, the energy sector has had the most effect on increased greenhouse gases with an increase of almost 30% (Ministry for the Environment, 2006b).

Over the next 40 years, climate change is expected to result in increased climate variability across New Zealand and a greater occurrence of extreme weather events (Parliamentary Commissioner for the Environment, 2004, p125). Western areas of the country may have greater rainfall and greater erosion while eastern areas could experience more severe droughts. Pasture production can be expected to increase in southern areas of New Zealand and the area available for growing subtropical fruit (e.g. kiwi-fruit) may increase. Biosecurity risks from subtropical pests and diseases are expected to get worse (Parliamentary Commissioner for the Environment, 2004, p125).

Farmers can reduce carbon dioxide production by managing their agricultural machinery more efficiently and by using direct drilling rather than ploughing to increase carbon sequestration in the soil (Clark et al., 2001).

Using high energy feed and concentrate rations can reduce the amount of methane being produced by livestock. Reducing stocking rates or converting from dairy cows to sheep farming also reduces methane production (ibid).

Management practices that reduce the amount of excreta nitrogen produced will achieve the greatest reductions in nitrous oxide. Improving drainage, reducing soil compaction and avoiding nitrogen fertiliser applications when the soils are cold and wet will also reduce nitrogen oxide (ibid).

Extension Role

Industry expectations of extension

Over the last 20 years, the world’s population has increased by a third to almost seven billion people. The average living standards of people have also risen. A sign of this has been that over the same time period world trade has increased three times. Each person now requires an average of over 21 hectares to maintain themselves compared to a world biological maximum estimated at 15 hectares per person. It seems apparent therefore that the way we are now living is not sustainable (United Nations Environment Programme, 2007).

In New Zealand, raising agricultural production has been associated with ‘erosion of topsoil, loss of soil fertility, water pollution, loss of biodiversity and [squandering] of non-renewable fossil fuels’ (Parliamentary Commissioner for the Environment, 2004, p20). Intensive farming systems have also been linked with reduced food safety, human health risks, declining viability of family farms, and reduced rural quality of life (ibid).

However, there have been positive benefits from agriculture such as its aesthetic value, recreation opportunities, water accumulation, flood protection, nutrient fixation and recycling, soil formation, habitat protection and carbon sequestration (Parliamentary Commissioner for the Environment, 2004, p23).
There has been much commentary that if pastoralism was the cause of New Zealand’s land resource problems then removing pastoralists would allow the land and rivers to heal themselves (Isern, 2002, p240). History suggests otherwise that removing human care and attention has been found to often make things worse, not better, in New Zealand’s reshaped and highly modified ecology. Rather than a passive approach to ecological management (Isern uses as an example the guidelines contained in the Parliamentary report on South Island tussock lands; (Parliamentary Commissioner for the Environment, 1991)) a more active husbandry is usually needed in order to maintain particular ecological conditions in the face of continual external environmental threats and modified ecological relationships (Isern, 2002, p245).

**Extension approaches to natural resource management opportunities**

New Zealand has three government departments with oversight across some of the outcomes associated with extension and natural resource management in primary industries. MAF provides policy advice to the government on the economic and environmental development of industries. It also has one staff member responsible for rural community development. The Ministry of Research, Science and Technology (MoRST) provides policy advice on research, technical development and the institutional arrangements for their delivery. The Ministry for Environment (MfE) provides government with policy advice on natural resource management and the administration of the RMA. These government departments work together and with The Treasury Department when their policy issues cross departmental boundaries. However, the departments have limited responsibility in their policy intelligence or delivery for ensuring that extension priorities and opportunities are recognised by government. MAF does include extension outputs in the Sustainable Farming Fund programme and Climate Change Strategy.

Extension delivery in New Zealand is provided by a number of organisations. These include private agricultural consultants, such as those associated with property valuation, veterinary practices and financial and investment advice. DairyNZ (an industry owned company) has consultants providing landowners with mass and group extension for economic and industry development. Fertiliser companies, seed companies and other sales staff provide some extension opportunities as part of their commercial marketing opportunities. Extension in natural resource management is also provided by the Landcare Trust (a QANGO) community facilitators and education officers in local authorities.

Current extension activities to manage and resolve specific natural resource issues or opportunities reflect the scale at which decision making occurs (Figure 1). Different extension strategies have been needed for natural resource management issues compared to production decisions. These take into account the unique factors of natural resource management including the obscurity of long term trends, their complexity and their systemicity.

**Figure 1. Extension approaches determined by scale and strategic intent**

<table>
<thead>
<tr>
<th>Strategic Intent</th>
<th>Decision Making Scale</th>
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<tbody>
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<td>Individual</td>
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<td></td>
<td>Collective</td>
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<td></td>
<td>Group</td>
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<tr>
<td></td>
<td>Community</td>
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<tr>
<td>Objective decision making</td>
<td>nutrient budgeting</td>
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<tr>
<td></td>
<td>‘soils underpinning business success (SUBS)’ education package</td>
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<td></td>
<td>environmental care-groups</td>
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<td></td>
<td>community guidelines</td>
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<td>Bringing short and</td>
<td>farm plans</td>
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<td></td>
<td>integrated</td>
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<td></td>
<td>regional plans</td>
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</table>
Landowner decision making can occur at an individual or group scale depending upon the nature of the issue and whether or not perceived property rights need to be relaxed in order to find a resolution. An issue such as low soil fertility may be appropriate to be addressed by individual property owners applying fertiliser to suit their own principals, finances and timing. In comparison, a pest issue that transcends property boundaries such as rabbit control may require decisions by groups of landowners working together. In such cases, the landowners may forgo some of their property rights in order to share a combined control programme with specified control procedures, timing, costs and property access.

Individual decisions may still be addressed by landowners working together to achieve collective efficiencies, e.g. shared purchasing of a weed spray to reduce costs, but as a collective there is little influence upon how people might determine to address their own individual responsibility towards an issue.

Group decisions can range from a club scale to a community scale. Club scale decision making is focussed upon the needs of group members. The actions of clubs of people are mainly intended to address particular natural resource issues and capture as much as possible of the benefits amongst the members. Irrigation management very often takes a club approach where the members share the costs of establishing and maintaining a scheme amongst themselves and attempt to restrict unintended water access from the scheme by other parties.

Community decision making to address a shared natural resource issue also takes into account not only the behaviour of freeloaders or holdouts to a community decision. Freeloaders seek to obtain the benefits of a community decision without fully bearing the costs of participation and holdouts try and maintain their existing advantages without being affected by the consequences of any community decision. Any community decision making that does not address the needs of freeloaders and holdouts risks being underpinned by the actions of these people operating as singular or collective individuals.

Natural resource management extension strategies may be particularly effective at assisting landowners to be more objective about their production decisions. These include encouraging landowners to use nutrient budgets on their properties to minimise losses of nitrogen and phosphate as part of their fertiliser and waste treatment decision making (AgResearch, 2006; Parminter et al., 2007). Soils underpinning business success (SUBS) programmes enable landowners to assess the state of the soils on their properties, recognising their strengths and limitations and then to manage them accordingly (Mackay et al., 1999).

The Landcare Trust facilitates landowner programmes addressing local resource issues. These help landowners to understand the importance of these issues to other farmers and non-farming people as well as how their management practices can make these issues worse or better (New Zealand Landcare Trust, 1996). A few communities have developed guidelines for people living in the community or moving into it.
The guidelines include ways for landowners to take care of natural resources on their own properties and those that are shared by the community e.g. water (Parminter et al., 2005).

Natural resource strategies can help landowners to integrate longer term natural resource issues with their more short term production frameworks. Theses include developing property plans and industry environmental management systems to guide resource and production decisions (Blaschke and Ngapo, 2003; Carruthers, 2005). Integrated Catchment Management programmes can assist participating landowners to address common issues associated with waterway health (Edgar, 2006). Regional plans may be developed through consultation and participatory processes to provide ways for communities to work together on common resource issues. Regional plans include regulations that, amongst other things, minimise freeloading and holdouts (New Zealand Government, 1991).

Information may be brought together in extension strategies that particularly assist landowners with resolving complex natural resource issues. This may be done in farm visits that bring external social, market and technical information to bear on a particular farming system and management opportunity. Information and experience sharing may be a component of field days and conferences where a range of ideas and practices can be canvassed by a large number of participants relatively efficiently. Discussion groups and other similar groups provide opportunities for their members to learn about specific topics and the practices that may be applied on their own properties. Community development forums may be held around particular concerns to develop a community response and plan of action for those issues (Parminter et al., 2006).

References


Writing a chapter on extension planning raised some initial difficulties, in that rigorous extension planning incorporates all aspects of good project planning. This left the authors with a dilemma - how to write a chapter on extension planning without excluding the many useful (but standard and available elsewhere) project planning approaches and elements? Ultimately, it was decided to focus only on what differentiates extension planning from standard project planning in this chapter.

Levels of planning

To provide context, the chapter first proposes three broad levels to project/extension planning:

- ‘Program’ level planning
- ‘Project’ level planning
- Event level planning

In this context, the meanings of the words ‘program’ and ‘project’ are not absolute; rather they reflect a level of hierarchy relative to each other and the operating environment.

‘Program’ level planning, centres around higher order needs (these could be program, organisational, political, community, economic, environmental or social etc). Practically, it is about developing the right suite of programs/projects to address higher order needs. Broad extension strategies or approaches can be applied at this level, but will not be focused upon in this chapter.

‘Project’ level planning focuses on developing the right suite of objectives to deliver the overall purpose for a particular project, and the right suite of broad activities to deliver those objectives. The timeframe might be anything from a six-month to five-year project. This chapter focuses only on this ‘project’ level of extension planning.

Event level planning is about designing the process for a single event (such as a workshop, field day, meeting etc) to best meet the purpose of that event. Event level planning is the ultimate delivery mechanism for project impact, and is at the heart of extension practice. It is however, too large an area to cover in this chapter. A tool which provides an overview to planning at this level is the ‘Event planning framework’, by the authors at www.arid.com.au/publications.

Separating planning into the three levels is most useful when applying logic to project design. ‘Design logic’ explores cause and effect relationships within (and between) programs, projects and events, and on
completion demonstrates a series of logically expected consequences (Note: ‘Design logic’ is traditionally referred to as ‘program logic’ or ‘program design clarification’ as referenced by Dart pers comm 2007, Owen and Rogers 1999, and Owen 1993. These phrases can be misleading though, as consideration of design logic need not only apply at program level - it is equally valid at project and event level planning).

Achieving project impact

Extension encompasses the approaches, processes and tools around which impact, or change, is achieved by projects. Core to achieving project impact is identifying exactly what change is intended (and with whom), and planning project activities to deliver specifically to those targets. These three elements are expanded upon in the remainder of the chapter:

1. Identifying intended change/impact
2. Identifying target audience for change/impact
3. Planning extension activities to deliver identified change/impact to identified target audiences

To consider the relative potential impact of each target audience for change (individual or group) on achieving overall project impact, it is useful to describe the change the project would hope to achieve with each of them, particularly level, scale and complexity of the change. Ease of delivery of that change (resources and capacity), should also be considered, as well as rough priorities in terms of achieving project purpose. The final step is to look at all that information collectively and determine which target audience individuals or groups are likely to provide greatest (or least) project impact.

1. Identifying intended change/impact

Five key areas to consider when exploring intended change/impact are:

I. Direct intended change and ultimate intended change

II. Four levels of intended change

III. Scale of change

IV. Complexity of change

V. Potential influence on change

Direct and ultimate intended change

It is useful in project planning to identify the ultimate desired or intended change for the project. This refers to the final intended change a program or project aspires towards. This will almost certainly be a change in improved environmental, social, or economic conditions. Considering ultimate intended change helps keep program thinking directed towards longer term outcomes, and adds clarity to identifying direct intended change. In most cases, multiple projects or sources of influence contribute towards achieving ultimate change.

Realistic program/project capacity often means aiming for a lower level of change than the ultimate change. Direct intended change refers to the level of change the project will have direct responsibility for,
and aims to achieve through project activities. It is the specific part a project will play in achieving the ultimate intended change. In some cases, the direct intended change for a program or project will be the same as the ultimate intended change.

There are usually a number of direct intended changes (often of different levels) associated with a project, which will be reflected in project/extension objectives. The highest level of direct intended change should be consistent with overall project purpose and responsibility.

**Four levels of intended change**

Four successive levels of change can be used as a guide to identify the level of change a project is aiming for (Note: these levels of changed are evolved from Claude Bennett’s hierarchy of outcomes (Bennett and Rockwell, 1975, Bennett, 1975)). Level 1, change in awareness, is the smallest suggested level of change, moving up to level 4, improved environmental, economic or social conditions as the highest level of change. Each successive level generally requires greater resources (time, money, expertise etc) to achieve. Levels 1, 2 and 3 refer to change relating to people; specifically changes associated with the defined target audience for change.

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Change in awareness</th>
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<tbody>
<tr>
<td>Level 2</td>
<td>Change in knowledge, understanding and skills at a generic level*</td>
</tr>
<tr>
<td>Level 3</td>
<td>Change in practice or behavior (small or large scale)</td>
</tr>
<tr>
<td>Level 4</td>
<td>Improved environmental, economic, social conditions</td>
</tr>
</tbody>
</table>

*In this context, ‘generic skills’ refers to more broadly applicable skills, for example those observed and practiced at a workshop or field day; rather than tailored to individual needs or sites.

**Scale of change**

Along with level of intended change, it is important to consider and describe the scale of a change (this will be related to the target audience and purpose for the change). Scale could relate to either the area of intended change or the number of people adopting the intended change. The practice change could be either small or large scale, or could be a sequential process moving from small scale trialing to larger scale adoption.

A project could aim for a flow-on effect from a small number of demonstration site/s to a wider target audience. Alternatively, the project could plan to set up a larger number of individual trial sites, and focus on getting a high level of change with the (smaller number of) farmers hosting each demonstration site. In areas where properties are large, large scale practice change could potentially result from working with individuals on a single property, taking them through a learning and trialing process, and providing other support for large scale practice change.
In some cases, a project may aim to work towards a high (level 4) intended change, but at a small physical scale, for example a project to plan, implement, and evaluate surface water management works on a paddock scale. A project could encompass additional (or alternative) objectives that aim for a lower level of change, but with a wider audience, for example delivering a series of (level 2) workshops targeted at increasing knowledge, understanding and generic skills of all landholders in the region in surface water management.

**Complexity of change**

In most cases, choosing and planning for a particular level of intended change, means planning for all levels of change leading up to that level. Aiming for a level 4 change in environmental, economic or social conditions, would usually incorporate planning for levels 1, 2 and 3 as well. This may not be the case for more simple practice changes.

Implementing a change such as a new herbicide or crop variety is relatively straightforward, and doesn’t require major change to current thinking, systems, practices, equipment etc. Project extension aiming for a change in (level 1) awareness about the herbicide or crop variety may be all that is needed to effect a large scale practice change. (Such planning decisions should be justified by documenting the relevant situation and logic in the extension plan.)

**Potential influence on change**

When considering what change and with whom for a project, it is also useful to make an assessment of how easy it is likely to be for the project to achieve that change with its current capacity. Some change will inherently be more difficult to impact upon due to the nature of the change, the history surrounding the intended change, the characteristics of the innovation/technology. Pannell et al (2006) discuss that innovations are more likely to be adopted (by landholders) when they have a high ‘relative advantage’, or perceived superiority to the idea or practice it supercedes, and are readily trialable, referring to how easily a landholder is able to learn about its performance and optimal management.

Another point relating to potential project influence is that after trialing has commenced (by landholders), personal experience gained through trialing is likely to be the main influence on further decisions (Dong and Saha 1998; Marsh et al 2000; cited in Pannell et al 2006). This suggests that outsiders such as extensionists, researchers, consultants etc, and social networks, are likely to have greatest influence on target audience decision-making at levels of change 1, 2 and the start of level 3.

2. **Identifying target audiences for change/impact**

Three key stakeholder groups for planning projects/extension are ‘funders’, ‘partners’ and the ‘target audience for change’. Separating target audience/s for change from partners and funders is a core concept within extension planning, as it guides project thinking, and therefore extension activities, towards the actual impact a project hopes to have.

The target audience for change may be the end user, describing individuals or groups responsible for implementing the final (usually on-ground) change. In the area of agriculture and natural resource management, end users are usually farmers and other land managers.
Alternatively, the target audience for change may be intermediary individuals or groups in the influencing process, also known as a next user. Next users may well target the same end user as your project. In the area of agriculture and natural resource management, potential next users include natural resource management regional groups/officers, private sector consultants, agribusiness, farmer groups, local government officers, state agriculture/primary industries agency programs, other government agencies, and more. The intermediary may have stronger existing relationships and influence than a new or short term project could expect to have. The key to success is to understand the ongoing needs of intermediaries sufficiently to tailor project information, products and services directly to those needs.

It can be useful to spatially represent the target audience for change to clarify relationships and lines of action between your project and the end user (see Fig 1 below).

3. Planning extension activities to deliver identified change/impact to identified target audiences

Extension activities can be broadly chosen or designed to deliver specifically to the identified level, or levels, of change. A suite of extension activities planned in this way will facilitate achievement of overall project impact. This section provides an overview of the types of extension activities congruent with each of the levels of intended change:

I. Activities congruent with Level 1 - Change in awareness

II. Activities congruent with level 2 - Change in knowledge, understanding and skills at a generic level

III. Activities congruent with level 3 - Change in practice or behavior

IV. Activities congruent with level 4 - Improved environmental, economic, social conditions
Before looking at activities congruent with each of the levels of change, consideration needs to be given to the identification and prioritisation of target audience individuals and groups, identification of target audience characteristics, needs and wants, and the development of packages and processes targeted to those characteristics and needs. This applies to all levels of change.

‘Distribution’ to target audiences is then achieved through the activity types outlined below for each level of change. Note that in most cases, planning activities for a particular level of change means planning activities for the identified level, and for all levels below that.

**Activities congruent with Level 1 - Change in awareness**

Activities to support a (level 1) change in awareness are about attracting the attention of the target audience. The target audiences are exposed to the message, product or technology through one or more distribution points.

In terms of distribution, a common avenue to exposure is the use of mass media. This includes locally relevant newsletters, rural newspapers, rural TV and radio, and may be through community, government or commercial mechanisms. Distribution may also be through targeted activities, such as at field days, workshops, one-on-one etc. Physical cues such as signage, stickers, badges etc are used to provide a cue or link to the message, product or technology rather than provide information directly. Placing on a websites (own or others) is useful, but without connection to the target audience results in availability rather than awareness.

Alternatively, exposure may be through targeted individuals or groups, such as a particular consultant or grower group. In this situation, clearly identifying and segmenting the target audience, and understanding their characteristics and needs will be a process unique to that individual or group. A relationship between project staff and target audience will be important for ensuring the package is right for the audience, and the audience are exposed to the product.

The key to success for most awareness raising activities is setting up lines of access or communication to the distribution point or target, and allocating staff to be responsible for particular distribution points or targets.

**Activities congruent with level 2 - Change in knowledge, understanding and skills at a generic level**

Activities to support a (level 2) change in knowledge and understanding should involve information exchange, clarification and discussion, between target audience and project staff/experts, and within the target audience. Activities to support a (level 2) change in generic skills should involve demonstration of those skills and opportunity for hands-on practice, in conjunction with gaining knowledge and understanding.

Example level 2 activities include events such as workshops, field days and training courses, networks that allow information exchange and discussion across a range of stakeholders, expert or peer demonstrations, interactive web-based learning groups, tools to support more informed decision making, with interactive sessions in use of tools, and more. The application of adult learning principles and theory (Knowles 1990, Malouf 1994, Burns 1998, McGill and Beatty 1995, Mumford 1993, and other) is valuable when developing workshops, field days and other extension events that lead to increased knowledge, understanding and
generic skills. Factors that enhance the learning process can accelerate the adoption process (Pannell et al, 2006).

Commitment to action at the end of level 2 activities can be promoted by encouraging the target audience to clearly outline (verbally or written) intended next steps. The possibility (or certainty) of external follow-up on intended actions can provide added motivation. Providing tangible evidence of follow-up support mechanisms will also be useful in encouraging commitment to action.

Ideally, level 2 culminates with the target audience gathering enough information and generic skills about a particular technology (or other) to make an informed decision about initiating practice change for their own property or situation. The decision to proceed with practice change though is rarely this simple. From the perspective of adoption of conservation practices by individual rural landholders, Pannell et al (2006) state that adoption is based on subjective perceptions or expectations rather than on objective truth, and that these perceptions depend on 3 broad sets of issues: (i) the process of learning and experience, (ii) the characteristics and experience of the landholder within their social environment and (iii) the characteristics of the practice itself. It should be noted that these issues may differ for target audiences who are not rural landholders, particularly for next user groups discussed in section 2 above: ‘Identifying target audiences for change/impact’.

Note that a well informed decision not to initiate a particular practice change is just as valid as a well informed decision to make the change.

**Activities congruent with level 3 - Change in practice or behavior**

Activities (or tools) to support a (level 3) change in practice or behavior should be focused in three key areas. The target audience needs to

- Gain sufficient confidence and motivation to initiate the change
- Have enough situation-specific knowledge and skills to initiate the change
- Have the physical resources necessary to act

Small scale trialing on the target audiences’ own site, or for their own situation or business, is a valuable tool at this level. A positive experience on a small scale can result in increased (site-specific) knowledge and skills, increased confidence, and potentially greater motivation or desire to adopt on a large scale. A negative experience could equally lead to a decision not to adopt on a larger scale. As noted above, once personal experience is gained through trialing, this experience is likely to be the main influence on further decisions (Dong and Saha 1998; Marsh et al 2000; cited in Pannell et al 2006).

Positive or negative incentive, resulting in increased motivation to act, can be another useful tool in achieving practice or behavior change. Positive incentive includes financial, such as seed money to establish and manage trial sites, free soil sampling, training subsidies etc. Working as a group or part of a team can also provide positive incentive, as individuals feel more supported, and often have a greater sense of commitment and responsibility to the group goal. Negative incentive, including regulation or policy instruments, may be appropriate in some circumstances.
A suite of extension activities can be focused on raising confidence in the expectation of ongoing support, for example easy access to relevant technical expertise, tailored information packages, password protected websites, personalised list of expert contact details, designated resource area in the local Shire office etc.

Community level practice or behaviour change is also worth considering. A community is likely to resist change being imposed from ‘above’, without opportunity to consider or influence. Where aiming for practice or behaviour change at a community level, the key is for individuals within that community to develop ownership of the change. This could be achieved by inviting the community to be involved in the process of change, being transparent about the change process and desired outcomes, keeping the community informed throughout, and publicly acknowledging community input and involvement.

**Activities congruent with level 4 - Improved environmental, economic, social conditions**

Activities congruent with (level 4) improved environmental, economic and social conditions are about evaluating whether extension activities at level 1,2 or 3 have resulted in the expected environmental, economic or social outcomes. Description of the program logic (or cause-effect relationships) that theoretically supports the change occurring is clearly an important element of the evaluation planning.

For additional detail, see ‘Planning for greater impact – Identifying desired level of change and planning extension activities to meet that level of change’ by the authors at [www.arid.com.au/publications](http://www.arid.com.au/publications).

**Example of extension activities for each level of change**

The following example is from a project titled ‘Waterwise on the farm’ (Note: this example is a broad reflection of the ‘Waterwise on the farm’ project purpose and activities at one point in time only; all project detail is not included). The overall purpose of the project was ‘To improve water use efficiency in irrigated agriculture….’. Extension activities congruent with each level of change are presented below, demonstrating how planning to level of change can result in a well rounded project extension plan which delivers the stated project purpose. The highest level of intended change should be inherent in the overall project purpose.

**Activities congruent with level 1 - Raised awareness**

- Articles in local Agmemo, local papers, industry publications, radio interviews, course advertising.
- Invited to talk about project (purpose, activities etc) at field days being run by someone else.
- Development of relevant Farmnotes

**Activities congruent with level 2 - Change in knowledge, understanding, generic skills**

- 3 half-day workshops at least 1 week apart. Workshops include presentation of technical information, demonstration of actions required, opportunity for participants to practice those skills, and opportunity for questions, discussion and clarification. Participants take home a training manual with all technical information, plus tools, calculators and planning formats for applying information (CD and hard copy).
- Participant evaluation of the series of workshops (on content and process, and about any changes they intend to make, or in some cases have already made).
• Field days on specific topics of interest as demanded by irrigators or other industry stakeholders.

Activities congruent with level 3 - Change in practice/behaviour

• Project staff visit the property of each workshop participant between workshops 1&2, and 2&3, and again after workshop 3 if requested by grower. A blank schedule for the visits is passed around at the end of each workshop for participants to complete. During the visits, project staff help irrigators use tools, calculators and planning formats for own situation, as needed for that grower.

• Irrigation improvement grants providing financial assistance to participants to help with making on-ground changes to improve their irrigation efficiency although no funding this year). Need to have completed training and approved irrigation plan to be eligible. Project provides a blank word template (electronic and hard copy) and a completed (real) example of the irrigation plan format.

• The project maintains five demonstration sites within different key industries and regions, aimed at demonstrating best irrigation and nutrient management practices.

Activities congruent with level 4 - Improved environmental, social, economic

• Biannual evaluation of the impact of workshop/project activities on water use efficiency in irrigated agriculture.

Summary

In summary, the central theme to achieving project impact through extension planning is to identify exactly what change is intended (and with whom), and plan project activities to deliver specifically to those targets. A key element of this process is to consider the relative potential impact each target audience for change may achieve by describing the change for each audience (level, scale, complexity, influence), and prioritising in terms of achieving overall project purpose.

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Extension for Landscape Change

Colin Freeman

The need for landscape scale change in the condition of our natural resources is widely recognised. The Regional Delivery Model for Natural Resource Management (NRM) programs aims to help restore and conserve Australia’s environment and natural resources but is unlikely to result in the required landscape scale change (RMCG, 2006).

Rural extension has evolved since the 1960s towards increasingly participative processes within a broadening definition of extension to encompass capacity building to enable change (Coutts et al., 2004) and see elsewhere in this book). Rural extension has also begun to include the triple bottom line aspirations associated with sustainable agriculture, while simultaneously the Landcare and Catchment Management experiment of the past two decades has brought NRM issues to the attention of rural Australians and spawned new models and methods to address them.

A useful lens through which to view the development of extension and NRM is the tension between social and technical approaches to problem definition. Place-based approaches are emerging in Australia as an approach to NRM which can reconcile current mismatches between the landscape scale at which rehabilitation is required, the property scale at which NRM occurs, and the social scales at which people cooperate and act.

This chapter anticipates further evolution and integration of agricultural extension and NRM practice to play a role in the landscape scale change required for sustainable landscapes and describes a place-based model of program design which allows appropriate scales of administration, biophysical processes and community participation to be identified and nested.

Place-based approaches provide opportunities for enhanced integration of agricultural extension and the Regional Delivery Model of NRM and so have implications for extension practitioners acting as change agents in non-urban Australia.

The Regional NRM Model

The concept of Total Catchment Management (TCM) has underpinned state and federal approaches to Natural Resource Management in Australia since the mid 1980s. TCM is defined as ‘the coordinated and sustainable use of land, water, vegetation and other natural resources on a catchment basis so as to balance resource utilisation and conservation’ (http://www.western.cma.nsw.gov.au, undated).

Since 2000, the $1.4 billion National Action Plan for Salinity and Water Quality (NAP) and the $3 billion Natural Heritage Trust (NHT) have been the major national programs aiming to improve the management of Australia’s natural resources. The NAP and the NHT are partnerships between all levels of community
and government, and reflect a view of governance which maintains that voluntary practice change, encouraged by incentives, is the most effective way to create improvements in NRM.

Programs and projects funded under the NAP and NHT are delivered via 56 Regional Bodies (sometimes called Catchment Management Authorities) which have produced strategic plans for NRM and investments strategies for incentives. The devolution of power and resources to Regional Bodies is contingent on participatory, representative and transparent processes and reflects the consensus that traditional top-down governance has demonstrably failed (Whelan & Oliver, 2004). In each region, a Regional Body headed by a community-based Board has been formed to produce a single NRM plan and a single investment strategy for the region.

This approach is consistent with a trend since the early 1990s toward devolution of governance responsibilities and increased community involvement in NRM as a response to Agenda 21 and the International Union for the Conservation of Nature’s The Way Forward (Brown, 1995) and evidenced in over 60 countries worldwide (Plummer and Fitzgibbon, 2004). It is also consistent with the New Public Management paradigm in which government uses market and quasi-market mechanisms to deliver public services (Crowley, 2001). In this model, the Australian Government is a ‘purchaser’ of NRM ‘outcomes’ from ‘providers’.

In the Howard years, the outcomes identified by the Australian Government were identified as Matters for Target. To be accredited and funded, each Regional NRM Plan had to identify Resource Condition Targets and Management Action Targets which addressed the Matters for Target set out in the National Framework for NRM Standards and Targets, which were:

I. Land salinity;
II. Soil condition;
III. Native vegetation communities’ integrity;
IV. Inland aquatic ecosystems integrity (rivers and other wetlands);
V. Estuarine, coastal and marine habitats integrity;
VI. Nutrients in aquatic environments;
VII. Turbidity / suspended particulate matter in aquatic environments;
VIII. Surface water salinity in freshwater aquatic environments;
IX. Significant native species and ecological communities; and
X. Ecologically significant invasive species.

