Using a systems viability approach to evaluate integrated conservation and development projects: assessing the impact of the North Rupununi Adaptive Management Process, Guyana

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*Jayalaxshmi Mistry, Department of Geography, Royal Holloway, University of London, Egham, Surrey TW20 0EX

j.mistry@rhul.ac.uk

Andrea Berardi, Open Systems Research Group, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK

a.berardi@open.ac.uk

Matthew Simpson, Wildfowl and Wetlands Trust (Consulting) Ltd, Slimbridge, Glos. GL2 7BT, UK

matthew.simpson@wwt.org.uk

Odacy Davis, Conservation International Guyana, Georgetown, Guyana

odacyd@gmail.com

Lakeram Haynes, Rewa Village, North Rupununi, Region 9, Guyana

lakehays@gmail.com

*corresponding author

Abstract

Integrated conservation and development projects (ICDPs) are common place in the field of biodiversity conservation. However, there is little evidence in the wider literature on the successes of these projects, with failure attributed to a range of factors including a bias on either conservation or development, weak assumptions and limited monitoring and evaluation. In this paper, we evaluate an ICDP in the North Rupununi district of Guyana. Using a systems viability approach, we show how assessing the project and the nested systems within which it is operating reveals numerous human and institutional capacity issues which could have been managed better if highlighted at the project development stage. We conclude with the proposal that a systems viability approach to ICDP development, monitoring and evaluation encourages greater learning and adaptive management processes for increasing the long-term impact of ICDPs.

Keywords: Guyana, ICDP, system viability, social-ecological system, monitoring and evaluation, adaptive management

Introduction

Integrated conservation and development projects (ICDPs) are "…approaches to the management and conservation of natural resources in areas of significant biodiversity value that aim to reconcile the biodiversity conservation and socio-economic development interests of multiple stakeholders at local, regional, national and international levels" (Franks & Blomley 2004). This broad definition of ICDPs embraces the aims of the numerous conservation and/or development focused organisations that have adopted the ICDP approach in their work (Campbell & Vainio-Mattila 2003; Wells et al. 2004; see Appendix 1 of Garnett et al. 2007). Many large funding organisations within the field of biodiversity conservation, for example, routinely request for project outcomes that will have significant benefits for local community livelihoods and/or institutional capacity building, as well as the preservation/conservation of species and ecosystems. A large proportion of these projects will be led by natural scientists who may not necessarily have the knowledge, training or skills necessary to deal with the socio-economic and political aspects of such projects, and are 'learning on the job' to a certain extent (Mistry et al. 2009a). Equally, projects undertaken by development sector staff may not neccessairly have an in-depth understanding of the environmental or conservation aspects of a project. Nevertheless, leadership of ICDPs by natural scientists or development staff, unfamiliar with aspects from outside their sector, is still common practice. There is a need to develop project management processes which can be appreciated and carried out by staff across sectors.

There is an assumption that with the numerous ICDPs undertaken every year, there would be some understanding of the effectiveness of these projects in integrating conservation with development. However, there is little evidence in the

wider literature on the successes and failures of such projects, and of the few project impact assessments, the majority have focused within the confines of protected areas (e.g. Salafsky et al. 2001, 2002; Gibson et al. 2005; Gjertsen 2005; Hayes & Ostrom 2005; Struhsaker et al. 2005; Brooks et al. 2006; Baral et al. 2007), although many more ICDPs take place outside these regions. Wells et al. (2004), reviewing a number of case studies, outline an array of factors that have contributed to the failure of ICDPs, including over-optimistic goals, weak assumptions, unconvincing local participation, targeting of the wrong threats, uncertain financial sustainability, low benefit generation, and the need by donors for rapid success. Underlining these are the diverse positions of natural versus social scientists, as well as North versus South perspectives on the link between poverty alleviation and conservation (see Wainwright & Wehrmeyer 1998; Adams et al. 2004; Brockington & Schmidt-Soltau 2004; Kepe et al. 2004; Roe & Elliott 2004; Sanderson & Redford 2003, 2004) which determine how goals within ICDPs are prioritised. Foremost, a lack of adequate monitoring and evaluation of ICDPs over the short and long-term has contributed to a lack of lessons being learnt about their management and subsequent impacts, which applies to both small scale (Horwich & Lyon 2007) as well as large-scale (Horta et al. 2002) projects.

A more integrative, holistic and adaptive approach to project development, monitoring and evaluation, may address some of the factors considered necessary to make ICDPs successful. These include an understanding of existing environmental and social trajectories, consideration of the biophysical context and the capacity of people, the use of both local and external knowledge, the consideration of a multitude of stakeholder perspectives and their active participation in achieving project goals, fair tenure and governance arrangements for action research allowing adaptive

management (Sayer & Campbell 2004; Wells et al. 2004; Garnett et al. 2007). A change in mindset is also required where the natural and social sciences are seen to go hand in hand.

Much recent work on natural resource management has focused on social-ecological systems (SESs) - human-in-nature systems where the human and the ecological are tightly integrated, and where interactions between the two domains over a range of scales sustain the coupled systems over space and time (Berkes & Folke 1998). Sustainability of these SESs largely depends on their resilience i.e. their ability to withstand internal and external change, and their adaptive capacity; an aspect of system viability that reflects learning, flexibility to experiment and adoption of novel solutions (Berkes et al. 2003). Recognising the integrated social-ecological nature of landscapes could therefore help researchers develop projects that better analyse and address the interactions between conservation and development.

