



**Public-private partnerships for storm risk
management in the Cayman Islands**

Emma L. Tompkins and Lisa-Ann Hurlston

March 2010

Centre for Climate Change Economics and Policy

Working Paper No. 21

Sustainability Research Institute

Paper No. 21

The Centre for Climate Change Economics and Policy (CCCEP) was established by the University of Leeds and the London School of Economics and Political Science in 2008 to advance public and private action on climate change through innovative, rigorous research. The Centre is funded by the UK Economic and Social Research Council and has five inter-linked research programmes:

1. Developing climate science and economics
2. Climate change governance for a new global deal
3. Adaptation to climate change and human development
4. Governments, markets and climate change mitigation
5. The Munich Re Programme - Evaluating the economics of climate risks and opportunities in the insurance sector

More information about the Centre for Climate Change Economics and Policy can be found at: <http://www.cccep.ac.uk>.

The Sustainability Research Institute (SRI) is a dedicated team of over 20 researchers working on different aspects of sustainability at the University of Leeds. Adapting to environmental change and governance for sustainability are the Institute's overarching themes. SRI research explores these in interdisciplinary ways, drawing on geography, ecology, sociology, politics, planning, economics and management. Our specialist areas are: sustainable development and environmental change; environmental policy, planning and governance; ecological and environmental economics; business, environment and corporate responsibility; sustainable production and consumption.

More information about the Sustainability Research Institute can be found at: <http://www.see.leeds.ac.uk/sri>.

This working paper is intended to stimulate discussion within the research community and among users of research, and its content may have been submitted for publication in academic journals. It has been reviewed by at least one internal referee before publication. The views expressed in this paper represent those of the author(s) and do not necessarily represent those of the host institutions or funders.

Public-Private Partnerships for Storm Risk Management in the Cayman Islands

© Emma L Tompkins and Lisa-Ann Hurlston 2010

Email: E.L.Tompkins@leeds.ac.uk

Contents

Contents	3
Abstract	4
About the Author	4
Introduction	5
Public private partnerships for environmental governance	6
Cayman Islands hurricane preparedness and the National Hurricane Committee	8
Past and future effectiveness of the National Hurricane Committee	12
Conclusions: lessons for public private partnerships in hazard management	14
Acknowledgements	16
References	16

Abstract

This paper analyses the role of public and private responsibility in the provision of public goods – specifically national hurricane preparedness, including early warnings and post-impact recovery. This is achieved through a review of the changes that have occurred in the Cayman Islands' National Hurricane Committee (NHC). The NHC is a novel hybrid institution that emerged after spontaneous collective action by various members of the Cayman Islands' society. The National Hurricane Committee is now an official public-social-private partnership that uses relational contracting transactions, hierarchical management relationships and recurrent contractual transactions to prepare the Cayman Islands for storms and manage the islands' recovery in a state of emergency.

In this paper, the effectiveness of the NHC is considered in terms of how the risks are being managed, who takes responsibility for risk management, who pays for the services, and who bears the risk. The discussion reveals that PPPs can provide effective governance structures for weather-risk management, but they need to be carefully implemented to ensure that the distribution of costs and benefits from their existence is not captured by a small group of powerful individuals.

Key words: public-private partnerships, PPP, Cayman Islands, Caribbean, tropical storm, hurricane, risk management, governance.

Submission date 14-10-2009; Publication date 15-1-2010

About the Authors

Emma L. Tompkins has worked on issues related to climate change adaptation since 2001 specifically barriers and limits to institutional adaptation, public-private partnerships for adaptation, and drivers of individual adaptation. She has published numerous papers on adaptation to climate change and resilience as well as handbooks on surviving climate change in small islands and participatory coastal zone management.

Lisa-Ann Hurlston is the Sustainable Development Coordinator in the Cayman Islands' Government Department of Environment's (DOE); she is also the Subcommittee Chair of the National Assessment of Living Conditions. She has collaborated with Emma Tompkins since 2003 on assessing climate change risks and the adaptive capacity of the Cayman Islands.

1 Introduction

Public-private partnerships (PPPs) describe a wide range of initiatives that bring together the public and private sectors for long term partnerships of mutual benefit. They have been described as “an institutionalised form of co-operation of public and private actors who, on the basis of their own indigenous objectives, work together towards a joint target, in which both parties accept investment risks on the basis of a predetermined distribution of revenues and costs” Nijkamp et al.(2002: 1869).