Community participation was identified in the 1983 National Conservation Strategy as essential to realising NRM (NRM) objectives following rural development theory which stressed local self-help supported by change agents (Curtis, 1998). The particular extent and type of community involvement varies between each of the States and Territories, with some Regional Bodies being Statutory Bodies (e.g. NSW, Victoria, South Australia) while others are not-for-profit community organisations or companies (e.g. Queensland).
Challenges for Regional NRM Bodies

The Regional Delivery Model for NRM (NRM) programs is overwhelmingly supported by (interviewed) stakeholders (Keogh et al., 2006), and will be supported by the Australian Government at least until 2012-13. Nevertheless, the level of funding delivery for NRM through the Regional Model is unlikely to result in the desired landscape scale change (RMCG, 2006). Four issues are identified below as challenges for Regional Bodies aspiring to foster landscape scale change.

Mismatch of aspirations and resources

Regional NRM Bodies face a daunting task. They are charged with maintaining those natural resources which are in good condition and improving the condition of degraded natural resources. A national review of NHT2 points to the difficulty of influencing ‘a large number of agricultural enterprises each with their own reasons for making decisions about practice change’ (RMCG, 2006).

However, NRM issues are huge and the resources provided to the Regional Bodies are insufficient to achieve landscape scale change in land use practices and Resource Condition Targets are unlikely to be met (RMCG, 2006). A typical example of a Resource Condition Target provides for a 0.5% or 1% improvement in an indicator of resource condition (such as length of riparian vegetation) to be achieved over a 10 year period. At this rate, the targets in the plans will be achieved within 1000 to 2000 years. Strategic planning for delivery NRM funding and initiatives is unlikely to result in Resource Condition Targets being met (RMCG, 2006).

Given this disparity between resources and aspirations, it makes sense to provide programs which seek to change the culture of farming and the perception of good land management, so that landholders voluntarily change practice to be consistent with local views of good management (RMCG, 2006). Vanclay and Lawrence note that until a specific environmental management practice becomes an accepted part of a farming subculture it will not be adopted regardless of benefits the practice may provide. The most effective use of incentives then would seem to encourage the acceptance of specific practices as part of the local farming subculture.

Mismatch of Resource Condition Targets and drivers for farmer engagement

Regional NRM Bodies are in a difficult position. They occupy the middle ground between a top-down concern for strategic investment of public money in natural resource condition improvement at a landscape scale and the bottom-up methods known to be successful in engaging the people who actually manage the properties which constitute those landscapes.

Accreditation of regional plans was dependent upon the plan addressing the protection of biophysical assets described in national Matters for Target, setting Resource Condition Targets (10-20 years) which relate to the Matters for Target, and identifying Management Action Targets (five years) to achieve the Resource Condition Targets. While aspirations for sustainable production were expressed in plans at the national and regional level, sustainable production issues were subsumed or lost in the expression of biophysical targets for resource condition (see RMCG, 2006).

Perhaps because of this, agricultural industries are yet to be fully engaged in NRM planning and delivery programs (Keogh et al., 2006). A recent review of the Community Landcare Coordinators funded via the National Landcare Program identifies the potential for tension between the promotion of sustainable
agriculture and promoting the regional approach and linkages to the Natural Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP) (Centre for International Economics, 2006).

Improving sustainability requires ‘engaging landholders, building their understanding of NRM issues, and building the understanding within NRM regional bodies about agriculture and regional socio-economics’ (RMCG, 2006). These things inevitably take time and rely on the building of relationships.

Mismatch of ‘community’ and communities, and the rhetoric of community-driven NRM

‘Community’ is a value laden term which has no fixed definition (Carr, 2002). A community might be a community of place, practice, people, or interest; or it might be the community which commonly refers to the general population.

In reviewing the Regional Delivery Model of NHT2, Keogh et al suggest:

That strategic landscape scale change is most effectively achieved where communities have a sense of ownership over planning and investment decisions, and are therefore prepared to make the investments in time, resources and better practices to achieve good outcomes. The importance of the community ownership principle, especially at the regional level, reinforces the biophysical importance of the region as a basic unit for NRM program delivery. (Keogh, 2006, p16).

The proposition/notion that the Australian Government has devolved responsibility for NRM to the ‘Community’ through the Regional Delivery Model rests on three assumptions:

- That there is a regional community;
- That the Regional Body is the regional community (or can know and represent the views of all the people within the region);
- That since there is a Regional Body, the people within the region are aware that they have taken ownership of decisions which imply that they will commit time and resources to improving NRM.

These assumptions are likely to be flawed. It is unlikely that a survey of residents of any region would find a majority who were aware that there was a ‘region’, that a Regional Body was making investment decisions on their behalf, or that they had taken sufficient ownership of these decisions to invest their own time and resources.

Marshall (2007) points to the commonly reported gap between the rhetoric surrounding ‘community-based’ approaches and ‘community-government partnerships’, and the reality of NRM under the Regional Delivery Model. The Regional Delivery Model since 2001 has scaled-up the ‘delivery’ of on-ground works from a reliance on local community and catchment groups to regional bodies representing large populations and extensive areas (Marshall, 2007). However, governments generally did not consult Landcare and other local groups when deciding how to up-scale the experiment in community-based NRM that the groups had embarked upon during the previous decade (Marshall, 2007), with the result that the voluntary cooperation of local groups in many regions was undermined (Ewing, 2000). The Regional Model, notwithstanding the often genuine attempts at community engagement within many NRM Regions, is largely characterised by the hierarchical purchaser-provider model of New Public Management rather than the partnerships-between-equals concept which originally underpinned community engagement in NRM via local group action (Marshall, 2007).

Mismatch of scales of ecological processes and institutional and management units
The science underpinning catchment management programs has applied simplistic technical-fix approaches to water and ecosystems in catchment management (Falkenmark and Folke, 2002), and reflects an entrenched ‘hard science’ culture and an embedded distrust of social science (Roughley, 2005).

Rationalist economic models and centralising tendencies of the organisations, which deliver catchment management programs, have mitigated against the inclusion of social science and the participatory approaches which inevitably follow from consideration of people as central agents in both resource degradation and sustainable resource management (Roughley, 2005). The process of catchment rehabilitation which has begun must, if it is to be successful, recognise that humans are the ‘keystone species’ in landscape degradation and rehabilitation (Kearns & Barnett, 2000).

Catchments are often large enough to encompass ecological processes, but are too difficult to manage, given logistical, economic and social constraints (Kearney and MacLeod, 2006). While catchments were identified as planning units as a means to integrate a number of biophysical issues, these issues may not reflect catchment boundaries at all, being either bigger than the catchment, or relatively small and localised (Bennett, 2003).

Regional Bodies may well manage the investment programs relating to provision of incentives for improved NRM, but they do not and cannot manage catchments.

Currently, no one manages catchments. Rather, parcels of land which comprise the catchment are managed by a variety of individuals, families and organisations.

It is common to hear that regions are appropriate to address the need for ‘landscape scale change’ (e.g. Keogh, 2006). But what is ‘landscape scale change’ and who are the people who will act to deliver it? Landscape scale change, and presumably restoration if it is to occur, can only occur as the sum of the activities (decisions) of individual landholders conducted at paddock and farm scale (Lefroy 1999).

**Eco-social approaches**

The planning logic behind the Regional Delivery Model is lineal and has the effect of directing strategies and investment plans into asset-based silos, which constrains innovation and the integration of economic, social and biophysical responses to complex NRM issues. These approaches from a management paradigm are inappropriate for dealing with complex problems.

Goldstein describes the manner in which the non-linearity of complex social systems of organisations defies the traditional models of organisational change. Extensive planning based on precise assessment of the current situation and an anticipation of planned outcomes (i.e. the Fallacies of Strategic Planning described by Mintzberg (1994)), is replaced by recognition that outcomes are unpredictable and change may be precipitous.

An important insight from Landscape Ecology is that it is imperative to define the scale of investigation (Addicott et al., 1987) and to match the scale of investigation to the scale at which organisms and processes operate (O’Neill et al., 1988; Wiens, 1989; Levin, 1992). Much of the rhetoric of strategic large-scale projects (as opposed to the so-called ad hoc community-based approach prior to the Regional Model) can be seen as reflecting an appreciation that many of our NRM issues are manifest at relatively large scales.
There is an emerging awareness among ecologists that ecological and social systems must be considered jointly. Holling (2001) suggests that the era of ecosystem management by incremental increases in efficiency is over. We are now in an era of transformation in which ecosystem management must ‘build and maintain ecological resilience as well as social flexibility needed to cope, innovate and adapt’.

Various approaches have been taken in attempts to reconcile the fact that the condition of ecological systems is in most instances influenced by humans acting within social systems, and that the economy is nested within society and society is nested within ecology.

Such approaches are described by terms such as communicative catchment (Martin, 1991) socio-ecohydrological (Falkenmark and Folke, 2002), eco-civic (Brunkhorst, 2002), and social-ecological systems (Walker et al., 2002; Bohnet, 2005; Cumming et al., 2006). These approaches have in common a basis in systems thinking where nature and society may be modelled as two major subsystems with interactive linkages (Falkenmark & Folke, 2002).

Social organisations are complex systems (Flood, 1999). Predictability in complex social systems, as in biophysical systems, is difficult and necessarily short term due to the iterative and interactive nature of events and relationships, and the requirement of impossible precision in describing the current situation (i.e. sensitive dependence on initial conditions) (see Gleick, 1987; Flood, 1999). The implication of this unpredictability for change management and strategic planning is that planning horizons (or foresight horizons) must be necessarily short (Mintzberg, 1994).

**Scale**

Scale is central to understanding complex social systems, and while the biophysical sciences specify scale in terms of space and time, determination of social scale requires the addition of representation and organisation (Cumming et al., 2006).

The appropriate social scale for the management of social systems is not obvious. Rather, the appropriate scale for management is the ‘community of interest’ containing people in social relationships. The community of interest is self-defined (Brown, 1995) and cannot be prescribed. The task of catchment management organisations should be to nest the management of communities of interest within hierarchies of scale so that goals for ecosystem and catchment management can be met (Brunkhorst, 2002). The notion of subsidiarity (Brown, 1995) suggests that decisions regarding management should be devolved as closely as possible to those affected. Cooperating autonomous agents succeed best when they interact along lines of trust.

Long term solutions to scale mismatch problems will depend on social learning and the development of flexible institutions that can adjust and reorganise in response to changes in ecosystems (Cumming et al., 2006). Mismatches between the scales of social systems and the ecological processes which are to be managed have been identified as causes of problems in the management of biophysical systems (Cumming et al., 2006) and as impediments to successful catchment management (e.g. Brunkhorst, 2002).

Such adaptive adjustment requires a ‘recurring spontaneous self-organisation that generates novelty and creativity in a managed dynamic full of tension’ (Stacey, 1992). ‘Managed’ in this context refers to the development of informal social groupings with a focus on local issues and action (Flood, p91). Sustainability is then the capacity to create, test and maintain adaptive capacity; and development is the process of creating, testing and maintaining opportunity (Holling, 2001). Holistic NRM programs require
genuine social empowerment through devolution of authority, responsibility and freedom to experiment, and this authority and responsibility must be vested at the lowest appropriate level (Lovell et al., 2002; see also Brown, 1995).

**Place-Based Planning**

Marshall cautiously suggests that the notion of subsidiarity manifest in sub-catchment organisation offers a means to adaptively manage our landscapes as complex social-ecological systems. He notes also that successful efforts at capacity building are demand-led: that is, individuals participate in capacity building to the extent that they expect it to further their own goals (Marshall, 2007). Place-based planning offers a means to engage landholders in planning for issues in which they have an interest and over the extent of their self-defined community.

Place-based planning has been adopted in urban situations (e.g. Roberts, 2001) and by Regional NRM Bodies around Australia under various descriptors such as Sub-Catchment Planning (Webb, 2005) Local Area Planning (Pagon, 2006), Integrated Area Wide Management (Rankine et al., 2005) and Neighbourhood Catchments (Millar et al., 2001).

Decision making at a place-based scale will require organisations comprising many individuals. While government agencies address issues on a fragmented segment basis and have high administrative costs, communities (Lovell et al., 2002) and individuals (Vanclay, 2004) find it relatively easy to think and act holistically. There are also efficiencies in ‘delivery’ to be gained through community-based organisations harnessing local knowledge, ownership of issues and locally relevant solutions (Kingma et al., 2001).

Organisations comprising local catchment residents will be required to enable catchment management at a landscape scale, and strategic thinking (Mintzberg, 1994) will be required to catalyse the formation of these catchment-based organisations. This strategy must involve the provision of the conditions required for self-organising social groups to develop and to adapt through learning (Senge, 1990).

**Models for change**

The fields of change management and learning organisations provide some useful perspectives.

Brown’s (1995) 4Ps (Policy, Problem, Practice and Place) model provides a conceptual framework which can be applied to Place-based planning.

Given the foregoing discussion of the interplay of social systems and bio-physical systems, and the recognition that the actual managers of natural resources within catchments are the residents, it is important to begin the application of the 4Ps model with Place. A sense of place (i.e. community of interest) is required for people to have a sense of belonging sufficient to become a member of a group (Carr, 1997).

Place has two elements which define it: first, the geographic location and extent which is defined by the people who reside there. It is important to note that communities of interest can only be self-defined. The first element of encouraging self-organisation then is to allow self-definition of Place.

Second, Place is not simply defined as a map and a list of residents. There must be some common understanding and aspirations which underpin the decision of local residents to organise and cooperate. People within any Place have different ways of valuing landscapes and different levels of commitment to
maintaining the values they identify (Wardell-Johnson, 2005). When people in a Place are brought together in groups, the desirable characteristics of good relationships do not spontaneously or necessarily emerge: cooperation, voluntary participation, exchange of benefits and responsibilities, and trust may need to be facilitated and supported (Elix and Lambert, 2003).

Senge (1990) suggests that a guiding idea is required, and in this context it is (or could be) a common aspiration for the future of their Place. This guiding idea cannot be prescribed and must be able to evolve (Senge, 1990), and again self-definition is critical in encouraging self-organisation.

Policy emerges from the interplay of local people with their aspirations for the future of their Place, and should not be prescribed. Top-down policy-driven landscape change may threaten social and economic sustainability. Plsek and Wilson (undated) suggest that the interactions between actors within organisations are more important than particular actions of individuals, and that plans for progress should not be specified in any detail. Rather, minimum specifications for policy yield more creativity and harness unpredictable capabilities of the group which are not inherent in any of the individuals.

The four principles of policy suggested by Plsek and Wilson relate to the interactions between group members.

- First, generative relationship are sought which focus on positives and possibilities, and which recognise the value and dignity of the world views, aspirations and imperatives of each group member.
- Second, a policy of minimum specification (similar to a focus on outcomes as opposed to outputs) allows the emergence of novel approaches, and avoids the flawed logic of strategic planning (Mintzberg, 1994) which extrapolates the future from a conception of the past.
- Third, a policy of focusing on positive attractors for change recognises that the notion of ‘resistance to change’ is more fruitfully cast as an absence of something attractive, rather than as an inherent fault of conservatism or inertia in people.
- Fourth, a constructive and encouraging approach to variation in ideas and approaches recognises that innovative ideas and methods may prove profitable. In addition, it recognises that local variation is important in adaptive management, and that self-organisation means that variation between groups in approaches and methods is inevitable and desirable.

A final principle for the determination of Policy is that the organisation must aim to be a ‘learning organisation’ (sensu Senge, 1990) and adopt a co-learning ethos. This underpins the ability of the group to create, test and maintain its adaptive capacity (Holling, 2001), and to draw upon its own resources to become self-organising. In addressing management of biophysical resources, a collective and participatory co-learning ethos sits comfortably with the ideas of action research (Kremmis & McTaggart, 1988) and learning organisation (Senge, 1990).

Problem definition and solution, like the definition of Place, must be done by the members of the local group. An important insight from the literature of agricultural extension (see Vanclay, 2004) and the experience of Landcare (see Carr, 2002) is that problems will not be addressed unless identified as problems by those involved. The response to the problem as defined by the group is the creation of social infrastructure (i.e. groups and relationships) which recognise the community nature of self.

When ‘foresight horizons’ are complex, as they are in NRM, unpredictability requires ongoing reinterpretation of realities and scenarios. Since outcomes (of strategy) depend upon interactions between many agents, strong and trusting relationships between agents maximise the possibilities of
cooperative action for novel responses to situations. Precedents and models exist in many community-based organisations which have grown from the bottom up (see Carr, 2002), and such self-organised groups can be ‘attracted’ to states of more coherence and more complex order, and so function very effectively. The largely spontaneous development of networks of Landcare groups in the 1990s provides an example of this.

The purpose of these social relationships in problem solving is to identify the appropriate theory, methods and tools to address the problem. Senge’s (1990) theory, methods and tools may be applied to this to provide the new skills, understanding and capacity characteristic of a learning organisation. Five skills are identified as critical for success: systems thinking, personal mastery, mental models, building shared vision and team learning.

The application of these principles will allow the determination of suitable Practices. These practices (whatever they may be) will reflect cultural change because they will have emerged from information validated by those involved, be freely chosen by those involved, and be applied towards an aspiration to which those involved are committed (Burnes, 1992).

Oliver reviewed American community groups which have successfully achieved the paradigm shift required to recognise their inter-connectedness and envision sustainability, and identified characteristics which are common and which resonate with the concept of a learning organisation:

- a good working knowledge of the ecosystem;
- a commitment to ecosystem health;
- a commitment to learning; respect for all the parts;
- a sense of place; acceptance of change;
- a long-term investment horizon; and
- the ability to set limits.

The conceptual model for this strategy derived from Brown (1995), is provided below.
Implications for Regional NRM Bodies and extension practitioners

Place-based approaches are more complex than the simple delivery of funds to individuals and groups to undertake project activities. They necessarily involve more people and interests than may be directly involved in project activities, and challenges for philosophy, resources and skills.

Learning, and the knowledge which comes from learning, is critical in all conceptions of extension for practice change. Extension to date has been conceived as providing learning and knowledge through transfer of existing knowledge (via transfer of technology, one-to-one advice, or structured training) or through active participation by farmers in research (Black, 2000). This learning is commonly related to biophysical issues (agricultural practice or NRM) and the extension practitioner is either someone who can impart knowledge they possess or guide the research for new knowledge. A learning organisation requires not only new biophysical knowledge about the landscape in which it resides, but also needs knowledge (and experience) of how to learn and how to be an organisation.

Further, extension to date has not commonly or necessarily been provided to all residents in a particular place. Both transfer of technology and group approaches extend to a subset of the population who are interested (or targeted). Place-based approaches necessarily (try to) involve all residents within a place, and in doing so bring together a range of stakeholders with different and often competing perspectives, agendas and imperatives. Extension for NRM is more conflictual than extension for improved agricultural production and requires extension to be conceived as a process of negotiation (Leach, 2003); and Place-based approaches in NRM are more conflictual again than extension of incentives to individuals and groups.

Implementation

Place-based approaches require a policy approach that builds social capital in communities, which can be ‘a challenge for those accustomed to a top down, highly accountable model of policy based around traditional policy ‘silos’” (Kilpatrick, 2000). To the extent that Regional Bodies necessarily design their programs in response to the reporting requirements of the Australian Government, they face the same challenge as that of government: to apply the principle of subsidiarity in devolving responsibility to community-based organisations via ‘collaborative-partnerships-between-equals’ models (Marshall, 2007). Place-based planning also invites and values conversations regarding subjective, spiritual and cultural issues which may seem beyond the scope of NRM, but their expression and provision of a safe space for that expression may be essential for providing a context in which NRM issues may be raised and negotiated.

Devolving authority for decision making and therefore for outcomes in NRM programs can be scary for extension practitioners. In the community-based approaches which value the knowledge of locals and provide decision making to locals, extension practitioners are no longer (necessarily) valued for their technical expertise which, presumably, may be an important component of their self-concept and sense of worth. Rather, the skills most useful to the extension practitioner within Place-based approaches are those of facilitator, for which they may have had much less training than in their technical specialty area.

Lambert and Elix (2000) describe this facilitator role as one of ‘cultural translator’: ‘Much as a language translator enables communication between people from different language groups, so a ‘cultural translator’ will have the ability to understand and interpret, in ways meaningful to other parties, the cultural values and norms of each participating sub-group in a multi-stakeholder group’.
Trust is essential for Place-based planning (Elix and Lambert, 2003), yet the time required to create the relationships required to foster trust may be difficult under circumstances where Regional Body programs are relatively short term and tenure of staff is short term, uncertain or constantly changing. Place-based planning thus requires a commitment in time and resources beyond that which has historically been possible, but may be possible under the recently announced continuation of NHT3.

**Conclusion**

The extension of funding in NHT3 suggests that Regional Bodies have sufficiently demonstrated their governance and NRM delivery capabilities. Funding support until 2012-13 provides a signal to stakeholders and State and Local Government that Regional Bodies may have a degree of longevity and a mandate for NRM management. Increasing community acknowledgement of environmental imperatives, spawned through increasing media coverage of drought and climate change concerns, may act to cement the place of Regional Bodies as important players in NRM planning and management.

Place-based planning offers Regional Bodies an approach in which they can lead the development of locally-defined, community-based organisations with the potential to harness interest and energy by acting at scales which allow integration of social and biophysical concerns. In the same way that Landcare and catchment groups in the 1990s experimented with approaches and models applied in unique local conditions, so can Regional Bodies learn from Place-based approaches employed by other Regional Bodies and other planning organisations, and apply them to suit local circumstances.

Wardell-Johnson (2005) provides the conclusion:

> ‘We can no longer afford to silence a contextualised politics of place in preference for a more abstracted and less attached politics of interests if we are to maintain resilience in rural Australian landscapes.’

**References**


Plsek, P.E. & Wilson, T. (Undated). Complexity, leadership, and management in healthcare organisations www.bmj.bmjjournals.com/cgi/content/full/323/7315/746


Monitoring and evaluation processes within the extension context must be able to serve a variety of stakeholders with a broad range of needs. To that end, it is important to be able to select and apply the evaluation methods that will best suit a particular purpose and to understand how best to analyse the data that are collected, in meaningful and useful ways. For example, what kind of program or project is being assessed? Are we working with a large or small group of stakeholders? Is self evaluation appropriate or should we call in an external evaluator? The purpose of this chapter is to provide a broad overview of the range of evaluation approaches and frameworks that might usefully be applied to evaluate extension projects and activities. The literature on evaluation is vast and the terminology often confusing; the aim here is to clarify some relevant terms and approaches and to guide extension professionals towards some relevant texts and papers.

Theories of Evaluation: History, Function and Approaches

Evaluation has been used extensively to assess the success of interventions (Popham, 1993; Patton, 1986; Guba and Lincoln, 1989), but since the early 1970s its focus has been on providing professional information to program sponsors about impact (Guba and Lincoln, 1989; Shadish, Cook and Leviton, 1991; Stufflebeam and Shinkfield, 1985; Patton, 1986; Popham, 1993). Three main ways of charting the development and changes in evaluation theory relate to its historical development, the types of evaluation methods available and the intended function of evaluation studies.

History

Guba and Lincoln (1989) have provided a historical perspective on the range of evaluation approaches, which they described as four generations of evaluation. What they called ‘first generation’ evaluation covers the period from Aristotle to the 1930s. They called this generation of evaluation the measurement generation because they felt that evaluators were preoccupied with measuring the results of their efforts. They called their ‘second generation’ of evaluation the generation of description. They stated that evaluators were the ‘describers’ of what was happening. The evaluators were asked to find out what was happening in various government programs so that success could be examined against previously set goals. Guba and Lincoln (1989, p28) described this period as being characterised by the work of Ralph W. Tyler. This period, they suggested, ran from the 1930s to the 1950s.

The 1960s and 1970s were identified as the ‘third generation’ or the generation of judgement and was characterised by judging the worth of a program. Guba and Lincoln (1989) stated that the work of Robert Stake and Michael Scriven was influential during this period in indicating that measuring against goals and objectives could be misleading when attempting to judge the merit of a program. This was because many worthwhile, indirect effects could be excluded from consideration. Finally, Guba and Lincoln (1989) suggested that this period was followed by a ‘fourth generation’ evaluation which reflected a responsive constructivist evaluation. This phase of evaluation has been shaped by more participative models which favour an action research approach and increased involvement by those stakeholders both involved in and affected by the evaluation process.
Guba and Lincoln’s descriptions can be criticised for being historically over-categorised and indeed they ignore the fact that evaluators are still practising first, second and third generation evaluation approaches. For example, Rossi and Freeman (1993), Popham (1993), Patton (1986) - three major authors of evaluation literature - still advocate first, second and third generation evaluation as relevant and valid. However, Guba and Lincoln’s (1989) work is still valuable for building a picture of the historical stages of development within evaluation theory.

**Function**

A second way of categorising evaluation literature is to emphasise the function intended for the evaluation output. Scriven argued (in Popham, 1993, p14) that evaluation has two purposes or roles. The first is to satisfy the needs of program providers - for example, is it worthy of continued support? This evaluation is done at the completion of a program and called summative evaluation. The second is to produce information that is useful for the maintenance and development of the program; this is called formative information. Most modern program evaluation needs to be able to produce both types of data.

Summative information is characterised by questions like: ‘has the program been effective?’, ‘has it been worthwhile?’, ‘should it continue?’, ‘did it bring about the required outcomes?’ (Patton, 1986, p66). Formative information is characterised by the questions: ‘how can the program be improved?’, ‘what is working well and what is not working so well?’, ‘what are the reactions of the clients, staff and others to the program?’ and ‘what are their perceptions about what should be changed?’ (Patton, 1986, p65). The importance of summative data for any evaluation is that they contribute to the program’s validity for an external audience, and in some cases are relevant to the internal audiences as well as a way of providing internal coherence or unity to a program.

Another useful typology to describe function is that of Owen and Rogers (2000), who described five broad forms of evaluation.

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<th>Evaluations at this level scope the environment in which a project or intervention is to take place</th>
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<td>Form B: Clarification</td>
<td>is where the objectives of the program are examined, clarified and assessed to ensure that they are logically connected with the program outcomes and activities</td>
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<tr>
<td>Form C: Interactive</td>
<td>where the design of the project is monitored for appropriateness</td>
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<tr>
<td>Form D: Monitoring</td>
<td>where the project objectives are monitored for progress</td>
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<tr>
<td>Form E: Impact</td>
<td>where the project is finally assessed to determine if the objectives have been achieved. This phase also allows for the reporting of indirect effects and any recommendations</td>
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</tbody>
</table>

Within each ‘form’ of evaluation, numerous approaches have been developed to suit particular purposes in evaluation. For instance, ‘cost-benefit analysis’ is a form of impact evaluation, commonly used by economists (but out of favour in other disciplines because of its emphasis on monetary values). Monitoring is a common part of modern extension programs and can be participatory or non-participatory.

**Approaches**

A third way of examining evaluation is to focus on the approaches used. Stecher and Davis (1987) and Popham (1993) classified evaluation according to approaches rather than history. We have nominated evaluations who work within that approach.
- Experimental - characterised by the work of Rossi and Freeman;
- Goal oriented - characterised by the work of Popham, Owen and Rogers, Mayne, Dart;
- Decision focussed - characterised by the work of Stufflebeam;
- User oriented - characterised by the work of Patton;
- Stakeholder approach – House, Mertens, Weiss, Roberts
- Responsive - characterised by the work of Guba and Lincoln and Stake, Pawson and Tilley, Truman, Mertens and Humphries, Dart.

We now explore the approaches to evaluation listed above in a little more detail.

**Experimental Approaches**

Lee Cronbach (in Stufflebeam and Shinkfield, 1985) was concerned about accountability and isolated what he believed were the components of a program to study its effects. He identified the various components as being the units, treatments and observations. In Cronbach’s work, the units were the school students, the treatments were the new education programs and he then observed the effects of the programs. He felt that this direct comparison between ‘treated’ and ‘untreated’ units provided clear information about the impact of the treatment. Many evaluators today are still comfortable with this experimental approach and endorse it (Rossi and Freeman, 1993, p32; Wadsworth, 1991, p69).

**Goal-Oriented Approaches**

Popham (1993), with a background in educational evaluation, used an objective oriented approach to evaluation because so many educational programs are encouraged to use objective centred evaluation to measure impact. He cited Bloom’s and Gagné’s work on objectives. They focus on educational and learning objectives respectively. Bloom’s educational or teaching objectives deal with measuring changes in knowledge, values and physical skills. Gagné’s learning objectives are concerned with measuring ability in areas like rote learning, discrimination between objects and identifying objects.

Goal-focussed evaluation is contrasted with ‘goal-free’ approaches, in which the outcomes of programs other than those related to the program goals are also considered and reported upon (see below).

**Decision Focussed Approaches**

Stufflebeam (in Stufflebeam and Shinkfield, 1985) looked more broadly than the educationists at the object of the evaluation and developed the CIPP model (Context, Input, Process and Product evaluations). He argued that context, input, process and product should all be evaluated individually to gauge their effects on the final outcome, and that these are interlinked. For example, to study the effects of the products alone may yield misleading data; they must be considered in relation to the other three. In other words, Stufflebeam viewed these components as four variables that could affect a program.