In this paper, we present an alternative approach for the monitoring and evaluation of ICDPs which is based on a systems viability analysis developed by Bossel (1999). Here we show how the system viability approach can help assess the sustainability and impact of projects, and in particular, its usefulness in identifying the key constraints for the success of such projects.

Theoretical framework for monitoring and evaluation

A "system" can be defined as a set of components that interact in order to produce a common outcome. Systems persist over time because the outcomes are of benefit to the system's components. Thus, the outcomes 'feed back' to reinforce and sustain the components i.e. the system maintains viability. Bossel (1999) clarifies the meaning of system viability: “when we talk about a viable system, we mean that this

system is able to survive, be healthy and develop in its particular system environment. In other words, system viability has something to do with both the system and its properties, and with the system environment and its properties" (p. 24). Bossel (1999) proposes that system viability is determined and directed by a set of core system properties or what he defines as system 'orientators'. For practical use in integrated conservation and development projects with a range of stakeholders, these core properties have been simplified and adapted:

1) *Existence* – Does the system have the basic requirements to exist?

2) *Resistance* – Can the system stay the same within a changing environment?

3) *Flexibility* – Can the system return to its original state within a changing environment using existing processes and structures?

4) *Adaptability* – Can the system adjust to a changing environment using new processes and structures?

5) *Ideal performance* –Can the system maximise its efficacy, efficiency and effectiveness in whichever environment it finds itself in?

Thus, a system demonstrates particular characteristics which support at least the first, if not all, the orientors if it is to remain viable. One can also intervene within systems in order to strengthen one or more orientors, prioritising the first orientors if viability is threatened in the short term, or the latter orientators if viability is threatened in the long term. Crucially, it is clear that a social-ecological system cannot operate in isolation from its environment. There is a strong element of subsidiarity here. Many ICDP projects struggle to have an impact not because of internal problems within the social-ecological system, but because the contextual conditions (or 'environment') within which the system functions present insurmountable challenges (e.g. McShane & Wells 2004; Garnett et al. 2007). An awareness of these challenges

may allow the project to evolve better ways of intervening by, for example, not wasting resources on aspects determined by scales outside of the project's reach. A corresponding set of indicators is therefore required to inform on the factors which are indirectly influencing the social-ecological system.

A systems approach integrating both social and ecological aspects has been applied extensively in the field of natural resource management (see, for example, Walker and Salt, 2006). However, most of these approaches are determined by a particular conceptual arrangement which define 'resilience' as the overriding orientor for sustaining system viability. Other orientors, such as 'adaptability', are considered to be contributing towards maintaining system 'resilience'. It is also possible that the term 'system resilience' is confused with, or at least, deemed to be equivalent to, 'system viability'. It is our contention that Bossel's clear illustration of how several unrelated orientors provide distinct characteristics for maintaining system viability is one of the most straightforward frameworks for indicator development in natural resource management. Reed et al. (2006) also single out Bossel's system viability approach as one of the most comprehensive to-date. Yet, although there are several detailed publications (e.g. Muller & Leupelt , 1998) exploring the theoretical aspects of system orientors, few studies have applied this theoretical approach in practice.

This particular systems viability approach thus establishes a straightforward, interdisciplinary, multi-scale and integrated framework which allows us to investigate a project, such as an ICDP, as it intervenes within a nested set of complex adaptive systems. The ICDP intervenes within a disparate range of social and ecological boundaries determined by the worldviews underpinning the thoughts and actions of a range of stakeholders, and is set within a dynamic social-ecological context (the socio-ecological system and its ‘environment’) which changes over time, space and

organisational scale (Bossel 1999, 2001). For monitoring and evaluation purposes, an ICDP intervention can be considered as directly engaged with a particular 'socio-ecological system' and its associated 'environment' i.e. a combination of human and ecological components acting in concert to maintain viability. This framework allows for indicators to be developed that can evaluate aspects of socio-ecological system viability within the scale of direct project intervention, as well as the contextual larger-scale. These indicators can then be used for evaluation within an iterative process as both the nature of the ICDP intervention, its target socio-ecological system and the wider context change.

Methods

The context of the ICDP project

The authors were all involved in the development and implementation of a project that integrated conservation and development in the North Rupununi region of Guyana. The third smallest country in South America after Suriname and Uruguay, the 214,970 km^2 of land cover makes Guyana slightly smaller than the UK, with a population of just over 750,000 in the 2002 census. The majority of the population live on the coastal area of the country, historically linked to the sugar and rice export economy established during colonial times. In terms of ethnicity, the majority are of African and East Indian origins (originally introduced to the Caribbean region as slaves or as indentured labourers respectively). The indigenous communities live almost exclusively in the interior. The ethnic distribution also reflects land-use within the country, with the coast dedicated almost entirely to intensive agriculture, while the interior was until recently a mix of relatively pristine rainforest, savanna and wetland ecosystems used traditionally by indigenous communities.

Guyana is an economically poor, but natural-resource rich country; partially as a result of restrictions on external investment and natural resource exploitation during the socialist government of the 1960s and 1970s at a time when many other developing countries were implementing massive World Bank sponsored liberalisation programmes (Mistry et al. 2009b). However, since democratic elections in the early 1990s and the resulting economic liberalisation, exploitation of natural resources in the interior through logging and mining, particularly by foreign investors, has experienced a dramatic increase. As a result, land tenure has become a major issue for the indigenous communities living in the interior – few have rights to the land they have subsisted on for centuries and as a consequence, they are vulnerable to state licensed resource extraction activities where the indigneous communities rarely see direct long-lasting benefits and frequently experience the loss of their traditional livelihood activities (Mistry et al. 2009b).

