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Measuring adaptive capacity: application of an indexing methodology in Guyana

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MEASURING ADAPTIVE CAPACITY: APPLICATION OF AN INDEXING METHODOLOGY IN GUYANA

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INTRODUCTION

Disaster risk is not only associated with the occurrence of intense physical phenomenon but also with the vulnerability conditions that favour or facilitate disaster when such phenomenon occur. Vulnerability is intimately related to social processes in disaster prone areas and is usually related to the fragility, susceptibility or lack of resilience of the population when faced with different hazards. In other words, disasters are socio-environmental by nature and their materialization is the result of the social construction of risk. Therefore, their reduction must be part of decision making processes. This is the case not only with post disaster reconstruction but also with public policy formulation and development planning. Due to this, institutional development must be strengthened and investment stimulated in vulnerability reduction in order to contribute to the sustainable development process in different countries.

In order to improve disaster risk understanding and disaster risk management performance a transparent, representative and robust System of Indicators, easily understood by public policymakers, relatively easy to update periodically and that allow cluster and comparison between countries was developed by the Institute of Environmental Studies (IDEA in Spanish) of the National University of Colombia, Manizales. This System of Indicators was designed between 2003 and 2005 with the support of the Operation ATN/JF-7906/07-RG "Information and Indicators Program for Disaster Risk Management" of the Inter-American Development Bank (IDB).

This System of Indicators had three specific objectives: *i)* improvement in the use and presentation of information on risk. This assists policymakers in identifying investment priorities to reduce risk (such as prevention and mitigation measures), and directs the post disaster recovery process; *ii)* to provide a way to measure key elements of vulnerability for countries facing natural phenomena. It also provides a way to identify national risk management capacities, as well as comparative data for evaluating the effects of policies and investments on risk management; and *iii)* application of this methodology should promote the exchange of technical information for public policy formulation and risk management programs throughout the region. The System of Indicators was developed to be useful not only for the countries but also for the Bank, facilitating the individual monitoring of each country and the comparison between the countries of the region.

The first phase of the Program of Indicators IDB-IDEA involved the methodological development, the formulation of the indicators and the evaluation of twelve countries from 1985 to 2000. Afterwards, two additional countries were evaluated with the support of the Policy Regional Dialogue on Natural Disasters. In 2008 a methodological review and the updating of the indicators for twelve countries was made in the framework of the Operation RG-T1579/ATN/MD-11238-RG. Indicators were updated to 2005 and for the most recent date according to information availability (2007 or 2008). This report has been made using –with some adjustments that in each case are referenced– the methodologies formulated in the first phase of the Program of Indicators IDB-IDEA[1].

The System of Indicators above mentioned were applied in Guyana and the results are presented in the report: DEVELOPMENT OF DISASTER RISK INDICATORS AND FLOOD RISK EVALUATION.

The previous report and methodology focus on current expressions of vulnerability and disaster risk, measures which can be used to develop scenarios for assessing future risk. The current report presents a methodology and results that add to this by providing an explicit focus on those elements of organizational capacity that define the adaptive capacity of that organization and in aggregation provide an assessment of the national adaptive capacity. The methodology described below was first developed as part of a multi-hazard vulnerability assessment approach by King"s College London with support from the European Commission Directorate General for Research. The approach was applied first to London in 2010 to assess the adaptive capacity of risk managers and those at risk in the context of drought and heat-wave.

The Adaptive Capacity Index (ACI) has five sub-components (improving foresight, critical self-reflection, organizational structure, support for experiments and resources to enable adjustments). These are generic qualities of adaptive capacity derived from theory and confirmed through initial discussion with a small group of respondents to make sure that the sub-components are sensitive to local conditions and ways of expressing risk and its management. In this way the same framework can be applied to risk managers operating with a national or more local area of responsibility, or across a range of sectors from rural development to water management, urban planning and environmental management, as well as for disaster risk management. This is important, adaptation to climate change requires a focus that can incorporate both environmental and development sectors to meet this all embracing challenge. Wherever possible it is sought to use direct measures of phenomena – the existence of reports etc, but often a more subjective, expert assessment is required.

This progress report presents the methodology and outcomes of the evaluation of the Adaptive Capacity Index to Guyana at a national scale and disaggregated into stakeholders with national and sub-national viewpoints and capacities. This allows comment on the

[1] More information and details of methodologies can be found in IDEA (2005). "System of Indicators of Disaster Risk and Risk Management: Main Technical Report". Program of Indicators for Disaster Risk and Risk Management IDB-IDEA, Universidad Nacional de Colombia, Manizales. http://idea.unalmzl.edu.co

revealed extent to which adaptive capacity is distributed between development organizations in Guyana with implications for policy recommendations.

1 CONCEPTUALISING ADAPTATION AND ADAPTIVE CAPACITY

Adaptation is a deceptively simple concept. Its meaning appears straight forward: it describes a response to a perceived risk or opportunity. The IPCC defines climate change adaptation as:

> "adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2008: 869).

Complexity comes with distinguishing different adaptive actors (individuals, communities, economic sectors or nations for example) and their interactions, exploring why it is that specific assets or values are protected by some or expended by others in taking adaptive actions, and in communicating adaptation within contrasting epistemic communities. It is also important to distinguish between adaptive capacity and adaptive action.

Adaptation includes both adaptive capacity and adaptive action as sub-categories (Pelling, 2011). Capacity drives scope for action, which in turn can foster or hinder future capacity to act. This is most keenly seen at the local level, when adaptation requires the selling of productive assets (tools, cattle, property) thus limiting capacity for future adaptive action and recovery. But can be seen also at the organizational level where adaptive acts close down flexibility and opportunity costs are incurred, for example when the economic investment place in a large structural adaptation, such as building a sea-wall makes it difficult in the future to consider any other choice than the strengthening of the sea wall – or face criticism for waster earlier resource. Similarly it might be that the sea wall and the security it is felt to provide attract a number of neighbouring land uses (residential, commercial etc) that then require protecting and justify subsequent investment. Alternatives, such as managed coastal retreat are harder to make, while they may be the more flexible and in the long-term sustainable response to sea-level rise associated with climate change.

Elsewhere, adaptive capacity has been conceptualised both as a component of vulnerability and as its inverse, declining as vulnerability increases (Cutter, 2008). This distinction is important in designing methods for the measurement of adaptive capacity and vulnerability, which are generally conceived of as static attributes, and the subsequent targeting of investments to reduce risk. The distinction is less important for assessing vulnerability or adaptive capacity as dynamic qualities of social actors in history. For these projects it is more important to recognise that vulnerability and adaptation interact and influence each other over time shaped by flows of power, information and assets between actors.

The relationship between vulnerability and adaptive capacity varies according to size and type of hazard risk and the position of the social unit under analysis within wider social-ecological systems. Position matters as vulnerability and adaptive capacity at one scale can have profound and sometimes hidden implications for other scales. For example, a family in Barbados may benefit from living in a hurricane proof house (low micro-vulnerability)

but still be impacted by macro-economic losses should tourists be deterred by hurricane risk in an island whose economy specialises on tourism with limited diversity (low macro-adaptive capacity).