Scriven and Stake (in Popham, 1993) echoed Stufflebeam’s concern that all factors affecting evaluation results must be considered when making decisions about the worth of programs. In a similar vein, Bennett (1975) developed a hierarchy of outcomes so that impacts of extension programs could be measured incrementally. The need for this approach was recognised because of the political environment in which publicly funded programs operated. Bennett’s hierarchy, which is illustrated in the figure below, is used extensively by agencies in Australia.
### Bennett's Hierarchy

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>INPUTS – resources expended</td>
</tr>
<tr>
<td>2.</td>
<td>ACTIVITIES - the number and type of activities undertaken</td>
</tr>
<tr>
<td>3.</td>
<td>PARTICIPATION - the number of participants at the activities</td>
</tr>
<tr>
<td>4.</td>
<td>REACTIONS – their reaction to the activities</td>
</tr>
<tr>
<td>5.</td>
<td>CHANGE IN KNOWLEDGE, ATTITUDE, SKILLS, ASPIRATIONS (KASA) – their changes in these areas.</td>
</tr>
<tr>
<td>6.</td>
<td>PRACTICE CHANGE - change in behaviour</td>
</tr>
<tr>
<td>7.</td>
<td>END RESULTS - measure of impacts</td>
</tr>
</tbody>
</table>

Bennett (1975) also looked at the specifics of evaluation and graded the progress of a treatment, to use Cronbach’s terminology, so that its effects could be assessed in progress (cited in Patton, 1986, p153). Bennett had seven steps in his process and he evaluated the effects of each step and its relationship with the next. The final step was the outcome that was intended by implementation of the program, intervention or treatment.

Application of Bennett’s hierarchy is particularly helpful for the evaluation of large programs in that it satisfies program sponsors who are comfortable and familiar with goal-centred evaluation (DPI Publications; DPI, 1992). It also provides them with interim data. Bennett’s model is especially valuable in that it is acceptable to both qualitative and quantitative surveyors and provides at least one point of contact between the two views (Carey, 1995). Both types of surveyors find his hierarchy helpful to structure their observations. Fish (1990), Wadsworth (1991), Kakati (1992) and Weiss (1983a) are four who acknowledge that evaluators who have differing views often have difficulty accepting the credibility of each other’s work.

### User focussed evaluation

Patton (1986) was concerned about the lack of implementation of evaluation outcomes, largely because the results were of little use to those who commissioned the evaluations. His suggestion to overcome this was to involve those who commissioned the work in the design of the evaluation. He also suggested that the definition of utilisation should be widened to include incidental use in program development and the implementation of research information (Patton, 1986, p37). For example, if research information is used a decade after being published, there may be no one who would remember to include it in the ‘used’ category.

### Stakeholder Approaches

Stakeholders’ evaluation, as described by Robert Stake in the ‘Cities in Schools’ program (1983) and analysed by Carol Weiss (1983a, b), involves the stakeholders in the design and data collection of the evaluation at the beginning of a program.

In accurately representing stakeholders, Mertens (1999) has raised the issue of representing the experiences of marginalised groups with her theory of inclusive evaluation. In particular, she raises the tensions between objectivity, credibility and validity, and the problems associated with the appearance of advocacy or political motivations in evaluations which ‘take the side of’ marginalised groups in an effort to
promote equality (Truman, Mertens & Humphries, 2000). While these tensions must be carefully negotiated, a more inclusive model of evaluation has the capacity to elicit an increased level of objectivity via the inclusion of a wider range of views and the potential revelation of some rather critical new information in the evaluation process (Mertens, 1999).

Further to this, Roberts (2004) has developed a coexistive model of evaluation which seeks to ensure that these different perspectives and voices are not lost or minimised and each can be given appropriate weight. The advantage of this approach is that any conflicting views about a program can be exposed and accounted for. The coexistive approach does not strive to make different perspectives understandable to one particular audience (e.g. the funder) and it incorporates procedural steps to ensure a forced consensus is not arrived at.

**Responsive and Participatory Approaches**

An important branch of the literature on participative participatory evaluation includes action research models (Wadsworth, 1991; Brown, 1988; Whyte, 1991) and Guba and Lincoln’s model. Action research is a collaborative effort and is therefore participatory. Guba and Lincoln’s model of evaluation used different terminology but is otherwise similar to action research. Action research is a model of collaborative action for research or evaluation that has four parts to it, one of which is reflecting on actions taken. The other three are: Planning for action, Taking action and Observing what happened. However, more important than this four part cycle is the code of engagement that demands that all individuals who collaborate are of equal value and status and they take part in the study because of the skills they bring to it rather than because of their status elsewhere (McNiff, 2002; Whyte, 1991; Kemmis and McTaggart, 1988).

Each of the approaches described here are still in current use. What determines which approach is used are: the aims of the evaluation, the expectations and needs of the client (the users of the results of an evaluation), and the evaluator’s experience, skills, background and values.

**Evaluation Frameworks**

The circumstances of each evaluation differ and it is important to ensure that the methodology fits the type of project and the objectives to be measured. In designing an evaluation framework, it is necessary to bear in mind that there are a number of forms of evaluation (Owen and Rogers, 2000). Evaluations can be proactive and are valuable to scope the environment in which the program or project is to take place. Still in the early stages of a proposal, another form of evaluation is to clarify the objectives and ensure that the outcomes and the objectives are logically connected. Once a project is operative, it may be necessary to modify the design and an interactive form of evaluation is used to obtain data from the participants to establish if the design of the project is working well or needs to be changed. To ensure that the project meets its objectives, it is necessary to monitor the progress of the program or project being evaluated. Finally, and most commonly, the impact of the project may have to be measured to ascertain if the objectives have been achieved and whether any modifications are recommended for the future.

The chief purpose of an evaluation framework is to be systematic about planning and undertaking the monitoring and evaluation of a program and project. A framework is an outline or set of steps that can be used to ensure that all parts of an evaluation are considered. For example:

- Bennett’s hierarchy can be used to ensure that incremental effects are added up as a program or project progresses and so its progress can be monitored and measured along the way, while
Owen and Rogers’ framework can be used to ensure that evaluations are carried out at particular stages of a project.

Similarly Wissemann’s steps can be used to ensure that proper consideration is given to the focus of the evaluation Logical Framework – to ensure that appropriate objectives, indicators, information and data collection methods match the level of evaluation. A logical framework is a logical set of steps such as Vision→ aims→ objectives→ actions.

These Logical, Wissemann’s and ERI frameworks are now described in greater detail

**Wissemann’s six steps**

Wissemann (2004) suggested six steps that can be taken to ascertain and clarify the form of the evaluation required and hence the information required.

I. Clarify the evaluation request. One needs to ascertain:
   - Why the evaluation is being requested (the purpose of the evaluation)
   - Who wants the evaluation, and whether a steering committee should be formed to oversee the evaluation
   - Whether an external evaluation (or evaluation team) should be used (for reasons such as impartiality, credibility, expertise or trust)
   - What the evaluation is likely to mean to stakeholders (such as funders, program providers and program recipients)
   - The resources available (time, funds and personnel)
   - The political context within which the evaluation will be conducted
   - Whether to evaluate (because of unrealistic expectations or ethical considerations).

Focus the evaluation. This includes determining the scope of the evaluation and writing the key questions that the evaluation will answer.

Identify information needs. Identify the information that needs to be collected to answer the key questions.

Identify information sources and data collection methods. Determine where and how the information will be obtained.

Decide on the methods of data analysis and reporting procedures. Various forms of quantitative and qualitative data analysis may be performed. A number of reports may be produced, each tailored to a different audience.

Sequence evaluation activities and produce a written evaluation plan, including timelines and assigned responsibilities (where necessary).

**Logical framework**

These steps lead into the development and use of a basic logical framework. A hierarchy, such as Bennett’s referred to earlier in this chapter, can be developed into a more expansive logical framework covering the whole project. The table below adds another level of Bennett’s, the context in which the project is operating and separates the seven steps of Bennett’s into four groups: Broader Impact; Direct Effects; Internal Project Factors; and Outside of Project Control. The flow from the ‘resources’ to the ‘social-
economic-environmental outcomes (the description of the project itself) is also referred to as the ‘Vertical – or Project -Logic’.

Table 1: Basic Logical Framework:

<table>
<thead>
<tr>
<th>Evaluation Levels</th>
<th>Hierarchy (+context) Narrative summary</th>
<th>Objectives/Key Performance Indicators</th>
<th>Key evaluation questions</th>
<th>Information needed to measure/monitor</th>
<th>Evaluation methods to capture information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broader impact</td>
<td>Social-economic-environmental outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct effects</td>
<td>Practice changes</td>
<td>Knowledge, Attitude, Skills, Aspirations (KASA) changes</td>
<td>Reactions</td>
<td>People Involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal project factors</td>
<td>Activities / process</td>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outside project control</td>
<td>Context – policies; climate; policies; Related projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Logical frameworks such as that in Table 1 can be limiting in that they imply a linear flow from a project’s beginning to its end and life is not always that simple. Some variations on these logical frameworks seek to address this by including a column that lays out the assumptions that are inherent in moving up the Vertical logic and/or include a risk assessment column. Others show more clearly the steps and processes needed to move towards the desired outcomes.

The ‘context’ row (bottom row) allows scope to show a range of factors that could impact positively or negatively on the outcome. By specifying these at the beginning, they can also be benchmark monitored to assist in better understanding the move or otherwise up the Vertical logic.

**Monitoring, Evaluation, Reporting and Improvement (MERI)**

Developed by Dart around 2003, the MERI framework is used widely in government programs in Australia related to the management of natural resources. This framework applies rigour to the development and assessment of different levels of a program to ensure that they are explicit to the program staff and therefore explicit also for an evaluation. Dart asserts that when the framework is clear this helps to ensure that the evaluation is also clear (2007a).

Table 2 outlines the steps for developing a MERI plan for a regional NRM strategy.
Table 2: MERI Plan for developing a regional NRM Strategy

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Surface the program logic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Clarify the key NRM outcomes sought</td>
</tr>
<tr>
<td>1.2</td>
<td>Identify desired changes at four levels of logic</td>
</tr>
<tr>
<td>1.3</td>
<td>Interrogate the logic</td>
</tr>
<tr>
<td>1.4</td>
<td>Identify key assumptions</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Consider where targets fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Resource condition targets</td>
</tr>
<tr>
<td>2.2</td>
<td>Management action targets</td>
</tr>
<tr>
<td>2.3</td>
<td>Outputs and milestones</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Consider best lines of evidence to report against targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Select best lines of evidence</td>
</tr>
<tr>
<td>3.2</td>
<td>Use performance stories</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Consider evaluation: develop key evaluation questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Consider which assumptions to evaluate</td>
</tr>
<tr>
<td>4.2</td>
<td>Consider audiences of the evaluation and priorities</td>
</tr>
<tr>
<td>4.3</td>
<td>Develop key evaluation questions based on priority needs</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 5</th>
<th>Choose methods to address key evaluation questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Select methods for addressing evaluation questions</td>
</tr>
<tr>
<td>5.2</td>
<td>Consider ethics, design and analysis</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 6</th>
<th>Develop utilisation, learning and reporting strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Consider how data will be used for adaptive management</td>
</tr>
<tr>
<td>6.2</td>
<td>Consider how data will be meaningfully reported</td>
</tr>
<tr>
<td>6.3</td>
<td>Consider how contribution will be demonstrated</td>
</tr>
<tr>
<td></td>
<td>Reporting &amp; Improvement</td>
</tr>
</tbody>
</table>

(Source: Dart, 2007a, p.7)

The MERI framework is not only a critical part of a program cycle in that it provides the necessary monitoring and evaluation to elicit the information needed to ensure a program is on the right track, but it also provides a way of communicating those findings to others. This is important, particularly where programs are being funded externally and there is a reporting condition connected to the receipt of that funding. But further to this, it also means there is potential to report the results of programs not only to those directly involved such as the funders but also to other stakeholders such as the target of such programs, for example.

In Australia, the MERI framework has been widely adopted by government as a mechanism for monitoring and evaluating the programs and activities managed by the regional NRM bodies. In this context, MERI Plans are meant to provide the processes for the NRM bodies to not only monitor the state of the natural environment and coordinate data collection across programs, but also to demonstrate the contribution to improvement in natural resource condition made by the programs in their regional strategy and provide performance information which will inform annual planning for investment and contribute to adaptive management (i.e. refining the regional strategy). Further to this, MERI Plans can provide accountability to funders and the community and provide a mechanism for managing reporting processes (Dart, 2007a, p8).
Tools for collecting data

There are two types of data: qualitative which is non numerical (words, visual images, sound smells) and quantitative which is numerical (numbers). Data can also be categorised as primary (gathered by the researcher from the research subjects) or secondary which entails the use of data gathered and interpreted by someone other than the researcher.

There are three key ways to collect data:

I. Asking questions

Observation

Analysing material that people produce such as written and spoken words, visual images.

Quantitative data are collected by counting, for example:

<table>
<thead>
<tr>
<th>Questions</th>
<th>How many individuals mentioned a particular item when responding to a question. What score individuals gave when asked to rate a level of satisfaction for example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texts</td>
<td>How many pictures, photos, words were created.</td>
</tr>
</tbody>
</table>

Qualitative data are the words, pictures, sounds collected in the responses to questions or what is observed.

Both quantitative and qualitative data also come from secondary materials such as spoken and visual documentaries and documents.

I. Asking Questions

Ways to ask questions

Details

Surveys: face to face interviews, web and mailed questionnaires, paper based questionnaires

Graded scale questions and multiple choice questions collect quantitative data. An example of a graded scale question is when respondents are asked to give a grade to a statement such as from strongly agree to strongly disagree.

Open ended questions collect qualitative data. An example of an open ended question is ‘What do you think of....’

Focus groups and facilitated discussions

‘The purpose of focus groups is to bring together small numbers of people to discuss topics on which information is wanted’ (Carman and Keith 1994, p.22). To elicit data, focus groups rely on interactions between individuals to observe and record how they collectively explore an issue.

Focus group questions are generally semi-structured or open-ended. They are designed to elicit qualitative data. Stanfield (2000, p41) recommends following the process below when designing focus group questions: ‘Begin with a simple question addressed to the group, and ask each person to answer it individually. This demonstrates to participants that all opinions are valued. Subsequent questions can then be addressed to the whole group, the facilitator making it clear that anyone can answer.’
Narratives, Storytelling, Most Significant Change Techniques

There are many ways of asking people to tell a story. Methods of story telling can be structured or unstructured. ‘Story-based’ approaches to data collection offer a more comprehensive qualitative form of evaluation and can make up for some of the gaps in evaluation left by more quantitative and less colourful data collection techniques. The story-based approach described in more detail here has also been referred to as ‘monitoring without indicators’ (Dart et al., 2000, p.1). The Most Significant Change Technique developed by Davies and Dart (2003) is another style of narrative.

Case studies

Stake writes that as a form of research, ‘a case study is both the process of learning about the case and the product of our learning’ (1998, p.87). Generally case studies can be classified into three main categories: intrinsic case studies, instrumental case studies and collective case studies. Intrinsic case studies generally seek to understand very particular cases. In these cases, researchers do not intend to use their findings to develop understanding about more general phenomena; rather their attention is closely focused on what is particular or specific about the selected case study. Instrumental case studies are generally cases that are studied to provide insight or clarity to a more general issue. Alternatively, instrumental case studies might also be used to help refine a theory. In such cases the case study itself is of secondary interest, it is merely the mechanism for advancing understanding of this more overarching concern. Collective case studies occur when researchers undertake several case studies at one time. This might be so as to elicit information about a population or general condition and for the most part collective case studies can be seen as the extension of an instrumental case study to several cases.

History Trip/Events tracks, turning point tracks

The use of a history trip allows evaluators to reconstruct the history of an intervention and identify the significance of the main events in its past. By using an evaluation process which identifies the significant historical aspects, it is likely that a shared history and culture can be established (through an intervention or catchment history in terms of landscape change) and this can be built upon in the future. Photos, stories, recollections and opinions can be part of these continua.

Participant Observations in the field

‘First and foremost, some observational fieldwork is essential if the evaluator is to provide a suitably descriptive account of the core features of any program’ (Clarke, 1999, p80). The following items to observe come from Hammersley and Atkinson (1983, p93–102).

Things to look for:

- Goal: the things that people are trying to accomplish.
- Actors: the people involved.
- Space: the physical place or places.
- Activities: a set of related acts that people do.
- Objects: the physical things that are present.
- Acts: single actions that people do.
- Events: a set of related activities that people carry out.
- Time: the sequencing that takes place over time.
- Feelings: the emotions felt and expressed.

(Source: Spradley in Hammersley and Atkinson, 1983)
Janesick (2004) provides a very useful guide and exercises on how to carry out observations in her publication, ‘Stretching’ Exercises for Qualitative Researchers.

Analysis of primary texts

Text analysis is most often used to analyse qualitative data. Texts are words and visual images that people have created. They are records they have kept (data about rainfall, pasture, vegetation changes), photos people have taken, drawings and other pictorial creations people have made. What people document and why tells a lot about them. The data with the texts is also valuable in its own right.

The distinction needs to be made between primary texts and secondary texts. Primary forms of data are compiled by individuals with first-hand experience of the events under investigation, i.e., meeting minutes, journals and log books. Secondary forms of data are produced by individuals who do not possess personal knowledge of the event/s, such as official reports and external evaluations.

There are many ways to collect data that is both qualitative and quantitative but generally it can be done through asking questions, observing what happens and looking at what has been created.

**Reporting**

Reporting against key evaluation questions

Most often the reporting of evaluation results responds to the key evaluation questions which are set at the start of an evaluation. These questions tend to centre around areas such as:

- What has been achieved?
- What has worked well?
- What can be improved?
- What were the unintended benefits?

To provide a response to each of these questions, data would have been collected by many other sub questions that reflect the detail of the project or program.

**Reporting against a framework**

Reporting against a framework such as Bennett’s, a MERI (monitoring, evaluation, reporting improving) or a logical framework are also ways of structuring an evaluation report. These frameworks are described in the previous section.

**Performance story: Interpretation and attribution**

Government programs generally seek specific outcomes and effective programs are those that are seen to meet their objectives and contribute to these outcomes. Mayne (1999, Dart, 2007) suggest that in terms of evaluating government programs the question of attribution is critically important in not only determining the worth of a program but also for determining potential future directions. However, it is one thing to determine if the objectives of a program are being achieved; it is more difficult to measure to what extent the program itself is contributing to those objectives, or exactly what contribution it is making. Generally the attribution problem is addressed by program and policy evaluation in one of the following ways. For example, a time series might be constructed to observe the program’s performance over time. Alternatively evaluators might measure changes among a population accessing a particular program in
comparison with a population not receiving the program as a comparison study. However Mayne notes that even given these evaluation techniques ‘determining definitively the extent to which a government program contributes to a particular outcome is usually not possible…[however]...we might be able to provide a reasonable estimate of the magnitude of the impact’ (Mayne, 1999, p5). The aim is thus to increase understanding about the program and Mayne suggests a process of contribution analysis as a way of addressing attribution with performance measures. Such a contribution analysis would involve the following steps:

- Present the logic of the program
- Identify and document behavioural changes
- Use discriminating indicators
- Track performance over time
- Discuss and test alternative explanations
- Gather additional relevant evidence
- Gather multiple lines of evidence (Mayne, 1999, p7).

A performance story is built from these steps and Dart (2007b, p3) provides a framework for writing a performance story which includes:

- A narrative section explaining the program context and rationale
- A results chart that outlines the major findings from the program
- A narrative section that describes the implications of the results
- A section that provides a number of vignettes of significant change
- An index or appendix that details where the data came from.

Reporting is done against evaluation questions, the elements in a framework or it describes the performance of a project or program.

**Summary**

Evaluation comes from a long history of practice that began when teachers tested their students to see if lessons had been learned. The description of evaluation approaches has been done in a number of ways for this publication. The first is a description of what happened chronologically in the period from Socrates to modern time. The second is according to the function, that is, what it is trying to find out. This could be looking at evaluation to measure impact or to make ongoing change. The third is to look at the approach taken such as whether the evaluation was designed as an experiment, or for empowerment or was user oriented. For example, the experimental approach to evaluation looks at pairing sites of individuals who are the subjects of interventions with a control group where there has been no intervention. There are also approaches that focus on who will use the results of an evaluation as opposed to involving the subjects of an evaluation in a collaborative way. All approaches still have currency. Their use is determined by the aim of the evaluation as well as the skill and values of the evaluators.

Evaluation frameworks are also a strong feature of this chapter and hierarchies such as Bennett’s and logical frameworks were looked at. Wissemann’s steps and Dart’s MERI framework were also described as useful for structuring an evaluation.
The tools to collect data that are described here fell into one of three categories. Primary data were collected through: asking questions, observing what happens or looking a material that had been produced. This catered for both quantitative and qualitative data in the main. Quantitative data came from items that could be turned into numbers and qualitative data came from items that could be turned into descriptions.

Evaluation results were usually reported against the aims and objectives of the evaluand (the project or program being evaluated) and these are reflected in the key evaluation questions. Emphasis is usually placed on the impact and outcomes of the program or project although information about improvement is now just as sought after.

What we have tried to do in this chapter is not only to present material to which we have contributed, or found useful but also to include new material that is being currently discussed by evaluation practitioners.

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Roberts, K. 2004, ‘Coexistive model of evaluation’,


With the 1989 book *Farmers First*, it was widely recognised that many of the problems faced in conventional agricultural research and extension practices have been related to the processes of generating and transferring technologies, and a new emphasis was placed on finding solutions through farmers’ own capacities and priorities. This has been particularly relevant in the case of agriculture professionals bridging the ‘expert knowledge’ and ‘local knowledge’ divide whilst working with resource-poor and small-holder farmers in developing countries. As Scoones and Thompson (1994) note, while advances have been made, there are still issues of power relations between advisors and local groups, between different communities and individuals, and these are complicated by complex socio-cultural dimensions and conflicts between knowledge systems.

This chapter engages with some of these complex agricultural extension and capacity building complexities in Thailand. The chapter is based on recent research in Thailand that involved interviewing of many stakeholder groups, as well as analysis of government agricultural and environmental policies and laws. Notably, it was identified that there are often significant tensions or distrust between local farmers, non-government organisations (NGOs) and agriculture (or forests) department officials. This tension has a considerable history in Thailand with complex roots based on political persuasion, discriminations based on ethnic group (Santasombat, 2003a; 2003b), elitism, education (and urban-rural/peasant) discriminations (Missingham, 2003), ‘traditionalist’ discourses (Forsyth, 2004; Reynolds, 2001), differing perceptions of environmental management and conservation (Hirsch, 1996; Ganjanapan, 1996), economic policies and intentsions, amongst other factors. From this study, we note that the actions of a number of NGOs, activists and academics have helped draw attention to the power relations and tensions between local farmers and government officials, with some gradual impacts on government policy.

The chapter provides a brief analysis of government agricultural policies (historical and current), as well as a number of projects and case studies in different regions of Thailand. The conclusions highlight some recent projects and changes of policy that reflect upon a changing public awareness of the official farmer knowledge politics occurring. They also reflect on a growing awareness of environmental issues in agriculture. This is of particular relevance for agricultural extension workers, and those working and researching in the area of agricultural or environmental capacity building.

**Agricultural Policies in Thailand: 1950s to Present**

Thailand’s agricultural policies in the 1950s through to the present have been heavily influenced by the green revolution movement. An emphasis was placed on increasing crop yields through improved plant varieties and farming technologies to support burgeoning populations, exports and economic growth.
Driving this movement were the International Agricultural Research Centres (IARCs) of the Consultative Group for International Agricultural Research; multinational agro-industrial companies; international funding bodies such as the World Bank; as well as United Nations bodies such as the Food and Agriculture Organisation. The period was typified by technical assistance from the aforementioned external sources and related research projects that introduced new high yielding crops, synthetic fertilisers and pesticides through the Thai Department of Agriculture.

At the same time as technologies were introduced into Thailand, these research bodies extracted germplasm and knowledge of local plant varieties for the expansion of international gene banks, and to further IARC breeding programmes. The Thai authorities collaborated particularly with the International Rice Research Institute (IRRI) in the Philippines. It has been reported that Thailand donated as many as 50,000 rice germplasm samples, covering many of their domestic varieties and landraces. Also included were rice varieties such as Jasmine Rice (Khao Dok Mali 105), which has been successively improved by farmers, particularly in the northeast of Thailand. The qualities of the rice were investigated and then later submitted to IRRI. Thus, research and development projects introduced new activities but also tapped existing plant genetic resources and local knowledge (see Phongpaichit and Baker, 2002; Shigetomi, 2004).

Intensive farming activities of the green revolution brought with them increased yields, at least in the short term, and also a number of negative social and environmental consequences. These included massive land clearing activities (particularly tropical forests), land degradation, impacts on water resources (overuse and water quality issues), and impacts on human health. One indicator of the severity of these impacts was poisoning incidents. Prior to the 1960s, synthetic pesticides were barely used in Thailand (Shigetomi, 2004). In 1975, 518 people suffered from pesticide poisoning from which 18 people died. This increased to 4,234 pesticide poisoning cases and 34 deaths in 1998 (Ministry of Public Health, cited by Tantemsapya, 1996, p273-274). Arising from these cases of environmental degradation and desires to maintain an effective system of local plant breeding, genetic resource and knowledge conservation are some alternative initiatives that seem to be gradually paving the way for policy change (discussed later).

Notably, some have questioned the manner in which research and development activities occurred over the past half century, arguing the need for programmes that encouraged ‘participatory development’ (Hirsch, 1990, p28-31). Implicit in this history of agricultural change is a paradox whereby the image and practices of small farmers as ignorant and tradition-bound has lingered on one level, whilst on the other hand they have been looked upon as a store of knowledge from which scientists can learn. Internationally, this ‘two-way street’ of agricultural extension, research and development seems to be gradually improving with increased emphases on farmer-oriented adaptive research (and the farming systems research perspective) (Byerlee, 1988). However, stigmas still remain in Thailand (discussed in the following section), and the activities of the Department of Agricultural Extension (DOAE) have often remained blinkered to ‘home-grown’ agricultural innovations and plant breeding activities (see www.doae.go.th/english).

The functions of the DOAE are clearly outward-oriented. In other words, their primary activities involve focusing on external policies strategies, research and outcomes, and applying it to domestic circumstances. On the other hand, they also provide cooperation and technical assistance outwards to neighbouring developing and least developed countries. Where their activities are generally lacking are with respect to the fostering of grassroots or local breeding activities that can ultimately develop new domestic plant varieties to sustain exports and local economies. As Rerkasem (2003, p303) notes of Thailand:
Farming systems, participatory research, participatory plant breeding, and numerous other ideas and methods aiming to improve researchers’ recognition of the need to understand and respond to on-farm conditions have come and gone without much real, lasting effect.

However, there are some positive signs that government policies, laws and actions are recognising the value of local farmer and breeder knowledge, as well as responding to the linked concerns of ‘food sovereignty’ (reduced inputs/debt) and chemical toxicity in agriculture. These are discussed in detail in the final section. In the meantime, NGO activities and farmers’ networks have filled the gap for farmers wanting to convert back to low-input farming, organic practices, and local plant variety breeding (see section four).

Different Knowledge Systems

Where the ultimate challenge seems to lie is in the tensions between different knowledge systems, with one extreme representing local knowledge and ‘traditionalist’ or ‘communitarian’ discourses (see Reynolds, 2001), and the other extreme demanding rapid ‘progress’ and agricultural advancement through biotechnological development (see Rerkasem, 2003). Tension existing between these camps can be related to intolerances or cultural differences based in ideological beliefs, customary norms, religion and spirituality. These then may manifest in the perceived ‘education levels’, class status or other social divisions that may then re-surface in the application of policy and government programs.

Notably, there is a considerable history of state-community tensions in rural areas inhabited by minority groups in the north of Thailand. For example, the former Deputy Director of the Royal Forests Department has been quoted as saying:

> On the question of whether the Royal Forests Department has a basic understanding of the situation of village people in the forest, I will speak frankly. It is not that we look down on them, but the knowledge of local people is not capable of understanding the public good... must we educate the people first, in order to give the people familiarity with trees and forest conservation... (October 1996, cited by Luangaramsri, 2001)

Ganjanapan (1996) also provides a useful study comparing technocratic government classification systems of soils, land and forest, with local knowledge systems in northern Thailand. The implication from her study is that local classifications of soil and land have their own advantages, as well as the more technocratic methods. But conflict has regularly arisen over the classification of forest areas as separate from agricultural areas (see Santasombat, 2003a). Ideally, both methods could be integrated and used together – something that some community activists, as well as forests and agriculture officials seem amenable to (Komon Pragtong, Interview, 2005).

Evidence of dissatisfaction with the technocratic directions of government policy is the recent rhetoric of a ‘self-sufficient economy’. This has been countered by those that, quite justifiably, note the interdependence of countries for crop germplasm, and that there is a considerable history of foreign agricultural technology absorption and domestic adaptation to suit Thailand’s needs. Although this self-sufficiency rhetoric is sometimes extreme and (historically) misguided, the different discourses and emerging projects reflects the need to embrace a diversity of knowledge systems. In the agricultural context, this suggests that there is a place for grassroots and government activities to lower farm inputs, and to make better use of domestic genetic resources, technologies, knowledge and innovations.
The following section explores two case studies of local NGO extension activities that have sought to engage with local technology development, chemical toxicity in agricultural environments, germplasm exchange, and local knowledge exchange. Some of the important cultural beliefs and activities that these projects have engaged are also noted.