Termed the NRAMP (North Rupununi Adaptive Management Process), the purpose of our ICDP was to facilitate effective and appropriate natural resource management to promote and sustain human and ecological health in the face of increasing social and environmental change. The project focused on the North Rupununi district of Guyana, close to the border with Brazil, an area of approximately 22,000 hectares that comprises relatively undisturbed wetland, savanna and forest ecosystems supporting a high diversity of plant and animal life and maintaining a predominantly subsistence lifestyle for the indigenous inhabitants. The NRAMP project was principally supported through funding from the Darwin Initiative (DEFRA, UK Government) and was implemented between 2003 and 2008. The project initially undertook ecological and social monitoring of the indigenous-wetland system in the North Rupununi (Wetlands Partnership 2006, 2008a; Mistry et al. 2008)

and then went on to provide natural resource management support (through the development and promotion of local livehoods such as ecotourism) and capacity building (materials for education and training from school, community, institutional to postgraduate level) using an adaptive, participative, holistic, evidence-based and practical approach (Wetlands Partnership 2008a). The learning cycle, namely observation, evaluation, planning and acting (and iterations of this cycle), framed the adaptive nature of the NRAMP and rather than institutionally-led, the project advocated a networked and non-hierarchical 'champion-led' approach where individuals are supporters, campaigners and facilitators of the NRAMP (Wetlands Partnership 2008a).

The project principal investigators were all trained as natural scientists and as such the project was initially biased towards conservation rather than development. However, as the project progressed and as problems emerged, particularly associated with human capacity in Guyana and our positionality with regards to our Guyanese colleagues (see Mistry et al. 2009a), we came to the realisation that many of the assumptions on human capacity we had made in the original project proposal were underestimated and we had been somewhat naïve and optimistic in what could be achieved and how. This led us to reflect on the way projects are generally developed and the ways they are monitored and evaluated. For example, although outputs stated on project proposals may have been produced, there have been concerns that success in these projects tends to be short-lived and fragile, with little lasting improvements in the well-being of the communities and environment in which they took place (McShane & Wells 2004; Garnett et al. 2007). We therefore wanted to go beyond the project proposal indicators of success, and assess the impact of the NRAMP project

within the evolving capacity of the North Rupununi and Guyana. It was in this context that we adopted the system viability approach for project monitoring and evaluation.

Indicators for system viability

The aim here was to assess the impact of the NRAMP project – the NRAMP project is envisaged as a process-based intervention that contributes to the viability of the North Rupununi social-ecological system, which is nested within the 'environment' of Guyana. Table 1 lists the key indicators developed for measuring the impact of the NRAMP project. These are divided into indicators for the NRAMP's socio-ecological system of interest, the North Rupununi, and indicators for the socio-ecological system's wider 'environment', Guyana as a whole.

The project initially focused on collecting data on the viability of the North Rupununi ecological system which provided a biophysical context for the NRAMP project. Using viability indicators such as hydrological functioning, habitat types and species diversity, the assessment showed that the ecological functions of the North Rupununi wetlands were being performed in the manner in which would be expected for the healthy operation of different wetland waterbody types (Wetlands Partnership 2006, 2008a; Mistry et al. 2008). The pristine nature of the ecological component of the North Rupununi meant that the analyses in this paper primarily focused on the social aspects of system viability. In addition, with high dependency on the state, the distinction between the regional and national level social systems are in many cases blurred. As such, national level indicators were employed for some social aspect of the North Rupununi socio-ecological system, with North Rupununi specific information given where possible.

The indicators were developed through a combination of outputs/recommendations from project stakeholder fora meetings, personal experience of the authors and discussions with project staff in Guyana (a full rationale for each indicator is given in Wetlands Partnership 2008b). As such, the indicators are both qualitative and quantitative. Criteria used to select indicators included ability to accurately and objectively measure progress towards the NRAMP goals, namely positive interventions in the region, and ease of use. Foremost for the latter was the ability to be readily measured, cost effectiveness and making use of available data (see Table 3 from Reed et al. 2006 for full range of possible criteria). For the qualitative data, we recognised the influence of creeping subjectivity and so used methods of triangulation in order to reduce bias within the results. Data for the indicators came from primary sources, namely records and information from the NRAMP project, and from secondary sources, including government, NGO and international agency reports. This was collated by the authors from personal experience and knowledge, on-line searches and communication with Guyanese colleagues, and is presented in full in Wetlands Partnership (2008b). However, the task was complicated by the lack of recorded information and the lack of disclosure of what should have been publicly available information. As a result, in some cases, some conclusions may be supposition rather than based on concrete evidence, whereas in other cases, highly suitable indicator categories had to be removed as a result of lack of information.