PPPs are often created in response to specific challenges, hence they tend to be novel in structure and function (Savas 2000). The structures of the PPPs tend to be shaped by the nature of the exchange. Ring and Van de Ven (1992) identify three main types. One, recurrent contractual transactions describe repeated contracts between the government and other partners (such as contracting-out, franchises, concessions). These tend to occur when the public sector out-sources services on a long-term basis, for example a city government out-sources cleaning of government buildings to a private firm. Two, relational contracting transactions occur when government services are sold using private sector expertise and finance, such as private marketing arrangements for public goods and services. An example of this can be seen in the partnership to manage parks in London, UK to bring in revenues through activities such as concerts, sponsorship, publishing and licensing opportunities using the Royal Parks brand (H. M. Treasury 2000). Three, hierarchical managerial transactions exist where power is retained by government but resources are extracted from the private sector often where there is controlled competition. An example would be equity buy-ins when private investors purchase shares in state-owned businesses, for example following flotation of government owned industries on the stock market.

Hybrid forms of governance are increasingly found in all aspects of public service delivery (Klitgaard and Treverton 2003), although as Wettenhall (2003) notes, working relationships between the public and private sector have existed for many decades. Recent examples of PPPs can be seen in urban land use planning (Nijkamp et al. 2002); water resources management (Stewart and Gray 2006); and a variety of other areas in the UK including air traffic control, public transport, nuclear energy, medical research, public procurement, social housing and health (H. M. Treasury 2000).

The recent trend towards more PPPs for public service delivery in the UK and other Western democratic states mirrors a trend that has emerged over the past few decades in natural resources management towards hybrid forms of governance, such as co-management of resources (Lemos and Agrawal 2006). Co-management involves joint management through some degree of power sharing between government and resource user groups (often comprising the private sector, individual users and community groups). Co-management has been used for a variety of purposes: to gain public support, to reduce government costs of enforcing legislation; and to enhance resource quality (Agrawal 2001). In the fisheries sector there has been a history of co-management with user groups and government acting together to maintain fish stocks, to monitor extractive uses and to enforce fishing restrictions (Jentoft 1989; King 1997; Lim et al. 1995; Mikalsen et al. 2007; Warner 1997). Experiences of co-management in a variety of other natural resource

management settings fare reasonably widespread. Examples can be found in forest management (Birner and Wittmer 2006; see for example Sekhar 2000); coastal zone management (Few 2001; Sandersen and Koester 2000; Sudara 1999); and watershed management (Ravnborg and Guerrero 1999).

At the World Summit on Sustainable Development in Johannesburg in 2002, discussions focussed on the potential for PPPs to enhance government achievement of environmental or sustainable development objectives. Of most interest was the role of voluntary participation by wider society to work with the government; these types of partnership are referred to as 'Type II' partnerships (Kara and Quarless 2002). This paper focuses on Type II partnerships (i.e. soft 'social-public' engagement) as well as more formalised PPPs and their respective roles in managing natural hazards and risks associated with weather events.

In the following section we review the types of PPPs that are becoming more commonly associated with risk and hazard management, and will consider the justifications given for their use and the issues associated with their use. Section three presents in detail the PPP created in the Cayman Islands to manage hurricane risk (the Cayman Islands National Hurricane Committee), focussing on its history, rules and structure. The effectiveness of the National Hurricane Committee is explored in section four. Specifically, who bears responsibility for risk management of weather related hazards, who pays, who bears the risk and who participates in decision making. We conclude that PPPs can provide effective governance structures for weather-risk management, but they need to be carefully implemented to ensure that the distribution of costs and benefits from their existence is not captured by a small group of powerful individuals.

2 Public private partnerships for environmental governance

Governance has been defined in many ways (see for example Adger et al. 2003; Bulkeley and Mol 2003; Davidson and Frickel 2004; Jordan et al. 2003; Liverman 2004; Pellizzoni 2004), however, the key theme running through the definitions relates to the broadening and deepening of participation in decision making, beyond politicians, to include wider society. Several authors argue that the new environmental policy tools being developed reveal a movement away from government towards governance (Bulkeley and Mol 2003; Jordan et al. 2003). Individuals, firms, the state, or hybrids of the other three (such as PPPs) can participate in these new forms of governance (Williamson 1999).

There are three main arguments in favour of PPPs: they enable wider participation in social decision making; they expand the reach of government; they make decision making more cost efficient. We will expand on each of these points. First, PPPs permit non-government members of society to have an active role in decision making and management, allowing citizens and businesses to become partners and beneficiaries in the provision of public goods and services (Stewart and Gray 2006). The second argument in favour of PPPs is the opportunity to expand the natural boundary, scope, and flexibility of the state (H. M. Treasury 2000). In the words of Kara and Quarless, PPPs "should serve as mechanisms for the delivery of the ...agreed commitments by mobilizing the capacity for producing action on the ground" (Kara and Quarless 2002: 2). Bloomfield (2006) suggests that PPPs can

exploit private philanthropy to improve public service quality, share risks with the private sector, and produce cost savings. The latter argument is the third most often used to justify the use of PPPs, i.e. PPPs increase the efficiency and cost effectiveness of policy implementation (Besley and Ghatak 2001; Birner and Wittmer 2004; Portney and Stavins 2000; Savas 2000). Klitgaard and Treverton (2003) and Nijkamp et al. (2002) argue that PPPs are rarely used to enhance participation, rather they provide cost savings and less risky provision of public services. Proponents of PPPs argue that the large size and lack of incentives within government, mean that the public sector is not always the ideal provider of public goods and services (for a summary of this argument see Kamieniecki et al. 1999). This last argument is built on a significant amount of literature on public choice theory and transactions costs which recognises the cost and inefficiency issues associated with government provision of some public goods and services (North 1990; Williamson 1999).

