ASIA-PACIFIC NETWORK FOR
GLOBAL CHANGE RESEARCH

Project Reference Number: ARCP2013-24NSY-Fidelman

Supporting Governance Institutions for Adaptive Capacity to Environmental Change

The following collaborators worked on this project:

1. Pedro Fidelman (Project Leader), Sustainability Research Centre, University of the Sunshine Coast, Australia; Email: contact@pedrofidelman.com
2. Truong Van Tuyen, Hue University of Agriculture and Forestry, Vietnam; Email: tvtuyen@huaf.edu.vn
3. Kim Nong, Ministry of Environment, Cambodia; Email: moepmcr@gmail.com
4. Melissa Nursey-Bray, University of Adelaide, Australia; Email: melissa.nursey-bray@adelaide.edu.au

University of the Sunshine Coast

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Project Reference Number: ARCP2013-24NSY-Fidelman

Supporting Governance Institutions for Adaptive Capacity to Environmental Change

Final Report Submitted to APN

Part One: Overview of Project Work and Outcomes

Non-Technical Summary

The Earth system is experiencing social-environmental changes (for example, overexploitation of natural resources, biodiversity loss, and climate change) at a pace that is unprecedented in human history. In this context, adaptation is a societal response, which can minimise the adverse impacts of such changes. Successful adaptation rely on the capacity of individuals, communities, organisations and governments to adapt to different disturbances. It involves a better understanding of relevant conditions that enable society to prevent, mitigate and adapt to impacts of social-environmental changes. One of such conditions refers to institutions – that is, the sets of rules (legislation, policies, decision-making procedures) and social norms that structure human interactions; and, therefore affect how society respond to environmental change. While it has been recognised that institutions play a critical role in determining a system's ability to adapt, there is still relatively limited efforts to assess the characteristics of institutions that enhance adaptive capacity. This study seeks to examine how institutions support adaptive capacity, and the underlying conditions for building and mobilising such capacity. It draws on case studies from natural resource management in Cambodia, Vietnam and Australia. Lessons from this study may prove useful to other natural resource management contexts and jurisdictions, particularly those featuring changing environmental, socio-economic and political settings.

Keywords

Adaptive capacity, institutional analysis, decentralisation, fisheries management, Southeast Asia

Objective

The main objective of this study is to examine how institutions support (or otherwise) adaptive capacity, and the underlying conditions for building and mobilising such capacity.

Amount Received and Number of Years Supported

The Grant awarded to this project was:
US$ 46,000 for Year 1

Activity Undertaken

- Inventory of resource management institutions (desktop review)
- Assessment of how institutions may support (or otherwise) adaptive capacity
- Synthesis of findings and reporting

Results

- Increased capacity for institutional analysis in the context of coastal resource management in collaborating countries
- Increased understanding of institutional factors enabling and constraining adaptive capacity
- Increased capacity of stakeholders to develop more critically reflexive practice in resource management
- Dissemination of findings (e.g., conference presentations, dissemination workshop, website [http://pedrofidelman.com/research/projects/apn-2013/])
- Technical report
- Scholarly publications (two manuscripts in preparation)

Relevance to the APN Goals, Science Agenda and to Policy Processes

Goals: this project involved cooperation, exchange of expertise, and capacity development in three countries subjected to environmental change issues. It has provided, for example, through focus group discussions with a wide range of stakeholders, a platform for these stakeholders to reflect, exchange experiences and improve understanding of their capacity to respond to environmental change. **Agenda:** the project support many of the APN areas, in particular, climate change, multiple impacts on coastal domains, and strategies to improve governance that support pathways for sustainability. **Policy Processes**: this project has produced policy-relevant information to support responsive and flexible institutional arrangements that enhance adaptive capacity to environmental change.

Self-evaluation

The general objective of the project was accomplished, and outputs produced to date are highly satisfactory. As mentioned above, the project has promoted cooperation, exchange of expertise, and capacity development in the participating countries. It has also provided opportunity for stakeholders to develop more critically reflexive practice in natural resource management. Further, the project has also provided capacity building for young scientists and students. Overall, undertaking this project has been a rewarding and positive experience.

Potential for further work

This study focused mostly on adaptive capacity at the local and state levels. Potential exists for future work that examines adaptive capacity at different levels simultaneously, and how such capacity are reinforced at multiple levels. Other area for further work is examining the conditions that underpin institutional constraints to adaptive capacity by drawing on theories of institutional reproduction and change.