**Local rice research institutes, seed exchange networks and farmer training**

During research collaborations with the Tropical Resources Project of the National Human Rights Commission of Thailand, a number of case studies were conducted throughout the provinces and regions of Thailand. For the purposes of this chapter, case studies and projects from two distinct areas will be discussed: Khao Khwan adjacent to Suphan Buri in central Thailand; and Ku Ka Singha in Roi Et province (northeastern Thailand).

The two case studies reveal a number of interesting situations relating to recognition, utilisation or encouragement of local knowledge in farmer extension activities. They each represent a different circumstance: extension in an institutional setting, and a seed exchange network encouraging germplasm exchange and genetic diversity. The cases also highlight some of the challenges faced by materially poor or indebted smallholder farmers, including environmental concerns (‘chemical farming’ and genetic diversity).

**Khao Khwan Rice Research and Farmer Training Institute**

Khao Khwan Rice Research and Farmer Training Institute is located in the floodplain rice-growing province of Suphan Buri in Central Thailand. The Institute is a non-profit, non-government organisation run by the plant breeder and environmental activist Daycha Siripat. The primary function of the centre is for the education of farmers about organic agricultural methods and for the researching of traditional plant breeding methods such as seed selection. The centre operates under a mix of traditional and modern principles and methods. The centre trains local Thai farmers in an effort to get them off chemical reliance and ‘input dependent’ practices, and have also been involved in research and training throughout the country and the broader region. The Director started the Institute in response to growing dependency on chemical inputs that were causing considerable public harm. In addition, these farmers were sourcing their crops annually from the Department of Agricultural Extension or private companies as part of packages that created a debt cycle.

The research and training centre is principled around the Theravada Buddhist philosophies that dominate the religion of Thailand. The name of the centre itself refers to the belief that there is a spirit (Khwan) within rice (Khao) and all living things. As Boonridrthaikul (2004, p28) notes:

*Rice, for Thai people, has profound significance not only as a source of food but also as an essential component of religious practice, national culture, and way of life. Their thinking with respect to rice is demonstrated in their beliefs, rituals, traditions, folklore, proverbs, riddles, folk songs which are evident throughout production and even consumption processes.*

Thus the centre puts an emphasis on a holistic view of the agro-ecosystem surrounding primary crops and vegetable gardens and on limited usage of chemical inputs. The centre is not preoccupied by religion, but rather utilises the insights that Buddhism provides to develop ‘commonsense’ approaches to agriculture, recognition of the ecological connectivity of living things, and human’s place as a part of this complex system. In this sense, the centre urges a re-traditionalisation of past farming techniques which are time-tested and adaptive to local environmental conditions. The farming plots at the centre aim at balancing
staple crop production (rice) with fruit, vegetable and herb growth, secondary staples (corn), natural drainage ponds containing fish and other animals, natural fertiliser development and use, and traditional/organic pest control techniques. The centre had reverted these plots back to more ‘natural’ ecological conditions from a former chemical agriculture plot. Daycha noted that as a result of this, pests such as snails and rats were of little trouble because natural predators such as wading birds had since returned.

The training of farmers in organic methods (agricultural production using no synthetic fertilisers or pesticides) is one of the main goals of the extension and training offered by Khao Khwan. The Institute demonstrated use of natural fertilisers such as the Azolla plant and nutrient fixing indigenous micro-organisms in the rice ponds. Furthermore, the centre puts an emphasis on the selection of seeds – a skill that has been lost by farmers in many parts of the country.

The selection of seeds allows for the development of higher quality crops in following seasons, and reduces the occurrence of blight, fungus and other grain defects. It is also a key activity in the development of new local varieties that are well adapted to their surrounding conditions. The farmers are taught to collect the rice seed and review them for replanting the following season. Seeds are selected from plants which portray certain desirable attributes, for example, disease resistance, strong roots, high yields, adaptations to climate and water availability, and appropriateness for soil types. The best grains from these are selected based on a number of criteria: clarity, lack of cracking, lack of blight or fungus, colour, size and shape. Boonriderthaikul (2004) also notes that seeds are selected according to cultural and religious significance of the plant (some seeds are highly important for rituals), gastronomic factors and pest resistance. Thus, local knowledge is respected and is re-taught to many farmers, alongside other modern techniques.

These techniques are taught to farmers who then apply them on their own landholdings, and share them with friends and neighbours. Consequently, a number of farmers from the school indicated that through the program they had reduced their reliance on expensive external farm inputs, had reduced debt, and in a few cases were subsequently buying back land they had previously sold.

The Khao Khwan program has been so successful that a similar education program has been established by the Department of Agricultural Extension, primarily with the aim of promoting organic agriculture to fuel the ongoing demand of this niche market (Wichar Tithipraesert, Interview, 2005). This has also become a broader government policy involving other departments seeking to ‘clean up’ some past agricultural practices and enter new markets.

At Khao Khwan many of the plants grown are modern re-seeding varieties of the kind available from the Department of Agricultural Extension. Some varieties were even introduced from other countries or regions for adaptation to local conditions. Daycha indicated that few farmers in the central region still used traditional varieties, noting a few long rooted, floating ‘wet rice varieties’ still grown in small pockets (Daycha, Interview, 2005). However, it was clear that many of their activities did in fact seek to re-apply local knowledge and techniques, if not the use of traditional crops. It was clear that Daycha wanted the centre’s activities to be understood as highly adaptive, useful and current, rather than parochial.

A focus group of local farmers attending the Institutes classes revealed a number of their primary concerns. Most of the group were immediately concerned about issues of debt affecting them directly. When asked about farmer debts, most complained that they had bought ‘seed and chemical’ packages from the
Department of Agriculture, which were too expensive and often did not live up to expectations of yield. Farmers complained about the advertised yields being lower than expected under normal conditions and under conditions of drought. This was particularly a problem for the farmers after several years of intensive chemical farming, in which their fields were becoming unproductive, infertile and in some cases toxic. The farmers indicated that there had been a failure of government extension in relation to these environmental consequences and their management of debt. Instead the Khao Kwan centre had been helping them manage these issues.

Ku Ka Singha Indigenous Seed Fair, Roi Et, Northeastern Thailand

The next case study site was a seed fair organised by the Alternative Agriculture Network (AAN) and Thai NGOs to support the sharing of seeds (primarily rice, but also vegetables) throughout Thailand. The fair was held in Ku Ka Singha, Roi Et Province in the northeastern (Issan) Region. The fair is usually held in the province of Issan but has also been held in other parts of the country in recent years. At this fair, farmers were invited to come and share seeds from all regions of Thailand. The fair was funded by partly government grants, by the NGO organisers, and also international development agencies.

Notably the ‘indigenous’ title of this fair is an embrace of the complex cultural associations that the local people involve with agricultural activities. The Issan identity is an ethno-regional association with relations to both the dominant Thai and Lao ethnicity. As McCargo and Hongladarom (2004) have noted Issan-ness is a ‘problematic political construct, reflecting ambiguous self-understandings and self-representations on the part of Northeasterners’. Their relationships with Thai and Lao authorities and groupings have the potential to be fraught with cultural, social and political ramifications. This is notable in relation to traditional knowledge and seed exchange. Whilst this fair initially involved predominantly Issan people, reflecting regional folk knowledge domains (as described by Piyasilp and Kusanthia, c2002), I came across the fair at a different stage, when it had evolved through NGO collaborations and networks, to incorporate other rural groups. The fair came to reflect openness in traditional/local knowledge sharing that was inclusive of many Thai peoples.

The fair was essentially about promoting the use of local, wild and domestic varieties, adaptation of these varieties to new conditions, and breeding of new local or domestic varieties. The activities of the farmers at such fairs results in a sharing of germplasm across the country (potentially across borders) and contributions to the overall pool of in situ genetic diversity. Crop germplasm has historically had a complex distribution across the globe, with seed exchanges having occurred for millennia. Presentations by NGOs at the fair highlighted the historical sharing of germplasm by these networks (regionally and beyond), and the problems caused by recent issues associated with intellectual property rights allowing monopolistic controls over plant varieties, genes or plant derivatives.

At this fair, there were over 130 different plant varieties (mostly rice, but other crops and vegetables) brought to be exchanged. This was an increase on the previous year where just over 100 varieties were brought for exchange. This is an expansion again on previous reports that the Issan network had as few as 50 varieties being grown by the network in the year 2000-2001. The increase can be attributed to greater numbers of farmers becoming involved and due to some genetic change resulting in a few newly identified local varieties. One individual named Wu Pah is said to grow more than 50 traditional and local varieties on his farm alone. He shares the seeds from these with other farmers as has been done traditionally for generations.
On display were also local or wild plant varieties (landraces) that had become threatened, and there were also empty displays of varieties now completely lost. The signage at the fair encouraged farmers to create in situ gene banks for genetic diversity on their farms by planting farmers’ varieties or ‘landraces’. It also encouraged the exchange of these varieties.

Visits to adjacent farms were conducted to demonstrate traditional agricultural techniques including the use of indigenous micro-organisms and manure to fix nitrogen. Local vegetable varieties were displayed and a number of herbs with explanations about their applications as tonics and stomach ache suppressants. One of the organisers described such knowledge sharing in terms of the network being ‘a community with common understandings about the sharing of plants and associated knowledge’ (Ubon, Interview, 2005). These understandings were based on traditions and customs, but were also based on an activism of re-traditionalisation. The seed exchange community should best be envisaged as a network of existing, evolving and expanding tradition.

Rituals were also explained including the use of various varieties of rice for specific rituals, for example Khao Dam (or black rice) is highly revered by the local Issan people. Ubon (Interview, 2005) indicated that rituals and traditional customs in the Issan region were still regularly associated with crops in a similar approach to those expressed by students of Khao Khwan in the central region. Ubon indicated that these customs are widely practiced throughout Thailand, but are gradually being forgotten. While showing me parts of the village, Ubon pointed out at nearly every house the presence of shrines dedicated to Phra-phhum (spirit lord of the place/village) or Phii-baan (the spirit protector of the house), or to Mae Phoesop (spirit of rice). These are not limited to the Issan region, but may be found throughout Thailand, and reflect traditional animist beliefs (despite the dominance of Buddhism).

In the evening, traditional music and songs were played and tales of folklore were told by some of the elder people from Ku Ka Singha. The speeches made and the stories told linked the need for conservation of traditions in agriculture (including traditional plant cultivation) with the beliefs and way of life of Issan farmers. The songs also celebrated the history of their people, particularly their agricultural existence and its link to their culture.

This case study was also useful for understanding the way information is disseminated to farmers by NGOs. Through these networks, some of the local farmers were thus well-informed about new government initiatives, new laws, concerns about using ‘package’ farming inputs, and even the potential effects of free trade agreements (FTA). For example, one farmer who was interviewed named Watasana (Dej) indicated that he thought the ‘FTA is bad because it will take the rice from my hand. It will encourage them (companies) to take our knowledge and patent it’ (Interview, 2005). Notably, the next farmer interviewed, named Kwaam Bak Lai, had no such concerns; he did not know about such things. He was most concerned about getting out of debt which came as a result of purchasing Department of Agriculture ‘high-yielding’ jasmine rice seeds which had not provided good yields and which had been affected by drought.

New Laws, Incentives and Changing Agricultural Policies

In the past 15 years, sustainable agricultural practices have increased through emphases on crop diversification and rural differentiation (Shigetomi, 2004), yet this is only having gradual impact. In terms of ‘sustainable agriculture’ concerns, not much has changed since Tantemsapya (1996, p269) noted:

> Chemical farming culture still persists. Sustainable agricultural practices are still not popular among the majority of farmers. Local NGOs have, to a certain extent, contributed to the
development of the sustainable agriculture movement in the country. The government, on the other hand, continues to support conventional, high-input agriculture.

Government policies have reflected the growing public concerns about chemical contamination of food products and environmental degradation. Gradually there has been some increasing concern among consumers about the dangers of chemical-grown produce. Yet advances in government policy still reflect the seemingly incremental growth in public concern. Where government extension could play a major role is in the creation of new markets through certification of ‘organic’ and ‘sustainable’ agricultural products, quality assurance, marketing and branding, and also by improving communications to farmers about input quantities and potential environmental or health impacts.

In terms of recognising the important contributions of farmers and breeders to crop genetic diversity, a number of government policies show some positive signs. The most notable is the Plant Varieties Protection Act (PVP Act, 1999). The PVP Act is specifically designed to also allow for protection of general domestic varieties (including broadly cultivated landraces and wild varieties), and local plant varieties, as well as new plant varieties (which comply with distinctness, uniformity and stability requirements). Yet there have been some criticisms of the actual implementation and application of the PVP Act.

Daycha, the director of Khao Khwan, indicated that despite the seeming good intentions of the provisions on local plant varieties, wild varieties and those on general domestic varieties, he was angry that the Department of Agriculture had only implemented new plant variety protections favouring large scale breeders and agro-industry. The students at the school knew nothing of the PVP Act or its provisions, and the Act was largely perceived as irrelevant to them. The consensus seemed to be that it was merely a bureaucratic concern for officials in Bangkok.

Ubon Yuwaa, an AAN leader, expressed concerns similar to Daycha about smallholder representation and the lack of implementation of the PVP Act. He suggested that PVP was irrelevant to the Issan farmers (at the seed exchange fair) in its present state, and that it would take considerable review of the provisions, farmer education, and extensive department outreach if it were to have any effects at all. He indicated that most farmers at the fair were too concerned about debt and productivity to know much about the local variety provisions, and that they were probably sceptical of the benefits that might flow from registration. Nevertheless, if groups were interested in registering local varieties, members of this seed exchange community would be likely candidates because of their continued ‘value-added’ practice of seed selection and adaptation. Farmers’ cooperatives or NGOs could, in theory, register general domestic and local varieties for farmers such that they could remain publicly accessible (Ubon Yuwaa, Interview, 2005). This suggests that if the DOAE is serious about encouraging local plant registration, then they need to use NGOs and networks such as the AAN to inform them. To date, they have made insufficient effort in this regard.

Conclusion
This chapter has shown that there is a clear space for the acknowledgement of farmers’ own capacities and priorities in conventional agricultural research and extension practices. There will always be a wide diversity of circumstances and positions held in a country with such a strong agricultural history as Thailand. While they may not be the most desired approaches for all farmers, there is a growing demand for two linked areas of further research and extension in Thai agriculture: sustainable (low input)
agricultural practices and local breeding activities that expand the use of local genetic resources and knowledge.

The chapter has noted some of the power relations between advisors and local groups, between different communities and individuals. These are complicated by complex socio-cultural dimensions and conflicts between knowledge systems. What needs to be recognised is that a diversity of knowledge systems are operating alongside each other and, in many cases, in interaction. These systems need not be adversarial. Encouraging local knowledge ‘alternatives’ could create new markets, support local economies and support some livelihoods that are rooted in traditional practice (see Santasombat, 2003b), or that yearn to go back to semi-traditional approaches. From this study, we note that the actions of a number of NGOs, activists and academics have helped draw attention to the power relations and tensions between local farmers and government officials, with some gradual impacts on government policy and with the mainstreaming of some NGO and grassroots network activities. It is hoped that these provide useful case studies for related projects in other countries in the region and the developing world.

Abbreviations and Acronyms (for this chapter)
AAN Alternative Agriculture Network, Thailand
DOAE Department of Agricultural Extension, Thailand
FTA Free Trade Agreement
IARC International Agricultural Research Centre
IRRI International Rice Research Centre
NGO Non-Government Organisation
PVP Plant Variety Protection

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Interviews:

Daycha Siripat, Director, Khao Kwan Rice Research Foundation (29 April and June 2005).

Komong Pragtong, Forest Conservation Officer, National Parks, Wildlife and Plant Conservation Department (18 August 2005).

Kwaam Bak Lai, Northeast Thai Farmer/activist, Roi et (25 April, 2005)


Watasana (Dej), Northeast Thai Farmer, Roi et (25 April 2005)

Wichar Tithipraesert, former director, Plant Variety Protection Division, Department of Agriculture (6 May 2005).
Economics and Extension
Sally P. Marsh, David J. Pannell and Rick S. Llewellyn

Economic considerations affect the provision of extension services in a number of areas including: the provision of extension services, the employment of extension professionals, and understanding of an effective role for extension. In this chapter, we argue that applying economic theory can provide useful insights for extension theory and practice. In the first section, we discuss the economic theory that supports the provision of publicly-funded extension services and briefly outline changes in government thinking about the appropriate use of public funds which has led to the growth of private-sector extension provision world-wide, including in Australia. The second section of the chapter briefly reviews research that has estimated the economic returns to extension. Possible economic benefits from extension include: accelerated benefits from earlier and faster rates of adoption of improved new practices; reduced risk because of accelerated learning about new practices; and better informed non-adoption decisions. We discuss the difficulties in measuring many of the intangible human capital benefits of extension that are better left to disciplines other than economics and the difficulties in isolating the impact of extension on practice change. The final section of the chapter discusses the role for extension as a policy tool to achieve behavioural change, focusing on achieving practice change for natural resource management outcomes. We then briefly outline some areas where we consider an economics-based approach can assist in the focus and delivery of more effective research and extension activities.

Introduction
Extension theory has benefited from principles and insights across many disciplinary areas, including psychology, sociology, education, communication science, community development and economics. Different discipline areas have been considered more or less important to the understanding of extension and provision of extension services at various stages of the development of extension theory. In Australia, the relative importance of different theoretical understandings of extension and extension approaches commonly in use have varied over time (see Coutts, 1997 and Chapter 2 in this publication for a history of extension provision in Australia). Economic theory has been considered relatively more important during periods of strong agricultural growth. For example, in Australia and the United States of America following the Second World War, economic theory on the adoption and diffusion of agricultural innovations, proposed originally by Griliches (1957), influenced agricultural extension provision.

In recent decades, economic theory has taken more of a backseat in the Australian extension profession, which has increasingly become interested in the other areas of social science. However, we argue that an economics-based approach to considering extension provides extremely useful insights for extension professionals in a number of areas. Indeed, we believe that, without sufficient insight into economic issues, the relevance of extension agents and theoreticians alike will be compromised.
Economics is primarily interested in how individuals and society allocate scarce resources among competing uses. Decisions about resource allocation have implications for extension in at least three areas:

I. Governments (national and state) make decisions about the funding of extension services, and their appropriate roles;

II. Rural communities in general (through regional catchment management organisations) make decisions on which activities and services to invest in to achieve natural resource management (NRM) outcomes; and

III. Landholders make decisions about whether to invest in learning about and adopting new practices on their properties.

These decisions affect the provision of extension services, the employment of extension professionals, and the sorts of roles requested of them. Of course, economic considerations are not the only factors that influence the decisions that are made in these three areas, but they do play a major role.

In this chapter, we outline some of the areas where economic theory is useful for rationalising the provision of extension services and for achieving effective extension provision. In Section 2, we discuss why governments fund extension services, how thinking about the funding of public extension services has changed in recent years, and the implications this has had for extension provision. The economic returns from extension are discussed in Section 3, along with issues related to the measurement of costs and benefits of extension. In Section 4, we consider, from an economic perspective, the role for extension as a policy tool, and then discuss economic theories related to uncertainty and learning about innovations.

Market failure and private-sector extension

Over the past two decades, in part at the prompting of economists, governments have increasingly been concerned with the justification for their involvement in the economy. Agricultural extension has not been exempted from this scrutiny.

The market-failure justification for government funding of extension

With the focus on microeconomic reform in Australia starting in the 1980s, an important question began to be asked: could we not leave extension to private sector providers? Why does government need to be involved? The economic theories that prompted these questions also contain concepts that provide potential justifications for government involvement, principally the idea of ‘market failure’. This recognises that in particular situations the private sector is not likely to deliver all of the goods and services that would be best for society overall.

Categories of market failure include:

- **Public goods**: This includes cases where there are problems with free riding, so that a provider of a good cannot prevent it from being used by anybody who wants to. For example, it may be difficult for a private sector extension agent to stop some types of information from being disseminated beyond their direct clients. This means that it is more difficult for the provider to charge people for the good or service with the result that, if left solely to the market, such public goods would not be provided or at least under-provided.

- **Externalities**: This includes examples such as pollution or protection of sensitive environments, where actions by one person or business have an impact on others. Government action, potentially including extension, is sometimes warranted to reduce these impacts.
Information-related failures: This can arise, for example, from uncertainty, ignorance or misinformation leading people to make decisions that are probably not in their own best interests. If a government has reason to believe that it has better information, this provides a potential justification for extension.

If it is possible to identify a case of market failure that is sufficiently strong to outweigh the costs of acting and the risk of government failure, then economists would accept that a case exists for government action.

Although market failure is sometimes not a very precise concept (Marsh and Pannell, 2000b), it has been very influential among public sector economists, particularly those in departments of Treasury and Finance. If there is not market failure, economists are concerned about ‘crowding out’, meaning that intervention by government is likely to inhibit private sector providers from delivering the same services, which they may do more efficiently than can occur in the public sector. In Australia, this concern led to the establishment of National Competition Policy, which has had a major influence on many aspects of government at state and national levels.

During the 1990s, major changes in agricultural extension occurred in Australia at the Federal level and in all states (see March and Pannell, 2000a). Changes in government funding policies during this period were not limited to agricultural extension, or even to agriculture, but rather reflected changing views about the appropriate role of government in the economy. Changes that occurred in agricultural extension provision reflected the policy focus on market failure and crowding out. They included a decline in traditional public sector agricultural extension services providing one-to-one advice to farmers on issues that mainly generate private benefits, a growth in public sector extension activities related to the environment and natural resource management to address public good and externality issues, and a substantial growth in the private sector provision of extension (for more detail see Marsh and Pannell, 2000a).

Results of the move to private-sector provision of extension services

The shift to the private sector as the primary provider of productivity-related agricultural extension services and the public sector as the provider of environment-related extension services, which occurred as a result of the economic drivers discussed previously, has fundamentally changed the provision of extension services in Australia. In this section, we discuss just three of these changes and issues arising from them.

The growth and influence of farmer-led groups

Since the mid 1990s farmer-led groups have become significant providers of research and extension services, predominantly in broadacre agriculture. The Research and Development Corporations (RDCs) have targeted investment to these groups, perceiving them to have better links to farmers than do government agencies. Investment by the Grains Research and Development Corporation (GRDC) in grower group projects has reached AUD $6.5million per annum (Kearns, 2006). The highly organised grower-led organisations that now employ their own research and extension staff have turned the old concept of grower ‘participation’ in R&D projects on its head. Llewellyn (2007) notes that in some cases it is traditional research organisations and researchers that are now encouraged to become ‘participants’ – at the invitation of growers. In the context of traditional research and extension models, this is a remarkable demonstration of the development of social capital, empowerment and the building of capacity. It has also seen grower groups rapidly become major information providers to other growers. However, currently there is little critical research examining the value and reach of extension activities undertaken by grower groups.
A number of authors have noted that the projects and activities of grower groups remain based on ‘traditional’ agricultural trial work (Carberry, 2001; Ridley, 2005; Llewellyn, 2007). Furthermore, beyond the core activities of participative research and capacity building activity undertaken by grower groups, most engagement between growers and groups is through the simpler and less personal methods most commonly associated with traditional communication, e.g. field days, seminars, newsletters, publications, etc. When grower groups are considered as deliverers of agronomic research information, similarities with traditional extension’s linear or ‘top-down’ information delivery model are apparent. Clearly, these ‘linear top-down’ approaches continue to have value as extension tools. Given the limited number of growers actively participating in grower groups’ research processes, it is likely that the overall economic benefits of grower-group-funded R&D projects will be substantially determined by the influence of these traditional information-based modes.

Public-sector provision of environment- and sustainability-related extension

The re-orientation of public sector extension towards environmental and natural resource management issues often leaves public sector extension agents facing major challenges. In particular, the behavioural changes being encouraged are often of limited appeal to landholders as many changes being advocated have poor ‘adoptability’. The short- or medium-term economic returns to landholders are often poor, especially if grown at large scale (e.g. Bathgate and Pannell, 2001; Kingwell et al., 2003). In addition, other characteristics highlighted in the adoption literature (Rogers, 2005; Pannell et al., 2006) are often adverse, including complexity, riskiness, compatibility, and long time lags between investment and any resulting benefits.

As a result, the overall benefits from public sector extension are likely to be less than if they had invested in technology transfer for productivity-raising innovations (Cary, 1998). Furthermore, the lack of quantifiable results from sustainability-oriented extension is difficult to reconcile with the stronger accountability models being implemented by public sector agencies. The next section, which reviews economic returns from extension, does not include studies of returns to sustainability-oriented extension. The implications of a strong reliance on extension to achieve sustainability-related objectives are discussed further in this chapter.

The use of Market Based Instruments

A belief that market forces should be used wherever possible to gain effective and efficient investment has led to an interest in the use of Market Based Instruments (MBIs) to obtain NRM outcomes. Examples include tradable pollution permits, auction-based systems and environmental offset schemes. Auctions or tenders have been the most successful of these approaches in agriculture. They help to reveal information about the costs of conservation works to farmers that would otherwise be unavailable, and there is a hope that they may lead to the involvement of farmers who have not been prompted to action by traditional extension-based approaches. Extension providers still often have a role to educate farmers about MBI opportunities and operational procedures.

A number of market-based schemes were funded in Australia as part of the National Action Plan for Salinity (see http://www.napswq.gov.au/mbi/), and both economic and social research continues into their effectiveness. In some circumstances, they can work well (e.g. Stoneham et al., 2003). Pannell (2001), however, argues that economic instruments for NRM outcomes do not always work well and that economists should be more explicit with policymakers about their strengths and weaknesses. In particular, Pannell suggests that MBIs should only target situations where market failure is clear and costly.
Economic returns from extension

Implicit in the funding by governments of extension services is the understanding that the taxpayer is investing in an activity that will produce benefits for individuals and society. It is our belief that the impact of agricultural extension should primarily be judged on the basis of it achieving the adoption of beneficial changed practices and innovations (as opposed to providing more generic learning skills, for which purpose there already exists a public education and training system). We think that this is fundamentally the expectation of public sector policymakers who choose to fund extension. It is worth noting that some commentators on extension (including some within this book) would contest this view. In this section, we briefly discuss the ways in which economists think about estimating the economic returns from extension.

In Australia, governments and agribusiness invest considerable funds in extension. For example, Mullen et al. (2000) estimated that AUD$250 million was spent in 1998 by four state departments of agriculture (Western Australia, New South Wales, Victoria and South Australia) on research, and AUD$137 million on extension related to agricultural productivity. Existing economic research suggests that the net returns to productivity-oriented extension are positive (e.g. Feder et al., 1987; Huffman and Everson, 1993). We are not aware of any formal assessment of the net benefits of extension targeted towards the environment and natural resource management.

Research on the economic benefits of extension faces a number of difficulties, the most serious of which is the difficulty of distinguishing the effects of extension from contributions to productivity from other sources, notably from research and development (Huffman and Evenson, 1993). It is very difficult to attribute any change in farming practices to any particular extension activities due to the multitude of social and informational processes in operation. Additionally, it can be very difficult to estimate extension expenditure and the resulting outputs because in most cases R&D activity is integrated with extension to some extent.

Possible sources of economic benefit from agricultural extension include: earlier commencement of the diffusion/adoptions process, a more rapid rate of adoption after it commences, higher final levels of adoption, improvements in landholder skills and confidence in applying new practices, and reduced risk. Of these, the available evidence indicates that extension alone often does not affect the final level of adoption (e.g. see Marsh et al., 2000). This is likely to be determined by factors such as the actual benefits of the practice to the landholder (as further discussed in below).

Most profitable new farming practices will eventually be adopted by commercial landholders at some optimal level even without extension, but extension may bring forward adoption by increasing awareness, demonstrating techniques and returns, and building human and social capital. Earlier adoption means that benefits can be generated over a greater number of years. Economists would quantify the benefits by comparing the estimated patterns of adoption with and without extension, relating adoption to financial or environmental benefits, and using discounting to allow for the different values of benefits and costs at different times (e.g. see Pannell and Schilizzi, 2006).

Although changes in adoption are probably the core benefits of extension, there can also be broader impacts, including changes in attitudes of farmers, and the impacts of the extension on skills and knowledge of farmers (i.e. the effect on human capital). Furthermore, extension often plays a role in linking farmers and researchers (i.e. builds social capital), helping to direct the nature and location of the
research and development program, and identifying R&D priorities in different regions. These other benefits are much more difficult to quantify.

The overall rate of return to investment in extension activities in Australia has not been documented and there have been few studies elsewhere. Compared to studies evaluating the benefits from agricultural research, there are relatively few empirical studies of the net economic benefits of agricultural extension, and even fewer that consider both public and private-sector extension effort (one study is reported by Marsh et al., 2000). This is undoubtedly because of the difficulties associated with such work, such as long lag times to adoption and complexities of attribution.

Given the difficulties and limitations in using economic approaches to estimate the full returns to extension, extension professionals have generally used other approaches to evaluate extension activities (e.g. as reviewed in Dart et al., 1998). However, these often focus on processes and outputs rather than outcomes, especially economic outcomes.

**The role for extension as a policy tool for achieving behavioural change**

Economic principles can help to guide decisions about the circumstances when extension is an appropriate tool to pursue policy objectives and also help to inform extension delivery. In view of the generally disappointing performance of extension in achieving high level goals in some major programs for the environment and natural resource management (see below), these are particularly important issues.