As with the indicator selection, thresholds were set for each viability indicator in discussion with Guyanese colleagues. The majority of these thresholds were qualitative and in the form of targets and baselines which allow monitoring of progress. The indicators were then ranked and assigned a weighting according to their

ranking. The indicator scores and rankings were then used to calculate the overall index values for each viability category (see Figs. 1 and 2). The following formula was used for normalising the final values (i.e. fitting them between 0 and 1):

(total weighted indicator value - minimum weighted value) / (maximum weighted value - minimum weighted value)

We realise that it is vital to include a full breadth of views at all stages of the viability analysis and that ideally there needs to be as wide a consultation as possible. Different stakeholders have different types of 'power' which can influence indicator identification, threshold setting, indicator scores and ranking of indicators. Our analysis of the impact of the NRAMP project only involved project personnel (representatives of some of the main stakeholders involved in the project), so the results are only indicative. Although our results are clearly biased towards investigating the impact of the NRAMP project on the socio-ecological viability of the North Rupununi, the project was in fact the only intervention in the region which specifically engaged with the region's overall viability, as opposed to the highly specialised interventions by other concurrent projects, such as raising AIDS awareness, experimenting with sustainable logging, improving child nutrition, or preserving a particular endangered species.

Results

An evaluation of the impact of the NRAMP project using the system viability approach identified some key findings (a full evaluation of the indicator data,

discussion of the results and recommendation for future actions is given in Wetlands Partnership 2008b) (see Figs. 1 and 2).

Existence

Assessment of NRAMP project impact showed that the *existence* of the North Rupununi social ecological system is significantly jeopardised by the limited number of trained NRAMP facilitators. These were considered by a wide range of stakeholders as the principal champions capable of concurrently engaging with the wide range of social and ecological challenges facing the North Rupununi. Although we recognised the urgent need to train individuals, the original project proposal put much more emphasis on developing the training material than actually carrying out the training. However, we can argue that within the project's limited time span we were forced to first concentrate on developing the training material. In addition, the inadequate provision and standards of education and skills training in Guyana meant that undertaking the project training courses once was not sufficient to develop the necessary skills for facilitating others (something we had assumed in our original project proposal). These trainees needed to have many more opportunities to practice the NRAMP processes and techniques before they could train others.

Resistance

Our analysis shows that *resistance* i.e. the ability of the North Rupununi socio-ecological system to withstand external pressures, has by far the lowest score out of all the viability categories. The NRAMP approach clearly focuses on grassroots bottom-up participation of communities; project stakeholder fora also identified the local communities as having the central role for biodiversity conservation of the

region. However, the indicator data shows that community participation is weakened by the limited decision-making controls conferred by the national government. Land tenure is currently limited to the immediate vicinities of their settlements, rather than over traditional land use areas, and the serious socio-economic situation restricts communtiy support for activities which are not directly related to fulfilling their immediate survival. This position reduces the confidence of communities to internally support natural resource management initiatives, such as the NRAMP, which require long-term commitments for long-term benefits.

Flexibility

The *flexibility* of the North Rupununi socio-ecological system was limited by the overall health status and susceptibility to disease of NRAMP facilitators. For example, malaria is endemic to the North Rupununi and is a key factor regularly affecting NRAMP facilitators. In addition, showing initiative and the ability to think critically are necessary skills for maximising the amount of flexibility in order to achieve established goals. Project records showed that although facilitators were able to identify bottlenecks and weaknesses in NRAMP procedures, they were restricted in their ability to put into action, in a timely way, modifications in behaviour to circumvent problems. This situation is mirrored within the wider Guyanese context, where the overall capacity of the population to engage in critique of the established order and put into place better alternatives has been actively suppressed, first by the colonial powers, then by dictatorship, and most recently, a focus on race politics to the exclusion of all other civic priorities (Mistry et al. 2009).

Adaptability

The three levels of NRAMP capacity building – community, ranger/environmental officer, and postgraduate courses - are intended to increasingly encourage individuals to implement NRAMP in a less rigid way, and empower facilitators and champions to adapt the process to better reflect the changing local circumstances. Thus, *adaptability* within the North Rupununi socio-ecological system is highly dependent on individuals passing through all three stages of training. Again, because of the short term nature of the project, individuals were only able to engage with one of the first two stages of training, and then only once. The NRAMP itself encourages individuals to consider adaptability through the explicit reference to the four stages of the learning cycle: observation; evaluation; planning; and acting. Our data shows that although there is some evidence that stakeholders are now familiar with the four terms of the learning cycle, it is difficult to see this understanding translated into an in-depth application of the practical techniques illustrated in the NRAMP.

Ideal performance

Although *ideal performance* was deemed as the least important of all the viability categories, it scored the highest from our analysis. This was because the two indicators of motivation, level of participation within internal NRAMP meetings and contribution to the development of the NRAMP, scored highly, principally thanks to several incredibly motivated and determined individuals. However, we may have been overly optimistic on the motivation indicators, as the motivated individuals were mainly junior staff and the project regularly suffered from the lack of attendance and participation of senior in-country managers.

The 'environmental' context

The impact of the NRAMP project is also highly dependent upon the wider 'environmental' context within which the NRAMP is intervening. Our analysis shows that the *existence, adaptability* and *ideal performance* of the 'environment' in which the NRAMP project is working is severely limited by inadequate provision and standards of education and skills training in Guyana, and together with the 'brain-drain' from the country, a lack of suitably qualified people in the field of natural resource management, the development sector, as well as health and education. Although there is 100% and 65% enrolment at primary and secondary school levels respectively, the percentage of teachers having received training provision is only 57% (in 2004) (Guyana Millenium Development Goals Report 2007). The problem is heightened in interior regions such as the North Rupununi, where student to trained teacher ratios are 111 for primary schools and 51 for secondary schools (Ministry of Education 1999-2000). The National Development Strategy for Guyana (Civil Society of Guyana 2000) estimated that there is a 21% rate of absolute literacy in Guyana, and an overall functional literacy rate that is just over 50%. There is only one university in the country and very few lecturers teach and research in the areas of natural resource management and sustainable livelihoods, and even fewer have postgraduate qualifications in the field.