Those who argue against greater investment in PPPs often raise two criticisms: the danger of power-sharing among unelected groups leading to a loss of legitimacy as power is devolved; and a potential loss of innovation especially where services are contracted out. Mikalsen (2007) argued that as the Norwegian fisheries became managed collectively between the fishers and the government, the co-management group assumed power and effectively blocked government decision making in relation to fisheries management. As power is devolved from the government to non-elected groups the legitimacy of decisions taken in the 'public interest' can decline (Birner and Wittmer 2006). If PPPs are developed to reduce the cost of provision of government services then there is also the possibility that cost cutting could reduce the long term social benefit as investment in research and development, or new innovations is unlikely to be made (Bennett and Lossa 2006).

Partnerships designed to provide support for government policy and regulations are only likely to enhance policy and implementation if there is true cooperation and trust between the partners. Wettenhall (2003) argues that where there is a hierarchical relationship between the partners, e.g. under equity buy-ins, there is unlikely to be this sense of true cooperation. Where there is equality between the partners with no one party superior to any of the others then social capital, in the form of reciprocated social interactions and relationships, becomes a significant element in the relationship as does trust (Lovrich Jr. 1999). Social capital and trust (in the institutions involved; between the institutions, and between the individuals involved) can become stumbling blocks and limitations to the effectiveness of the partnerships (Ramonjavelo et al. 2006).

This paper focuses on a variety of arrangements between the Cayman Islands Government, the private sector and the wider community in the Cayman Islands designed to better manage storm hazards in the Cayman Islands. The justification for the development of these novel partnerships was an enhancement of the quality of storm risk management, and better recovery capacity. The lessons from the Cayman Islands could provide a useful lesson for other islands and local government agencies struggling with limited resources to enhance their storm risk management.

3 Cayman Islands hurricane preparedness and the National Hurricane Committee

The Cayman Islands comprise three low lying islands. They are located in the North Atlantic Hurricane belt and subjected to annual storm risk during the ‘hurricane season’ which usually runs from 1st June until the end of November, although the intermittent appearance of storms in December has led to speculation that the hurricane season is extending. Based on hurricane activity in the past 50 years, the islands experience a major hurricane (i.e. Category 3 or higher on the Saffir-Simpson scale) on average once every 7 years, see Table 1.

Table 1: Major Tropical Storms Affecting the Cayman Islands in Recent Years

Date	Wind speed (mph)	Category ¹	CPOA ² (miles)	Name
15-Sep-55	98	H 2	15	Hilda
14-Aug-69	58	Ts	43	Camille
19-Sep-75	40	Ts	36	Eloise
07-Aug-80	155	H 5	54	Allen
07-May-81	40	Ts	36	Arlene
05-Nov-81	86	H 1	17	Katrina
13-Sep-88	144	H 4	23	Gilbert
19-Sep-02	69	Ts	52	Isidore
12-Aug-04	92	H 1	32	Charley
12-Sep-04	155	H 5	28	Ivan

Notes: ¹ ts = tropical storm, H = hurricane, numbers refer to Saffir-Simpson scale; ² Closest point of approach to weather station (in miles)

Source: http://stormcarib.com/climatology/MWCR_all_isl.htm, accessed May 31st, 2006

During tropical storms (including hurricanes) the Cayman Islands are most vulnerable to waves of increased magnitude, coastal inundation due to storm surge, high winds and driving rain (which can lead to severe flooding and the weakening of building foundations and walls). Little information exists on the impacts of past storms on the Cayman Islands. Reporting has historically focussed on deaths and community coping mechanisms, such as ‘The 32 Storm’, which is a compilation of recollections of the 1932 storm which killed 67 people and damaged many homes (McLaughlin 1994), or more recently on the very short term economic impact of Hurricane Ivan on the Cayman Islands (ECLAC 2005).