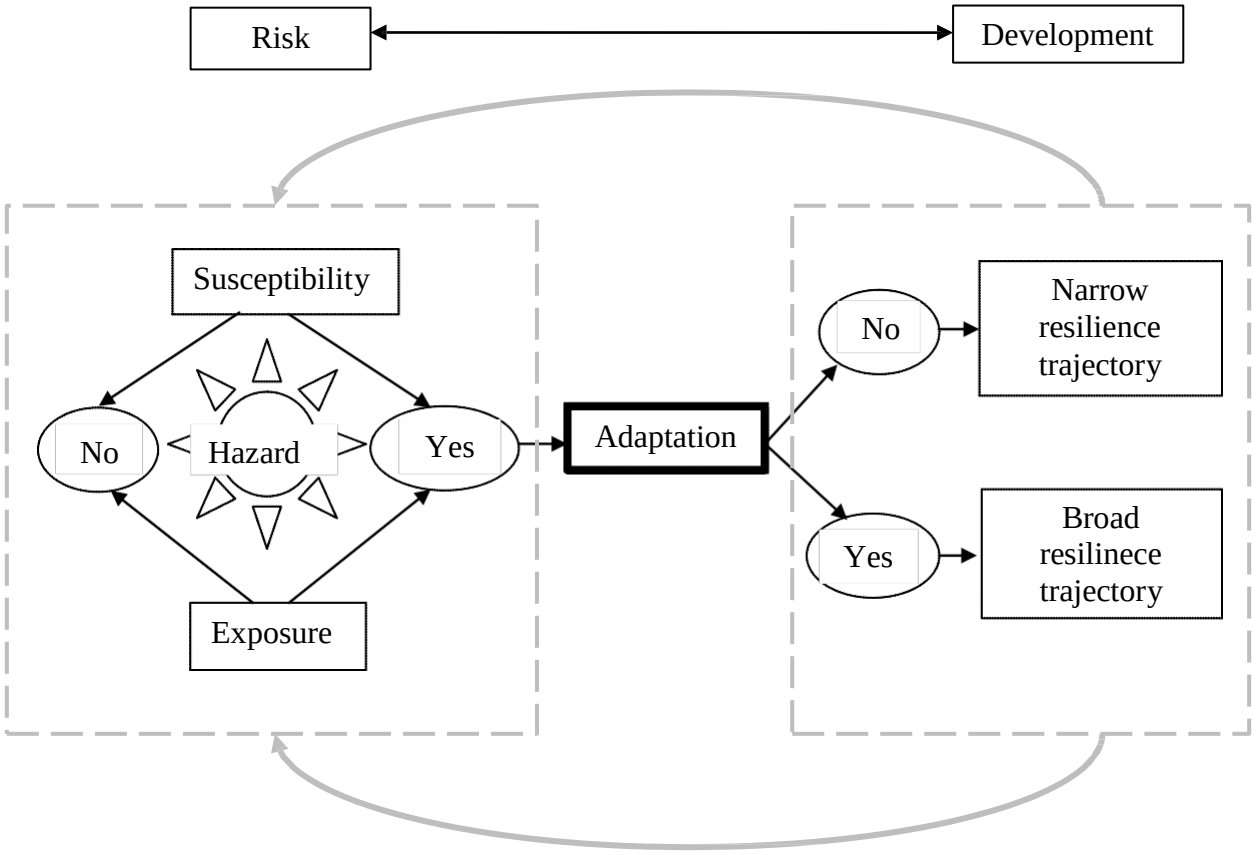
The predominant understanding of adaptive capacity is that while it is a distinct concept it is part of the wider notion of vulnerability. The IPCC conceptualises vulnerability as an outcome of susceptibility, exposure and adaptive capacity for any given hazard:

> "Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC, 2008, p883)

Exposure is usually indicated by geographical and temporal proximity to a hazard with susceptibility referring to the propensity for an exposed unit to suffer harm. Adaptive capacity and action then can either reduce exposure or susceptibility. Adaptive actions to reduce exposure focus on improving ways of containing physical hazard (building sea walls, river embankments, reservoirs etc.), they can also include actions to shield an asset at risk from physical hazard (by seasonal or permanent relocation or strengthening the physical fabric of a building, infrastructure etc.). There is some contention here with individual studies including shielding under exposure or susceptibility. However, this is only problematic when assumptions are not made clear, preventing aggregation of findings (a specific concern for the IPCC which seeks to build knowledge on vulnerability and adaptation from local studies world-wide). Susceptibility can be reduced by a wide range of possible actions including those taken before and after a climate change related impact has been felt.

Adaptive capacity and action occupy a pivotal position in the production of risk and development (see Figure 2.1). Risk (the potential for loss) is generated when an environmental hazard (such as a flood) occurs in proximity to people, their assets or life support systems including critical infrastructure and ecosystem services. The degree of risk is determined by exposure and susceptibility of people and their asset. For any level of risk adaptation offers the possibility of a deliberative approach to the management of future risk. Where there is no adaptation this represents an opportunity missed and a narrowing of subsequent options for resilience in development. Where there is reflection on the possibility of adaptation as a response to perceived risk this is associated with a broadening of resilience options. It may be that upon reflection no adaptive action is taken, for example because of competing investment needs, but this may contribute to future risk but is at least a deliberative decision and one that itself can build or point to the need for changes in adaptive capacity to enhance future action. In this way, decisions around adaptation and whether or not to invest in adaptive capacity reflect onto development and through this risk levels going forward into the future.

Figure 1: Adaptation intervenes in risk and development



Through adaptation one can gain insight into the social mechanisms leading to the distribution of winners and losers and identify opportunities and barriers to change as both risk and development coevolve. Too often though, research and policy development on adaptation has focussed on narrow technical or managerial concerns. For example, in determining water management or sea-defence and building structural guidelines. Wider questions of social values etc. that direct technological and social development and risk have been acknowledged as root causes but put in the background as too intangible or beyond the scope for adaptation work (Adger et al., 2009c). Within the community of social researchers tacking climate change the social root causes are well acknowledged and amongst many policy makers there are recognised too. Multilateral development agencies and NGOs such as WRI, WWF, Practical Action, CARE, etc. are taking a lead and tools are being developed to help policymakers, who have understood the complexity of the problem but had access to the tools to begin planning for adaptation. The current analysis also helps to respond to this critical lacuna by making adaptive capacity visible amongst key decision-makers over different scales and over time.

Scale effects mean that adaptation is experienced as both nested and compounding.

- Nesting allows higher-order change to facilitate lower-order change, for example legislative change (in the national system) may lead to changes in land-use decision-making (at the sub-national level) and building design (at the local level). The reverse is also a possibility, for example where local demands for change (for example from a water management group) feed into regional level policy decisions and potentially shape national level investments for environmental management.

- Compounding reflects the potential for incremental adaptive changes to stimulate or hinder more profound change in technical or policy regimes. Building resilience can provoke reflection and be up scaled with consequent changes across a management regime enabling transitional and potentially transformative change – but it could also slow down more profound change as incremental adjustments offset immediate risks while the system itself moves ever closer to a critical threshold for collapse. On the ground mosaics of adaptation are generated from the outcomes of overlapping efforts to build (and resist) resilience as part of development. Mosaics that can change over time as underlying hazards and vulnerabilities as well as adaptive capacity and action change driven by local and top-down pressures.

Adaptation is primarily as a mechanism to avoid harm though can also be considered as an opportunity to exploit new or emerging environmental contexts (for example as local agricultural land-uses become untenable in Asia many farmers have switched to higher value aquaculture based livelihoods). This said, the priority for Guyana is in risk reduction and management through adaptation. The impacts of climate change will be felt directly (weather related and sea-level rise events), indirectly (through the knock-on consequences of reduced access to basic needs as critical infrastructure is damaged or employment lost) and as systems perturbations (the local implications of impacts on global commodity prices or international migration). Adaptation therefore needs to insert itself to ameliorate vulnerability caused by each level of impact.