The *resistance* of the 'environment' is constrained by land designation and tenure. The proportion of land area set aside for conservation is one of the lowest in South America (World Resources Institute 2005) and although there are a number of key wetland sites of global biodiversity importance, Guyana is the only country in South America that has not acceded to the RAMSAR Convention on Wetlands. An evaluation of current government policies over natural resources shows that although indigenous communities in interior regions have some ownership over their land, it

does not extend to traditional use areas and they do not have rights over resources such as water and minerals. This means that the government can approve externally funded exploitative activities for certain natural resources on titled land as well as in adjacent state land. Nevertheless, Guyana still contains vast tracts of intact tropical lowland forest, savanna and wetlands.

Health issues significantly affect the *flexibility* characteristics imposed by the North Rupununi socio-ecological system's 'environment'. At present, the dominant infectious diseases in Guyana are malaria, respiratory infections, sexually transmitted diseases, HIV/AIDS and tuberculosis, while other major causes of death are through stroke, heart disease, accidents and injuries (Guyana Millenium Development Goals Report 2007). Although malaria is not considered a major cause of death overall in Guyana, it is particularly prevalent in the interior regions, such as the North Rupununi, where combined with malnutrition and repeated episodes, the risk of morbidity is greater. From 2000 to 2005, the prevalence of malaria within the population has increased from 11.5% to 18.5%, contributed to the increase in mining and logging activities in remote interior regions (Guyana Millenium Development Goals Report 2007). *Flexibility* is also restricted by inadequate governance. Data for Guyana from the World Bank's Governance Matters 2007 Report highlights that for all governance indicators, from voice and accountability to corruption, either there has been no real change from 1996 to 2006, or that the governance situation has actually worsened.

Discussion

Although in practice all the original NRAMP project deliverables were completed and all the outputs were achieved, as Fig. 2 indicates, there were moderate scores for

project impact on the North Rupununi socio-ecological system's *existence* and *ideal performance* and low scores for *resistance*, *flexibility* and *adaptability*. These results are mainly because of the assumptions taken at the design phase of the project. It has been argued that the typical mode of project development does not allow for a clear and in-depth assumption analysis, and that the assumptions column/section is often reduced to ritual 'it'll be all right on the night' use, with 'killer assumptions' which rarely manifest themselves while there is funding (Odame 2001) such as mismanagement of the project, insufficient resources (including time, human, physical, and financial resources) and lack of participation or breakdown in communication with project stakeholders and beneficiaries downplayed, giving project managers a pleasing yet false sense of security (Porter et al. 1991). In our case, although we had recognised the importance of greater numbers of NRAMP facilitators, we assumed that once individuals had taken a training course, they would be sufficiently qualified and confident to become facilitators themselves. However, we severely misjudged the knowledge and skills of the trainees taking the courses, and wrongly assumed that people having completed secondary school and undergraduate degrees would be on par with similar individuals from other countries. If we had looked in more detail at the educational context within which individuals studied (unqualified teachers, underqualified lecturers, type of curriculum at school and university level in terms of knowledge and skills development), we may, on reflection, have developed less ambitious training material in a shorter timeframe, and dedicated more time to actually helping individuals through the courses so they could become competent facilitators. Fundamentally, the viability analysis shows that in the context of a country such as Guyana, effective capacity building cannot take place

within the timeframe of normal ICDPs of three to five years, but require long-term commitment and support to be successful (Baral et al. 2007; Mistry et al. 2009a).

Human capacity issues had a very large effect on many aspects of our viability 'intervention'. Although when developing the NRAMP project we identified the need for more qualified people (in terms of their knowledge and skills) in the field of natural resource management, we never really paid any attention to the other 'internal' (Diener & Diener 2005) capacity issues that could be crucial to the success and impact of the project. This internal, psychological dimension to capacity is dependent on a wide range of factors including physical health (e.g. high prevalence of debilitating disease within project staff), mental well-being (e.g. motivation of working in difficult conditions can be low, structures and processes within organisations do not allow for supportive working conditions), family obligations (e.g. lack of government services means individuals have to take time out from the project when there are family problems) and limited opportunities to foster diverse skills development. All of these factors signifcantly affected the impact of the NRAMP project, and were not only relevant to NRAMP facilitators and community members, but also to senior in-country managers, who in addition, lacked appropriate organisational and administrative skills to run projects such as the NRAMP (Simon et al. 2003; Mistry et al. 2009a).

Garnett et al. (2007) propose some lessons for the success of ICDPs and as well as understanding the biophysical context, considering demographic changes and broad-based measures of human capacity, they propose that project effectiveness is correlated with the robustness of national, regional and local governance, as well as stable, transparent and equitable systems of land tenure. Although we had an adequate level of understanding of governance issues at the local level, we did not pay enough

attention to regional and national level governance issues and the different systems of land tenure in the region. We assumed that the approach developed in the NRAMP project and the principles upon which it was based would be straightforwardly incorporated into institutions and government policies. In reality, it turned out that even though the local communities keenly advocated and practiced the principles and approaches of the project, there were conflicts of interest between the project and national level policies and actions. If these had been identified prior to the conception of the project, steps could have been taken to engage more fully with key individuals and agencies at the national and regional level.