Between 2001 and 2005 an assessment of the Cayman Islands hurricane coping capacity was made (see Tompkins and Hurlston, 2003). That assessment showed that between 1988 and 2002 the Cayman Islands Government trebled the speed with which it could protect its buildings from advancing storms (Tompkins and Hurlston, 2003). Much of this improvement can be attributed to the actions of a Type II public-private partnership – the National Hurricane Committee (NHC). The NHC drives all stages of tropical storm risk management in the Cayman Islands. This includes: long

term planning for risk reduction through NHC member participation on development planning boards, annual preparedness exercises, provision of early warning and evacuation advice, response advice while a storm is in progress, and recovery of the islands after the storm. Annual planning for hurricane season involves developing detailed plans of who should act, in what way and when, when hurricanes are approaching the islands. At the end of every hurricane season there is a review of the mistakes made and the lessons learned with a view to enhancing the capacity to respond in the following year. This learning based approach is central to the process of hurricane planning in the Cayman Islands.

Figure 1 Formal Government hurricane preparedness and response strategy



Notes:

CIRC = Cayman Islands' Red Cross
 DERT = District Emergency Response Team
 EOC = Emergency Operations Centre
 ERS = Essential Relief Services
 HE the Governor = His Excellency the Governor

LoGB = Leader of government business
 NHC = National Hurricane Committee
 RCIP = Royal Cayman Islands Police
 SIEC = Sister Islands Emergency Committee
 Source: National Hurricane Committee (2006)

At the time of this study, the NHC was a composite of eighteen sub-committees, which loosely operate within four groupings: support services; emergency response, human concerns and infrastructure (see Figure 1). The sub-committees are: Joint Communications Services, Continuity of Operations, Resource Support, International Aid Management, Economic Continuity, Evacuation, District Emergency Response,

Search and Rescue, Security and Law, Enforcement, Shelter Operations, Essential Services Relief, Medical Relief Services, Mass Fatalities Management, Utilities and Communications, Initial Clearance and Debris Management, Emergency Communication, and Economic Impact Assessment. Each sub-committee reports to and takes direction from the NHC chair.

The NHC was initially a voluntary committee comprising concerned individuals from different parts of the Cayman Islands society: the churches, the voluntary sector, the government, the regulated utility industries, the private sector and individuals. Following a combination of the championing of hurricane preparedness by the Cayman Islands fire chief, a series of near misses with hurricanes in the 1980s and 1990s, and a positive attitude to committee-driven management, the National Hurricane Committee was strengthened and enhanced (Tompkins and Hurlston, 2005).

The National Hurricane Committee (NHC) is now a more structured entity and it is formally incorporated into the hurricane planning process in the Cayman Islands through legislation (Figure 1). Under The Emergency Powers Law (1997), in the event of a storm-related disaster, the NHC has the mandate to manage many aspects of post-storm recovery, see Box 1.

Box 1. Section 4 of The Emergency Powers Law (1997)

Sub-committees within the NHC can organise themselves as necessary to achieve their objectives. As a result, the sub-committees use different organising structures and have varying levels of participation by government, the private sector and individuals.

Some sub-committees comprise solely civil servants. These mostly relate to support services and keeping government functioning in the event of a storm, such as the Emergency Operations Committee and the Continuity of Operations sub-committee. Most other sub-committees have some degree of public and private participation. In terms of the lowest levels of multi-partner participation, the Joint Communications sub-committee is essentially a government department which uses the private sector to achieve objectives. The Joint Communications sub-committee has the remit: to encourage individual responsibility for planning for hurricanes with education about preparedness activities; to inform the public about health and safety and timely information about impacts and responses; and to keep lines of communication open. The Joint Communications sub-committee achieves this by using the private national and international media as mouthpieces through which to deliver timely and accurate information.

Hierarchical management relationships are used in other sub-committees to ensure that regulated industries continue to provide essential services after a storm (e.g. the Utilities and Communications sub-committee). The Utilities and Communications sub-committee is responsible for maintaining utilities and communications around the islands. The local electrical utility company (CUC) and the local telecommunications company (Cable and Wireless, Cayman Islands) both have clauses in their long term

licence agreements with the government to provide and maintain their services during and after storm events.

By far the majority of the sub-committees use relational contracts with the private sector to achieve their objectives. For example, the Resource Support sub committee creates formal agreements with the private sector to ensure that enough resources (notably construction equipment and vehicles) are available to enable the government to continue to function and reconstruct after a storm. This involves working in partnership with the hardware supply association to ensure that they will assist the NHC by coordinating procurement of essential hardware and distribution of this hardware following a storm. It also involves working with owners of construction equipment and other vehicles that could be used in the event of a hurricane. The Initial Clearance and Debris Management sub-committee uses “debris hauling contracts” with private contractors (through the trade association: Heavy Equipment and Vehicle Operators Association) to “activate local haulers to collect and dispose of debris on pre-planned district routes, to pre-determined transfer, separation and storage sites.” Relational contracts are also used to provide social support through NGOs. For example in the provision of shelter operations, the Cayman Islands Red Cross, an NGO is expected to train shelter staff and provide assistance within the shelters.