As one moves from direct through indirect to systems perturbations climate change impacts interact with other systems features such as development policy, demography and cultural norms. This makes it increasingly hard to identify and communicate the consequences of climate change in isolation so that adaptation becomes both a climate change specific and more generic human process of development. The vastness of climate change and the multitude of pathways through which it can affect life and wellbeing for any individual or organization make it almost impossible for „climate change" in a holistic sense to be the target of adaptation. In comparison international targets for mitigation are relatively simple. Rather, people and agencies tend to adapt to local expressions of climate change – flood events, changing crop yields or disease vector ecologies, often without attributing impacts or adaptation to climate change. This again makes identification, communication and ultimately the development of supporting governance structures for climate change adaptation a challenge unless such efforts are integrated into everyday activities and structures of policy making.

1.1 Adaptive management

Adaptive management draws from systems theory and recognises the interdependence of the social and ecological. Its focus is on large and complex social-ecological systems

dynamics, for example watershed or forestry management. Its major contribution is in taking us from abstract, modelling or conceptual work to that based firmly in the empirical reality of decision makers who wish to mainstream adaptation into changing development contexts.

First developed in the late 1970s to support decision-making under uncertainty for natural resource management (Holling, 1978) adaptive management is part of a wider body of literature on organizational management that sees social/organizational learning as a key attribute for systems survival (Argyris and Schon 1978). This is often explained as the spread of successful innovations from individuals to become common practice. For example where a new agricultural or management practice is copied until it becomes the norm. Under adaptive management individual and organizational learning is both encouraged from planned actions (such as change in the regulatory environment) and in response to unplanned environmental surprises (natural or technological disasters). While not specifically formulated with climate change in mind, the aim of providing a conceptual framework and subsequent management guidance for decision-making in contexts where information is scarce and contexts are dynamic is analogous to the challenge facing forward looking climate change adaptation (Pelling et al, 2007).

Learning is enabled in adaptive management through ongoing policy experiment. This usually takes the form of centrally developed management innovations that are piloted locally. If successful they may be replicated or up-scaled across the management regime. Underlying hypotheses explaining relationships between management actions and environmental systems are in this way compared and adapted to over time. This should produce continuous and anticipatory adaptation (Kay, 1997), indeed as the environment changes in response to social adaptations this would demarcate a coevolutionary system over time.

A range of interpretations of the adaptive management approach exist. Learning is framed as an activity at the interface of environmental and economic policy, through to wider questions of democratic principles, scientific analysis and education (Medema et al, 2008). Walters and Hilborn (1978) distinguish between different degrees of formality in learning. Between passive and active adaptive management, with active approaches using formal scientific methods to evaluate experiments and, it is claimed, providing more reliable information for decision-makers. Medema et al (2008) describe active approaches as experience-knowledge-action cycles. In all cases high levels of stakeholder involvement are required for the surfacing of hypotheses and the translation of experimental findings into policy learning.

Evidence from existing experiments in adaptive management offer an early opportunity to observe the challenges likely to present themselves if adaptation to climate change were to become mainstreamed into development. Some very significant challenges to adaptive management have been identified by Walters (1997), Lee (1993) and Medema et al. (2008).

Walters (1997) In a review of 25 adaptive management regimes in riparian and coastal ecosystems of the USA found only two that were well planned with programmes being distracted by focussing on the process of model development and refinement rather than

field testing and application. Walters argues that failure in the take-up of adaptive management by senior decision-makers is caused by a combination of the perceived short-term expense and risk of undertaking experiments, concern that the acknowledgment of uncertainty and acceptance of experimentation inherent in adaptive management may undermine management credibility, and lack of participation from stakeholders. Lee (1993) also analyses the barriers to take-up and adds that the high costs of information gathering and monitoring and associated difficulties in acquiring funding have also inhibited the implementation of adaptive management approaches. Medema et al (2008) summarise these challenges into four barriers for implementation of adaptive management, each with an associated research agenda. These are presented in Table 1. Their most important call is for more knowldge on the outcomes and challenges of adaptive management which unfold slowly and very differently in individual contexts.

The institutional and economic constraints identified in Table 1 are all amenable to policy that can support experimentation and make learning from error an acceptable method for living with change. Where climate change associated uncertainty is increasing, the efficiency argument may also move in favour of a more adaptive management approach.

Table 1: Barriers for the implementation of adaptive management

Challenge	Barrier for adaptive management	Research agenda
Institutional	Rigid institutions (cultural values and more formal rules). Lack of stakeholder commitment to share information over the long-term.	What institutional arrangements are best suited to implementing adaptive management?
Evidence of success	The use of „soft" conceptual and qualitative modelling makes it difficult to communicate outcomes. The boundaries between adaptive management and background processes can be difficult to distinguish.	Methodologies are needed to gather evidence for and communicate the outcomes of adaptive management to stakeholders.
Ambiguity of definition	Multiple, ambiguous definitions make it difficult for resource managers to understand how they can apply this approach.	Is ambiguity a potential strength indicating diversity? Refining the typology of approaches associating themselves with this adaptive management will help add clarity.
Complexity, costs and risk	Experimentation can be ecologically and economically risky. Adaptive management is slow and planning costs are high compared to centralised management.	An honest dialogue is needed on the appropriateness of concepts from complexity science such as sub-optimality, uncertainty and diversity.

Source: Pelling (2011), based on Medema et al (2008)

Adaptive management also helps to provide insight into a key element of adaptation to climate change - multi-stakeholder collaboration for social learning. Evidence suggests that many of the challenges to this aspect of adaptive management are common to other development approaches that seek to incorporate or be led by community actors. Such challenges are most well studied in international development contexts (eg Mungai et al., 2004) and often revolve around the distribution of power between local and management actors worked out through the division of labour and responsibilities, and control of information and decision-making rights (Pelling, 2007). In a study of seven community based forestry management organizations supported as part of adaptive management programmes in the western USA, Fernandez-Gimenez et al. (2008) found that the best outcomes measured by benefits in social learning, trust, and community building, and application and communication of results came from projects where local actors had been given an opportunity to participate. Not only in data collection and monitoring but also in design and objective setting, and where projects were supported by commensurately large budgets. Of those projects with much more limited financial support the best results were found where community members participated in multiple roles.

From this more bottom-up perspective the key challenges for adaptive management – and by implication for integrating adaptation into development planning more generally can be identified:

- the need for higher level organizations to be receptive to local viewpoints and undertake learning in response,
- the challenges of maintaining local engagement over extended time-spans, and
- determining and securing the needed level of technical assistance and science capacity to ensure the validity and credibility of community led efforts.

Fernandez-Gimenez et al. (2008) also point to the opportunities that adaptation can open. They note that community led approaches to adaptive management can be a source of local skill training and employment generation in the establishment of an ecological monitoring workforce. These could in part off-set or help to justify the financial costs of adaptation in development.

1.2 Resilience and adaptation

Resilience is popularly understood as the degree of elasticity in a system, its ability to rebound or bounce back after experiencing some stress or shock. It is indicated by the degree of flexibility and persistence of particular functions. That resilience is not simply synonymous with adaptation has been well demonstrated by Walker et al. (2006a) who argue adaptation can undermine resilience when adaptation in one location or sector undermines resilience elsewhere, where management focus on a known risk distracts attention from emergent hazard and vulnerability and increased efficiency in adaptation

(through risk management for example) can lead to institutional or infrastructural inertia and loss of resilient flexibility.