Publications

- FIDELMAN, P.; POWELL, N.; TRUONG, V. T.; KIM, N.; POCH, B.; TE, L. 2014. Supporting Governance Institutions for Adaptive Capacity to Environmental Change. *APN Science Bulletin*, 4: 121-123 (ISSN 2185-761x).

- FIDELMAN, P. et al. Assessing Adaptive Capacity of Resource Management Institutions in Cambodia, Vietnam and Australia. Target journal: Regional Environmental Change (in preparation)

- FIDELMAN, P. et al. Does Decentralised Institutions Support Adaptive Capacity? Insights from Cambodia, Vietnam and Australia. Target journal: Society and Ecology (in preparation)

Conferences

- FIDELMAN, P. et al. Institutional Adaptive Capacity in a Changing Environment. Asia-Pacific Network for Global Change Research (APN) Side Event at the Regional Forum on Climate Change, 2 July 2015, Bangkok, Thailand.

- FIDELMAN, P. et al. Assessing Adaptive Capacity of Coastal Resource Governance in Cambodia, Vietnam and Australia. 2015 Canberra Conference on Earth System Governance, 14-16 December, Canberra, Australia (forthcoming).

Acknowledgments

The project team would like to thank the participants in the focus group discussions and workshop for sharing their time and knowledge. We also would like to acknowledge the support from our home organisations: University of the Sunshine Coast, Cambodia's Ministry of Environment, Hue University of Agriculture and Forestry, and the University of Adelaide. The financial support from the Asia-Pacific Network for Global Change Research is highly appreciated.

Preface

Responding to environmental change requires a better understanding of how institutions – the rules and norms that structure human interactions – enable society to adapt to impacts of such change. In this regard, there are still limited efforts to understand the characteristics of institutions that enhance adaptive capacity. By drawing on case studies from Cambodia, Vietnam and Australia, this study seek to examine how institutions support (or otherwise) adaptive capacity, and the underlying conditions for building and mobilising such capacity. This study contributes to a relatively limited but growing literature on institutional adaptive capacity; its lessons may prove useful to other natural resource management contexts and jurisdictions.

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1. Introduction

The Earth system is experiencing social-ecological changes at a pace that is unprecedented in human history. Some of the most pressing issues facing human societies include overexploitation of natural resources, biodiversity loss, and climate change. In this context, adaptation is a societal response, which can reduce the adverse impacts of such changes (Fidelman et al., 2013). Adaptation refers to "…the decision-making process and the set of actions undertaken to maintain the capacity to deal with current or future predicted change" (Nelson et al., 2007).

Successful adaptation rely on the capacity of individuals, communities, organisations and governments to adapt to different climatic and non-climatic stressors (i.e., adaptive capacity) (Hill and Engle, 2013, Engle, 2011). It involves a better understanding of relevant physical and social conditions that enable action to prevent, mitigate and adapt to impacts of a changing Earth system (Biermann et al., 2010). In sum, adaptive capacity is a critical property in fostering adaptation to environmental change (Engle, 2011).

Adaptive capacity focuses on governance, institutions and management; therefore, it is translatable to decision- and policy-making applications (Engle, 2011). These may explain an increasing number of studies on institutional dimensions of adaptive capacity in recent years (Hill and Engle, 2013). These studies suggest that responding to environmental change will necessarily demand responsive and flexible institutions (as opposed to traditionally conservative and reactive ones) that facilitate adaptive capacity. This involves, enabling social actors to design new institutions and reform existing ones to better respond and adapt to a changing environment (Gupta et al., 2010).

While it has been recognised that institutions play a critical role in determining a system's ability to adapt (Agrawal, 2008, Engle and Lemos, 2010, Lebel et al., 2006), there is still relatively limited efforts to assess the characteristics of institutions to enhance adaptive capacity of society (Gupta et al., 2010). This study seeks to examine how institutions support (or otherwise) adaptive capacity of social and political actors, and the underlying conditions for building and mobilising such capacity. It draws on empirical cases of decentralisation of natural resource management in the context of the Peam Krasaop Wildlife Sanctuary (Cambodia), Tam Giang Lagoon (Vietnam) and the state of South Australia (Australia). Lessons from this study may prove useful to other natural resource management contexts and jurisdictions, particularly those featuring changing environmental, socio-economic and political settings.