As a metholodological framework for monitoring and evaluting ICDPs, the systems viability approach has many strengths. As Reed et al. (2006) point out, " it is one of the most holistic and rationalised frameworks for developing sustainability indicators" (p. 412). This holistic nature is exemplified by the significant refocusing of the NRAMP intervention when it was realised through implementing the viability approach that the health of the North Rupununi social-ecological system was being threatened primarily by factors within the social domain. Recognising the nestedness of social-ecological systems is another key attribute of the framework allowing cross-scale linkages to be made and forcing the user to think 'outside the box'. Viability or 'health' is also a term that many stakeholders can relate to and is a useful idiom for conceptualising how social-ecological systems function. On the other hand, the actual viability categories can be difficult for users to understand. This made us simplify the original definitions of the categories for the NRAMP team as indicated in this paper, but we recognise that further adaptation of the concepts as well as exemplars of indicator categories would be necessary for greater stakeholder involvement. Including as many stakeholders in all stages of the viability analyses, from indicator

selection to monitoring and evaluation, would be a key recommendation for future applications of the approach.

Conclusion

Using the systems viability approach to evaluate the impact of the NRAMP project on the North Rupununi socio-ecological system within its 'environmental' context shows that our assumption analysis for the original project proposal and its management in the initial stages was very weak. It also highlights the inappropriateness of some of the activities and outputs in the context of where we were working. Taking a viability approach to designing and then managing a project would allow for greater thought about the sustainability of a project's impact within this context and over the longer term rather than just focusing on the project's prescribed area of interest and funded timescale. It would stimulate questioning of promises made at the project design stage by in-country project partners on their ability to engage in and sustain a project. A viability approach would make us think more laterally and holistically about the assumptions we are making and the indicators of success, and could bring a range of stakeholders into the frame whom we had previously overlooked.

We recognise that our viability analyses was a snapshot in time and that an updated assessment may paint a slightly different picture depending on recommendations being taken forward and the evolving context of the project. Indeed, for monitoring and evaluation, the systems viability approach encourages a learning, adaptive approach (Robinson & Redford 2004; Salafsky & Margoluis 2004) as you can identify at different stages in the project which areas (*existence*, *resistance*, *flexibility*, *adaptability* and *ideal performance*) require more investment/improvement or, in extreme circumstances, a fundamental rethink in strategy. The success of a

project then becomes not just about achieving particular outputs and targets within the limited timeframe of funding, but also about increasing the overall long-term impact of the initiative in the context of a complex, unpredictable and changing world.

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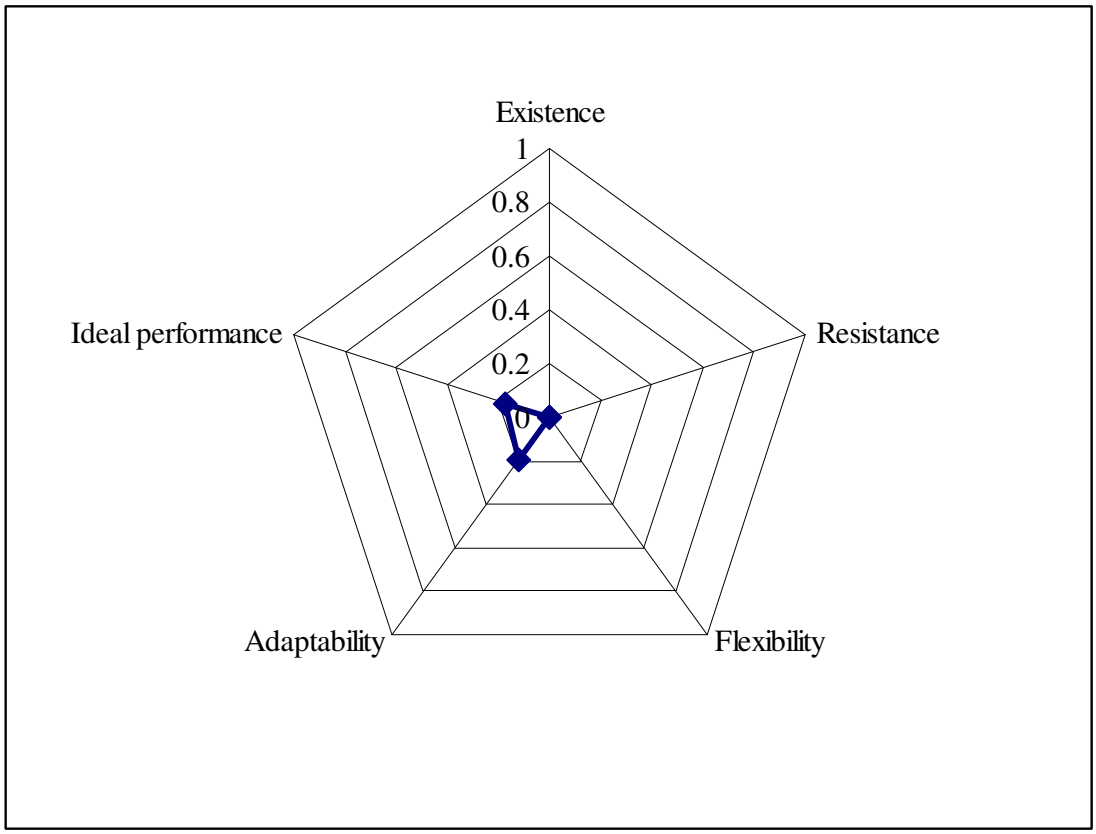
Figure legends

Figure 1. Star diagram showing system viability for the NRAMP 'environment'. The scale is from 0 = no viability to 1 = very high viability. Note that Existence, Resistance and Flexibility have zero values.