Resilience has been contrasted both with stability and vulnerability. Stability, according to Holling (1973) is an attribute of systems that return to a state of equilibrium after a disturbance. This compares with resilient systems that might be quite unstable and undergo ongoing fluctuation but still persist. Stability is more desirable in circumstances where environmental perturbations are mild, resilience is most useful as an attribute of systems living with extremes of impact and unpredictability. Within the disaster risk community, resilience has been interpreted as the opposite of vulnerability. The more resilient, the less vulnerable. But this belies the complexity of the conceptual relationship between these terms which have also been constructed as nested – with vulnerability being shaped by resilience (Manyene, 2006) which for some, in turn incorporates adaptive capacity (Gallopin, 2006). Stability and vulnerability provide useful bounding concepts for resilience. They suggest that resilience is about the potential for flexibility to reduce vulnerability and allow specific functions to persist. What it does not tell us is how these functions are identified or who decides (Lebel et al., 2006). This requires a more critical engagement with social processes shaping resilience (see Chapter 3, 6, 7 and 8).

Working with the idea of resilience, and especially efforts that seek to measure it are made difficult because of its multifaceted character. The processes and pressures determining resilience for a unit of assessment change with spatial, temporal and social scale – a community may be resilient to climate change associated hurricane risk (through early warning and evacuation, for example) but less resilient to the long-term inflections of climate change with the local and global economy. The subjects of analysis are also wide, bringing diversity but also fragmentation to the study of resilience. Cutter et al, (2008) identify studies attributing resilience and related metrics to ecological systems (biodiversity), social systems (social networks), economic systems (wealth generation), institutional systems (participation), infrastructure systems (design standards) and community competence (risk perception) (Folke, 2006; Paton and Johnston, 2006; Rose, 2004; Perrow, 1999; Vale and Campanella, 2005).

One of the first critical engagements with resilience from the perspective of environmental risk management came from Handmer and Dovers" (1996) proposal of a three-way classification of resilience. This insightful framework has echoes of Burton et al."s (1993) classification for coping and still offers a great deal. It highlights both the contested and context specific character of adaptation and is worth describing in some detail. The three-way classification presented resilience as: (1) resistance and maintenance; (2) change at the margins, and; (3) openness and adaptability.

Resistance and maintenance is commonplace, particularly within authoritarian political contexts where access to information is controlled. It is characterised by resistance to change, actors may deny a risk exists with resources being invested to maintain the status quo and support existing authorities in power. When risk is undeniable these systems typically delay action through a call for greater scientific research before action is possible. Vulnerability can be held at bay by resource expenditure, for example in food aid or through containing local hazard risk through hard engineering „solutions". But this can

generate additional risks for other places and times through global flows of energy, resources and waste. This type of resilience offers an easy path for risk management, there is little threat to the status quo and considerable stress could be absorbed, however when overcome the system would be threatened with almost complete collapse – Diamond"s (2005) thesis on the collapse of ancient civilisations reminds us of this possibility.

Change at the margins is perhaps the most common response to environmental threat. Risk is acknowledged and adaptations undertaken, but limited to those that do not threaten core attributes of the dominant system. They respond to symptoms, not root causes. Advocates argue that this form of resilience offers an incremental reform, but it is as, or more likely to delay more major reforms by offering a false sense of security. Preference for near-term stability over radical reform for the wellbeing of future generations provides a strong incentive for this form of resilience. This approach is well illustrated by the Hyogo Framework for Action on Disaster Risk Management, this sets forth an international agenda agreed by nations for managing disaster risks including those associated with climatic extremes. Not surprisingly given the vested interests of dominant voices in the international community for the status quo the framework is limited. It calls for the integration of risk management policy into development frameworks, the increasing of local capacity for risk reduction and response, for new systems of disaster risk identification and information management (ISDR, 2005).

Social systems displaying openness and adaptability tackle the root causes of risk, are flexible and prepared to change direction rather than resist change in the face of uncertainty. That this mode of resilience is so rare is testament to the huge inertia the results from personal and collective investment in the status quo. Large fixed capital investments make change difficult as do investments in soft infrastructure − preferences for certain types of education or cultural values make shifts painful in industrial societies. Dangers also lie with this form of resilience: instability will lead to some ineffective decisions and maladaptation would need to be prepared for within individual sectors as a cost of wider systems flexibility. These are both worries that decision-makers have cited in making it difficult for them to commit to adaptive management strategies, as described above.

Handmer and Dovers prefigure their account by a caution that while the three classifications are designed to cover the full range of policy responses to the adaptation challenge, most actors will operate in only a small part of this range. This points to a central dilemma for adaptation - that the comfort zone for adaptive action is relatively small because of the instability that come arise from change. Resilience then has the possibility of moving beyond this impasse by both identifying flexibility within the socially accepted bounds of stability but also making transparent for all social observers the range of choices foregone. Mapping the characteristics of social systems that are more of less amenable to these three forms of resilience is a key foundation for the analytical framework which places emphasis on the processes through which systems undertake or resist adaptive change.

More contemporary work on resilience and its relationships with vulnerability and adaptation have also applied critical reasoning. This has focussed on the advantages of

inclusive governance. This it is argued facilitates better flexibility and provides additional benefit from the decentralisation of power. On the down side, greater participation can lead to lose institutional arrangements that may be captured and distorted by existing vested interests (Adger et al, 2005b; Plummer and Armitage, 2007). Still, the balance of argument (and existing centrality of institutional arrangements) call for a greater emphasis to be placed on the inclusion of local and lay voices and of diverse stakeholders in shaping agendas for resilience through adaptation and adaptive management (Nelson et al, 2007). This is needed both to raise the political and policy profile of our current sustainability crisis and to search for fare and legitimate responses. Greater inclusiveness in decision making can help to add richness and value to governance systems in contrast to the current dominant approaches which tend to emphasise management control. When inevitable failures occur and disasters materialise this approach risks the of undermining legitimacy and public engagement in collective efforts to change practices and reduce risk. This takes us back to Handmer and Dovers (1996) analysis of the problem of resilience and shows just how little distance has been travelled in the intervening years.

2. METHODOLOGY

2.1 Institutional context

The institution in charge of planning and conducting operations related to the different types of disasters in Guyana is the Civil Defence Commission (CDC), established in 1982. CDC is a full member of the Caribbean Disaster Emergency Response Agency (CDERA). The Commission works closely with UNDP in the revision of the Disaster Management Plan. The mission of the commission is to develop, implement and maintain a national Disaster Preparedness and Prevention Programme, to prevent or mitigate the impact of all kinds of disasters, and to provide rescue, evaluation, shelter relief and rehabilitation.

Besides, the United Nations Development Programme has provided technical assistance to Guyana since 1952. Regarding addressing disaster risk reduction, UNDP has supported Guyana in its efforts to reduce the risk of natural disasters by working with national institutions, the private sector and civil society to develop human, financial, and technical and legislative capacities. Meanwhile, together with ECLAC conducted a major assessment of the 2005/2006 floods. Programmes were implemented as a follow up such as: establishment of a National Emergency Management Organization; establishment of Sustainable Sanitation Systems; establishment of a Disaster Infrastructure Recovery Programme; and institutional capacity building at the national level. This experience provides key baselines against which to measure contemporary adaptive capacity. It also indicates the role played by international actors in offering technical input to the Government of Guyana as policy and capacities are shaped. Assessing adaptive capacity in Guyana and any discussion of a forward looking appraisal will need to consider international as well as national and local viewpoints.

2.2 Data collection methods

The ACI research tool aims to provide quantitative assessment of adaptive capacity but also a context within which to engage stakeholders in a reflective assessment of resilience. One where self-critique of risk management practice, and capacity to change values, behaviour

and outcomes as an indicator of adaptive capacity is placed alongside a review of existing practices and capacities. This is important, in teasing apart the relationship between the risk management and adaptive capacity elements of resilience and how far they influence one another.