Sub-committees invite participation from private companies or individuals who are instrumental to the achievement of their objectives. Hence, the composition and structure of each sub-committee is influenced by its desired objectives. It could be argued that the level of participation by non-government actors reflects benefits that each perceives they can extract from participation in and possible ownership of the outcomes of that group. From the shape of the NHC and the inclusion of the private sector in hurricane planning, the Cayman Islands Government have implicitly set as a post-storm priority the rapid resumption of economic activity. With this focus, the benefits from participating in the NHC to the private sector are clear. After a storm, if they work collectively with the NHC, they are more likely to be able to continue to function and make money in the aftermath of the storm and in the longer term. Birner and Wittmer (2006) have found similar behaviour in Guatemala, where the need for shared common interest was critical to guarantee effective group working for forest management.

In the following section the effectiveness of the various types of PPP within the NHC are considered. Specifically, has the NHC been effective, who has benefited from its existence and in what way?

4 Past and future effectiveness of the National Hurricane Committee

Using the metric of time taken to prepare all government buildings for hurricanes, the National Hurricane Committee has proven effective in enhancing the quality of hurricane preparedness in the Cayman Islands (Tompkins and Hurlston, 2003). The sharing of critical elements of disaster risk management between government, the private sector and wider society has been central to this. All parties now take responsibility for risk management, thereby sharing the burden of preparedness, response, and recovery. There has also been a sharing of the costs of managing the risk. The private sector faces short term losses by allowing its potentially profitable

equipment to be requisitioned by the NHC in times of need. Such equipment is in such high demand after hurricanes that it could be rented out at elevated prices. However, by allowing the NHC to commandeer equipment, the private sector could be seen to be buying insurance. If an NHC partner's business has been affected, they will gain benefits from the NHC who will come to their assistance (as part of the wider relief efforts). A history of experience and exposure to past events has shown that participating in the scheme is a wise risk management approach. Similarly, through the NHC, the risks are essentially shared, as each participant in the NHC is both providing assistance and guaranteeing assistance for others in the event that it is needed. In terms of generating reduced risk exposure, it appears that the NHC has been effective. In terms of the longevity and legitimacy of the NHC it is also useful to consider the effectiveness of the process involved in achieving the outcome.

All institutions that rely on committees can generate high transactions costs, especially where individuals are required to sit on multiple committees and their time is taken from other productive activities. A clear danger with committee structures requiring voluntary participation is that those with the time and resources to participate do so. This can lead to a subversion of the committee agenda to achieve personal goals. Assessing the effectiveness of the system of governance that shapes any public-private partnership is therefore also important.

In the 1990s there was significant investment in understanding the role of deliberation and public participation in decision making about natural resource management, to assess their potential to enhance the quality of decision making about the environment. Much of this literature is reviewed in Burgess (2005), other significant contributions to this literature comes from risk research, such as Renn et al. (1995); psychology (Connolly et al. 2000); research into resilience, such as Berkes and Folke (1998); development research (Berkhout et al. 2003); and research into participatory decision making, such as O'Riordan et al. (1999) and Kasemir et al. (2003). Broadly participatory decision making was promoted as a critical element in achieving wider societal support for decisions, despite some significant critiques, such as Cooke and Kothari (2001) and Bulkeley and Mol (2003). As participation in environmental decision making became a standard, rather than an exception, investigations began into how to identify successful or effective processes for public inclusion in decision making. Rowe and Frewer (2000) identified two central elements in effective public participation: the acceptability of the institutional structure and the effectiveness of the process by which people are engaged. Acceptability relates to: levels of representativeness (broader is better); removal of biases from process (ideally no steering from within); timing of involvement (early is better); power to change the status quo; and transparency of process. Effective processes were identified by: adequate resources; clear task definition; structured decision making; and cost-effectiveness. In their analysis of participatory decision making for environmental planning in the Great Lakes region, Beierle and Koninsky (2000) identified four related elements as important to effective participatory decision making: the quality of the deliberative process, the quality of communication between participants, the commitment of the lead agency to the process, and the absence of conflicts over the resource. Other literature highlights the importance of process, acceptability, context and effectiveness, such as Adger et al. (Adger et al. 2003) who define four criteria for 'good' governance: equitable distribution of benefits, a legitimate process, cost efficiency and an effective process that generates desired

outcomes. Underpinning concepts of legitimacy and effectiveness lies the central element of trust in the process and in other participants (Adger et al. 2005; Pellizzoni 2004; Ramonjavelo et al. 2006). Leach and colleagues (2002) suggest from their work on US watershed management, that trust building between partners in participatory management took between 4 and 6 years. This time was needed to educate participants, overcome distrust, reach agreements, secure funding, and begin implementation.