**The Australian experiment with natural resource management policy**

Over the past two decades, extension has featured very prominently as a tool used by governments to pursue environmental objectives. Starting with the National Landcare Program (NLP) in 1989, there was an emphasis on raising awareness, education, promoting a stewardship ethic, and harnessing peer pressure among groups of farmers (Curtis and De Lacy, 1997; Vanclay, 1997). The NLP introduced a new type of extension agent: a facilitator, often with little technical background in agriculture. For over a decade, this paradigm was the dominant force shaping resource management policies for Australian agriculture, and it remains influential. In addition, under more recent programs (NHT and NAP), many regional NRM bodies spent a large share of their resources on extension. In the new national program, Caring for our Country, the emphasis on extension may be less than in earlier programs, but we still expect it to be substantial.

The NLP approach was very successful in raising awareness of resource conservation issues among farmers, and in some cases this awareness has led to changes in farming practices. However, for the more difficult environmental problems such as dryland salinity and biodiversity conservation, the changes achieved through these major investments in extension have been much too small and scattered to prevent ongoing resource degradation. Contributors to Lockie and Vanclay (1997) identified a range of problems with the objectives and underlying assumptions of the NLP. Particularly important has been complacency about considering the adoptability of the land management practices being promoted (Pannell et al., 2006).

**When is it appropriate for government to invest in extension as a policy tool?**

These experiences raise the question of when extension should be selected as the front-line tool for pursuing environmental goals. Pannell (2008) presents a simple framework to guide the choice between policy mechanisms, based on the levels of public and private net benefits that are likely to result from land-use change. ‘Private net benefits’ refer to benefits minus costs accruing to the private land manager as a result of the proposed changes in land management. It includes financial outcomes, but also the broad
range of other factors that influence the adoptability of practices (Pannell et al., 2006). ‘Public net benefits’ means benefits minus costs accruing to everyone other than the private land manager. Defining them in these ways is helpful because the private net benefit dimension relates to the behaviour of the landholder, while the public net benefit dimension relates to externalities (the effects on everyone else that flow from the landholder’s behaviour), which provide a justification for government action.

For each category of policy mechanisms, Pannell initially proposes some simple rules to guide environmental managers. Policy options include extension, both positive and negative incentives, technology development (R&D) and informed no-action. For extension the rules are:

- Do not use extension unless the change being advocated would generate positive private net benefits. In other words, the practice should be sufficiently attractive to landholders for it to be ‘adoptable’ once the extension program ceases.
- Do not use extension where a change would generate negative net public benefits.

The framework incorporates various realistic complexities, including: that there are lags to adoption; that extension reduces but generally does not eliminate those lags; that extension has costs that must be accounted for; and that with limited program budgets, the priority for investment would be those actions that generate the greatest overall benefits per unit cost. With these factors incorporated, Pannell suggests that extension is appropriate as the main environmental policy tool to influence behaviour in the following situations:

- where changes in land management that would achieve environmental outcomes are adoptable on a sufficient scale (i.e. where they have high ‘relative advantage’), but are not so highly attractive that they will be adopted rapidly even without extension; and
- where the resulting environmental benefits are sufficiently large to justify the expenditure on extension, allowing for the opportunity to use the resources to protect other environmental assets.

These conclusions, combined with the earlier observations about outcomes from extension in current NRM programs, have powerful implications for the use of extension in these programs. Given the limited adoptability of existing land management options required for environmental outcomes, we conclude that there has generally been an over reliance on extension to achieve NRM outcomes. Without the existence of highly adoptable practices, a primary reliance on extension will lead to poor achievement of policy goals, will impose great stresses and difficulties on extension agents, and risks wasting the resources and good will of cooperative landholders.

Closely related to extension is the option of providing small temporary grants (a positive incentive) to landholders if they change their management in specified ways. Often extension officers are responsible for the assessment and allocation of these grants. Their main effect is to provide encouragement for landholders to trial new practices. Permanent adopted will only follow if the practices are sufficiently attractive to the landholders to be adoptable. Thus, the role for such grants is similar to the role for extension: encouragement for trialling of practices that have been assessed as being adoptable. They might be targeted to trialling of practices that are complex, and for which adoption would otherwise be slow.

**Economic perspectives to consider when extension is used as a policy tool**

In this section, we look at how an economic perspective can be usefully applied to the planning and delivery of extension. Economists have developed models of technology adoption that focus on
uncertainty, information and learning (e.g. Abadi and Pannell, 1999; Marra et al., 2005), and we believe these are also very helpful when considering extension approaches.

In these economic models, following the discovery that an innovation exists, the potential adopter has high uncertainty about its relative advantage. Relative advantage is described as ‘the degree to which an innovation is perceived as being better than the idea it supersedes’, and is one of two overarching innovation attributes identified by Pannell et al. (2006) as determinants of adoption, the other being ‘trialability’. Information is acquired and processed, contributing to the learning process through which farmers adjust their perceptions. This is likely to include a reduction in uncertainty about the relative advantage of adopting the particular innovation. This information acquisition and processing involves a cost to the decision maker (e.g. time and money) that is part of the cost of making a practice change. The cost may be so high as to inhibit the learning and adoption process. Extension has the potential to reduce this cost, and thereby to promote adoption.

A central proposition arising from these models is that the greater the actual relative advantage of an innovation, the more likely it is that positive information will be generated regarding its relative advantage (Lindner, 1987). Studies analysing diffusion processes (i.e. adoption over time, over a population) have demonstrated that where innovations were more profitable, adoption was more rapid (e.g. Griliches, 1957; Marsh et al., 2000). Rogers (1995) offers further support when stating that diffusion studies have found ‘relative advantage’ to be one of the best predictors of an innovation’s rate of adoption. A number of the elements of relative advantage can be positively influenced by extension. For example:

- Complexity (e.g. extension programs may provide expertise and skills to reduce management costs associated with complex change);
- Compatibility (e.g. extension programs may facilitate adaptation of a technology to a local environment/system).

Considering trialability, extension can reduce the information and learning costs involved in the adoption process. For example:

- Observability (e.g. extension may provide tools for more cost-effective measurement of results that would otherwise be hard to observe);
- Complexity (e.g. extension may assist farmers to interpret results from trialling of complex systems);
- Time lags (e.g. extension may provide advice on practices’ long term outcomes that cannot be readily observed in the short term).

In these ways, extension can be seen as reducing learning costs for potential adopters.

The economic models of learning point to different potentials for extension to influence learning at different stages of the diffusion/adoption process. In the early phases of diffusion, information and learning-related factors are major determinants of the speed of adoption (Lindner, 1987), so there is good scope for extension to influence the rate of adoption. However, as diffusion proceeds, there is a greater likelihood that highly relevant information will be obtained at little or no cost as a result of contact with multiple neighbours for example.

D’Emden et al. (2008) and Llewellyn et al. (2005) provided empirical support for this conclusion. They studied well advanced diffusion processes for no-tillage cropping and integrated weed management practices. For some key variables, they found that non-adopters were well-informed already and held
perceptions similar to adopters. Non-adoption did not reflect a lack of information about these variables, so extension focused on them was unlikely to influence behaviour. Other things being equal, information will have the greatest impact on learning when the decision-maker is not yet well-informed about the innovation (i.e. the decision-maker has a high level of uncertainty about the innovation’s likely performance).

Applying an economics based approach to considering the information and learning aspects of extension can help to identify where extension investment can be directed towards factors that (a) are influential in the adoption decision and (b) can be influenced by extension. The effective targeting of extension initiatives can also benefit from greater recognition of learning costs and the role for extension in reducing these costs.

Conclusion
In this chapter, we have explored the ways in which an economics based approach to thinking about extension can provide insights for extension theory and practice. We discussed this in three areas: the provision of extension services and employment of extension professionals; the economic returns from extension; and the circumstances in which extension should be relied upon to pursue policy objectives.

Economic drivers were key reasons for the move in Australia in the 1990s to private sector provision of productivity-related extension seen to have private benefits; and the shift of public sector extension to areas more explicitly addressing public benefits, such as agricultural sustainability and environmental issues. This has fundamentally changed the way extension is provided in Australia and resulted in a much larger role for public sector extension in the area of NRM rather than productivity-related areas, and an interest in the use of economic policy instruments to achieve NRM outcomes. It is interesting to note that emerging issues such as impending climate change and the failure of global financial systems experienced in 2008 are now putting pressure on governments to again rethink the appropriate role of government in the economy.

The role of extension as a policy tool for achieving NRM outcomes was discussed. Reliance on extension as the primary policy tool should be limited to cases where sustainable land management practices are adoptable over a scale that is sufficient to achieve the desired NRM outcomes. This highlights the need to assess the adoptability of practices prior to engaging in extension, which has generally not been done. It is our assessment that extension has been overused in NRM programs and in many situations it has failed to generate the desired natural resource outcomes. In these situations, the resources involved may have been better directed towards other policy mechanisms including: regulation, conservation tenders, engineering works, R&D and technology development. To maintain the support of policymakers for ongoing investment in extension, it is crucial that it be used appropriately in circumstances where it can make a major difference to the achievement of policy goals.

Finally, economic approaches to learning and technology adoption provide useful insights into the role extension can play in facilitating the learning and change process, specifically with the aim of providing better targeted planning and delivery of extension initiatives.

References


PLUS GET John Mullen – returns to extension paper/s
This book, and indeed the wider extension network in Australia, is replete with examples and models of various extension approaches that are employed by intervening agencies seeking to enable desired change(s) in sustainable production and/or natural resource management. Chapter 1 paints a picture of extension as a policy instrument, or a method or mechanism used by government and government agencies as well as other institutions including business to achieve a desired effect (also see Vanclay and Leach, 2006). This chapter provides a perspective on extension policy in Australia, a framework in which a national extension policy platform can rest and a process model for negotiation of effective extension policy as an effective instrument for enabling changes.

A Perspective on Extension Policy in Australia

What is extension policy? Although extension is a long term discipline, it seems that a relatively small number of people have seriously studied the role of extension policy, and indeed the need for adaptive extension policy within agencies to enable practitioners to effectively achieve the outcomes for which they are funded. Maybe this is part of the challenge for extension – Or conversely, an opportunity for its improvement.

Between 1987 and 1994, Jeff Coutts investigated the role of extension policy in the development and early implementation of a formal extension policy in the Queensland Department of Primary Industries. His findings included the realisation that the formulation of extension policy occurred at the strategic level. This prefaced the need for building external commitment with stakeholders and cross-agency negotiation. While this process secured resources to put in place new structures, processes and positions and continued to legitimise public sector extension, the implementation of the extension strategy and longer term results were somewhat problematic. The roll-out of the extension strategy was prescriptive rather than consultative which limited ‘commitment at the collective level’ to ‘policy endorsed at the executive level’. Also the policy remained unaltered for about a decade which further embedded issues with the initial implementation (Roberts Pers Comm, Foster Pers Comm and Hamilton Pers Comm). One of Coutts’ key recommendations was that regular and inclusive negotiation, and review of extension policy employed by, the organisation is needed, involving key primary industries stakeholders, to meet changes of priority and mitigate against resistance to prescriptive policy implementation (Coutts, 1994). It could be argued that the regular and inclusive negotiation and review recommended by Coutts has not been progressed at strategic or other levels in the Queensland Government or, for that matter, at a national level.

Understanding the context within which extension policy exists in 2008 is important and may explain the lack of progress to date.
The rise of environmental concerns over the past decade, nationally and globally, has broadened the charter of extension beyond its traditional agri-centric roots (see Chapter xx). The achievement of sustainable production, which is now more commonly considered as a component of natural resource management (NRM), is becoming a complex and dynamic business. There is now a far greater range of sectoral interests in the management of natural resources. Property managers are confronted by a growing number of stakeholders, each with particular claims on the control of resources and/or the production systems employed. Landholders lament the fact that they are encumbered with a complex array of decision making, planning and regulatory apparatus.

Surprisingly, despite the growing number of well-meaning efforts in pursuit of sustainable development (including extension along with other policy instruments), there are an even greater number of opposing factors that thwart the achievement of sustainable outcomes. In the lead up to the World Summit for Sustainable Development in Johannesburg 2002, Minu Hemmati made the following observation:

Many individuals, organisation and institutions have been responding to the challenge of sustainable development. Yet many still seem reluctant to take the need for change seriously. We have a long and difficult way to go if we want to live up to the values and principles of sustainable development. Taking one step beyond the stalemates, which we face, in many areas, we need to learn how to listen to each other, to integrate our views and interests and to come to practical solutions which respect our diversity (Hemmati, 2002:1).

The changing context of extension policy in Australia

In rural and regional Australian terms Scott-Orr and Banks consider the need integrate views and interests for agriculture, NRM and service provision:

In the 21st century environmental issues have come to dominate Australian agriculture and natural resource management. Sustainable management of our natural resource is the greatest challenge facing our agricultural industries and this must be done while maintaining or improving farm profitability. Facilitating this change and empowering communities is arguably the most valuable service agencies can provide. Communities, especially urban communities, are requiring greater environmental stewardship from land managers. They are demanding solutions to issues such as salinity, water sharing, soil acidification, chemical dependency and native biodiversity preservation or restoration. A new paradigm of engagement between rural and urban communities is needed (Scott-Orr and Banks, 2002:2).

Obviously, service delivery and interventions of the past are not meeting current needs. The ‘old paradigm of engagement’ that Scott-Orr and Banks (2002) advise retreat from is arguably the technology-transfer extension model which served rural development and the primary industries sector well through the 1950s to the 1980s. Extension has been used as a policy instrument for over a century in Australia, and much longer internationally, for engaging rural and regional stakeholders in numerous ways to promote voluntary change in how resources are managed. In the last decade however, changing economic, ecological and social contexts see a broadening emphasis on the management of natural resource systems for sustainable futures. So how has extension practice and extension policy kept pace with this need for change?

In the 1990s, Marsh and Pannell observe that extension policy in Australia was heavily influenced by changing administrative structures (e.g. Funder-Purchaser-Provider) and a change in the paradigm within
which the extension community operated. Moreover, that the extension environment in Australia reflected a world-wide trend towards the privatisation of agricultural extension services. This trend appears to be related to factors such as the declining relative importance of agriculture in the economy and budget pressures on governments, as well as the increasing influence of economists’ theories and prescriptions within government (Marsh and Pannell, 2000).

**Considering Extension Internationally**

As presented above, extension in Australia is on uncertain ground. Extension also seems to be in a critical position globally. Rivera notes that public sector agricultural extension, assailed by economists and politicians in the 1980s underwent diverse policy-driven structural as well as managerial and grassroots changes in the 1990s. Extension policy has been shifting in light of conflictive views held by different interest groups and the tension that exists between those who would concentrate on agriculture and land management mainly as a business and those who see multiple functions, especially related to social development and natural resources management (Rivera, 2000). Extension is now broadly acknowledged as a pluralistic array of institutions engaged in knowledge and information related to technological change, not restricted to the public sector (even though in many countries it remains a significant stakeholder). Importantly, Christoplos argues that in the 21st century it is critical to transcend the assumption that extension policy is a matter of a simple choice between traditional public sector service provision and full-scale privatisation of service delivery (Christoplos, 2003).

On one hand, world demand for food and sustainable production systems and landscapes continues to escalate (Feder et al., 2002) but on the other, extension programs are being wound back drastically (Röling Pers Comm). World Bank staff members see challenges facing extension are a reflection of current times, but argue that the rural sector must nearly double biological yields on existing lands to meet food needs in the next quarter century.

> *The world has nearly one million agricultural extension personnel. More than 90 per cent of them are in developing countries. Development agencies have poured US$10 billion into public extension programmes over the past five decades. Yet a study published in 2001 by the United Nations’ Food and Agriculture Organisation found that extension services across the developing world are ‘failing’ and ‘moribund’, in ‘disarray or barely functioning at all’ (Feder, 2005:1).*

Feder et al. suggest a sustainable approach to providing extension services – minimal external inputs, a systems orientation, pluralism and arrangements that take advantage of the best incentives for landholders and extension service providers – is needed to release necessary local knowledge, resources, common sense, and organising ability of rural people (Feder et al., 2002).

Additionally, others see that a focus on whole property enterprises and their natural and human resources is more likely to contribute to sustainable livelihoods and production systems than one which concentrates on single commodities or which separates extension services to different organisations. They suggest that extension objectives can range from the effective transfer of technology to the building up of strong rural organisations that can exert influence over future research and policy agendas, and also take and enforce collective decisions over natural resource management (Garforth and Lawrence, 2002). These authors advise that a shift towards organisational (institutional) development will in turn promote more sustainable agricultural and rural development.
A look at extension institutions

Generically, Leeuwis (2003) suggests that challenges land users and extension practitioners face in the quest for sustainable futures is indeed complex and endemic. Challenges for extension mirror the very pressures and changes that landholders, resource users and farmers are exposed to in their evolving social and natural environment. Leeuwis (2003) further maintains that extension organisations themselves are the source of many underlying issues with re-positioning of priorities and funding arrangements, new communication technologies, and developments in theory putting new pressures on service delivery. Institutional challenges for extension include developing capacities for ‘dealing with collective issues’ where there is an inherent need to manage complexity, conflict and unpredictability. Institutional stakeholders designing and participating in innovation processes require capacities in translating and re-interpreting knowledge and technologies across different social groups rather than disseminating or transferring it. Matching the technical and social dimensions of an innovation requires new things of extension institutions as does the need to cater to diverse farming, NRM and livelihood strategies. Moreover, extension organisations (and institutional arrangements) need to continuously learn and adapt to add value in times of discontinuous change. A key to this will be the recognition of changing professional identities where as the context, aims and outcomes of change arenas rapidly evolve, the range of professionals in the same or overlapping space with extension is also increasing (adapted from Leeuwis, 2003).

Australian responses to extension policy tension

A key concern for extension policy in Australia is that these tensions have not given rise to an effective transition of paradigms enabling ‘agricultural extension’ to be re-discovered (Woods Pers Comm) to include broader notions of ‘Sustainable Production’ and ‘NRM extension’. In 2008, in the wake of several activities that have done well to unearth the intractable nature of extension policy (e.g. Cooperative Venture for Capacity Building (CVCB) extension review projects, SELN-RDC workshops, APEN national extension policy forums), Beilin et al. provide further reasoning as to why extension policy remains elusive in Australia. They argue that in order to achieve the economic, environmental and social outcomes required for sustainability in Australia, stakeholders involved with extension policy need to understand the complex context in which it operates. Thus, extension policymakers must involve the range of stakeholders, including official institutional and local stakeholders, and allow their various perspectives on policy and practice – in particular, their definitions of best practice – to be represented. Moreover, genuine collaboration through discourse between institutional policymakers, researchers, extension practitioners, program participants and other stakeholders is essential (Beilin et al., 2007).

As we can see, the increasing complexity of the extension policy environment requires that policymakers maintain a vigilant stance and progress inclusive and ongoing negotiation processes in order to adapt the extension policy instrument to meet changing needs. So is this actually happening in Australia?

Transitions with Extension Policy Negotiations in Australia

Through much of the 20th century, as extension policy remained the province of State Government Agricultural Departments, extension policy negotiations were internal and largely confined to these agencies and close industry partner organisations. Funding for traditional research and extension services from the 1950s and through to the mid 1990s was provided predominately by State Governments, CSIRO and agricultural university faculties (Mullen et. al., 2000). In the mid to late 1980s however, as the role of the public sector in delivering extension services to meet ‘market failure’ came into question (as per Mullen
et. al., opcit), and improved technology facilitated cross-border interaction and exchanges amongst extension practitioners and organisations such as APEN (the Australasian Pacific Extension Network) developed to activate these developing extension networks, it could be expected that extension policymakers would follow suite and coordinate extension policy nationally. This however did not occur and despite attempts through Research and Development Corporations to improve arrangements between state and federal government and industry extension efforts, improvements in the national coordination of the extension policy environment were not realised.

A further complication for extension policy negotiation and coordination was the progression of national natural resource management initiatives including the Decade of Landcare (1990-2000), the National Action Plan for Salinity and Water Quality (2001-2006) and the Natural Heritage Trust I, II and now Caring for Our Country packages (1997 - Present) amongst a number of other associated programs. Each of these initiatives sought to encourage landholders to adopt more sustainable practices mainly through information provision and social processes (Pannell et al., 2006). In an effort to deal with NRM priority issues, the Australian Government, in association with state and territory governments, identified 56 regions covering all of Australia through the extension of the Natural Heritage Trust in 2002-03. Each regional body developed an integrated NRM plan with local communities, support from government and the best available science. While the delivery of extension services was resourced, with extension sometimes re-badged as ‘capacity building’, a clearly articulated policy platform to coordinate agricultural extension with NRM extension was not progressed at a national scale, or indeed at state and/or regional scales.

Naturally, APEN was an interested player in the status of extension policy at different scales, but with particular interest at the national level as the need for improved coordination of effort was becoming increasingly evident (See APEN International Conference Proceedings, 2001). The protracted lack of negotiation and the ownership and control of extension policy (Marsh and Pannell, 2000) within industry and the NRM sector as well as traditional state government agricultural extension agencies saw dialogue develop amongst APEN membership. Building on arguments from Marsh and Pannell (1997 and 2000), Coutts et al. (2001) called for concerted effort to address widespread inefficiencies in the Australian broader ‘extension system’ as well as with specific extension programs in rural and regional communities. These authors argued that important issues include:

- declining investment in building extension capacity since the 1960s, with state agencies no longer providing this role, results in large gaps in professional development for extension practitioners;
- extension in Australia is involving a greater deal of private sector delivery with some extension personnel lack basic skills for their role;
- fragmentation between research organisations and extension or advisory agencies, government departments, private agencies and related industries;
- major funding programs largely rely on junior professionals on short term contracts leading to institutional amnesia, no continuity or career structure, very high job turnover, burn out and frustration at all levels;
- arguments about cost-shifting, and mutual suspicion and distrust are perpetuated by Commonwealth/State demarcation disputes;
- overlaps, inconsistencies and deficiencies occur (e.g. CSIRO and Cooperative Research Centres (CRCs) often excluded from extension loop);
different programs occurring in the same regions sometimes cover the same ground with limited collaboration and/or communication;

little consensus is reached at a policy level about modes of extension;

limited investigation of new and emerging information and communication technologies (ICT) for social learning and the design of extension systems, and;

no consensus, consistency or coordination around evaluation of extension programs.

In 2001 Coutts, Douglas and Campbell (2001) called for APEN involvement in the instigation of, or at least, actions toward the establishment of a National Framework for Extension. Campbell later amplified similar concerns in a national newspaper claiming efforts are needed to take the lead in working with all levels of government, industry and non-government organisations to rethink extension and agree on a national extension framework. He argued that the framework should set out the respective roles and responsibilities of governments, catchment and regional bodies, local governments, NGOs and industry. Furthermore, that the Prime Minister and the premiers need to work together through the Council of Australian Governments to address the extension policy coordination issue (Campbell, 2003).

The following section discusses attempts by extension practitioners, through APEN as a representative organisation, to carry such recommendations forward and facilitate negotiations amongst policymakers to develop an ‘Extension Framework for Australia’.

**APEN efforts in facilitating extension policy negotiations**

Since its inception in 1993, APEN, as a peak body for extension in Australia, New Zealand and the Pacific region, convened several conferences and forums targeting the future of extension in Australia. APEN’s vision and role statements reflected this:

*Vision: APEN is the peak body for professionals working with people to manage change in agricultural and natural resources management communities. Role in contributing to this vision: To provide a platform for networking, professional development and representation of members (APEN 2004:1)*

APEN has been endeavouring to move extension out of the ‘agricultural rut’ (James, 2001) and broaden its base to include NRM stakeholders and other key disciplines facilitating change in rural and regional Australia. This is challenging and events such as the 2003 APEN National Forum saw extension continuing to be re-defined with ongoing confusion within and outside the field of extension about its role and function.

Many APEN members, particularly the Management Committee (MC), were increasingly concerned about the need to improve extension policy for the new and emerging needs of stakeholders in rural and regional Australia. Spurred on by Coutts et al., 2001, Campbell, 2003 and a wider dialogue with members, the APEN MC recognised that the paucity of coordinated extension policy negotiation led to further issues:

- seemingly irreversible reduction in publicly funded extension staff in every state;
- variable coordination by regional bodies and catchment management authorities for using extension as a delivery mechanism to assist achievement of regional or catchment NRM plans targets;
- a growing complement of private providers who may not associate with the term ‘extension’;
Governments’ frustrated policy responses to slow achievement of behaviour change through voluntary instruments such as extension, Landcare, incentives and education, and reversion (NRM agencies particularly) to regulation and compliance, aiming to achieve responsible practices through coercive means;

many APEN members had to redefine their job descriptions as agencies moved to short term project funding (e.g. 1-3 years) (Leach, 2002).

The APEN MC agreed to increase the network’s role in addressing the issue of representation of members’ professional interests which included more rigorous enquiry into what is going on with extension policy within agencies across Australia (APEN, 2003). A small Extension Policy Development Workshop was coordinated in Sydney to scope the needs for progressing extension policy negotiations at different scales. Adding to these developments, Childs (2004) suggested that extension (and APEN) should not endlessly plan, argue about process and procrastinate, but rather put something sensible in place and learn through action and continuous improvement (Childs, 2004). In liaison with the APEN MC, a group of APEN members then took up this challenge and planned a larger National Extension Policy Forum in 2004 and other activities in 2005. The resolution from these activities was that extension policy needs recognition as a mainstream policy agenda item and to be negotiated at a national level amongst agencies, industries, NRM regional bodies and key political stakeholders. The outcomes from these activities are presented in the following sections.

Towards a National Extension Policy Framework

APEN Extension Policy Workshop - 2003

An Extension Policy Workshop held in 2003 in Sydney involved the APEN executive, a small number of CVCB members as well as Research and Development Corporations (RDC) and academic representatives. This workshop resulted in draft extension policy documents and a recommendation for a higher order extension policy process involving wider practitioner, funder, beneficiary and political input. A key resolution from the workshop was to conduct a larger extension policy forum in 2004. Evaluation processes showed that the majority of participants believed the event to be an effective step in the development of an APEN position on extension policy. Workshop participants considered that this needed to be contextualised however, alongside a character description of ‘good extension practice’.

A strong element of this workshop was the consideration of extension networks and the extension policy negotiation dilemma as functional characteristics of a Community of Practice (CoP). A CoP is a group of people who share a common interest or passion and who, through voluntary exchange of their knowledge, insights and experiences, learn together and through action to develop new ways to deal with problems and challenges. CoPs define competence by combining three elements. First, members are bound together by their collectively developed understanding of what their community is about and they hold each other accountable to this sense of joint enterprise. To be competent is to understand the enterprise well enough to be able to contribute to it. Second, members build their community through mutual engagement. They interact with one another, establishing norms and relationships of mutuality that reflect these interactions. To be competent is to be able to engage with the community and be trusted as a partner in these interactions. Third, communities of practice have produced a shared repertoire of communal resources—language, routines, sensibilities, artefacts, tools, stories, and styles. To be competent is to have access to this repertoire and be able to use it appropriately.
Following this, APEN instigated a working group to plan a process for enabling policy dialogue within the ‘extension CoP’ at a national scale. This working group organised the National Extension Policy Forum in Sydney 2004. The working group saw the forum as a critical stage in a longer-term process including a National Extension Policy Summit with wide representation, as well as interactions with national bodies and political stakeholders (such as CoAG).

National Extension Policy Forum – 2004

Purpose of the Forum
The working group interactively resolved that the purpose of the forum was to agree on the scope and elements of a National Extension Policy Framework and a way forward to developing and implementing this framework. To achieve this, the forum aimed to: review existing state of extension programming and application in Australia and current research that would contribute to the framework; investigate the needs of both extension providers and recipients of extension services/products; define ‘extension’ and the scope of what the Framework will include; consider how the Framework might be coordinated across the range of organisations and individuals involved in extension activities, including mechanisms that might be used to implement it; and develop a first draft of the key elements of the Framework and an action plan to progress it. It is very important to note the high level of interest in the forum with 56 key stakeholders attending.

Workshop Outputs

Extension Policy Context and Proposed Extension Framework Elements
The forum positioned the context of extension policy in Australia and the need for a national framework for extension. The Triple Helix of ‘landscapes, lifestyles and livelihoods’ was suggested as a broadened focus for extension and a list of proposed framework elements. Different perspectives about extension policy within existing multi-stakeholder/multi-agency environments were presented. A key proposition was that there is currently no one organisation or arrangement in which a national extension policy framework would sit. An articulated and mutually owned extension policy framework would make visible roles, relationships, gaps and needs that would assist dialogue, negotiation and understanding amongst the different players and guide the internal policies and direction of those players towards a better collective national outcome.

The forum included workshop processes using presented information to further consider the needs for extension policy in rural and regional Australia. A synopsis of forum notes was reorganised into the list of suggested policy elements. It was agreed at the forum that this list would provide a good starting point for developing a National Extension Policy Framework.

The Forum recommended development of a National Extension Framework is progressed by the working group in concert with key stakeholders in the wider Extension CoP.

A Process Model for Negotiating Effective Extension Policy
Irrespective of increased visibility of extension policy in political discourse, for some in the working group the key issue remained how to progress action at the practitioner level. The working group met later in 2004 to build on outcomes from the Sydney Forum and progress a funding application for development of a National Framework for Extension. Needs for progressing development of a national framework were
identified and located against the elements of the triple-loop-negotiation model (see Leach, 2003 and Forthcoming for in-depth theoretical development of this model).