Our starting point was to adopt the basic framework established by the Risk Management Index. Adaptove capcity is evaluated based on the benchmarking of a set of subindicators that reflect performance targets associated with the effectiveness of disaster management activities. The participation of external experts as well as disaster managers in validating the quality of specific activities and capacities was incorporated to minimise bias.

In order to capture the layers of risk management operating within Guyana, the framework was applied at two scales: with stakeholders engaged in national level policy and action, and those with sub-national responsibilities. Both sets of respondents were asked to respond to a common template using descriptors to indicate levels of practice for each of five component variables (see Appendix 1). This was supported by an informal interview style of questioning used to draw out comments and judgements beyond the minimum of the quantitative assessment for which pre-coding was not possible. In this way the approach generated an opportunity for respondents to reflect on their own practice.

The index was built in three steps.

1. A basic structure for the index was derived theoretically and from past empirical experiences in Guyana and elsewhere (principally London) and offered to key respondents for refinement. Table 2 indicates the areas of practice from which respondents were recruited. It was important to include both Guyana based respondents and those with an overview but also removed from the direct policy process. Following adjustments, the framework was presented to the formal sample of national and sub-national respondents.

2. Respondents were purposefully selected to represent as diverse as possible a range of stakeholder views (see Tables 3 and 4). Care was taken to include members of the CDC chaired Disaster Platform (in both groups) and all respondents included in the RMI analysis were invited to participate to maximise the potential for joined-up analysis across these indexes of risk management capacity.

   Within each interview, which typically lasted an hour or so respondents were asked to put a value as a performance indicator for each indicator, and invited to discuss how this value was arrived at and more broadly the conditions that shaped their capacity and that of their organization to adapt to climate change and flood hazard in particular.

   Each indicator was assessed using five performance levels (*Very limited, Basic, Appreciable, Outstanding,* and *Optimal*) that were assigned a numerical value of 1 (*Very limited*) to 5 (*Optimal*). The use of a progressive numerical scale to assess performance does not indicate the presence of a universal standard of very limited or optimal capacity; neither is it to imply that the distance between each increment

is quantifiable or equal. In practice, the degree of adaptive capacity identified by each respondent was subjective to individual experience and assessment of performance targets for risk management. The incorporation of a wide range of risk managers and practitioners with a macro and local level understanding of risk management needs minimized bias, providing an overview of risk management performance.

To provide comparability across the sample respondents were prompted and guided through the placing of qualitative values. As a guide the following meanings were attributed to each performance level:

Very limited:
No formalised capacity. Activity is ad hoc, very infrequent and not planned or captured by strategy.

Basic:
A low level of formal capacity. Activity is planned. Action is infrequent and superficial, below the levels or intensity required to make a concrete difference to outcomes.

Appreciable:
A modest level of formal capacity. Activity is planned and strategic. Action is regular and outcomes can be identified but are limited in the depth of impact.

Outstanding:
Strong formal capacity. Activity is planned, strategic and integrated into all major sectors. Action is frequent, outcomes have made a clear difference to risk and its management.

Optimal:
Very strong formal capacity. Activity is planned, strategic, integrated and a part of everyday practice. Action is constant, outcomes have reshaped risk and its management and continue to do so in continuous cycles of activity.

Respondents were asked to comment on contemporary capacities, those just after the 2005 floods and those from before the floods in 2000. In this way the methodology provided scope for both direct and indirect elements of climate change and adaptation to emerge from the interview without directing. All interviews were held face-to-face.

3. Finally two analytical tasks were performed. First a quantitative analysis of stated index values to produce results tables and histograms. Secondly interview data was analysed qualitatively to draw out processes, gaps and opportunities for enhanced adaptive risk management.

Table 2: Respondents used to develop and test framework relevance to Guyana

Organization	Individual Respondent Roles

UNICEF	Emergency and Risk Specialist*
UNDP	Program Analyst – Environment*
World Bank	Operations Analyst
Delegation of the EC	Programme Officer
IADB	DRM Lead Specialist
University of Guyana	Geographical Information Systems specialist
University of Guyana	Environmental Education specialist
University of Guyana	Hydromet specialist

* Disaster Focal Point on National Platform

Table 3: Respondents with a National Viewpoint

Organization	**Individual Respondent Roles**
Ministry of Natural Resources	Minister
Ministry of Health	Chief Medical Officer
Ministry of Local Government	Special Projects Officer*
Ministry of Housing and Water	Minister
Minister of Agriculture	Permanent Secretary*#
National Drainage and Irrigation Board	Chief Officer
Civil Defence Commission	Project Co-ordinator*
Sea Defence	Chief Sea and River Defence Officer*
Office of Climate Change	Head, Advisor to President*
Lands and Surveys	Manager, Land Information and Mapping#
HydroMet	Chief Hydromet Officer*
Environmental Protection Agency	Senior Environment Officer*

* Disaster Focal Point on National Platform

Did not provide a quantitative assessment of adaptive capacity

Table 4: Respondents with a Sub-National Viewpoint

Organization	**Individual Respondent Roles**
Insurance Regulator	Assistant Director
Solid Waste Management (Mayor and City Council, Georgetown)	Director MSWMD
Guysuco	Manager, Security Services*
Guyana Rice Development Board	General Manager*
Guyana Rice Producers Association	Chairman*
Water Users Association	Chair: Canal Polder #1 and 2
Water Users Association	Chair: Cane Grove
Community Mobilizer	Community Flood Risk Organizer
Women Across Differences	Risk Awareness Mobilizer
Sugar Estate	LBI Estate
Guyana Red Cross	Project Coordinator*

* Disaster Focal Point on National Platform

The five components of the ACI were:

1. Improving foresight (horizon scanning for unexpected risks).
2. Critical self-reflection (the ability of policy and implementing agencies to reflect on practice outcomes).
3. Organizational structure.
4. Support for experiments in risk reduction and response
5. Availability of resources for flexible vulnerability management

The goal of „Improving Foresight" is to assess practices and resources in place to scan for future risks and opportunities associated with climate change and flood risk. This can include the possibility of change I associated fields that may compound climate change and flood risk. Areas of foresight can include hazard, susceptibility, development and disaster risk management. Typically foresight is improved when organizations include this as a formal element of job titles and work plans, when data and expertise, often external is sought out and made available. Scope to ask for dedicated assessments of aspects of future risk is a particularly strong indicator of foresight.

„Critical self-reflection" lies at the heart of resilience planning. It indicates the ability to step-back from existing goals as well as practices and consider alternative directions for an organization. Critical self-reflection relies upon organizational structures that allow a questioning of existing priorities and rationales as well as of technical and operational norms. Indications of a culture of critical self-reflection include past examples when the organization or a part thereof has changed strategic direction or the range of tools used to meet an existing goal, space in the administrative agenda for reflection that goes beyond questions of efficiency to include a testing of existing practices and rewards for professional practice that is questioning, and responsible.

„Organizational structure" captures the capacity for an organization to be flexible in the face of uncertainty yet allow core functions to persist into the future. Indications of organizational structure of relevance to resilience include horizontal and accountable internal governance structures, good relations with surrounding organizations and adequate tools in place to verify the quality of information relevant to potential risk and adaptation options.

„Support for experiments" includes both cultural and administrative elements of an organization that enable innovation. Experiments can be very localised or rather extensive and are used to help project a range of options into with which to respond to potential future risk scenarios. These can include structured experiments aimed at meeting specific futures, or more open acts that are generic and simply open scope but are not fixed on meeting a defined challenge. Experimentation is not efficient or profit-maximising in the short-term but does build resilience in the long-term.