In considering process effectiveness of the NHC, the method of delivery of hurricane preparedness needs to be evaluated in terms of whether the institution is supported (acceptable, legitimate, trusted and providing equitably distributed benefits), and whether the institution can sustain its quality of service over time (i.e. it continues to be effective in achieving desired outputs). The wide-spread buy-in to the sub-committee structure by the private sector and voluntary organisations in the Cayman Islands is partial evidence that the NHC is supported at present. Whether the NHC can sustain over the longer term is perhaps the better test of process effectiveness.

Longevity of PPPs appears to depend on: strong networks and ties between participants, as well as capacity within the government to participate in the PPP (Birner and Wittmer 2006); trust between people, within organisations and between institutions (Ramonjavelo et al. 2006); careful contract management and strong governance structures to avoid problems associated with long term contracts, especially lack of transparency (Bloomfield 2006).

The very nature of the Cayman Islands and the structure of the NHC, means that there is already high levels of collaboration between individuals and strong ties are apparent, both through familial connections and other social relationships. Trust in all committees and the nature of the contracts may be the issues that affect the longevity of the NHC. At present there is no effective competition in the provision of hurricane preparedness. The NHC takes responsibility for management of the risk and tries to ensure wide participation in the NHC to share the burden of that risk. There is no guarantee that introducing competition, for example in the form of private sector risk advisors, would increase the competitiveness of the NHC, however there is a risk that it could undermine the functioning of the committee structure by reducing trust in the institution.

PPPs have been criticised as they lack legitimacy and because they are non-elected bodies that take power from elected bodies. In the case of the NHC, it is clear that the multiple forms of relationship between the government, the private sector and the wider society do provide a form of legitimacy for the institution. In addition, the effectiveness of the NHC in reducing exposure to storms and in returning the island to full function after the passage of storms could be argued to generate further support. However, the NHC is clearly non-elected and it does hold significant power. In the Cayman Islands, which is a small island nation, with a small population, limited resource base and remoteness from other centres, it could be argued that the committee structure works well to ensure that adequate human and financial resources can be found to meet the needs of hurricane preparedness. Whether this structure would work effectively in other settings where these small island constraints do not exist remains to be seen.

5 Conclusions: lessons for public private partnerships in hazard management

In this paper we have considered the way in which weather related hazards can be managed, and risks shared, through investing in a variety of public-private partnerships. Despite limited resources to invest in long term planning, short term preparedness, event response and post-event recovery, public-private partnerships have facilitated effective diffusion of hurricane risk. While there are high costs of participation in terms of the time required by committee members' participation, the total costs to the government of providing hurricane preparedness are shared, as are the risks from hurricane exposure. Clearly there are benefits to governments from this arrangement, as there are for the non-governmental partners.

In the Cayman Islands, to date the NHC has proven effective in responding to hurricane risk. Many of the successes of the NHC could be attributed to the fact that the NHC operates in a small island context and there is a necessity for novel forms of institutional structure where resources are limited. The institutionalisation of the NHC has clearly increased social benefits without increasing significantly the costs of provision. This can partly explain the public support for the NHC, which is essentially an unelected body with significant power to influence the shape of development in the Cayman Islands. Nonetheless this current support could easily waiver in the event of a series of near-misses where there are significant time investments by the private sector partners in preparedness which proves unnecessary, or where recovery after a major storm is slow to happen or does not happen in the way in which the majority of islanders expect. Only longer term studies of the longevity of the NHC will dictate its true success.

The ability of the NHC to: adapt to changing risk levels under climate futures; changing levels of vulnerability, and shifting adaptive capacity of the islands will affect long term effectiveness. The annual process of review, renewal, and lesson learning of national hurricane planning will be critical to maintaining that the high level of responsiveness that the NHC retains.

Future response capacity could be enhanced by finding ways to further share the risks faced from intermittent hurricane exposure. Already risk management is devolved to departmental level, whereby each government department has to factor in the cost of insuring vehicles and drivers, thus ensuring that individuals are aware of the increase in risk from their own risk behaviour. The same could be achieved through decentralising building and contents insurance to government departments.

Having adequate information on the levels of exposure are important for risk management, but so too are assessments of vulnerability and areas of low adaptive capacity. Targetting vulnerable groups who can increase their own ability to prepare for storms could reduce the islands sensitivity to storms, for example by better explaining the risks of staying on islands facing major hurricanes to tourists, as well as new residents and immigrants without previous experience of exposure.

The success of the NHC has in part been dependent on the nature of the relationships that have been developed that have brought the private sector and wider society into partnership with the government. These Type II more voluntary

relationships have been built on the back of more formalised PPPs which have been operationalised through contracts which oblige the private sector to participate.

The question that remains is whether the success of the NHC in the Cayman Islands is a factor the size of the islands and the nature of the islands, is small, resource constrained, with high levels of social networks and a reliance on social ties. Could such a model of formal contractual PPPs which transcend into Type II PPPs be useful for coastal storm planning in the UK, tsunami planning in Sri Lanka or earthquake planning in Pakistan? The conclusions from this research is that the learning based, committee approach that brings together public and private actors is useful for sharing risk and bringing those who are exposed together to collectively share the burden of planning and recovery.