**Working Group transitions to SELN Nested System**

It was generally agreed that the activation of the State Extension Leaders CoP may be a useful step in progressing the negotiations required for developing a coherent National Extension Framework for Australia.

While the development of the State Extension Leaders Network (SELN) is a story within itself, two particular products of the network’s interactions are important to consider here. The first is the business strategy that SELN initially set for itself with an agreed mission to provide leadership and strategic direction in the development of State and National extension service delivery. SELN’s agreed aims included connecting with rural and regional stakeholders across Australia to:

- clarify the purpose and role of the extension policy instrument, both in its own right and within policy instrument mixes;
- instigate efforts to improve communication, cooperation and collaboration across extension service providers;
- encourage key stakeholders to reassess the role of extension policy and extension services; and
- progress the development of a national coordinated approach for extension.

SELN sees that its role in progressing these initiatives is to instigate and facilitate interactions with State and Territory Governments, Industry Bodies, Research and Development Corporations, the Cooperative Venture for Capacity Building, rural industries and the Ministerial Advisory Committees for primary industries and natural resources. SELN sought to work with the Australasia-Pacific Extension Network (APEN), a professional association for extension practitioners to help achieve desired outcomes. The second product is the policy discussion document prepared inclusively by members with endorsement from all State and Territory governments (see Vanclay and Leach, 2006 this book).

Arguably, SELN made considerable progress as a nested system for activating and mobilising extension policy negotiations. This was supported by SELN instigated initiatives within the extension CoP including:

1) project proposals from a SELN – RDC workshop in early 2006 (opened and endorsed by the Parliamentary Secretary the Hon Sussan Ley):
   a) Project 1 - Better results from investment in RD&E through a shift from commissioning research outputs to commissioning industry and landscape outcomes.
   b) Project 2 - RD&E projects designed and managed to achieve outcomes (rather than just outputs) (Metcalfe, 2006).

2) recommendations made by the Parliamentary Standing Committee on Agriculture, Fisheries and Forestry ‘that the Australian Government, in conjunction with State and Territory Governments and industry, develop a national extension framework to coordinate the provision of extension services nationally, and define the roles and responsibilities of governments, industry and extension providers’. (Commonwealth of Australia, 2006). SELN and APEN members played a key part in commissioned parliamentary interviews and were surprised that the final recommendations were almost verbatim reproductions of those provided at the public hearing. In February 2007, the Standing Committee
recommended as a component of its report to the Australian Parliament that the framework for rural extension will examine and establish:

a) ‘differences and similarities in drivers between extension for commercial agriculture and for natural resource management;

b) the role of governments in extension and responsibilities between levels of government;

c) supporting development of appropriate skills and training and competency standards for NRM extension;

d) clarity and consistency in the role of universities and other training institutions and providers;

e) career structures or other impediments to building and maintaining NRM extension capacity; and

f) mechanisms to promote NRM delivery as part of commercial extension activities’ (Commonwealth of Australia, 2006).

3) A SELN represented presented to a working group of PISC in June 2007 on behalf of SELN. The case presented was for considering extension as a policy instrument and its place alongside other instruments in achieving outcomes rather than outputs. Feedback from PISC was very positive and yet the next steps for the SELN-PISC engagement to operationalise this are not clear.

**Continuing Issues**

Despite these significant achievements over a relatively short time, SELN runs the risk of not being able to capitalise on the opportunities resulting from interactions with ‘insiders’ within state government (e.g. the endorsement of the SELN document: See Chapter xx) and with ‘outsiders’ such as the RDCs, PISC, NRMSC and others. As evidenced in recent SELN meetings, while most support that providing leadership for the development of nationally coordinated extension policy and a National Extension Framework for Australia (NEFA) is a very altruistic and noble goal, it is undecided whether members are individually supported by their employers to take coordination to this level. Development of a NEFA is not part of their job and the direct benefits to respective State governments for playing a coordination role within the multi-stakeholder extension CoP are unclear.

Interestingly, the CVCB after commissioning research into capacity building in rural Australia and further funding a project to investigate implementation of this research has run into similar issues. As with extension, commitment for the coordination of capacity building initiatives and policy frameworks within this multi-stakeholder environment are plagued by leadership paralysis. No one has a mandate to do this! (Kelly Pers Comm).

**Recommendations**

The following recommendations draw directly from discussions above. These recommendations are chronological steps for operationalising the interactions and negotiations needed to move toward convergence nationally on the role and function of extension policy. These recommendations progress from smaller achievable steps with existing nested systems through to ambitious systemic revolutions in the professional environment in which change practitioners deliver services in Australia.

- Convergence on the need to improve the Extension Policy Instrument
- Clarification of a Multi-stakeholder Negotiation Approach
- Identify the Benefit-Cost of the Extension Policy Instrument
- SELN instigate negotiations amongst key nested systems
- Endorsement by CoAG of an initiative to develop a wider National Extension Framework for Australia
- Developing an Extension MSO (Multi-Stakeholder Organisation)
- A National Action Plan for Extension and Capacity Building (NAPECB)

Conclusion
NRM and sustainable agriculture is certainly a contested human endeavour. Conflicting objectives, values, beliefs and interpretation frames this as a wicked and disputed action and learning space. The extension policy instrument is a multi-stakeholder apparatus for use in its own right, and in conjunction with other policy instruments. The negotiation of extension policy in Australia requires effective multi-stakeholder engagement and negotiation to advance coherent policies that correspond with the needs of sustainable NRM and agriculture. These negotiations, however, need to be driven by extension practitioners themselves.

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Röling, N. 2004, Personal Communication. Note: Niels is a long-standing recognised academic leader with the extension discipline
The Cooperative Venture for Capacity Building has commissioned considerable research into extension and capacity building in rural and regional Australia. See http://www.rirdc.gov.au/capacitybuilding/

The State Extension Leaders Network organised a workshop in 2006 with Research and Development Corporation (RDC) representatives to identify linkages between research, development and extension


Leach, G., 2002, Issues for Extension Policy in Australia, APEN Management Committee working document. Note: Greg Leach was nominated onto the Management Committee to advance extension policy issues.


Leach, G. 2003, Draft outcomes from Sydney APEN Extension Policy Meeting, APEN working documents


Jennings, J. and Leach, G., 2004, National Extension Framework for Australia (NEFA), Proposal to the Cooperative Joint Venture for Capacity Building. Note: This proposal was submitted to the CVCB for funding in September 2004


Regional NRM Bodies, Catchment Management Authorities and related governance structures in the Australian Government


Commonwealth of Australia, 2006, Skills: Rural Australia’s Need - Inquiry into rural skills training and research, House of Representatives Standing Committee on Agriculture, Fisheries and Forestry. Note: This report was tabled in the Australian Parliament (House of Representatives) February 2007.

Extension and capacity building are highly interconnected, with capacity building being an important component of extension activities: See Vanclay and Leach 2006 (Chapter1)

Kelly, D., 2007, Personal Communication. Note: Dana Kelly is a researcher working with the CVCB Policy Synthesis Project

Gordon, I., 2006, Personal Communication. Note: Ian Gordon has a high profile amongst national stakeholders in the salinity and water quality movement in the late 1990s. Ian suggested that the extension movement should implement some of the effective aspects of the multi-stakeholder process that secured political support and endorsement of the National Action Plan for Salinity and Water Quality.


The Council for the Humanities, Arts and Social Sciences (CHASS) was established in 2004 as a peak representative body for the humanities, arts and social sciences sector in Australia. In December 2005 CHASS commissioned research into collaborating across sectors in Australia

Metcalfe, J., Riedlinger, M., Pisarski, A. and Gardner, J., 2006, Collaborating across the sectors: The relationships between the humanities, arts and social sciences (HASS) and the science, technology,
engineering and medical (STEM) sectors, Council for Humanities, Arts and Social Sciences (CHASS). http://www.chass.org.au


The agribusiness sector has a crucial role to play in informing and building capacity of farmers/producers/growers (farmers) in Australia. The role of government extension services has now largely been taken over by the private sector and agribusiness is emerging as the key extension, training and capacity building provider for farmers. In addition, constant change in how publicly funded organisations operate and staff skill loss means that agribusiness is now a more ‘constant’ factor in extension in Australia than publicly funded organisations.

For the purposes of this chapter, the definition of agribusiness as sourced from Stone, 2006 is:

An organisation that generates income from the sale of a product or service – and this definition now applies to a wide range of individuals and organisations who aim to take part in the extension and capacity building role vacated by governments. Increasingly agribusiness is undertaking R&D work – and acting as the major information conduit, information consolidator, synthesiser and adviser to farmers

**Historical Perspective**

In the early 1990s, state government departments were the primary agencies for conducting both rural research and development (R&D) and extension (E). R&D findings were synthesised into advice which was delivered by Extension Officers direct to farmers. In turn, the Extension Officers were able to feed information back from farmers into R&D work thereby ensuring a practical, relevant outcome to the users/levy payers.

During the 1990s, a deliberate Australia-wide policy emerged for state government departments and agencies to withdraw from one-on-one information delivery and advisory services. The prevailing rationale was that this was more properly the role of private information and advice providers. Government then focussed more on delivery to groups of farmers than on 1:1 delivery.

Also during the 1990s, a strong landcare and catchment management sector emerged. This was a system centred, group based method of information delivery focussed mostly on NRM issues. Over time they gained increased access to funding – including the Natural Heritage Trust and more recently Caring for Our Country grants program. At the same time, a range of organisations including the rural Research and Development Corporations (RDCs) and the Cooperative Research Centres (CRCs), also emerged funded by a mix of farmer levies, taxpayer funds and partner funds.

During this time, farmers increasingly began to see agribusiness as an emerging form of technical competence, offering 1:1 advisory services and R&D activities. Many private consultants and advisers from corporate entities were already accessing information from the wider agribusiness sector and from
government researchers and then channelling it through to farmer clients. While government agencies were still carrying out most research, as it remains today, agribusiness was able to access R&D data from product developers and suppliers. Their technical expertise was grounded in the need to ensure their products worked effectively for farmers. Many agribusinesses also conducted field trials and the supplier organisations undertook their own product development R&D.

By the late 1990s, this transition of state agencies into group liaison agencies and undertakers of R&D was largely complete. It became evident that there was an emerging gap in the delivery of R&D information to farmers and the corresponding feedback loop to the R&D providers. During the late 1990s, agribusiness was responding at varied rates to these changes, taking advantage of these niches. Some former government extension staff moved into roles of private consultant advisers or were employed by national agribusiness companies.

The current situation is that state agencies and R&D organisations principally undertake research and development work, particularly the highly technical work. National and international product supply companies still undertake ‘blue sky’ R&D although there is pressure to reduce this (costly) work and the associated product information delivery.

Some agribusiness advisers undertake localised trial work for farmer clients or national or international company clients, which can yield practical, localised R&D results or new management practices. A range of farmer directed groups also undertake localised trial work and other information delivery roles, generally through access to external funding.

The Emerging Role of Agribusiness

In the last few years, agribusiness advisers (agronomists, livestock, horticultural, vets, nutritional, etc. and business management advisers) have become the primary source of technical information to farmers. Agribusiness can now be considered as the major extension provider rather than government personnel. This is validated by internal market research undertaken by a range of the RDCs (commercial in confidence data known to the author). As a consequence, many farmers/producers now see that government R&D activities are ‘out of touch with farmer needs (the ultimate end users) as there is no ‘personal connection’ or indirect connection between farmer and researcher’. (Stone, 2005).

A range of observations provide insights into this issue:

- Agribusiness informants are consistently used in both broadacre rural industries and more intensive industries. In the more intensive industries, strong adviser-farmer relationships are the norm, with the general exception of horticulture.
- A strong factor in the provision of on-farm advisory services is the development of personal 1:1 farmer to adviser relationships
- Grower directed agribusiness organisations are emerging as significant capacity building processes
- Although the government’s role may be perceived as declining in efficacy and credibility, individual staff still retain high credibility and remain a strong information conduit
- Agribusiness contributes to capacity building in the rural sector by acting as a catalyst for change in a range of information delivery mechanisms – particularly with respect to new technology
- Reseller specialist advisers and consultants can be considered part of the process of cross-fertilisation of ideas from industry to industry
- Private adviser / consultants who charge a fee for service (FFS) are generally perceived as providing honest broker advice and information, and have a role in the synthesis of information. Their focus is often on the most business-like farmers who can afford to pay FFS.

- Successful farmers are able to access, interpret and apply a smorgasbord of information at a holistic business level. The vital role of agronomists, consultants and some accountants is to facilitate that process and, in many cases, interpret / synthesise and make available new technology, ideas and concepts, so farmers can make the best decisions about applying that technology.

- Farmers and agribusiness are increasingly segmented so that no ‘one size fits all’ approach exists.

**Agribusiness Role in Extension**

Stone (2005) reports that the role of agribusiness in capacity building and extension remains largely unaddressed at a policy and structural level. Stone’s current work (unpublished) is focussed on informing this thinking and establishing mechanisms of engagement between farmers (clients); agribusiness (the conduit for information); and R&D organisations (funders and researchers). It aims to maximise delivery of RD&E - fostering connections between agribusiness and the R&D providers drawing on the emerging role of agribusiness. It also aims to facilitate government policy imperatives through direct information and advice delivery to a range of farmers, noting this must be based on a payment of some sort as the ‘terms of trade’.

A further series of issues inform the future position of agribusiness in extension:

- National reseller company agronomists / advisers are sometimes perceived to have conflicts of interest because they ultimately sell products or services. These companies are currently moving towards greater FFS to address these issues and provide clear market based payment systems.

- Industry training is a key means of informing traditional producers about issues but it is heavily reliant on government subsidies. Well-targeted industry training is also an important means of agribusiness professional development, though much of it to date is not well targeted.

- Agribusinesses take a highly segmented approach to their client base using differing strategies to engage differing segments of farmers. Many agribusinesses are looking to ‘fire their unprofitable and frustrating clients (slow-adopters)’.

- The connection between RDCs and agribusiness is currently very weak. This can be regarded as a major discontinuity between the front line advisers and the funders of the development of new technology.

- The management of the Intellectual Property and Commercial in Confidence issues of information ultimately fits with the desire of farmers to assure themselves of access to ‘honest broker supplied information’.

- A key emerging issue, the subject of current research, is to facilitate access of agribusiness advisers to all previously funded R&D outputs in one location or some form of an Information Repository. This includes cross organisation R&D on common issues like soil fertility, climate variability, water issues, etc.

**Segments of Agribusiness**

Stone (2005) and Stone (unpublished) identified distinct groups of agribusiness providers that are widely used by farmers and are considered to be the highest priority for initial engagement in the capacity building process:

- Resellers that market products and generate income largely from product sales and some FFS. They provide both information and advice.
- Independent Consultants who are principally agronomists/farm management advisers or farm financial consultants. They generate income largely through FFS in exchange for information or advice or planning/review activities.
- Suppliers to resellers who are also suppliers of products and associated technical information to advisers (resellers and independents) and sometimes farmers. They market their products through resellers and may conduct R&D activities and some information delivery activities.
- Accountants, financial and specialists that are largely FFS based
- Equipment suppliers who provide new technologies that support innovations like precision agriculture.

**Groupings of Farmers**

Target audiences for extension have to be considered separately in terms of determining how best to interact with them and meet their specific needs. This means that the traditional 'scatter gun approach' of information delivery is no longer relevant or appropriate in terms of agribusiness advisers.

In terms of farmer clients, the consensus from the interaction with farmers and agribusiness is that farmers are best thought of in four categories. These are current farmers ‘A’ to ‘D’, and three categories of emerging farmer groups:

- ‘A’ class clients/farmers are the top farmers in their discipline and are true farm business operators and innovators (innovators);
- ‘B’ class clients/farmers are lifestyle based, actively moving towards the ‘A’ class and are followers (early adopters);
- ‘C’ class clients/farmers are those whose operations are largely static in terms of innovation and development, and could become ‘B’ or ‘D’ clients (traditionalists);
- ‘D’ class clients/farmers are regarded as laggards who might exit the industry;

Lifestyle Farmers are an emerging group;

Young Professionals are the next generation who are returning home to the farm business with external specialist training and experience – which may well be non-rural; and

Corporate Farmers are those that come from larger organisations such as superannuation companies or expanding individual farmers who are seeking to expand or corporatise.

**Farmers, Agribusiness and Extension**

Innovative business-like farmers (regarded as being the top 20% described in the Paretto Principle, [Stone, 2005]) are those who operate in a globally focussed business environment and concentrate on ‘doing business’. They rely heavily on agribusiness as a key conduit for information as ‘honest brokers’ that are mostly FFS consultants. Information is also being increasingly provided by farmer-directed groups and direct from R&D providers. This contributes to the perception of information overload amongst farmers. Agribusiness advisers frequently synthesise the information into farm specific advice that will meet client farm goals and personal goals.

Stone (2005) reports that traditional ‘D’ (and some ‘C’) farmers are having real trouble accessing information and advice, especially because they are not willing to pay.
Other learnings from the author’s research on past projects indicate:

- Increasingly farmers are seeking highly competent advisers as their businesses become more complex and demanding. They seek snapshots of information and expect advisers to be able to provide highly technical data and possess a broad range of knowledge.

- Farmers who see a benefit are prepared to pay for advice and those who do not are not prepared to pay. This reflects free market forces in operation. Income production and profits must therefore be the key drivers for RD&E programs so these outputs can be passed on.

**Agribusiness Context**

The recent moves at RDC and CRC level to build relationships with agribusiness is based on the growing realisation that agribusiness is a key feedback mechanism to facilitate accurate priority setting of future R&D by R&D funders and providers and a capacity building mechanism that has yet to be fully canvassed.

The author’s work for one RDC (unpublished) has identified defined ways of engagement with RD&E providers that have the ability to be highly effective information delivery conduits:

- Farmers are driven by achieving a range of goals in their farm business enterprises. In general, farmers do not appear to care about the internal processes of government and agribusiness. They simply want to see the end result.

- The importance of personal interaction with researchers and technical specialists cannot be overstated according to the farmers / agribusiness personnel. They recommend all possible means of connection are explored, both with agribusiness personnel as well as with growers.

- Agribusiness nominated the best means to connect with RDCs is to develop a Communications Plan specifically for agribusiness contact that recognises all the factors, so that it impacts positively on the relationship between R&D providers and agribusiness.

- Agribusiness is seeking ways to access all available information from their own networks, from product supply companies and from within R&D organisations.

- It is critical that there is continued understanding of the differentiation in the agribusiness market

- An emerging issue is to see all R&D issues ‘housed’ in the one place that is readily accessible to farmers and advisers, and structured so that the information can be ‘synthesised into take home messages’, via an Information Repository. A commercial organisation is developing such a process at present.

Currently, there appears to be little communication between the major R&D organisations and agribusiness. This is related to differing cultures and some suspicion from government based organisations about the profit based motives of the private sector. The agribusiness sector also perceives that there are ‘different ways of thinking and motivation’ from R&D providers that are inconsistent with their approaches.

There is also little crossover or communication amongst the major agribusiness companies at a corporate level due to the strong competition in the market place. This is being quite consistent with what occurs amongst the private sector in non-rural industries. Further, there is limited communication between private consultants and major companies, again due to competition.

The importance of these lines of communication is emerging and methods to appropriately facilitate this are the current issue being investigated by the author over a number of management projects.
The recent moves at RDC and CRC level to build relationships with agribusiness is based on the growing realisation that agribusiness is a key capacity building mechanism and feedback mechanism to facilitate accurate priority setting of future R&D by R&D funders and providers.

**Agribusiness Drivers**

The production of income and company / business profits are the key overriding drivers of agribusiness when servicing client needs. Those who fail to operate their businesses profitably rarely remain in business. Therefore, agribusiness must balance providing information and advice about short and long term and private good and public good issues based on a range of financial, time, personal interest, client requirement and knowledge factors.

As agribusiness is based on generating an income, this often means ‘public good’ issues, which clients are not prepared to pay FFS for (such as NRM issues), are generally unprofitable and fail to attract skilled service providers. However, agribusinesses working for clients such as RDCs or state agencies are able to undertake NRM-type work that is externally funded and does not require substantial farmer FFS contributions. Some agribusinesses are utilising grant funds for NRM works. However, the ‘government distrust of agribusiness profit motives’ is anecdotally known to adversely affect this form of NRM-type service provision by agribusiness.

Some industries are more prepared to pay for information and advice than others. These include the grains, dairy, horticultural and intensive industries, and the more professional farmers / more profitable farmers (‘A’ and ‘B’) who realise the value of information and advice. This ‘user payers’ information and advisory selection process across the farming community reflects government policy, which is based on allowing market forces to operate in the delivery of market-based private sector services.

This means some industries have low level advisory services as the profitability is not there to sustain the services. The agribusiness model means that supply and demand will only equilibrate when the customer is prepared to pay for that product and / or service.

**Agribusiness Issues**

Agribusiness operators of today acknowledge this emerging issue as they strive to meet the increasingly sophisticated needs of their customers and of industry at large, and run a profitable and financially sustainable business. They are generally able to forecast the needs of their customers. However, they see emerging issues in finding and paying appropriate professional staff to service the current and future demands in the global agri-foods market place that is developing.

Agribusinesses also note inconsistencies in the market place when they are competing with remaining free or subsidised government services (when governments appear to have actively withdrawn from extension) and that some R&D providers / governments are supporting some services thus distorting the market place (Stone, 2006).

Equally, they question why RDCs in particular fund projects developed by the state agencies when agribusiness (and many ‘A’ and ‘B’ farmers) believes that those research and extension personnel are largely out of touch with their clients and, conversely, it (agribusiness) is in close touch. They question whether there would not be better value for money in focussing on supporting the agribusiness consultants and contractors who are actually ‘doing it’ at the ‘coal face’. (Stone 2006, APEN paper)
State and Federal government agencies are faced with making policy decisions about the role of agribusiness in capacity building, given that agribusiness is now arguably the most effective conduit to convey information and advice to farmers.

The continued evolution of agribusiness’ role in capacity building is likely to encompass:

- Facilitating the honest broker process so farmers can be sure they are getting the right information and the right advice to fit their needs;
- Continued emergence of farmer-directed honest broker groups which can assist in both information and advisory roles;
- A transition to full FFS in five years for most information being supplied, no matter who the supplier is (role of free market forces);
- A change in the mix and role of reseller advisers compared with private consultants, as long as the personnel are there to service those needs;
- Further development of the one-stop-shop concept through alliances and more agribusiness-to-agribusiness support;
- A metamorphosis and evolution of the rural information supply and advisory services offered by agribusiness, as agribusiness reflects the changing needs in the market place as they monitor farmer client needs and respond accordingly;
- Greater engagement of state and federal agencies and R&D personnel with agribusiness;
- The need to address issues associated with closed loop marketing and ownership and use of intellectual property, where information is retained within organisations for commercial benefit or provided by R&D agencies as papers into journals that are not readily accessible to agribusiness;
- Professional development of advisers, along with possible accreditation;
- Considerable attrition of traditionalist farmers in part due to their inability to access advice and information, and attrition of experienced advisers due to lack of succession and lack of personnel;
- Short-term assistance for some laggard industries, like livestock, to facilitate their transition to full user pays services or to allow market forces to prevail completely.

Current work being undertaken by the author reflects on the key issues emerging from the changing needs of farmers and agribusiness.

The author proposes that the future will be characterised by:

- A focused appreciation of Australia’s role and strengths and weakness in the global agri-foods industry and market place with Australia increasingly supplying into higher value market niches;
- A strong collaborative culture between the whole R&D sector and agribusiness, with an appreciation of each others perspective, in filling those niches though there will be some ‘bumps’ as the cultural issues are addressed;
- Joint relationships between state agencies / the R&D sector and agribusiness based on a joint culture of information supply by agencies, synthesis of that information by agribusiness into information products and packages that are jointly badged, delivery of those products by agribusiness on a 1:1 basis and small group basis, feedback from agribusiness to state agencies and R&D providers on farmer R&D needs;
- Inclusion of NRM and products/ markets/customers needs elements into holistic agribusiness farm advisory services;
Greater segmentation and specialisation of agribusiness advisers as the farm business becomes increasingly sophisticated and farmers rely strongly on outsourced advice;

Complete use of the FFS model;

The inclusion of NRM issues and public good issues into agribusiness on-farm advisory services;

Further technological advancements in the delivery of information from R&D to the Extension, Adoption and Capacity Building roles of agribusiness;

Development and updating of an Information Repository and a strong collaborative Knowledge Management and Feedback system to ensure the knowledge management is meeting customers needs;

An increasingly vibrant agri-foods industry and sense of excitement as younger people engage with the positioning of the Australian industry in the global market.

Summary

Innovative farmers across all rural industries have very defined needs in terms of accessing information and advice from agribusiness, and are prepared to pay (what they consider to be) fellow professionals at market rates. Government agencies are less aware of these issues (due to their operational / cultural constraints) while agribusiness itself is gradually evolving to meet the demands and opportunities created by the operation of free market forces in the global economy. Agribusiness is vitally aware of this transition due to their business-like approach.

Challenges with this transition include:

- Establishing a feedback loop on RD&E outputs and research priorities from state agencies and providers to these new front line agribusiness advisers;
- Agribusiness (and government agencies) accessing suitable personnel;
- Linking the cultures of government agencies with the culture of agribusiness and each finding common ground with the other;
- The need for ‘honest brokers’ in this information / advisory process;
- Greater segmentation of farmers and agribusiness advisers;
- Skill levels of professionals in rural and regional areas; and
- Establishing an information access and feedback mechanism through a form or forms of Information Repository that are readily deliverable to a highly mobile agribusiness advisory force.

The dominance of some key agribusiness operators in rural capacity building is an issue while the capacity building of the agribusiness sector at large is a challenge. The link between R&D and agribusiness information delivery and advice requires strengthening.

In the past, many of the costs of extension and advisory roles could be absorbed by agribusiness when various farm input products were sold as part of or incidental to the advice and information delivery. Only a small percentage of agribusiness operated on a true FFS business model. However, the ‘product’ market place is highly competitive and few opportunities exist for product sales to ‘prop up’ advisory services.

There is now such strong competition that the trend towards ‘fee-for-service’ advice and information delivery is strengthening and expected to become the norm rather than the exception within five years. This supports the notion that farmers are becoming increasingly sophisticated users of information and
advice and are seeking separation and transparency of the information supply and advisory services from other product/service supply.

It is clear that the role of agribusiness in extension and capacity building is strong and vibrant. Greater partnerships and collaboration, and addressing of key issues such as different cultures and attracting skilled professionals into the sector are key areas for attention in the short term. It is important to consider R&D providers in that role and information deliverers/synthesisers/advisers in that role, and ensure strong integrated linkages exist between both.

**Abbreviations and acronyms** (for this chapter)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>APEN</td>
<td>Australasia Pacific Extension Network</td>
</tr>
<tr>
<td>CRCs</td>
<td>Cooperative Research Centres</td>
</tr>
<tr>
<td>CVCB</td>
<td>Cooperative Venture for Capacity Building</td>
</tr>
<tr>
<td>FFS</td>
<td>Fee For Service</td>
</tr>
<tr>
<td>NRM</td>
<td>Natural Resource Management (soils, water, bio-diversity, catchments and landcare, etc.)</td>
</tr>
<tr>
<td>RDCs</td>
<td>Rural Research and Development Corporations</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Rural Research and Development</td>
</tr>
<tr>
<td>RD&amp;E</td>
<td>Research, Development and Extension</td>
</tr>
<tr>
<td>1:1</td>
<td>One-on-one contact (officer to landholder/primary producer)</td>
</tr>
</tbody>
</table>

**References**


'Do you have a gender element in your extension program?', the farming woman asked the older, experienced head of extension. Quick as a flash he responded smartly 'We don’t do gender – we do people'. (Quote, July 2007).

The purpose of this chapter is to explore the implications of this question and the ramifications of the answer for Australian agriculture. The intended audience is those who have a professional interest in extension, members of the farm family business team, policymakers and researchers. The chapter has four main sections:

- Gender matters?
- The invisible farmer - women’s work
- Barriers to participation
- Strategies to increase involvement in extension activities

The main contention of this chapter is that in modern Australian farm family businesses, it is the whole partnership who should be the target of extension activities. Gone are the days when one individual was thought to be the prime person. It is the combination of skills of all the team members that enable the family, the farm, and the business to operate.

In writing this chapter, my motivation is twofold. In 2000, the Women in Dairy Leadership Project of which I was a project consultant won an Australian Pacific Extension Network (APEN) award for excellence in extension. Over five years, this project worked extensively with women, encouraging and supporting them to take on leadership roles within the dairy industry. I hope there may be some lessons from this experience which are relevant. Secondly, I am driven by a belief in the opportunities for improvements based on best practice. Involving all the members of the farm family team will improve service delivery. It is effective. It brings results. Given all the issues facing rural Australia including the local and global importance of food security and the management of our natural resources, it will be to our advantage to use all our resources. I believe this includes involving all the members of the farm family business team in activities which bring about change and enhance the uptake of new technology.
Gender Matters – Why a Chapter on Women?

In a book on extension, why is it necessary to have a chapter about ‘the social construction of gender’ and specifically about women? Why is it not enough to think of people as people and treat them all the same way? Why is there a problem in saying ‘We don’t do gender, we do people?’