2. Institutional Adaptive Capacity

The notion of adaptive capacity – in conjunction with that of adaptation – has gained considerable prominence in recent years. Adaptive capacity refers to the preconditions that enable adaptation, including capital resources (e.g., social and physical elements) and the ability to mobilise these resources to anticipate or respond to environmental change (Nelson et al., 2007, Engle, 2011). Adaptive capacity is therefore a critical property for fostering adaptation; the higher adaptive capacity of a system, the more likely such system is likely to adapt (Engle, 2011).

Scholarship on adaptive capacity has particularly been developing in the context of the vulnerability framework. In this context, adaptive capacity is regarded as a critical system property for reducing vulnerability by modulating exposure and sensitivity (Engle, 2011). The concept of adaptive capacity has also been developing in the domain of the resilience framework, where it is often referred to as 'adaptability' to describe the capacity of actors to manage and influence resilience. The presence of adaptive capacity is believed to increase resilience (Engle, 2011, Nelson et al., 2007, Hill and Engle, 2013).

Assessments of adaptive capacity are typically based on predetermined attributes or indicators believed to be necessary to build such capacity (Engle, 2011). These determinants of adaptive capacity include general categories, such as information and technology; material resources and infrastructure; organisation and social capital; political capital; wealth and financial capital; and, institutions and entitlements (see e.g., Eaking and Lemos, 2006, Engle and Lemos, 2010, Engle, 2011). Noteworthy is, as mentioned above, an increasing number of studies on institutional determinants (Hill and Engle, 2013). This reflects the critical importance of these determinants for building adaptive capacity. In fact, institutions comprise resources actors use in responding and adapting to environmental change (Nelson et al., 2007). Further, institutions can both facilitate and constrain adaptation (Engle and Lemos, 2010, Eakin et al., 2014).

Institutions are systems of formal rules and social norms that structure human behaviour and interactions (Ostrom, 2005); and, therefore affect how society respond to environmental change (Young, 2002, Gupta et al., 2010) (Figure 1). In this regard, institutions can be defined as "*...formal and informal rules, rule-making systems, and actor networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change*" (Biermann et al., 2009). Accordingly, for the purpose of this study, adaptive capacity is defined as *"… the inherent characteristics of institutions that empower social actors to*

respond to short and long-term impacts, either through planned measures or through allowing and encouraging creative responses from society both ex ante and ex post (Gupta et al., 2010).

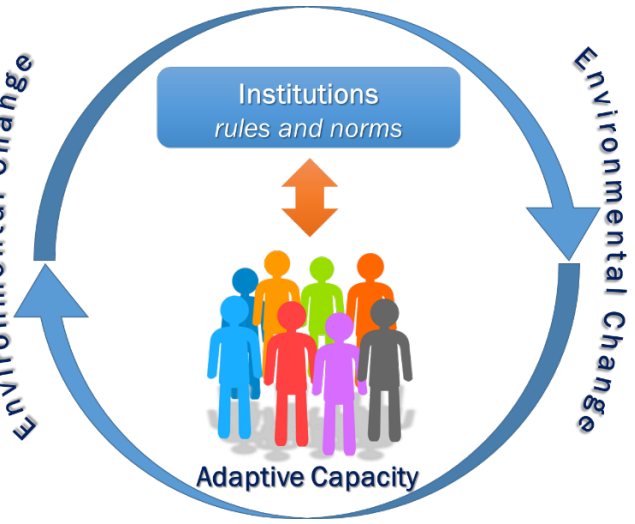

Figure 1: Institutions as determinants of adaptive capacity in the context of environmental change.

Gupta et al. (2010: 462) synthesise the various institutional determinants of adaptive capacity in terms of six broad dimensions; that is, the ability of institutions to: (1) encourage the involvement of a variety of actors, perspectives, and solutions; (2) enable actors to continuously learn and improve their institutions; (3) allow and motivate stakeholders to self-organise, design and reform their institutions; (4) mobilise leadership qualities of social actors; (5) mobilise resources for decision-making and implementation; and (6) support principles of fair governance based on legitimacy, equity, responsiveness and accountability. These institutional dimensions will be used to evaluate adaptive capacity in the context of the case studies. They are discussed in detail below (see section 4 on “Analytical Approach”).