Figure 2. Star diagram showing system viability for the NRAMP project. The scale is from 0 = no viability to 1 = very high viability.


Existence
1
0.8
0.6
0.4
0.2
0
Resistance
Flexibility
Adaptability
Ideal performance

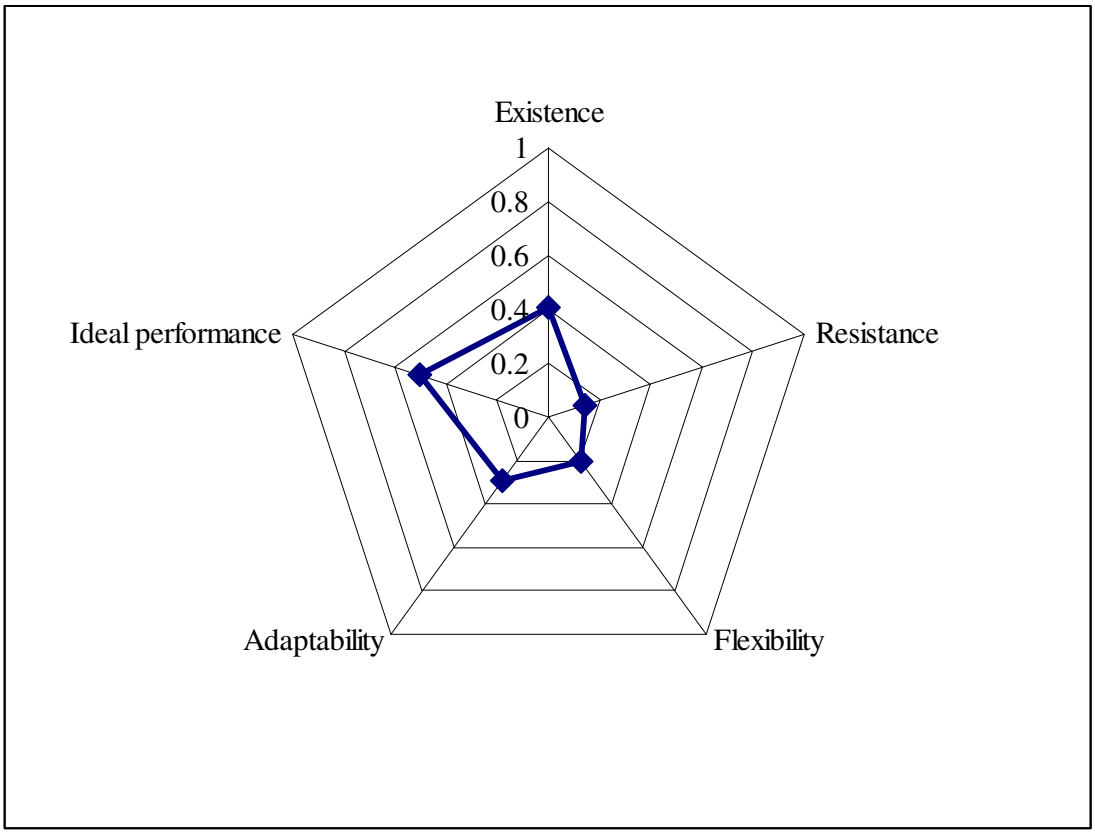

Existence
1
0.8
0.6
0.4
0.2
0
Resistance
Flexibility
Adaptability
Ideal performance

Table 1. List of indicators for the viability of the NRAMP project and its environment.

NRAMP indicators	Environment indicators
Existence	
Human resources	Human resources
Critical mass of NRAMP trainees	Number of knowledgeable and skilled individuals potentially available
Critical mass of Guyanese NRAMP facilitators	Number of people with facilitating skills in the area of natural resource management/sustainable livelihoods within Guyana
Representation	Support
Representation of NRAMP champions within integrated conservation and development NGOs and governmental agencies in Guyana	Number and capacity of NGOs and governmental agencies supporting integrated conservation and development in Guyana
Representation of key regional stakeholders at stakeholder meetings	
Representation of key national stakeholders at stakeholder meetings	
Clear communication	Sharing of information
Evidence of appropriate information dissemination	Access to on-line communication infrastructure

Evidence of constructive engagement with regional NRAMP stakeholders	Number of media outlets reporting on conservation and development issues
Evidence of constructive engagement with national NRAMP stakeholders	
Evidence of constructive engagement with NRAMP communities	
Knowledge of the NRAMP	General awareness of ecological sustainability and social justice issues
Ability to articulate the context, principles, process and outputs of the NRAMP	Relevant topics covered in national school curricula
	Number of university graduates in relevant disciplines
	Membership of local, national and international integrated conservation and development NGOs
Resistance	
Stable/regular support (funding, in-kind contributions)	Socio-economic climate
Amount of regular community generated income and/or in-kind contributions to support NRAMP and its champions	Evidence of increasing community viability