The simple answer is that people are different. It sounds obvious to say this. I believe it to be true. Men are different from women. Young people differ from old people. People see the world differently and act from different frameworks. Taking these differences into account is an important element of effective extension. To be effective in the ‘process of enabling change’ these differences need to be recognised, managed, and the hidden and institutionalized barriers, which are outlined in this chapter, addressed.

However, I also come to this chapter with a professional and also a personal interest in change management. I have a professional commitment to working with women to ensure they are able to make and be recognised for their contribution to agriculture.

Helen Cixous (in Toril Moi, Sexual/Textual Politics: Feminist Literary Theory, 1991) argues that there are two different ways of being in the world, the ‘masculine’ and the ‘feminine’, though neither is necessarily a matter of biology. The ‘masculine’, which she calls the ‘economy of the proper’, tends to be preoccupied with property, appropriation and propriety with establishing and defending boarders, and processing and controlling what lies within them. In contrast, the ‘feminine’, the ‘economy of the gift’, likes to cross boundaries, to give and receive and to live from within, open and attentive to what is unspoken and often unspeakable. By and large, I belong to this latter economy and in my experience the absence of this economy from the public life of agriculture leaves us all the poorer.

There are many pragmatic reasons for taking a proactive and inclusive approach to include all members of the farm family team in extension activities.

Research on capacity building in the agricultural sector demonstrates links between training and profitability (Kilpatrick, 1996). In addition, where the whole family farm team is involved in learning, even greater gains can be made (Kilpatrick and Bell, 2000). This is because all team members are involved from the beginning and are able to make joint shared decisions, rather than one member trying to convince another member of the benefits of a new approach. During the process of implementation, team members can also provide support to one another to assist with problem solving and in providing the confidence to move forward.

Women are half of the farmers in Australia. They obviously have at least half the good ideas, half the talent, and are keen, energetic and able to take on leadership responsibilities. Conversely, by failing to involve all members of the farm family business team, projects may risk failure because the people who hold the key roles and make the key contributions to the farm business economy may have been overlooked.

There is also the matter of being effective. Women’s workloads may be increased as a result of the interventions being proposed as part of the innovations being ‘extended’. The notion of fairness and inclusiveness is fundamental. ‘Nothing about us without us’ was the catch cry of the 4th International Conference of Women in Agriculture held in South Africa in 2007.
The Invisible Farmer

Gender becomes a particular problem in agriculture because traditionally women and their skills and work on the farm have been invisible and unacknowledged. Hidden in our language, there is an assumption of what a real farmer is. Traditionally the ‘farmer’ has been the person whose name is on the land title, the man, the older man, and the head of the house. The assumption has been this is one person and it is a male farmer.

Even when it has been understood that a team of people are engaged in the business, still the concept has persisted and reinforced by our language that it is men who are farmers and it is men who go to field days, turn up at ‘farmer’s meetings’, and stand for election to be farmer representatives in agricultural and farmer organisations. The farmer by definition is seen to be a man. He is the man on the land.

Not all women’s work as farmers is invisible or unacknowledged. In the past, for a woman to be known as a ‘farmer’, this woman would usually be either unmarried, single or a widow. The preferred term used by married women to distinguishing themselves from this model or of the male farmer is ‘woman farmer’. This term is used in a similar way to how people refer to a ‘woman doctor’. A woman farmer, how would she be different from another sort of ‘farmer’? The use of this qualifier in some way diminishes the work being described.

It would be problematic to assume that the word ‘farmer’ equates to farmer’s wife when it comes to recognising and accounting for women’s work. These are different jobs. Interestingly, the ABS definitions of occupations does not recognise farmer’s wife as an occupation. In fact on the census form (prior to 2006), the instrument used to collect the data for the ABS – there is an actual instruction that directs people who do any sort of home/house work to not fill in the questions on occupation. Home work is not counted. It is invisible. Not only is women’s work on the farm not recognised by the data collectors, women themselves often failed to recognise their role as farmer. They may say ‘I help out’ on the farm, or ‘I don’t work’ or ‘I am only a farmer’s wife’.

There have been occasional farm women who have made their mark in agriculture as ‘real farmers’. They are few in number and while they rarely like to be singled out for acknowledgement, their work and contribution is noticed and appreciated.

With women’s farm work being invisible and largely unacknowledged, this has meant that in the past the main target for extension has been ‘the male farmer’ and the work he does, which is largely production work. It is my contention that traditionally the work of women on farms has not been seen ‘as work’ and consequently fallen outside the scope of mainstream extension resources and activities.

Women’s Work

Women’s journey into the work of farming is typically different to that of men. Women usually come to farming through marriage. Firstly, it is a love relationship. It may then transform into a business relationship. The woman would have had another life in another community. She may have completed some formal training as a nurse, teacher, secretary, hairdresser, doctor, lawyer or journalist.

Many men come to farming as a result of their birth position. It is usually the son who inherits or partly inherits the family land. His career typically is more practical and hands on; he has learnt the art from his father, uncle or grandfather. While he may have done some training, it will most likely include informal training supplemented by credited courses.
In any agricultural situation, women do a variety of work including production work, re-production work and community work. Jane Gooday (1995) reporting on a survey of women on Australian broadacre and dairy farms commented that women have a diversity of roles and responsibilities within the farm business. Garnaut et al. (1999) demonstrated that the time women spent on farm management issues of 4.75 hours per week is very close to that of men at 5.5 hours per week. While men tended to do more paddock and stock work 45 hours per week than women’s 14 hours per week, women tended to spend more time doing the recordkeeping and organising the purchase of goods and services (quoted in Fulton et al. (2005)).

Women are a critical part of the farm management team in Australian agriculture. With 98% of Australia’s farm businesses run by farm families (Gaurnaut and Lim-Applegate, 1998), women are a significant part of the agricultural workforce. Often, however, the contribution of women is invisible. As illustrated by Pini, while this is the case in the sugar industry, it is also across most agricultural industries.

Since the late 1980s, research has been conducted to quantify the contribution of women to agriculture, with the Missed Opportunities – Women in Australian Agriculture report (1998) reporting the following:

> In 1995-96, the National Accounts report that the market value of farm input was $14.5 billion. When you include the value of household work, volunteer and community work and off-farm wage income earned by people on farms, the real farm income was just over $28 billion. Women contribute 48% of this real farm income.

Based on a survey of farmwomen in the broadacre and dairy industries in 1993-94, Gaurnet et al. (1999) found that women make up 47% of the people in Australia’s commercial farm businesses and 44% of Australia’s livestock industries.

| Table 1: Number of women involved in commercial farming operations 1994-95 |
|------------------|------------------|------------------|
|                  | Females          | Males            | Totals          |
| All Farming      | 71 433           | 81 141           | 152 574         |
| % of all farming | 47%              | 53%              | 100%            |
| Mixed livestock crops | 25 002         | 46 250           | 71 252          |

Source: Garnaut et al. (1999)

Outside commercial family farm businesses, women also contribute to the industry as small farmers, new farmers, specialist operations, farm labourers, harvest operators, contractors, farm consultants, accountants, bankers, educators, trainers, researchers, media and government representatives. On-farm women also contribute to farm management, administration and farm labour as well as the more traditional roles of wife, mother, community worker and educator.

At any one time, a farm management team member may have a number of roles, ranging from farm labourer to administrator, to farm business manager or off-farm office worker. Based on research in the UK, Gasson and Errington (1993) developed a typology of roles of farm women. This has been adapted to include on-farm and off-farm roles, for both men and women.

In this model, any member of the farm family may be acting in one or more roles. These roles will vary according to the family circumstances, the stage of farm succession and the structure of the farm business. In some cases, they may be the major decision-maker for particular aspects of the farm business, in others they may contribute to decisions, and in others they may not contribute at all.
In her Australian Bureau of Agriculture Research and Economics (ABARE) publication, Women on Farms, Gooday (1995) found that women were involved in the family farm business in a range of ways. Some women worked alone and were solely responsible for the decision making and operation of the farm, while others shared the decision making about the financial structure of the business, sales and purchases of livestock and crops, farm labour and family and household duties. Some assisted during peak times but were not involved in the day-to-day farm operation, while other women worked in the home tending to household duties or had full time, off-farm employment (Gooday, 1995, p2).

Garnaut et al., 1999 (Table 2) demonstrated that the number of hours women from broadacre and dairy industries spent on farm management issues is very close to that of men. Women contribute fewer hours than men to operational tasks, and more to office administration.

Table 2: Hours per week spent in various roles by members of the farm family business

<table>
<thead>
<tr>
<th>Role</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-farm employment</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>A: Record keeping, organising the purchase of goods and services</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>B: Acquiring information and knowledge</td>
<td>0.75</td>
<td>2.5</td>
</tr>
<tr>
<td>Total farm management (sum of A and B)</td>
<td>4.75</td>
<td>5.5</td>
</tr>
<tr>
<td>C: Paddock and stock work and maintenance</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>Household work, childcare, community and voluntary work</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>Off-farm employment</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Garnaut et al, (1999)

An analysis of National Farm Bis II figures for 2000-2004 shows that on average, 26% of participants in subsidised agricultural training courses were women. The sugar industry is 31.9%, sheep is 21% and beef is 33%. Rural Industries Research and Development Corporation’s (RIRDC’s) most recent analysis of rural business women (which included farmers) demonstrated a preference for training in the topics of business planning, financial management, computer technology, and marketing, followed closely by technical aspects of production (Houghton and Strong, 2004).

In many cases, an inability to address issues relating to communication, financial management and succession planning can prevent family farm businesses from being able to make the advances available through production research and development.

**Barriers to Participation**

As well as this sense of not being seen to be real or proper farmers, there have been significant institutional barriers which have worked to exclude women from mainstream agricultural activities. Agricultural education has been a key example where this exclusion was institutionalised. Prior to the 1960s, women were denied admission to attend agricultural colleges. (Reference per comm Frances Parker UWS and Liz Chapman Dookie).

There are a number of reasons cited including the potential impact of co-educational accommodation, the hard work, and difficulties with toilets. It was only relatively recently that the agricultural colleges, the main gateway into agriculture learning and jobs, allowed women to be students.
Without access to agricultural colleges, it has been extremely difficult for women to gain the formal education and hands-on knowledge and experience essential for farming. The exception to this was the universities. While it was rare for women prior to the 1980s to undertake the degree and postgraduate courses in agricultural science, there have been exceptions. The majority of these women focused their work in research and in academia, few to my knowledge worked in mainstream agricultural extension and few became farmers. In some states including NSW, there has been a strong tradition of women’s extension, where women with an interest in cooking and food worked with farmer’s wives on ‘home economics’.

A second major institutional barrier to women’s full participation in agricultural activities lies in the structure of farmer and agricultural organisations. The specific barrier is in the voting rules. Where voting is linked to the amount of production (as in the number of shares held and consequently votes cast), women are rarely represented. Substantial advocacy work carried out by women’s organisations in the 1990s has brought about changes in many of the State Farmer Organisations. However, in the majority of the commodity groups, the rules around membership and voting continue to act as barrier to participation by everyone, except the designated ‘farmer’.

For example the organisation CANEGROWERS in 2007 is typical of how the voting and membership rules work to disenfranchise a large segment of potential members. CANEGROWERS membership and voting has historically been limited to the name of the first person listed as the supplier. While the farm business or enterprise may be a member of CANEGROWERS, there is only one member of the farming team who votes. Traditionally this is the senior male.

Without a vote, women, and for that matter young people, are not ‘seen to be’ legitimate members of CANEGROWERS. This gives rise to the perception that women’s needs and issues are not acknowledged as being important. (This general issue of the sugar industry culture and its paternalistic nature has been outlined by Ian Plowman in the SRDC Technical Report 1/2007, P229.)

Where organisations have changed the voting rules there has been significant uptake of the opportunity to vote and an increase in participation. In organisations such as Queensland based Agforce, United Dairyfarmers of Victoria, and Victorian Farmers Federation, there are many examples of women taking leadership roles - women who are active in committees and make significant contribution to a range of extension projects. With the change in voting rules, gender representation is no longer an issue.

For women to be included in extension activities and for them to be given opportunities to learn and contribute to their industry, barriers need to be overcome and strengths developed.

Clearly, women are not a homogeneous group. Women in farm family business reflect the diversity which exists within the general population. While at some level it is possible to form broad generalisations, particularly where there are children or older dependant family members to be cared for, there will be variations in age, in family life cycles, in interest and level of confidence. This diversity needs to be acknowledged and recognised.

The Missed Opportunities report of RIRDC (1998) identified a number of barriers to women’s participation:

- The organisational culture in agricultural industries is seen to be male-oriented and unwelcoming;
- Family unfriendly workplaces – lack of flexibility;
- Women’s self-perceptions that their skills and abilities are inadequate for the task;
- Absence of role models and mentoring;
- Lack of recognised experience due to failure of organisations to apply ‘merit’ principles, while valuing a narrow set of traits;
- Lack of access to training; and
- Legal recognition of women’s role on farms.

On top of all the economic and structural barriers to participation is a social and organisational culture which places males, the farmer and his work, at the centre of farming, in many cases without recognising it is doing so.

**Strategies to increase involvement in extension activities**

Research and understand the operating environment.

In many instances, the farm is only one of a number of financial operations of the business. Income earned off-farm through investments or paid work all contribute to the family business income. Not only do the people earning the off-farm income deserve the opportunity to be involved with and consulted about farm and business decisions, they will have a contribution to make.

It is not always easy to determine within the farm family team who is responsible for which jobs. Sometimes farm women and men feel it necessary to ‘hide’ the real work they do.

Barbara Pini in her paper ‘Farm Women; Driving Tractors and Negotiating Gender’ (2005) discusses the gendered nature of work roles on Queensland sugar farms within the farming enterprise. She nominates machines as being the main criterion for differentiating work that is designated male and female. Men’s work is with machines. The cane-farming women who did engage in tractor work engaged a range of ‘gender management’ strategies by which they sought to both undertake a masculine role and retain their femininity.

Pini identified five different strategies:

1. Women hide their on farm contributions;
   - They emphasise the importance of their domestic and household roles;
   - They distance themselves from men and ‘knowing and keeping their place and not trying to be one of the boys’;
   - By making sure they ‘always acted like a lady’; and
   - Referring to farming as a business and their role was ‘just another job’.

Women’s contribution to the farm is in part determined by the stage of the family in the family cycle. Using data from ABARE surveys of people in farming which examined the proportion of women in a range of farm roles, based on their stage in the family cycle, at least 27% of women are at any one time engaged in childcare of some form.

This division of labour is given even greater complexity depending on the stage of the family life cycle. In her work for the Meat and Livestock Association (MLA), Amabel Fulton (2005) uses five case studies to capture the diversity and mix of farm family life stage, children and farm business responsibilities. In each
of the case studies, there is a portrait of the learning needs, aspirations and farm relationships are described.

I. The Assistant Farm Manager: The 50 to 60 year old farming woman who has a grown family, some of whom are part of the business. She is the full time business and farm manager, occasional farm labourer (‘give me a hand dear’) and responsible for farm administration and all family matters.

Off farm income: Typically this woman is a silent partner in the farm business. Aged 40-50. She has no ownership of the farm or the business. Her major on-farm contribution is mothering and caring for older relatives and contributing to the family business income through off-farm work.

Business Manager: The 40 plus year old woman is the business manager and farm partner, housewife and homemaker with school aged children. Her major contribution to the farm is her on-farm (but not farm related) business and the income she makes which complements the farm income.

Mentor: This 60 year old woman is a farm housewife and assistant farm manager. Her main role is supporting the extended farm families who work within the farm business. She is the grandmother, mentor to her daughter/son in laws and has occasional child care responsibilities.

Farm Labourer: This woman aged in her early 30s is a mother and wife. She is responsible for the home and the children. Her major on-farm contribution is to ‘help’ on the farm with actual work and in addition her off-farm income complements the family business income.

Each life stage ‘case study’ offers different challenges and hurdles to be overcome and opportunities to be addressed when considering how best to involve women in extension programs.

Timing is important.

During the 2003 drought and bush fire season, department staff from Primary Industries ran a seminar on ‘feeding stock in difficult times’. The content was relevant and excellent. The venue was ideal, a local farmer’s shed for shelter that enabled close proximity to the fodder and farm walk. The time of the session was from 7-11am, an early morning start including a BBQ breakfast. The organisers were very disappointed with the small number of women who turned up.

Where were the women? A review showed the problem was the seminar was held at breakfast time. A peak period in many farm families. Mothers were doing family work. They were getting children ready and ferrying them to the school bus. In making the family decision as to who should go to the seminar, the key information was that this workshop was about production. It was a busy time of day and only one member of the team could afford the time to attend. At this time of day, the least busy person was the male partner who also happened to have the management responsibility for production.

Gender specific groups

Sometimes it makes sense to have a day or event targeted to a specific group. The Wooragee BestWool / BestLamb group is one such instance. This wool and sheep learning group grew out of a friendship group of local small scale farmers in North East Victoria. They meet monthly as part of the Meat and Livestock Australia (MLA) and Australian Wool Innovation (AWI) program. A group with a focus on reaching farming women works for these members. The group is open to all and specifically aims to encourage women to attend. When topics of interest to others in the family team are up for discussion, they are encouraged to attend.

In the dairy, horticulture, sugar, cotton and grains industries, specific women’s groups have been formed as a way of engaging with women in that industry. Initially funded as part of Research and Development
programs, the groups are now largely self-sustaining with active email discussion forums. While targeted groups can be an effective extension technique, they work to best effect when they complement other extension activities and strategies. Women’s groups work well for some women. Men’s groups work well for some men. For others, mixed groups based on content related to specific skills is their preferred way of learning.

**Working with the whole farm family team**

Some of the most effective extension programs in terms of change management and uptake of new technology take place where all the members of the whole farm family team are involved. Meetings and workshops within these programs have been characterised by comfortable venues, creativity, involvement, long term engagement and commitment to doing new things differently.

**Involve women in the planning**

‘Nothing about us without us’. A key strategy for effective extension is to ensure that processes are in place to involve, listen and implement the advice of women. This is particularly important in the design stages of an extension program. Women will have the knowledge about available and appropriate venues, timing, speakers, and they will understand about managing transport and child care issues. They will know how to attract other women and through their local and regional networks they will be effective communicators.

Women and young people, in fact all members of the farm family team, need to be included at each level of decision-making: in agricultural and rural policy making processes, in research and development programs, in the evaluation and reporting mechanisms.

**Images and Publicity**

A picture speaks a thousand words. Traditionally, the public face of farming and agriculture has been the ‘man on the land’. It is not unusual to pick up an agricultural publication, newspaper or report and find nearly all the images are of men. A key strategy to increase involvement of more women and young people in programs is to have pictures of women, families and young people in the marketing material, in annual reports and in rural and agricultural media.

**Language**

Clarity about language is potentially one of the most useful strategies for working with women. When targeting women farmers, it makes sense to use the words women in the title. For example ‘Women and men are encouraged to attend’. However, if the event is designed to cross a variety of ‘jobs’ and the ‘right people’ are being encouraged to attend, then clear language describing the roles and expected content needs to be used. ‘This workshop will be particularly relevant for those in the business who are responsible for computer work. Women and men are encouraged to attend.’

**Collect Data by Gender and Age – Disaggregate**

Collecting and analysing data by gender and age allows for generalisations and targeting to be carried out more effectively. This is illustrated by the Rice family example (see below). Another example where this disaggregating can be important is the often quoted figure describing the education levels of ‘Australian Farmers’. This is an example where the data is blind to the composition of the farm family business. When the term ‘the average age of Australian farmers’ is used, it describes the education level of ‘the farmer’
who filled in the census form. The statistic does not describe the diversity of education qualifications and
experiences of the team of people farming, nor does the statistic reflect the education experience,
qualifications and background of the ‘non farming’ women and the children who also contribute to the
farm family business.

If the combined education experience of all the members of the Australian farm family business were
documented, it is my belief it would be very high, certainly in comparison to other industries.
Unfortunately we do not have this data and consequently farmers generally appear in the data to be
uneducated, at least in formal terms.

An Extension Story: Rice

Improving irrigation efficiency was the topic for a farm extension day. The one-day seminar was designed
to ‘bring innovations in farming practice to local farmers’. The topic was important and Jennie and John
Rice are a farming partnership. They work well together and enjoy their family farming lifestyle. Jennie
earns occasional off-farm income and is responsible for all the administration, computer work and financial
records on their farm. Their eldest son Jack is spending his gap year at home working on the farm.

Relevant. John Rice was keen to attend the day. At home after the field day, John was excited by what he
had learnt. It was ‘a very good day, lots of farmers’ and he shared with Jennie and Jack what he learnt
about the new mechanisms for testing soil moisture and for managing plant growth.

The next day Jennie met a woman farming friend in the supermarket. ‘Hi Jennie, you missed a great session
on irrigation yesterday.’ ‘Yes’, said Jennie, ‘John said it was good. He told us all about it at dinner last
night.’ ‘That’s great. Then you will be getting the new computer program that links the watering systems
to the accounting package’, said Jane. ‘Oh, he didn’t mention computers’ said Jennie, seething. She hated
it that John paid no attention to the computers and finances, leaving it totally to her. Here was just
another example where he failed to listen.

Jack was a keen football player and at practice on the Wednesday night, his mates were also discussing the
irrigation field day. ‘It’s great how they can send all the information by text’, they enthused. ‘What’s
that?’, Jack asked ‘well they can use the mobile to text prices for water, as well as times for releasing your
allocation’. Jack gave a deep sigh. Another example of his ‘olds’ being so totally out of date. Why hadn’t
his Dad told him about this? It would make a big difference to their time use. But he knew why. His Dad
didn’t know the first thing about texting and with those thick fingers, wasn’t going to start learning now.
He wouldn’t even have heard that bit of the session.

Tea that night was an interesting exchange. Where did the problem lie?

Was it with John for not picking up the information that he knew would have been of interest and
relevance to the jobs of his family? With Jennie and Jack for failing to appreciate that the day was about all
the skills needed on the farm and that they too should have gone to the seminar? What about the people
who designed the seminar publicity? If they had given more thought to the intended audience and
included details about the content, expectations and outcomes of the day, would it have helped the family
decide who should best attend?

Jennie and Jack agreed that if they had known what the day was about, they all would have made the time
to attend and they would have enjoyed the quality family time in the car travelling to and from the
seminar. Their failure to attend the seminar was a frustrating waste of an opportunity for everyone.
Kerby's check list for valuing women

Kerby et al. (1996) translated barriers to women’s participation in agricultural industry programs into a checklist for designing, implementing and evaluating programs. It is an excellent planning and evaluation tool. Where this checklist has been used (for example in programs in the dairy, horticultural and sugar industries), participation of women has increased.

Kerby’s check list for Valuing Women as Customers/members

Changing the mindset

Are you:

- Listening to the ideas, opinions and perceptions of both men and women?
- Recognising the varied skills, knowledge and experiences of our customers?
- Acknowledging the varied and sometimes different learning needs of men and women?
- Accommodating the learning needs of women and men?

Networking

Have you used networks by:

- Referring to your own list of women customers?
- Asking these women to invite other women?
- Sending the information to relevant organisations and groups?
- Accommodating the learning needs of women and men?

Inclusive language

Are you using language in which:

- People are treated equally?
- No irrelevance is introduced?
- No one is excluded?
- The style is consistent?

Consultation and planning

In your planning:

- Are women involved in the process?
- Do women have some ownership of the activity?
- Does the activity address the priorities of all customers including women?
- In designing the program:
- Have you discussed with women an appropriate format, venue and content for them?
- Do they prefer separate activities (to men) or combined?
- Do the speakers/contributors you have engaged reflect the input of the planning group? Is it possible to include women as speakers or contributors?
- Have you briefed your speakers about inviting participation from the women present?

**Planning an activity**

Is the venue:

- Appropriate for women?
- Known to women?
- Comfortable and inviting?
- Accessible?
- Used by the community for other activities?
- Offering appropriate facilities for women and men?
- Are the timing, costs and childcare appropriate for women?

**Childcare arrangements**

In organising childcare:

- Have you included the costs in your administration costs?
- Does the venue have childcare facilities?
- Have you encouraged the attendance of children if childcare is not available and provided activities for them in the program?
- Have you offered to reimburse the parents for the cost of childcare

**Promotion**

In your promotion:

- Have you targeted women?
- Have you direct mailed both partners?
- Have you personally invited women by telephone, word of mouth or letter?
- Have you informed community and school newsletters?
- Have you used daytime television and radio?

**Evaluation**

In evaluating the activity:

- How will you measure the outcomes of the activity against the objectives?
- Have you allowed for feedback from participants?

(Source: Kerby et al. (1996))

**Conclusion**

The chapter is written from the perspective of a woman who is a farmer and a daughter of farmers, a professional trained in education, a business owner who has over 30 years experience working in extension, predominantly with women and their families.
I see and experience the frustration when decisions are made which benefit one section of the business at the expense of the other; when the ‘economy of the proper’, property, appropriation and propriety, is preferred over the ‘economy of the gift’; the frustration which is felt when women have clearly identified that they want the option of working in women’s groups and the decision-makers say ‘we don’t do gender’; the frustration when agricultural budgets give priority to production and the business, communication, relationship and marketing elements of the farm family business are cited as less important; the frustration when agricultural commodity boards, all male, decide that a strategic approach to increasing the participation of women within their industry is not relevant, necessary or needed and consequently will not be funded; the deep frustration which comes when extension programs fail to achieve their desired results; when the time, effort, enthusiasm and energy of skilled, knowledgeable people appears to be wasted and the story of the rice family becomes the norm rather than the exception.

The production of this book is an important step in addressing this frustration. I hope some of the strategies and thoughts in this chapter will be useful and I will look forward to the second edition where the issues can be further developed.

Acknowledgement: Many of the ideas in this chapter have been developed in partnership with colleagues working in the field. In particular, I would like to acknowledge the contribution of Amabel Fulton for her analysis of women’s participation in the Australian meat, sheep and horticultural industries.

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The Role of Extension in Natural Resource Management

Joanne Millar

This chapter expands on the role of extension in achieving sustainable management of Australia’s natural resources. The first section describes how extension has evolved since the 1930s to address natural resource management (NRM) issues in Australia.

Extension in natural resource management has moved from a single focus on soil and water conservation to tackle a wider range of environmental problems associated with agriculture, urban development, forestry and fisheries.

This move has been driven by changing government and community priorities concerned with the erosion of public good assets (e.g. vegetation, wildlife, biodiversity, water quality, wetlands, old growth forests, etc). Extension for NRM also changed from individual property planning and on-ground works, to addressing problems at a catchment scale with coordinated action.

Changes in extension priorities and approaches could be seen to have been reactive instead of proactive towards the unfolding crisis of land degradation. This may have been the case early on with the transition from production based extension to NRM extension. However, the second section in this chapter illustrates how NRM extension approaches and methods have become more integrated, participatory and knowledge intensive over time, in a bid to get ahead of land degradation problems.

Fuelled by government funding and community support, regional NRM organisations have formed partnerships with private industry, local government and community groups to take on a greater role in extension. Hidden behind different programs, titles, funding arrangements, and job descriptions, NRM extension is varied but also has commonalities. These differences and similarities are highlighted using examples from across Australia.

Changing role of extension in NRM

Before the term, ‘natural resource management’ was even coined, there were people acting as extension agents in the fields of soil conservation and land management. Largely employed by state government departments, these extension officers were known as Soil Conservation Officers. Their role was to assist farmers, councils and utility authorities to control erosion, protect watercourses and manage growing infrastructure.

Statutory soil boards and catchment groups were formed as early as the late 1930s in New South Wales (NSW), the 1940s in South Australia (SA) and Western Australia (WA), the 1950s in Victoria and 1960s on the Darling Downs in Queensland (Bradsen, 1992 cited in Campbell, 1994). Soil Conservation extension
officers worked with the boards to implement works programs. These officers were typically engaged in a range of extension activities such as trials, demonstrations, field days, individual farm advice, incentive schemes, farm planning services, short courses, machinery hire, and mass media (Chamala and Mortiss, 1990; Campbell, 1994).

From soil conservation to a catchment management approach

Worsening of soil erosions in many areas and the emergence of dryland salinity in WA, NSW and Victoria prompted soil conservation agencies in several states to change their ‘modus operandi’ (Roberts, 1993; Campbell, 1994). There was a realisation that site rehabilitation and developing individual farm plans was not enough. Collective action across districts and catchments was needed (Commonwealth of Australia, 2000). The importance of educating and involving farmers in catchment management was championed by a number of people including Mr Ernest (‘Watershed’) Jackson from Albury throughout the 60s and 70s (Youl, Marriot and Yabben, 2006).

In WA, Land Conservation District Committees (LCDCs) were set up in the early 1980s to encourage greater involvement of rural communities in addressing land degradation problems. Local extension officers were represented on these committees, along with a range of complementary government departments. The role of the LCDCs changed from advising government to actively developing, promoting and implementing programs in their districts (Campbell, 1994).

A slightly different model emerged in Victoria with the formation of Farm Tree Groups by the Garden State Committee and the Victorian Farmers and Graziers Association (VFGA). Many soil conservation extension officers were given the role of supporting the Farm Tree Groups to obtain funds, plant trees and disseminate information on the important role of trees on farms. Often they would take on committee positions such as Secretary or Publicity Officer if the groups lacked the necessary skills. However, their primary role was to advise on soil conservation matters in relation to tree and pasture establishment.