„Resources to enable adjustments" focuses on financial and in-kind support for the elements of adaptive capacity described above, or other elements not fully captured, but considered as important by the respondent. These include internal resource allocation and the ability of the organization to leverage external resources, from financial grants to public legitimacy and local knowledge.

Respondents were prompted to comment on canonical and shadow systems components when responding to the sub-indicators. Canonical components refer to those which accrue, or are a part of the formal, recognised system; shadow components refer to informal practices, often normalised through repetition and widely acknowledged, but not formalised through legislation, regulation or guidance including job descriptions. In this way it is possible to capture adaptive capacity that is „ahead of the curve" ie where individuals are able to perform actions that build adaptive capacity even when this is not yet a formally recognised element of professional practice. Examples include the convening of working groups that go beyond established requirements, or holding informal conversations with colleagues from other government agencies or with international colleagues that help in identifying potential future risks.

2.3 Analytical methods

The design of the RMI involved establishing a scale of achievement levels or determining the „distance" between current conditions and an objective threshold or conditions in a reference country.

The ACI was constructed by quantifying four public policies. The ACI, as indicated in equation 1, is defined as the average of the four composite indices:

$$ACI = (ACI1 + ACI2 + ACI3 + ACI4)/4 \quad (1)$$

Weighting was kept neutral, each value retained its original calculated value. This reflects the subjectivity inherent in the data collection process and was considered the preferred analytical mode as it avoids the loss of transparency that a data transformation through weighting can produce.

Similarly performance targets were unadjusted allowing respondents to base their judgements on the surrounding discussion where evidence of stated performance levels were presented and adjudged by the interviewer. Performance level denominators were based on the RMI to allow comparability in analysis: though it should be remembered that the relationship is qualitative, not statistical. Importantly this enabled analysis to generate a prioritisation for policy recommendations on Government efforts at formulating, implementing, and evaluating support for adaptive capacity.

2.4 Bias and limitations

There are likely to be as many views of the adaptive capacity of Guyana and its organizations as there are stakeholders. The objective of this consultancy was to provide a clear and inclusive view of adaptive capacity and to provide a mechanism for self-reflection as part of this process in the belief that a stand-alone data extraction tools would be more likely to undermine than build adaptive capacity for the future.

The project was resource bound and consequently it was decided to focus on generating depth in a focussed study that could drill down from the national to the sub-national level. Alternative sample frames could have highlighted differences in perceived adaptive

capacity by geographical region (coastal/interior or by administrative coastal region), urban-rural or across productive sectors. The final sample dies include indicative viewpoints from several productive and critical urban and rural sectors. The project ToR specified a coastal focus and this was respected in the sample.

Preconceptions held by the analysts may have affected the framing and analysis of results and it was to control for this that the framework was discussed with key respondents from the University of Guyana n and a range of interested international agencies active in Guyana. Some of these respondents were asked to answer develop questions, others provided more open comment.

Respondent bias was controlled principally by the use of a structured questionnaire tool administered in person by the project researcher. It was felt that given the complexity of the information required this would be more fruitful than a telephone, internet or postal survey. This was born out in the high response rate and detailed and careful consideration given to the questions by the majority of respondents.

Strategic bias introduced by respondents is always a possibility. The high degree of match between multiple, diverse respondents across the sample suggests that this has been controlled for. Building a discursive approach around the core questionnaire further proved scope for respondents to explain their quantitative judgements of capacity and was a control on unsupported views.

3 ESTIMATION OF ADAPTIVE CAPACITY INDEX

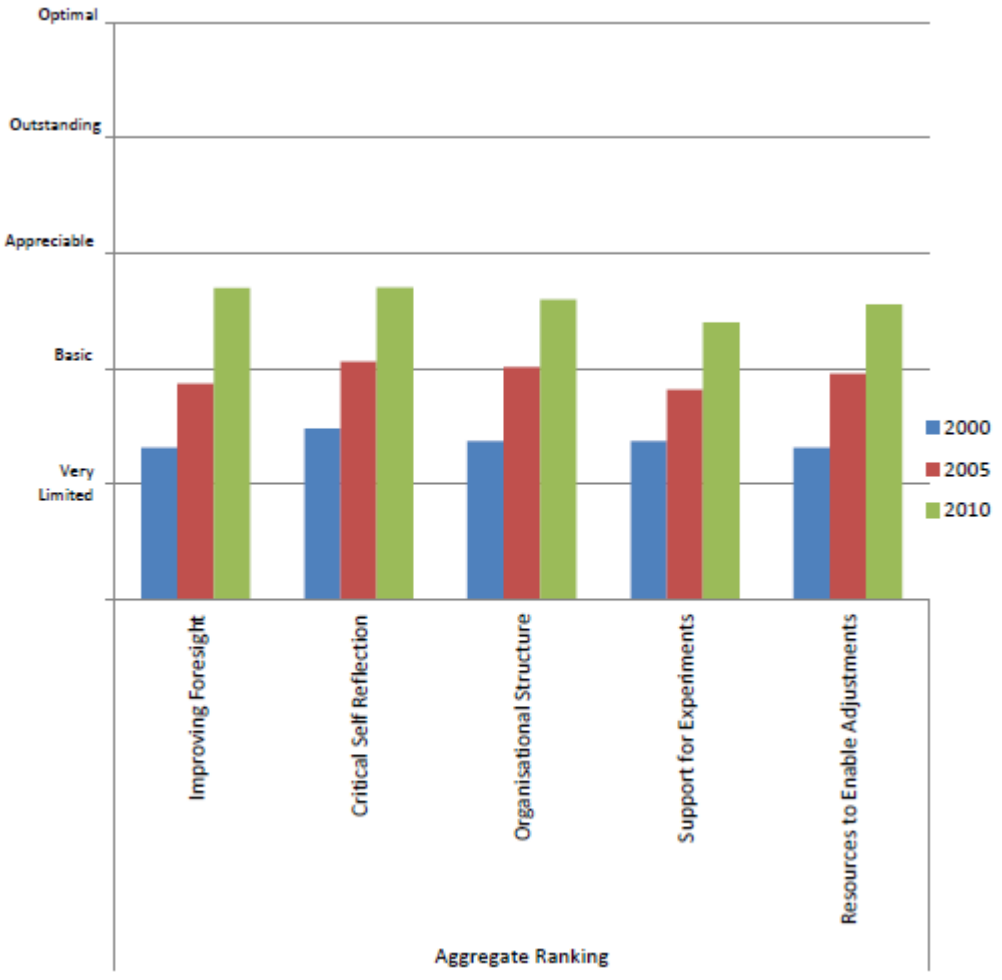
ACI results have been obtained from detailed surveys made to experts and representatives of different institutions related to risk management and international organizations. The surveys have been performed with the support of a local consultant and CDC, who have identified a list of potential local experts that have the proper knowledge about the disaster risk management in the country. Thus, this index reflects performance of risk management based on evaluations of academic, professional and officials of the country. Results for 2000, 2005 and 2010 are presented below in aggregate and disaggregated by national and sub-national viewpoint.

Table 4 shows total ACI and its components for the national level, for each period. These are illustrated graphically in Figure 2.

Table 4. Total ACI values for Guyana

Year	2000	2005	2010
Improving Foresight	1.3	1.9	2.7
Critical Self-Reflection	1.5	2.1	2.7
Organizational Structure	1.4	2.0	2.6
Support for Experiments	1.4	1.8	2.4
Resources to Enable Adjustments	1.3	2.0	2.6

Figure 2: Total ACI Values for Guyana



Error! Reference source not found.2 shows the qualification of sub-indicators[2] which composed the Total ACI.