Amount of regular government/external funding and/or in-kind contributions available for the NRAMP and its champions	Evidence of availability of funding for biodiversity conservation and sustainable development from personal, national and international donors
Community access to land and natural resources in ways which can be sustainably managed	National commitment to sustainable natural resource management and biodiversity conservation
Area of titled land in the North Rupununi	Area of land dedicated to sustainable natural resource management and biodiversity conservation
Area of state land secured for community use and/or biodiversity conservation in the North Rupununi	
Ratification of RAMSAR Convention	
Approval of Community Conservation Area/Concessions	
'Institutional'/policy integration	Compatibility of the NRAMP with other regional management plans and national level policies and regulations
Evidence of integration of the NRAMP into 'institutional' frameworks	Evidence of implications of other regional management plans and national level policies and

	regulations on the NRAMP
Evidence of direct reference to NRAMP within policies	
Flexibility	
Capacity and diversity	Healthy physical and emotional lifestyles/Education and training
Number of days off work of facilitators through illness e.g. malaria, or for other reasons e.g. family support	Level of risk factors e.g. healthy eating, malaria avoidance, physical fitness etc.
Evidence of a range of disciplinary backgrounds and experiences within NRAMP facilitators	Number and accessibility of different training and education courses available at local, regional and national level
Autonomy	Freedom of speech
Evidence of autonomy in decision-making by the NRAMP	Voice and accountability
Evidence of critical thinking within NRAMP facilitators	
Adaptability	
Ability to use the learning cycle to evaluate and change NRAMP goals, principles, process and methods	Democratic change
Evidence of community use of the	Impact and influence of grassroots

learning cycle to evaluate and change NRAMP goals, principles, process and methods Evidence of national level stakeholder use of the learning cycle to evaluate and change NRAMP goals, principles, process and methods	political and social movements in Guyana
Education and training Number of people passing through the different levels of NRAMP training and educational courses from basic knowledge to critical awareness	Education and training Number of knowledgeable and skilled individuals potentially available Number of lecturers with skills/knowledge for engagement at postgraduate level in the area of natural resource management/sustainable livelihoods within Guyana
Networking Frequency of on-line access by Guyanese NRAMP champions Frequency of visits outside normal working location by Guyanese NRAMP champions Frequency of visits by non-locals to	Physical networks Information and communication infrastructure within Guyana

normal working location of Guyanese NRAMP champions	
Ideal Performance	
Build capacity of future generations for sustainable livelihoods and natural resource management	Capacity of educators
Proportion of teachers engaged in delivering NRAMP school packs	Number of appropriately qualified teachers in Guyana i.e. have an undergraduate degree and have a postgraduate qualification in education
Increasing knowledge on social-ecological health	Availability of regional and national social and ecological health data
Monitoring of ecosystem and community viability in the North Rupununi	Availability and accessibility of regional and country level sustainable development indicators
Motivation	Assessment of quality of national governance
Evidence of attendance at internal NRAMP meetings	Country level indicators of good governance with specific references to social justice and ecological sustainability
Contribution to NRAMP development	

Table 2. A summary of the NRAMP environment.

Population projected to decrease from 751,223 in 2002 to 703,000 by the year 2025[a]. This forecast is in line with the continued high emigration of the population, causing a literal 'brain-drain' within the country of qualified and trained individuals.
The GDP per capita for Guyana in 2005 was US$4,508[b]. The percentage of the population living in extreme poverty has fallen from 29% to 19% from 1993 to 1999, but the stagnation in the economy from 2000 is predicted to have worsened the poverty situation in Guyana[c].
Although enrolment at primary school level was 100% in 2003, the drop-out rate has been increasing and is highest in interior regions such as the North Rupununi[c]. Access to secondary school in Guyana was 65% in 2002[d]. Less than 2% of the population go into tertiary education in the country[d]. It is estimated that there is a 21% rate of absolute literacy in Guyana, and an overall functional literacy rate that is just over 50%[e]. Only 57% of teachers teaching in schools in 2004 had undergone any official training[c]. About half of the secondary school teaching staff is employed on a part-time basis[e] and without suitable qualifications. At university level, student-teacher ratios are very low in some faculties, and not an insignificant number of lecturers have inadequate qualifications and experience[e].
The dominant infectious diseases in Guyana are malaria, respiratory infections, sexually transmitted diseases, HIV/AIDS and tuberculosis[c]. From 2000 to 2005, the prevalence of malaria has increased from 11.5% to 18.5%, contributed to the increase in mining and

logging activities in remote interior regions[c], such as the North Rupununi.

The land area protected to maintain biological diversity was 5,201 km^2 in 2006, 2.3% of the total land area[c], and one of the lowest in South America[f].

Data for good governance in Guyana highlights that for all indicators (voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption), either there has been no real change from 1996 to 2006, or that the governance situation has actually worsened[g].

Amerindians do not possess any rights to sub-surface resources or surface waters on titled land[e]. This means that exploitative activities can be explored and take place on titled land.

[a]Population & Housing Census - Guyana National Report 2002.

[b]Human Development Report 2007-2008.

[c]Guyana Millenium Development Goals Report 2007.

[d]Ministry of Education 1999-2000.

[e]Civil Society of Guyana (2000).

[f]World Resources Institute 2005.

[g]Governance Matters 2007.