At the same time, whole farm planning as an individual service was being taken up by private consultants and delivered through programs such as the Potter Farmland Plan and Farm Management 500 (Campbell, 1994). This lessened the role for government extension officers who concentrated their efforts on catchment planning workshops for interested groups.

The emergence of Landcare and its impacts on extension

The 1980s heralded the establishment of Landcare, a community based land protection program based on the principles of community driven, self help groups supported by change agents to tackle a wide range of land degradation issues (Chamala and Mortiss, 1990; Campbell, 1994; Curtis, 2003). The Victorian government gained the support of the VFGA and together they launched the program in 1986. Initially, government extension officers from agriculture or conservation agencies were assigned to each Landcare group to give technical advice and support administration. This role changed in 1988 with a partnership alliance between the National Farmers Federation (NFF) and the Australian Conservation Foundation (ACF) to boost Federal government funding for Landcare groups through the National Soil Conservation Program. The Decade of Landcare was launched with a $340 million funding program to accelerate the program throughout Australia (Campbell, 1994).

Landcare groups were able to apply for federal government funding to employ their own project officers and group coordinators. In some cases, this led to the ‘poaching’ of government extension staff to
Landcare projects. More common was the appointment of local farmers as extension agents who would work alongside agency staff in applying for grants, developing plans and completing on-ground works with the local community. Landcare groups tackled everything from rabbits, weeds, salinity and erosion to tree decline, pastures and water quality (Roberts, 1993; Campbell, 1994; Carr, 2002).

The success of Landcare however, came at a cost to traditional state extension services. The combination of declining state government funding in the 1990s, and growing federal government support led to an exodus of experienced extension staff from agencies, many of whom were not replaced. Landcare extension became a substitute for government extension as state departments shifted the costs for public good extension back onto the community (Curtis, 2003). In addition, Landcare funded extension staff could only be appointed on three year funding cycles which created a high turnover of staff as they sought new contracts or more permanent positions.

At the House of Representatives enquiry into catchment management in 2000, the Standing Committee on Environment and Heritage reported that:

> Traditionally, one of the most effective conduits of information and expertise to landholders has been the agricultural extension or field officer. The Committee notes from its own observations and evidence provided, that the states and territories have diminished or in some cases, entirely discontinued this service. The Committee is also aware that the loss of extension or field officers has been part of a process that has involved a lack of secure funding to build and transmit a knowledge base. Such policies are short sighted. The result has been a lack of continuity of information and expertise, and a loss of corporate knowledge, subsequently contributing to the development of ill advised short term goals rather than necessary long term programs. (Commonwealth of Australia, 2000, p64)

The decline in government extension staff created opportunities for community leaders, non-government organisations and entrepreneurs to take on extension and facilitation roles (Chamala and Mortiss, 1990). Private consultants also took on a greater role in providing extension services for Landcare groups in pasture and rangeland management, weed control, group facilitation and training (Roberts, 1993).

The following case study compares some of the extension approaches and learning outcomes of two pasture renovation landholder groups, one led by government agency staff and the other by a local Landcare community leader.

**A Tale of Two Extension Approaches to Perennial Pasture Renovation**

In 1996, the author undertook a study of two different landholder groups involved in learning about pasture renovation. The aim was to observe extension approaches being used and the extent local farmer knowledge was used and valued within the groups. One group was undertaking a 12 month structured course run by a government agency. Landholders met every month and the course covered a range of pasture, livestock and grazing topics. The other group was a local Landcare group who ran meetings, field days and a pasture course facilitated by a local farmer with extensive experience in pasture renovation.

The agency-led course meetings began with information sessions at the house or woolshed which covered the scientific principles pasture and animal production and guidelines pasture management. Pasture and animal assessment exercises usually followed in the field. A computer decision support system was also used. Whilst farmers learnt how to budget feed and maintain good pastures, the technical information was
not always absorbed or understood. Local knowledge emerged slowly during field activities as farmers gained confidence.

In contrast, the Landcare group based their activities on member needs identified at meetings. A weeds field day organised with local resources provided the catalyst for learning about pasture renovation. Twenty people enrolled a pasture course, which was held over three evenings and a half day farm walk. The information presented was largely technical in nature, drawing upon scientific explanations and recommendations. By interspersing anecdotes and practical advice, the local farmer complemented the theory and helped to provide a whole farm perspective. During field visits, the value of local knowledge was acknowledged in relation to adopting holistic, integrated and organic practices. (Millar and Curtis, 1997)

A call for greater support for Landcare groups to carry out a wide range of on-ground works, appoint their own facilitators and extension agents, and form better partnerships with state government agencies was heard. The Natural Heritage Trust (NHT) was established in 1997 to fund on-ground works across a wider range of programs such as Bushcare, Rivercare, Coastcare and Landcare.

Landcare group coordinators were employed over a five year period on a cost sharing basis (Curtis, Shindler and Byron, 2003). The NHT funds went towards state and federal agency Landcare support programs as well as employing local extension agents. Decisions regarding who and what to fund were made by State Landcare Councils with agency and community representatives (Moore, 2005).

**Ramping up extension for biodiversity conservation**

Concern for the rapid decline in plant and animal species across Australia prompted increased emphasis on research and extension for biodiversity conservation (Millar, 2001). Non-government organisations (NGOs) such as Greening Australia, World Wildlife Fund, Indigenous Land Corporation and Trust for Nature utilised the NHT to ramp up their conservation programs and employ extension staff (Figgis, 2003).

Young graduates and older extension professionals were snapped up by NGOs and state agencies. These new ‘green’ extension officers were trained to be facilitators, motivators, advisors, event organisers and fund raisers. Their role was to set and meet targets for revegetation, protection of remnant vegetation, conservation covenants, property vegetation plans, education programs, volunteer programs and campaigning (Millar, 2001). Unemployment amongst the extension profession at the turn of the millennium was at an all time low!!

The following case study describes the Community Nature Conservation extension program established in 1998 in Queensland.

**The Greening of Extension in Queensland**

The Queensland Parks and Wildlife Service (QPWS) established the Community Nature Conservation (CNC) Extension Network in 1998 to assist landholders, community groups and local governments with nature conservation planning and management on private and leasehold land. The network included 17 state funded regional extension officers, six Bushcare facilitators and seven Land for Wildlife coordinators funded by NHT and seven NatureSearch coordinators.

Extension strategies included farm visits to landholders interested in conservation, field days on habitat restoration and management, on-farm wildlife surveys, wildlife displays at shows and short courses.
Information about biodiversity conservation was also incorporated into agricultural extension programs and regional planning forums. For those landholders highly committed to conservation, the extension program facilitated covenants (Nature Refuges) and grants for on-ground works. Land for Wildlife registration offered landholders extension advice, a regular newsletter and a sign to acknowledge their contribution to nature conservation. Extension officers encouraged community involvement in fauna/flora monitoring and habitat restoration.

**The role of extension in regional NRM**

The success of the Landcare program and subsequent NHT initiatives demonstrated to the Federal government and the public that extension played a key role in bridging the divide between community and agencies. Regional delivery of NRM programs and services was deemed to be the most effective way to coordinate and engage local landholders and communities (Moore, 2005).

Catchment management authorities (CMAs) were established first in Victoria, followed by NSW and Tasmania, with WA, Queensland and SA creating their own versions of regional NRM boards or associations (Davidson et al., 2007). With Natural Heritage Trust 2 and other Federal funds directed to these regional bodies, it was inevitable that NRM extension would take hold within these organisations.

Catchment management authorities employ a wide range of extension staff dealing issues of land and water management planning, vegetation clearing, salinity and soil health, biodiversity conservation, weed and pest control, threatened species recovery, coastal rehabilitation, indigenous engagement, cultural heritage, school education, fisheries management and marine conservation.

Irrigation companies, Co-operative Research Centres (e.g. CRC Weeds, CRC Irrigation) and local councils also began employing extension staff to service their clients using Commonwealth funding with in-kind or cost matching contributions.

These extension officers provide free advice and assistance on a range of NRM issues such as non-chemical weed control, increasing irrigation water efficiency and developing land and water management plans.

One of the challenges for extension being delivered by regional organisations has been the short term nature of appointments (usually three years or less depending on the project). The low salaries and short contracts attract young graduates often with little experience in the area. It takes two years to develop technical expertise and confidence by which time they have to look for alternative employment. The lack of staff continuity is frustrating for landholders who need long term reliable advice on complex NRM issues. So whilst regional NRM extension provides a valuable training ground, it does not necessarily lead to optimal NRM outcomes (Webb and Cary, 2005).

**NRM extension approaches and methods**

NRM extension approaches and methods in the 60s and 70s tended to follow those used by production based extension at the time (e.g. responding to enquiries, farm visits, demonstrations, field days, and on-ground works). The NRM issues that extension services were directed to address tended to be reactive instead of proactive towards the unfolding crisis of land degradation (e.g. stopping erosion, rehabilitating saline sites). However, as the causes and effects of land degradation became better understood, so did the realisation that landholders could not do it alone. NRM extension needed to work at getting whole communities and catchments involved in dealing with the problems.
The following section describes how NRM extension approaches and methods have become more integrated, participatory and knowledge intensive over time, in a bid to get ahead of land degradation problems.

**From individual to group extension**

A major change in extension approach often associated with NRM and Landcare in particular has been the shift from one to one extension to working more with groups (Chamala and Mortiss, 1990). However, successful group methods were employed by agricultural departments and consultants as early as the 1960s. The dairy industry in Australia was the first sector to work with producer groups in collaboration with government extension officers. Known as ‘Dairy Discussion Groups’, these farmer groups were highly successful in taking up new technologies to increase productivity on their farms. The beef industry was quick to follow, recognising the power of peer learning in stimulating farmers to adapt new practices and concepts to their own properties.

The principles of group formation, facilitation, empowerment and action were quickly adopted by the Landcare movement. Landcare coordinators and extension officers were trained in facilitation, organisational management and leadership (Woodhill and Robins, 1998). Government, universities and private service providers assisted with building group capacity in facilitation, management and leadership skills (Chamala and Mortiss, 1990).

**Developing participatory approaches**

Natural resource management extension required a different model that relied less on the traditional theories of ‘transfer of technology’ (Rogers, 2003), and more on emerging participatory approaches to extension (Chambers et al., 1989; Scoones and Thompson, 1994; Pretty, 1995). Participatory extension involves bringing interested stakeholders together to identify common issues of concern in order to then facilitate joint decisions around collaborative actions. This complex and at times conflict ridden process is quite different from a discussion group sharing information so that members can go home and make informed decisions themselves. It requires skilled extension professionals who can manage the process and ensure positive outcomes are reached.

Landcare groups developed their own ‘style of participatory extension’ based on the needs of members, their stage in group development and skills of their facilitators (Millar and Curtis, 1997; Carr, 2002. To a large extent, Landcare ‘blossomed under its own steam’ as described by Campbell (1994, p. 196), creating its own participatory paradigm based on experience and on-ground achievements (Youl et al., 2006). As Landcare groups became more experienced, they formed Landcare networks within a region to attract more substantial funding and carry out more extensive works, share learning and build knowledge, and improve communication with government (Sobels et al., 2001).

**Social learning of knowledge intensive and integrated NRM practices**

Throughout the world, the use of participatory approaches to stimulate community involvement in environmental problems created the need for social learning. Social learning programs allow people to come to grips with complex, knowledge intensive NRM practices. Practices such as Integrated Pest Management, Sustainable Pasture Management and Agro-Forestry required understanding of soil-plant-animal-water-people-economic interactions as well as the application of scientific and local knowledge (Millar and Curtis, 1999; Pretty, 2005).
Extension plays a major role in these social learning programs and extension officers have had to learn more sophisticated ways of facilitating learning. Keen et al. (2005) describe five strands of social learning that appear to be essential for successful environmental management. These are; Reflection, Systems Orientation, Integration, Negotiation and Participation. If one of these elements is missing from an extension process then social learning is less than optimal.

For example, let’s say you have a farmer group that wants to learn how to control weeds for conservation purposes. You employ an open, consultative group process (Participation) where members negotiate what they want to learn and from whom (Negotiation). However, if the learning is not applied in a way that takes into account all the factors and consequences of controlling weeds (Integration), or the positive and negative impacts on the ecosystem and farm (Systems Orientation) and does not allow time for reflection on the results of trials (Reflection), then the decisions made by landholders may not be fully informed.

Extension in NRM also requires an understanding of what motivates people to participate, learn, trial and adopt new NRM practices (Mendham et al., 2007). A large body of literature exists on the topic of adoption of NRM practices but the principles are essentially the same (Cary et al., 2002; Pannell et al., 2006). If the practice fits with landholders’ goals, values, stage in life, family priorities, knowledge, skills and financial security AND there is adequate technical and social support AND the practice is easy to trial, cost effective and highly beneficial THEN people are more likely to adopt recommended NRM practices.

The explosion in community environmental programs since the 1990s has created a huge range of NRM extension approaches to social learning. Methods used are many and varied, depending on what projects, programs or groups are trying to achieve. Regular activities might include;

- Catchment or district or property NRM planning and mapping;
- Demonstrations and trials on NRM practices;
- Community monitoring of resources (e.g. WaterWatch and Salt Watch);
- Co-operative research with universities, CSIRO and state agencies;
- Short courses, seminars and study tours;
- Field days, farm walks and shows; and
- Employment projects.

**Conclusion**

This chapter has described the evolution of extension roles, approaches and methods in Natural Resource Management in Australia. Extension for NRM has become more sophisticated, integrated, holistic and responsive to environmental and community needs. The changes have been driven by a gradual discovery of the causes and effects of land degradation, a realisation that NRM solutions require collaboration within and across catchments, and growing confidence in the benefits of participatory extension.

Despite the diversity in NRM extension programs, the principles on which they are based are similar. These principles are to be participatory, inclusive and collaborative with actions on agreed outcomes, shared learning, sound scientific information, local and indigenous knowledge, and learning by doing.

The journey for NRM extension is far from over. The environmental challenges ahead of us will put more pressure on our natural resources. Extension will need to be a major component of policies and programs designed to deal with future NRM issues.
The role of extension in natural resource management will continue to evolve and respond to these challenges.

References


Using eExtension to better engage with clients and enable change

John James

Change is all around us. We see global warming seeming to affect almost every aspect of our daily living. We see fires, floods and famines occurring with increasing frequency around the world. In Australia, we have seen devastating droughts spreading across our increasingly sunburnt country.

We see changes in technology occurring at an almost alarming rate. No sooner have we grown accustomed to the latest version of a software program, than a pop-up message invites us to upgrade to yet another release.

We also see changes in how our primary industries are being produced and marketed. There seems to be an ever increasing range of produce being offered on the supermarket shelves. Yet, this is being produced by fewer and fewer companies which are becoming larger and larger.

Yet, it is interesting that while we are surrounded by change, we are not very good at changing ourselves and how we respond to change thrust upon us. This article explores how we, as extension agents, can better use electronic communications to better engage with our clients and enable them to better adopt change.

The changing nature of extension

Extension has undertaken different roles and used different approaches over time, as summarised by the attached diagram (SELN, 2006). In the early 20th century, it was more about extending the research findings from universities to the general populace. In the 1960s, the top down technology transfer approach was used, with diffusion of innovations and transfer of technology being common models. Over time, the shortcomings of these models led to the more inclusive approach of the farming systems research model, where farmers are involved at the beginning of the research and not just at the end. This then moved on in the 1980s to systems thinking where the whole system was considered and elements not treated in isolation. In the 1990s, a pluralistic approach tried to meet the needs of diverse stakeholders. The current approach is that of capacity building and community engagement, where state agencies are actively encouraging other providers to offer services.
The nationally agreed definition for extension states that ‘Extension is the process of enabling change in individuals, communities and industries involved in the primary industry sector and with natural resource management’ (SELN, 2006).

Overall, there has been a general trend of moving from a rather top down paternalistic approach to one that is more engaging, inclusive and consultative. This more participative approach has traditionally been very time consuming and travel intensive. This is why many change leaders have avoided engaging with large numbers of stakeholders in a change process, which has generally limited the potential adoption of new ways of behaviour.

The emerging role of eExtension

Web 2.0 technologies are the recent expansion of the traditional World Wide Web to enable online sharing, collaboration and networking. These ‘weapons of mass collaboration’ (Tapscott and Williams, 2006) allow organisations to better engage, connect and interact, with minimal cost and time commitment.

eExtension is the use of electronic technologies, especially information and communication technologies (ICT), to enhance face-to-face and paper-based interactions so as to enable change in individuals, communities and industries. It is not suggested that eExtension should ever replace the more traditional approaches of extension, but rather complement them. Generally face-to-face communication will always be the most effective means of effectively engaging with people, but the following are some ways that eExtension can aid the change process.

There is already a bewildering array of web 2.0 tools available, and this is growing at an almost exponential rate. There appears to be significant overlap with what various eTools offer to do, and this has created a confusing environment for users to make informed choices. In an attempt to simplify the situation, the most common eTools have been categorised using the traditional communication groupings of one-way vs two-way and written vs audio/visual.

One-way communication

One way written

Getting your message out to a broad audience as soon as possible is important to dispel myths and rumours. The use of the Internet is a very effective way of doing this, as once the material is written it requires very little extra time before it is accessible to millions of viewers. If print media were used, you would also have to allow time for graphic design, production of proofs and then the printing and distribution of the material, which may take several weeks.

An Australian agricultural example is the Virtual Agronomy project run by the Birchip Cropping Group (van Rees, 2007). This allows growers to access a range of electronic information regarding field trials that are underway, instead of having to wait for the trial to end.

While webpages are not as personal or engaging as other means of eCommunication, they are still far better than the absence of information which can raise unfounded fears and concerns. They are an example of pull technology which expect you to take the initiative to visit them to gain the information you desire.

The opposite is a push technology which actively sends information to the user. So if you know the email addresses of your target audience (such as members of an industry group) and you can encourage them to
give them to you (through a competition or the like), then you can use targeted email campaigns. These allow you to send a series of smaller, personalised communications on a regular basis using your email system or proprietary software (e.g. www.vision6.com.au). You can also segment your audience and send a specific message to one group of your overall audience, perhaps based on geographic location or work role.

SMS messaging with mobile phones can be used in a similar way, available from the same providers.

One-way audio/visual
The next step from written eCommunication is the use of podcasts or other sound files that allow the audience to hear the presenter’s voice and other sound effects. This adds a more personal touch, so the audience can hear the tonal intonations which add to the understanding of the material. It may also help the audience to better connect with the person making the announcement and so have greater empathy with them.

Podcasts are one common technology used for this which allows the listener to download the sound file and listen to it at their convenience. An Australian agricultural example would be the Grains Research and Development Corporation which has produced a number of podcasts on mainly technical topics, which may be heard at www.grdc.com.au. This project has yet to be evaluated, but it is assumed that farmers would download these talks to listen to as they drive their tractors.

Vodcasts (video podcasts) are like podcasts but include a video component so the viewer can see a moving picture of the person speaking or their subject matter. This allows the audience to even better engage with the presenter as they can read their body language. An example would be the Web on Wednesday presentations delivered by Cotton Seed Distributors, which may be viewed at www.csd.net.au.

Two way communication
Two-way written
The previous methods only allowed one-way communication, from the sender to the receiver. The addition of a feedback loop is important to allow the reader to clarify aspects of uncertainty and to raise issues relevant to them. This helps the communication to be better understood and of greater relevance to the audience.

A blog (short for ‘web log’) is like an online diary or journal where the author expresses their personal opinion on a topic. Readers are able to respond and add their own comments to what has been written. While the bulk of the material is written, you can also add audio, graphic and video files, depending on the capabilities of the hosting system (e.g. www.blogger.com).

The downside of using a blog in a change management setting is that it enables opposing views to be published alongside your original viewpoint. Of course, you can choose not to display the ones you do not like, but etiquette is that you only remove rude and offensive ones, otherwise no one will bother posting their comments. This can be helpful though as it gives you a chance to respond to the critics with perhaps extra information that helps them better understand the situation.

eSurveys allow you to gauge people’s responses to either a whole proposal or parts of it early in the change process. So instead of waiting to see how your target audience reacts to your proposal (using the old Decide, Announce, Defend approach), you can be proactive and use eSurveys early in the process. This
allows people to give you feedback on your concepts before you create your final proposal. This not only saves you wasted time if your proposal is off the mark, but again gives people a greater sense of ownership early in the process.

The eSurvey software (e.g. www.zoomerang.com) allows you to easily create surveys to gather quantitative and qualitative data that can help you make better decisions. Paper-based surveys also do this, but with the disadvantages of the time delay of printing the questionnaires, mailing them out, waiting for them to be returned, and then entering the data with its associated risk of data entry error. With eSurveys you can virtually create, distribute and analyse a survey within a matter of days.

If you are developing a document, you can invite others to help with the writing by using a wiki (from the Hawaiian word ‘wiki’ meaning quick). The best example is Wikipedia itself (www.wikipedia.org), which as of April 2008, had over 10 million articles in over 250 languages, attracting 683 million visitors annually. The following graph illustrates the popularity of wikis as a publishing medium (http://s23.org/wikistats/).

This online collaboration not only makes the writing task easier for you but gives greater ownership of the material by your fellow authors. Generally, those wanting to collaborate with you are invited by you to do so, or they may request through the site to be given the editing authority. Large organisations such as the United Nations are now using this approach, both internally and externally with great success (Bennett, 2007).

Two-way audio/visual

Teleconferencing is the easiest way of achieving two-way audio interaction and is available through a number of providers (e.g. www.hotairconferencing.com). This simple use of a commonly available technology can greatly enhance our communication efforts in a change management strategy. It allows the person speaking to actively engage with almost any number of people in geographically dispersed locations.

Web conferencing is a means of collaborating with others using no more than a computer, a web-cam, microphone and Internet access. The service provider (e.g. www.webex.com) enables the presenter to
control the system as to what is being viewed onscreen. This system allows those involved in the meeting to interact verbally and visually, and share electronic documents.

Integrated systems

Instead of utilising a range of disconnected eCommunication tools, you can use a one-stop-shop approach of an integrated solution (e.g. www.moodle.org). While Moodle was created as an eLearning platform for the education sector, it can just as easily be used in a change management program. Here you can use blogs, wikis, eSurveys and forums to convey your message and engage with your target audience.

Social networking software can be used to engage your audience in a change management program. There has been a dramatic rise in the use of social networking in popular culture, with websites such as www.youtube.com, www.myspace.com, www.flickr.com and www.secondlife.com. The graph to the right shows the exponential growth of people signing up to become Second Life players (Wikipedia, 2008). Second Life is an Internet-based virtual world with more than 10 million accounts. Players (known as residents) can assume the form of animated characters (known as avatars). There are a number of educational institutions that are using Second Life as an online environment for teaching and learning. These use a range of tools to support and connect learners in this online world.

In summary, while there is a wide range of Web 2.0 tools available, they can be grouped into traditional communication categories, as shown in the following table which provides examples of traditional and modern ICT approaches.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Traditional methods</th>
<th>Modern ICT methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-way communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-way written</td>
<td>Newsletter, FarmNote, book</td>
<td>Web page, targeted email campaign, SMS message</td>
</tr>
<tr>
<td>One-way audio/ visual</td>
<td>Movie/video, field day, seminar</td>
<td>Podcast, webcast</td>
</tr>
<tr>
<td>Two-way communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-way written</td>
<td>Letter, survey</td>
<td>Blog, eSurvey, wiki</td>
</tr>
<tr>
<td>Two-way audio/ visual</td>
<td>Workshop</td>
<td>Tele-conference, web-conference</td>
</tr>
<tr>
<td>Integrated systems</td>
<td>Conference</td>
<td>eLearning platforms, social networking</td>
</tr>
</tbody>
</table>

Increasing engagement to enable greater change

We know from our own experience that the more you can engage and interact with people before, during and after their change journey, the better it is going to be. This is true in terms of the rate of adoption, the level of adoption and the continued use of the adoption.

A simple model that summarises the old way of thinking is the DAD model – Decide, Announce, Defend. Sometimes this is expanded to DADA – Decide, Announce, Defend and Abandon. This model is where one or more people, generally working in isolation, decide what should be done, announce it and then spend a
lot of time defending it before then abandoning the concept due to poor adoption. While this happens in both the private and government sectors, it seems that government perfects the technique.

A more progressive and inclusive approach is called POP – an acronym for Public Owns Project (Walesh, 1999). This approach engages with the stakeholders early in the project and keeps them involved through the life of the project. This engaging approach has strong parallels with the change model documented by John Kotter (Kotter, 1996). He suggests the following eight-step process for successful organisational change.

<table>
<thead>
<tr>
<th>Create a sense of urgency</th>
<th>Help others see the need for change and the importance of acting immediately.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull together the guiding team</td>
<td>Make sure there is a powerful group guiding the change – one with leadership skills, bias for action, credibility, communications ability, authority, analytical skills.</td>
</tr>
<tr>
<td>Develop the change vision and strategy</td>
<td>Clarify how the future will be different from the past, and how you can make that future a reality.</td>
</tr>
<tr>
<td>Communicate for understanding and buy-in</td>
<td>Make sure as many others as possible understand and accept the vision and the strategy.</td>
</tr>
<tr>
<td>Empower others to act</td>
<td>Remove as many barriers as possible so that those who want to make the vision a reality can do so.</td>
</tr>
<tr>
<td>Produce short-term wins</td>
<td>Create some visible, unambiguous successes as soon as possible.</td>
</tr>
<tr>
<td>Don’t let up</td>
<td>Press harder and faster after the first successes. Be relentless with instituting change after change until the vision becomes a reality.</td>
</tr>
<tr>
<td>Create a new culture</td>
<td>Hold on to the new ways of behaving, and make sure they succeed, until they become a part of the very culture of the group.</td>
</tr>
</tbody>
</table>

This persistently inclusive process gets people onboard at the beginning of the change journey. As we all know, the sooner you involve people and the more you involve them during the journey, the more likely it is that they will fully and more quickly adopt the changes.

In an agricultural extension context, we could utilise the combination of Kotter’s eight steps and appropriate eExtension tools (summarised in Table 2) to produce a powerful driver for long-term change. The use of these Web 2.0 technologies can increase the engagement and collaboration, while reducing the time and cost involved.

The following is an example showing two ways to approach improving the knowledge, skills and attitudes of beef producers in the area of animal nutrition. In the past, we may have just run a two-day workshop on cattle nutrition, expecting that those attending will lap up the information and apply it in their farming practices. Generally we can report good results – the number of people attending the event and their satisfaction with the way the event was delivered. However, an evaluation in 12 months time will often indicate that the level of change or adoption has not been great. We may have increased their skills and knowledge but often not affected their attitude or desire to change.

An alternative approach is to better engage with the participants before, during and after the event. In the design phase, well before the workshop is even advertised, we can engage with potential participants to better understand their learning needs. This adult learning approach enables us to build on existing knowledge and deliver training that is relevant to the participants. We could use an eSurvey to easily
determine the background of the potential participants and their actual learning needs. As a result, we may discover that it is really calf nutrition that the people are most interested in and so we can tailor the training to suit. An alternative approach would be to send out a targeted email to share our thoughts about running a workshop and invite people to respond with their thoughts and ideas. We could also do this by utilising a blog, where again we would share our thoughts and invite feedback. In the past, we would usually have asked a few industry contacts to validate the training focus, but by using modern ICT tools we can afford to include all potential participants.

We would then move to the planning stage, where we need to plan the details and prepare the learning support materials. We could engage the researchers, industry representatives, agribusiness suppliers and other extension officers through web-conferences and teleconferences, so that no one needs to travel to collaborate on the project. A wiki could be used to quickly collate information and allow each person to build upon what has already been shared. In the past, this would have involved the time and expense of travel, which may well have excluded some people from participating.

While the workshop will be primarily face-to-face, we may link in with international specialists via a web-conference or two. Before the workshop finishes, we would demonstrate how we intend to keep in touch with participants by the use of various ICT tools. We would show them how simple each technology is to use, and invite them to try using them before they depart.

After the workshop, we would use an eSurvey to evaluate the effectiveness of the learning event and possibly send subsequent eSurveys at three months and 12 months to better measure the real impact upon practice change.

We would then offer to stay in contact with the group for the next 12 months, or for as long as seems appropriate. We would utilise web-conferences, blogs, podcasts and teleconferences as means of keeping in contact. We might even use Second Life as a way of creating an online community for continued interaction.

Summary of how eTools can be used to increase engagement

<table>
<thead>
<tr>
<th>Stage of event</th>
<th>eExtension tools that could be used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>eSurvey, targeted email, blog</td>
</tr>
<tr>
<td>Plan</td>
<td>Web-conference, tele-conference, wiki</td>
</tr>
<tr>
<td>Deliver</td>
<td>Web-conference</td>
</tr>
<tr>
<td>Evaluate</td>
<td>eSurvey</td>
</tr>
<tr>
<td>Post workshop</td>
<td>Web-conference, blog, podcast, tele-conference, Second Life</td>
</tr>
</tbody>
</table>

What the future may hold
As we and our clients become more familiar with the current Web 2.0 tools, and as more are developed, the amount of engagement and collaboration will undoubtedly increase. This will help us, as change professionals, to better engage with each other and further improve our own practices and techniques. It is my hope that that this will enable us to better interact with the stakeholders in the various projects we undertake, so that together we can better decide on the desired outcomes, work towards them and then evaluate and learn from them.

References


Van Rees, H (2007) Internet field days – helping farmers to make better decisions. RIRDC.