The Total ACI shows continuing and quite persistent progress over time. From 1990 to 2010 can be observed that the country had a level improvement from very limited to more than basic for all indicators. Though none have yet reached the level of Appreciable. There is some variation in the rates of improvement, though these are slight, support for experiments was consistently the weakest and critical self-reflection consistently the strongest aspect. It is informative that resources to enable adjustments while scoring lowest (with improving foresight) in 2000 was reported as the second and third equal best performing variable in 2005 and 2010 respectively. It should be noted that all values are low showing respondents indicate a lack of capacity, but within this finance is not singled out as a determining factor for limits to adaptive capacity. The data show that this is equally spread amongst, organizational, cultural as well as resource drivers. Elsewhere it has been noted that economic capacity is not the default limiting constraint of adaptive capacity, while adequate and appropriate risk and adaptation financing can help in enabling experimentation, diversification etc., it is important to get the institutional architecture right and this includes improving foresight, spaces for critical self-reflection and support for experimentation. Guyana"s current position is indicative of this with scope for gains from international support and national policy directed at more clearly defining and presenting adaptation as an organizational and policy goal and articulating how government agencies might make their procedures more adaptive. A starting point would be **to establish a national adaptation working group, to provide a forum for business, civil society and key government stakeholders including regional government, and including involvement of external expertise, from the Caribbean or wider afield.**

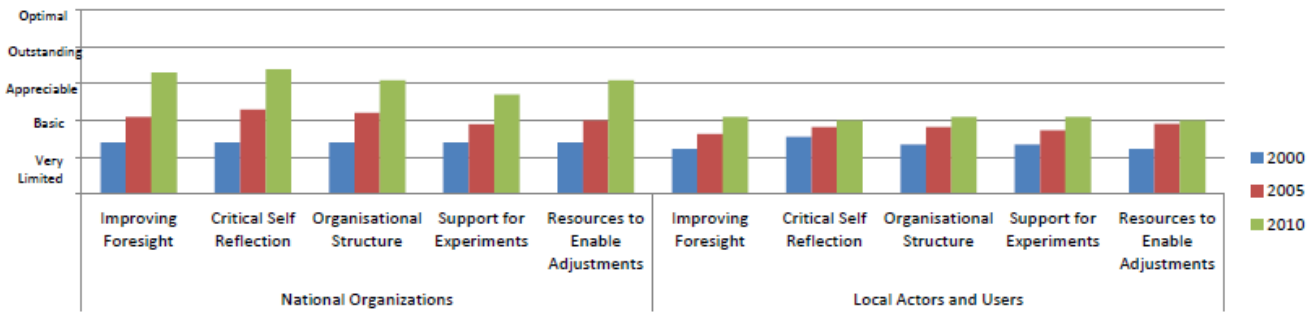
Table 5 shows the disaggregated ACI and its components for the perspective of national and sub-national level stakeholders, for each period. These are illustrated graphically in Figure 3.

Table 5: Disaggregated ACI values for Guyana: national and sub-national viewpoints

Year	2000		2005		2010	
	National	Sub-National	National	Sub-National	National	Sub-National
Improving Foresight	1.4	1.2	2.1	1.6	3.3	2.1
Critical Self-Reflection	1.4	1.6	2.3	1.8	3.4	2.0
Organizational Structure	1.4	1.3	2.2	1.8	3.1	2.1
Support for Experiments	1.4	1.3	1.9	1.7	2.7	2.1
Resources to Enable Adjustments	1.4	1.2	2.0	1.9	3.1	2.0

Figure 3: Disaggregated ACI for Guyana: national and sub-national viewpoints

[2] Qualification is linguistic and it does not use defined numbers. In meanings in the tables are: 1: *low*, 2: *incipient*, 3: *significant*, 4: *outstanding* and 5: *optimal*



Disaggregated data reveal a marked difference between descriptions of adaptive capacity for organizations with responsibilities at the national and sub-national levels. Consistently national level organizations report higher levels of capacity. This is so for all measures of adaptive capacity. The difference in adaptive capacity increases from 2000 to 2005 and again 2005 to 2010. At the national level improvements are most marked between 2005 and 2010 while at the local level greater improvements were registered for 2000 to 2005. This perhaps is indicative of changing international and national policy priorities on the one hand, and the local responses to the 2005 flood on the other. **The challenge going forward is to better connect local energies driven by sector and local specific concerns – clearly demonstrated by response to the 2005 floods, and the national architecture which is responsive to national and international policy.**

Bridging the gap between national and local capacities is a common challenge in adapting disaster risk management to climate change. Guyana"s focussed population, productive assets and physical capital base provide some opportunities for achieving this once local and national mechanisms can be broached. Differences between national and sub-national viewpoints were most marked for resources to enable adjustments which show a movement form basic to appreciable between 2005 and 2010 at the national level, while remaining almost unchanged around the basic threshold for sub-national capacity. These findings indicate that national and international support for adaptation is either finding it more difficult to reach sub-national actors, or that policy is not having as much impact at this level than the national suggesting gains are likely to be made by a more local orientation in support, while simultaneously working with national level actors to maintain a supportive institutional architecture.

Amongst national level organizations results from 2000 indicates some bias with only six respondents feeling able to offer a judgement. This is a reflection on staff turn-over and also perhaps the importance of the 2005 national flood event for this group of actors who were all very able to offer accounts of the ways in which this national emergency and the international response to it has led to changes in practice and capacity.

For 2010 values, capacity was described as appreciable for improving foresight and critical self-reflection and at a lower level for organizational structure and resources. These are reasonable score considering the novelty of adaptation as a policy domain and perhaps reflect a good level of flexibility in the Guyanese policy system around these more „information" driven elements of adaptation and a recognition at senior national and international levels of the need for review of formal organizational and financial

mechanisms to support adaptation. This said support for experiments – remains at a basic level, suggesting that while formal structural and financial and indeed information access mechanisms may now be recognising new climate information and considering adaptation this has not yet worked through even at the national level to the ground through experimentation as part of the development process. This might also reflect the limited scale of Guyana"s productive and critical infrastructure sectors and subsequent capacity to mount experiments and carry the costs of failures. **This finding points to a key policy recommendation for the international community which could support experimentation and reduce the risk burden for national level actors (and local counterparts).**

At the sub-national level the structure of adaptive capacity appears to be changing, though at a slow pace, with indications of greater support and less self-reliance. In 2000, critical self-reflection led the way in capacity – though all scores were very low-basic. By 2005 findings indicate access to resources had overtaken critical self-reflection with organizational structure also leading in the shaping of capacities. In 2010 all variables score around the „basic" threshold. This perhaps highlights a key challenge for sub-national actors caught between the desire to innovate and adapt and also to attract external support. **A key finding, reinforcing earlier observations is that support for adaptation might be usefully directed toward rewarding those who begin to take adaptive action – including at the organizational as well as at the levels of field experiments and adjustments, as well as supporting the manifestly vulnerable.**

4 INTERVIEWS

In discussion with stakeholders it was clear that many excellent adaptive practices are already being undertaken in Guyana but these are not yet being systematically recognised (even by those organizations where adaptive capacity and action is observable). Where there is no systematic recognition of adaptation generating support for adaptive capacity building is made more difficult.

Examples of good practice that can support adaptive capacity noted by respondents included:

1. The decision to support early warning infrastructure and capacity, especially at the East Demerera Conservancy where there is potential for sea intrusion. This shows awareness and monitoring is good and impacts can be improved with better coordination between agencies and organizations working in related fields.