What is less clear is how to ensure that the government and the private sector create a policy environment in which the “right partnerships” develop over time. The learning based approach adopted by the Cayman Islands Government can ensure that repeated mistakes are not embedded into annual planning processes. A bigger challenge is to put in place the conditions that put a check on the pursuit of profits by private sector participants through manipulation of contracts to produce longer terms gains from participation. Regular review of the contracts that exist between government and the private sector after the annual review of the planning process might be one method of ensuring that risks and costs are equally balanced.

Acknowledgements

This work would not have been possible without the support of the Cayman Islands' Government, specifically the assistance of the Department of Environment. The research was funded by the Tyndall Centre for Climate Change Research.

References

Adger W N, Brown K, Fairbrass J, Jordan A, Paavola J, Rosendo S, Seyfang G. 2003. Governance for Sustainability: Towards a 'Thick' Understanding of Environmental Decision-making. *Environment and Planning A* 35:1095-1110.

Adger W N, Brown K, Tompkins EL. 2005. The political economy of cross-scale networks in resource co-management. *Ecology and Society* 10(2):9. [online] URL: <http://www.ecologyandsociety.org/vol10/iss2/art9/>.

Agrawal A. 2001. Common property institutions and sustainable governance of resources. *World Development* 29(10):1649-1672.

Beierle T C, Konisky D M. 2000. Values, Conflict, and Trust in Participatory Environmental Planning. *Journal of Policy Analysis and Management* 19(4):587-602.

Bennett J, Iossa E. 2006. Delegation of contracting in the private provision of public services. *Review of Industrial Organization* 29(1-2):75-92.

Berkes F, Folke C, editors. 1998. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge: Cambridge University Press. 459 p.

Berkhout F, Leach M, Scoones I, editors. 2003. *Negotiating Environmental Change*. 324 p.

Besley T, Ghatak M. 2001. Government versus private ownership of public goods. *Quarterly Journal of Economics* 116(4):1343-1372.

Birner R, Wittmer H. 2004. On the 'efficient boundaries of the state': the contribution of transaction-costs economics to the analysis of decentralization and devolution in natural resource management. *Environment and Planning C* 22(5):667-685.

Birner R, Wittmer H. 2006. Better public sector governance through partnership with the private sector and civil society: the case of Guatemala's forest administration. *International Review of Administrative Sciences* 72(4):459-472.

Bloomfield P. 2006. The Challenging Business of Long-Term Public-Private Partnerships: Reflections on Local Experience. *Public Administration Review* 66(3):400-411.

Bulkeley H, Mol APJ. 2003. Participation and Environmental Governance: Consensus, Ambivalence and Debate. *Environmental Values* 12(2):143-154.

Burgess J. 2005. Follow the argument where it leads: some personal reflections on 'policy-relevant' research. *Transactions of the Institute of British Geographers* 30(3):273-281.

Connolly T, Arkes HR, Hammond KR, editors. 2000. *Judgement and Decision Making. An Interdisciplinary Reader*. 2nd ed. Cambridge: CUP.

Cooke B, Kothari U, editors. 2001. *Participation: The New Tyranny?* London: Zed Books. 207 p.

Davidson DJ, Frickel S. 2004. Understanding environmental governance - A critical review. *Organization & Environment* 17(4):471-492.

ECLAC. 2005. The impact of hurricane Ivan in the Cayman Islands. Mexico City: ECLAC and UNDP. 82 p.

Few R. 2001. Containment and Counter-Containment: Planner/Community Relations in Conservation Planning. *The Geographic Journal* 167(2):111-124.

H. M. Treasury. 2000. Public private partnerships. The government's approach. London: H.M. Stationary Office. 49 p.

Jentoft S. 1989. Fisheries Co-Management: Delegating Government Responsibility to Fishermen's Organizations. *Marine Policy* 13(2):137-154.

Jordan A, Wurzel R K W, Zito A R. 2003. 'New' environmental policy instruments: An evolution or a revolution in environmental policy? *Environmental Politics* 12(1):201-+.

Kamieniecki S, Shafie D, Silvers J. 1999. Forming partnerships in environmental policy: The business of emissions trading in clean air management *The American Behavioral Scientist* 43(1):107-124.

Kara J, Quarless D. 2002. Guiding Principles for Partnerships for Sustainable Development ("type 2 outcomes") to be elaborated on by interested parties in the context of the World Summit on Sustainable Development (WSSD). Johannesburg: Johannesburg Summit 2002. Available at: http://www.johannesburgsummit.org/html/sustainable-dev/sustainable_dev.html (accessed 22 March 2007).