3. Methods

Analytical approach

This study builds on the Adaptive Capacity Wheel (ACW) of Gupta et al. (2010), an analytical approach developed to assess institutional adaptive capacity. It consists of six broad dimensions: variety, learning capacity, room for autonomous change (autonomy), leadership, resources and fair governance (Figure 2). The ACW is a useful heuristics to examine strengths and weakness of institutional capacity to adapt to environmental change (Grothmann et al., 2013). It has been used to examine adaptive capacity in different settings and sectors (e.g., water management, coastal protection, agriculture, regional planning and climate vulnerability) (Grothmann et al., 2013, Van den Brink et al., 2011, Van den Brink et al., 2014, Grecksch, 2014, Bergsma et al., 2012, Gupta et al., 2015, Munaretto and Klostermann, 2011).

Figure 2: institutional dimensions of adaptive capacity (after Gupta et al., 2010).

Building on the ACW of Gupta et al. (2010) and related literature (e.g., Biggs et al., 2011, Ostrom, 2010, Dietz et al., 2003), the six institutional dimensions of adaptive capacity proposed in the ACW and associated evaluative criteria are conceptualised in the context of this study in Table 1.

Table 1: Dimensions and evaluative criteria of institutional adaptive capacity.

Dimension	Definition	Evaluative criteria
Variety	The ability of institutions to encourage the involvement of a variety of actors, perspectives, and solutions. Because environmental change problems are complex and unstructured, embedding diverse interests and perspectives, dealing with such problems requires multiple perspectives and solutions. This includes the participation of relevant stakeholders across different sectors and levels of governance in problem framing and formulation of solutions.	▪ Inclusive participation of relevant actors
Learning capacity	Learning is critical for dealing with uncertainty, surprises and changes that characterise environmental change. There is an ongoing need to revise existing knowledge and understanding to enable adaptation. Learning allows actors to reformulate knowledge and understanding based on experiences. Adaptive institutions are therefore those that enable social actors to continuously learn and experiment to improve their institutions.	▪ Activities that entail learning (e.g., meetings, decision-making, monitoring and enforcement etc.)
Autonomy	The ability of social actors to autonomously review and adjust their institutions in response to environmental change. Adaptive institutions allow and motivate actors to self-organise, design and reform their institutions. Authority (legitimate or accepted forms of power) for decision-making and implementation is supported (or at least not undermined) by actors and other decision-making entities.	▪ Authority to make and implement decisions ▪ Authority is not undermined by other actors/decision-making entities
Leadership	Leadership may be regarded as a driver for change when it points to (a) direction(s) and motivates others to follow. Institutions supporting adaptive capacity are those that can mobilise leadership qualities of social actors in the process of (re)designing institutions.	▪ Ability of actors to direct and motivate others to follow
Resources	Resources are critical in generating incentives and reducing transaction costs for actors to engage in collective decision-making and action. Therefore, adaptive institutions have the capacity to mobilise resources (human, financial, technical) for making and implementing decisions (e.g., adaptation measures).	▪ Human ▪ Financial ▪ Technical
Fair governance	Fair governance includes institutions that are accepted and supported by their constituents (legitimacy), considered to be fair (equity), responsive (responsiveness), and/or accountable to social actors (accountability).	▪ Legitimacy ▪ Equity ▪ Responsiveness ▪ Accountability

Selection of cases

The case studies selected comprise institutions, i.e., systems of rules, norms, decision-making processes and property rights defining coastal resource management. They illustrate decentralised management characterised by institutions that support shared responsibility

between state (e.g., government authorities) and non-state actors (e.g., community, resource users) – also known as co-management (Armitage et al., 2009). Decentralised resource management are believed to be more adaptive than traditional forms of regulatory management (Larson and Soto, 2008); and, therefore, adequate to investigate how institutions support adaptive capacity. Further, these cases are also characterised by environmental, socio-economic and political change, which provide a dynamic context in which adaptive capacity is examined. In addition, the Peam Krasaop Wildlife Sanctuary (Cambodia) and Tam Giang Lagoon (Vietnam) cases, offer the opportunity to build on past and current research. These cases were also selected given the availability of data and information from previous studies, and their history of engagement with decentralisation. Last, the inclusion of an Australian case was a suggestion of one of the assessors of our project proposal. The assessor's suggested that comparing cases across developed and developing contexts would be beneficial. The South Australia case was selected because it is the only state in Australia to have formalised fisheries co-management through specific government policy, and the experience of project collaborator Nursey-Bray with fisheries management in that state. It is important to note that unlike the PKWS and TGL cases, which is mostly community based small-scale fisheries, South Australia Fisheries Management is mostly state-wide in scale and include commercial, recreational and traditional fishing, as will be discussed later.