2. Self-reflection was reported especially after the 2005 floods by national agencies, Red Cross, and UN system with the Disaster Coordination Platform described by some as a mechanism for reflection. The Disaster Coordination Platform chaired by the CDC including focal points in different line ministries, Red Cross etc. the group has shared information on risk reduction and early warning with public

3. Efforts to integrate local and national systems of information include the Ministry of Local Government with assistance from the Ministry of Agriculture which has

established a hotline system in all ten regions for community complaints or reports on flooding, sluices and drainage malfunction. This system has been used to assess flooding and identify affected communities but is inconsistent in its reach.

4. Efforts to change behaviour to manage risk include work by the Ministry of Housing and Water in response to non compliance with building codes and standards which, for example, requires building 3 feet above sea level. Codes are now shared with Neighbourhood Democratic Councils but problems with enforcement remain. This is now being tackled by visits from officers in the Community Development and Planning Unit (within the Central Housing Authority) who go to communities to advise builders and communities.

Respondents from all groups (see Tables 2, 3 and 4) also identified what were felt to be key constraints limiting adaptive capacity and action. These findings are qualitative, but no less important, they provide a verification mechanisms for the quantitative VCI analysis and also point to specific recommendations for action.

Interview findings, which are summarised below around the themes of problem framing, governance, information and resources, confirm the main recommendations coming from the ACI.

4.1 Problem framing

Institutionalising adaptation as part of enhanced risk reduction activities will likely require additional strategic emphasis, the involvement of new actors, and additional collaboration between risk response and development agencies including the private and voluntary sectors. Respondents identified three areas of potential advancement:

1. Simplify legislation on disaster management to enhance the clarity of responsibilities for disaster risk management and response.

2. Re-orient local, national and sector flood risk systems which are currently reactive, to become proactive. Move from a focus on response to one that includes also preparedness. This requires change in management systems, forums, and response strategies that are currently designed to become operational once there is a flood, not before it takes place.

3. Broaden the scope for adaptation in risk management by incorporating a focus on social policy to support behavioural change. This is important if advances in technology and engineering capacity or form legislation – for example in land-use – are to bring their full benefit.

4.2 Governance

As noted, there are already examples of adaptive capacity and action in Guyana noted in this study and clearly much more activity will not have been observed. Making the most of this capacity and the efficient and equitable generation of additional capacity is a concern of governance. Four proposals were offered to us by respondents:

1. Simplify management roles and responsibility, especially where local, regional and national roles currently overlap for example in the management of drainage and irrigation.

2. Seek ways of bringing households, local communities and businesses into planning and preparing for flood risk, and in keeping local interests alive and active, perhaps by integrating these into ongoing programmes and institutions such as farmers groups, schools and NDC activity.

3. Consider ways in which the public can be supported in challenging risk generating activities – such as garbage dumping, especially where there are multiple benefits – to health, the environment and in flood risk reduction.

4. Support mechanisms that can demonstrate the fare allocation of resources associated with local development and risk management.

4.3 Information

Information is key to adapting to climate change. Information management including its generation and exchange becomes increasingly important as adaptation is mainstreamed into risk management as with any other sector. Respondents identified the following opportunities for improving information flow and access building mainly on existing capacities.

1. Work to improve communication protocols and relationships between organizations and departments responsible for flood risk management.

2. There may be scope to improve information collection and feed this in to scenario generation and foresight work with investment for example in Lands and Surveys, Hydromet and the University of Guyana where research capacity can be strengthened.

4.4 Resources

Adaptation can be helped by supporting specific organizational structures and human resources. Identified opportunities for support include:

1. Training personnel for effective cross-agency cooperation in risk management.

2. Seek ways to build institutional memory, perhaps by overlapping responsibilities in key working groups to counteract the high turnover of staff.

3. Consider new financial instruments and funds, both to support experimentation and local leadership in adaptive management approaches, and to share risk burdens through greater spread of insurance.

4. Consider a shift away from focussed capacity building and funding being directed to agencies that assist with response, towards support for development facing disaster risk reduction.

5 CONCLUSIONS AND RECOMMENDATIONS

It is informative to review the core findings of the ACI alongside those derived from its sister indexes, especially the Prevalent Vulnerability Index (PVI) and Risk Management Index (RMI). Conclusions from these indexes show that in Guyana disaster risk management has been improved over the last decade and more, but that despite this prevalent vulnerability has maintained levels from 1990. Improvements in risk management are not able to overcome rising levels of vulnerability from hazard exposure and susceptibility. This observation reinforces the findings of the ACI which show that while there is a stated improvement across all components of the ACI, levels remain at best „appreciable", and for local actors „basic". If part of the reason for the failure of improvements in risk management is the changing nature of hazard and vulnerability then adaptive approaches to risk governance would appear to offer advantages now – as well as preparing the institutional architecture of risk management for a future increasingly influenced by the uncertainties of climate change and other components of global environmental change.

Comparison with the RMI indicates some areas where positive movement can be built on so that gains for risk management take advantage of incorporating the lessons from adaptive capacity. The RMI shows that improvements are especially noteworthy in disaster management and risk identification. From this basis many of the options for enhanced adaptive capacity that are concerned with information, resource, governance and problem framing can be approached.

Summarising the analysis of the ACI five key recommendations can be made:

1. Establish a national adaptation working group, to provide a forum for business, civil society and key government stakeholders including regional government, and including involvement of external expertise, from the Caribbean or wider afield.

2. Better connect local energies driven by sector and local specific concerns with the national risk management and development architecture.

3. Advocate the international community to support local experimentation.

4. Support those who begin to take adaptive action – including at the organizational level and at the levels of field experiments and adjustments, as well as supporting the manifestly vulnerable.

5. Review existing management priorities, organizational structures and governance with a view to identifying efficient pathways for mainstreaming adaptation – for example by improving information flows, re-orienting disaster management to a more proactive and developmental footing and revising the institutional and legal framework, including the balance of capacity and responsibility between national and more local or sector specific actors.

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APPENDIX I

Adaptive Capacity Index: Sub-Components Ranking Frame

Index Sub-Components	**2000**	**2005**	**2010**
Improving foresight and planning (for potential flood risks 5 years or more in future)	*Very limited*	*Very limited*	*Very limited*
	Basic	*Basic*	*Basic*
	Appreciable	*Appreciable*	*Appreciable*
	Outstanding	*Outstanding*	*Outstanding*
	Optimal	*Optimal*	*Optimal*
Critical self-reflection	**2000**	**2005**	**2010**
	Very limited	*Very limited*	*Very limited*
	Basic	*Basic*	*Basic*
	Appreciable	*Appreciable*	*Appreciable*
	Outstanding	*Outstanding*	*Outstanding*
	Optimal	*Optimal*	*Optimal*
Organisational structures	**2000**	**2005**	**2010**
	Very limited	*Very limited*	*Very limited*
	Basic	*Basic*	*Basic*
	Appreciable	*Appreciable*	*Appreciable*
	Outstanding	*Outstanding*	*Outstanding*
	Optimal	*Optimal*	*Optimal*
Support for experiments in risk reduction and response	**2000**	**2005**	**2010**
	Very limited	*Very limited*	*Very limited*
	Basic	*Basic*	*Basic*
	Appreciable	*Appreciable*	*Appreciable*
	Outstanding	*Outstanding*	*Outstanding*
	Optimal	*Optimal*	*Optimal*
Resources to enable adjustment	**2000**	**2005**	**2010**
	Very limited	*Very limited*	*Very limited*
	Basic	*Basic*	*Basic*
	Appreciable	*Appreciable*	*Appreciable*
	Outstanding	*Outstanding*	*Outstanding*
	Optimal	*Optimal*	*Optimal*