Kasemir B, Jager J, Jaeger C C, Gardner M T. 2003. *Public participation in sustainability science. A Handbook*. Cambridge: Cambridge University Press.

King T D. 1997. Folk Management and Local Knowledge: Lobster Fishing and Tourism at Caye Caulker, Belize. *Coastal Management* 25:455-469.

Klitgaard R, Treverton G F. 2003. *Assessing Partnerships: New Forms of Collaboration*. Arlington, VA. 40 p.

Leach W D, Pelkey N W, Sabatier P A. 2002. Stakeholder Partnerships as Collaborative Policymaking: Evaluation Criteria Applied to Watershed Management in

California and Washington. *Journal of Policy Analysis and Management* 21(4):645–670.

Lemos M C, Agrawal A. 2006. Environmental Governance. *Annual Review of Environment and Natural Resources* 31:297-325.

Lim CP, Matsuda Y, Shigemi Y. 1995. Co-Management in Marine Fisheries: The Japanese Experience. *Coastal Management* 23:195-221.

Liverman D M. 2004. Who governs, at what scale and at what price? Geography, environmental governance, and the commodification of nature. *Annals of the Association of American Geographers* 94(4):734-738.

Lovrich Jr. N P. 1999. Policy partnering between the public and the not-for-profit private sectors: A key policy lever or a dire warning of difficulty ahead? *The American Behavioral Scientist* 43(1):177-193.

McLaughlin H R, editor. 1994. The '32 Storm; eye-witness accounts and official reports of the worst natural disaster in the history of the Cayman Islands. Grand Cayman: Cayman Islands National Archive.

Mikalsen K H, Hernes H K, Jentoft S. 2007. Leaning on user-groups: The role of civil society in fisheries governance. *Marine Policy* 31(2):201-209.

National Hurricane Committee. 2006. C.I. National Hurricane Plan 2006. George Town, Cayman Islands: Cayman Islands' Government. p 61.

Nijkamp P, van der Burch M, Vindigni G. 2002. A Comparative Institutional Evaluation of Public- Private Partnerships in Dutch Urban Land-use and Revitalisation Projects. *Urban Studies* 39(10):1865-1880.

North D. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

O'Riordan T, Burgess J, Szerszynski B. 1999. Deliberative and Inclusionary Processes: A Report from Two Seminars. CSERGE working paper PA-1999-06

Pellizzoni L. 2004. Responsibility and environmental governance. *Environmental Politics* 13(3):541-565.

Portney P R, Stavins R N, editors. 2000. Public policies for environmental protection. Washington DC: Resources for the Future. 304 p.

Ramonjavelo V, Prefontaine L, Skander D, Ricard L. 2006. A course in the development of the PPP: the institutional, interorganisation and interpersonal confidence. *Canadian Public Administration-Administration Publique Du Canada* 49(3):350-374.

Ravnborg HM, Guerrero MdP. 1999. Collective Action in Watershed Management - Experiences from the Andean Hillsides. *Agriculture and Human Values* 16:257-266.

Renn O, Webler T, Wideman P, editors. 1995. Fairness and Competence in Citizen Participation. *Evaluating Models for Environmental Discourse*. Dordrecht: Kluwer Academic Publishers.

Ring PS, Van de Ven AH. 1992. Structuring Cooperative Relationships between Organizations. *Strategic Management Journal* 13(7):483-498.

Rowe G, Frewer LJ. 2000. Public Participation Methods: A Framework for Evaluation. *Science, Technology & Human Values* 25(1):3-29.

Sandersen HT, Koester S. 2000. Co-Management of Tropical Coastal Zones: The Case of the Soufriere Marine Management Area, St Lucia, WI. *Coastal Management* 28:87-97.

Savas ES. 2000. Privatisation and Public-Private Partnerships. New York: Chatham House. 368 p.

Sekhar NU. 2000. Decentralized Natural Resource Management: From State to Co-Management in India. *Journal of Environmental Planning and Management* 43(1):123-138.

Stewart A, Gray T. 2006. The authenticity of 'type two' multistakeholder partnerships for water and sanitation in Africa: When is a stakeholder a partner? *Environmental Politics* 15(3):362-378.

Sudara S. 1999. Who And What Is To Be Involved In Successful Coastal Zone Management: A Thailand Example. *Ocean & Coastal Management* 42(1999):39-47.

Warner G. 1997. Participatory Management, Popular Knowledge, and Community Empowerment: The Case of Sea Urchin Harvesting in the Vieux-Fort Area of St. Lucia. *Human Ecology* 25(1):29-46.

Wettenhall R. 2003. The Rhetoric and Reality of Public-Private Partnerships. *Public Organization Review* 3(1):77-107.

Williamson OE. 1999. Public and private bureaucracies: A transaction cost economics perspective. *Journal of Law Economics & Organization* 15(1):306-342.