Data collection and analysis

This study adopted a qualitative case study approach (Yin, 2003). It used multiple sources of data, i.e., documents (e.g., grey [technical reports] and academic literature, organisation's websites, policies and legislation), participant observation, interviews and focus groups. Data collection was guided by the question of how resource management institutions facilitate adaptive capacity to environmental change; and, the analytical approach outlined above.

The review of documents sought to gather secondary data, e.g., factual information about the decentralisation process in the case studies. It also sought to complement interview and focus group data by drawing on previous studies, particularly those on co-management in the Peam Krasaop Wildlife Sanctuary and Tam Giang Lagoon. In this regard, it is important to note that project collaborators K. Nong and T.V. Tuyen have been involved with coastal resource management in the Cambodian and Vietnamese cases, respectively, for approximately two decades.

Overall, observation, interviews and focus groups were undertaken between April and December 2014 (Figures 3-6). Observations consisted of descriptions of activities,

behaviours, actions, conversations and other interpersonal interactions (Patton, 2002). Focus groups and interviews explored the perception of participants on how coastal resource management has facilitated adaptive capacity in terms of the six dimensions and criteria outlined in the analytical framework (Figure 2, Table 1).

Interview respondents and focus group participants were selected based on their history of involvement with and/or knowledge of decentralised resource management in the case studies. These respondents included community/villagers, resource users, members of decentralised entities (e.g., Fishing Associations and Village Management Committees), and government officials (Table 2).

Table 2: Data collection methods used in the case studies.

Case Study	Methods
Peam Krasaop Wildlife Sanctuary (PKWS) Case sites (communities): ▪ *Koh Kapic* ▪ *Koh Sralao* ▪ *Koh Kang* ▪ *Peam Krasoap*	▪ ***Desktop review*** of co-management in PKWS ▪ Informal ***scoping*** discussions and ***participant observation*** in each site for week ▪ ***Focus groups***, three in each site, involving Village Management Committees, fishers and villagers (Figures 3-4) ▪ ***Interviews*** with 50 key informants: former Staff of the Participatory Management of Coastal Resources project, high level officers and managers from the Provincial Department of Environment, Department of Agriculture, Fisheries and Forestry, Provincial Department of Women's Affairs, and Peam Krasoap Wildlife Sanctuary; former UNDP-GEF small grant's manager; past representatives of Village Management Committees; and, respected village elders ▪ ***Validation and dissemination workshop*** involving 26 participants
Tam Giang Lagoon (TGL) Case sites (communes): ▪ *Loc Binh* ▪ *Vinh Giang* ▪ *Vinh Phu*	▪ ***Desktop review*** of co-management in TGL ▪ ***Interviews*** with 20 key informants, including researchers and officers from government, fisheries and environment/resource agencies, and Fishing Associations ▪ ***Focus groups*** in each of the case sites involving 12-15 Fishing Association officers and members (Figures 5-6)
South Australia	▪ ***Desktop review*** of co-management ▪ **Focus group** with 6 fishery managers

Documents, interview and focus group data were analysed using systematic qualitative techniques (Miles and Huberman, 1994, Paton et al., 2004). These included content analysis of documents and interviews and focus groups data. Coding was based on the six dimensions and criteria described in the analytical approach. It yielded patterns and themes, which were then consolidated (Miles and Huberman, 1994). Data analysis was partly undertaken using the software NVivo.

Figure 3: Focus group discussion in Peam Krasaop Wildlife Sanctuary, Cambodia (source: K. Nong).

Figure 4: Meeting with the Commune Council in in Peam Krasaop Wildlife Sanctuary, Cambodia (source: K. Nong).

Figure 5: Focus group discussion in Loc Binh, Tam Giang Lagoon, Vietnam (source: T.V. Tuyen).

Figure 6: Focus group discussion in Vinh Giang, Tam Giang Lagoon, Vietnam (source: T.V. Tuyen).

4. Resource Management in a Changing Environment

The case studies selected, particularly the Peam Krasop Wildlife Sanctuary and Tam Giang Lagoon are illustrative of environmental, socio-economic and political change. These cases feature decline in resource conditions associated with resource use intensification. Such changes take place in the context of a centralised and hierarchical system of government, which, nevertheless, was promoting reforms towards decentralisation. In fact, decentralisation of resource management comprise very often a strategy response to social-environmental changes (Larson and Soto, 2008) (Figure 7).

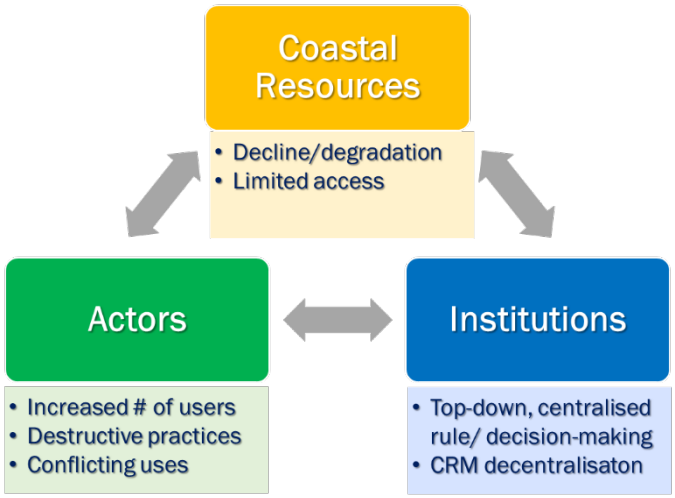

Figure 7: Environmental, social and political change in the Peam Krasaop Wildlife Sanctuary and Tam Giang Lagoon.

Decentralisation includes different types of policy reforms aiming to shift powers from centralised to more localised actors and institutions, such as sub-national units of administration, local government, the civil society, and/or local user groups (Meinzen-Dick and Knox, 2001). Accordingly, existing institutions were changed and new ones created to foster participatory, collaborative and decentralised coastal resource management. These were based on government intervention – and in the case of Cambodia and Vietnam, involved international development initiatives in partnership with the community. Institutional reform included changes in the legislation, sharing responsibility over resource management, and establishment of community-based, resource-user and/or stakeholder entities.

Following, additional background information are summarised for each of the case studies.

Peam Krasaop Wildlife Sanctuary, Cambodia

Peam Krasop Wildlife Sanctuary (PKWS) is located in Koh Kong province, southwest Cambodia. It was established by Royal decree in 1993 and is under jurisdiction of the Ministry of Environment. The PKWS contains extensive areas of mangroves (24,000 hectares, approximately), which are recognised breeding and nursery grounds for a number of marine and estuarine species. These areas contain some of the best remnants of mangroves in the Gulf of Thailand (Marschke and Nong, 2003).

Ten thousand people live in PKWS across three administrative district, containing 6 communes and 15 villages. For most of these people, mangrove and associated resources provide opportunities for income generation and livelihood. Such opportunities include wood and charcoal production from mangroves, and fishing. However, since the early 1990s, coastal resources have significantly declined as a result of population growth, clearing of mangroves for aquaculture and charcoal production, destructive practices (e.g., cyanide fishing), and illegal fishing (Marschke and Nong, 2003, Marschke, 2012).

The decline in coastal resources was compounded by an increase in the number of resource users, including “outsiders” operating larger boats and more modern fishing gear. Unable to compete with outsiders, local fishers started to use small trawlers and push nets in shallow waters. The intensification of resource use was detrimental, particularly to poorest households, and led to increased conflicts between resource users. For example, between those using trawlers or motorised push nets and those using crab traps in the same fishing grounds (Marschke, 2012).

In the late 1990s, a group of researchers and government staff supported by Canada’s International Development Research Centre began to work with local communities and resource users to explore options for participatory management of coastal resources (Marschke and Nong, 2003). An initiative known as *Participatory Management of Mangrove Resources* was led by the Ministry of Environment, at the national level, and involved an interdepartmental group, at the provincial level. Such initiative facilitated the establishment and operation of Village Resource Committees comprising members of the community and resource users (The Participatory Management of Coastal Resources Project, 2008).

Tam Giang lagoon, Vietnam

The Tam Giang Lagoon (TGL) is located in Thua Thien Hue Province, Central Vietnam. It is coastal lagoon covering an area of approximately 22,000ha and stretching approximately 70km along the coast (Tuyen et al., 2010). The TGL comprises an important nursery ground for numerous aquatic species, such as fish, prawns and crabs. Many of

these resources support the livelihoods of people living along much of the coastal area of central Vietnam. It is estimated that the lagoon's aquatic resources are directly or indirectly important, through fishing and aquaculture, for 300,000 people living in 33 communes and towns and 326 villages across the lagoon area (Tuyen et al., 2010, Tuyen, 2002).

The decline in fish catch and restricted access to the lagoon was a result from a rapid resource use intensification over the past 15 years or so (Tuyen, 2002). Such intensification has been associated with increased numbers of resource users (e.g., mobile gear fisher groups, fixed gear fishers, aquaculturists), diversification in fishing practices, and development of aquaculture in the lagoon. In addition, these problems are exacerbated by agricultural development and urbanisation (Tuyen et al., 2010).

Decentralised resource management was initially adopted at the district level to complement the existing centralised, top-down management approach. This new approach has built on several initiatives – including those supported by external development agencies (e.g., International Development Research Centre) – aiming at promoting more participatory resource management approaches (Tuyen et al., 2010).

Fundamental elements of resource management decentralisation in the TGL include the Fishing Associations. These are a type of social-professional organisations with responsibility for resource management at the village or user group level (Tuyen et al., 2010). Fishing Associations are formally entitled to receive fishing rights allocation (Tuyen et al., 2010, Marschke et al., 2012).

South Australia Fisheries Management, Australia

South Australia's fisheries resources support commercial, recreational and traditional fishing sectors. These sectors comprise the scope of South Australia Fisheries Management. Commercial fishing sector, the main focus of this study, include, for example: abalone, blue crab, marine scalefish, prawns, rock lobster, and sardine fisheries (PIRSA, 2012).

Over the years, the overall management of South Australia's fishery resources has been undertaken in partnership and in consultation with the fishing industry and other key stakeholders. This consultative co-management arrangement was largely implemented through Fisheries Management Committee processes. Nevertheless, conflicts between the government, the industry and other key stakeholders still persisted. This led the South Australian Government to recognise the need for its fisheries managers and scientists to engage regularly with commercial, recreational and traditional fishers, and other key actors

and the general community that use or have a stake in fisheries resources in the state (PIRSA, 2013).

In 2007, the Fishery Management Council of South Australia was established; and, replaced the Fisheries Management Committees. The Council consists of twelve members (including the Director of Fisheries) with a collective knowledge of diverse areas related to fisheries management (Fisheries Council, 2013). The Council's functions include the preparation of fishery management plans; advising the Minster on allocation issues, promoting the co-management of fisheries; promoting research, education and training in relation to fisheries and their management (Fisheries Council, 2013). Fisheries management plans are developed periodically for each South Australia's commercial fishery to assist in decision-making (PIRSA, 2012).

5. Results

This section presents the evaluation of adaptive capacity in the context of the Peam Krasaop Wildlife Sanctuary (PKWS), Tam Giang Lagoon (TGL) and South Australia Fishery Management (SAFM) initiatives. Strengths and weaknesses in terms of enabling and disabling conditions were also identified; these are illustrated in Table 3.

Table 3: General enabling and disabling conditions of institutional adaptive capacity in the PKWS, TGL and SAFM.

Dimension	Adaptive Capacity	
	Enabling	**Disabling**
Variety	Engagement of state and non-state actors from various sectors and multiple levels of governance Involvement of diverse knowledge and expertise	Diversity of perspectives, interests and authority may lead, in some cases, to conflicts and tensions between actors
Learning capacity	Decision-making and management activities with potential to entail leaning, e.g., training workshops, discussion forums, joint implementation, regular meetings	Limited resources for learning activities; conflict and tensions between actors; power imbalance; membership change of committees; weak leadership
Autonomy	Policies and legislation supporting decentralised resource management	Limited decision-making and implementation authority Partial support from high-level authorities
Leadership	Engagement and commitment of local and external leaders	Leadership qualities eroded by limited resources; self-interest; power imbalance; conflicts and tensions among actors
Resources	Ability of actors to mobilise external and internal resources (financial, technical and human)	Limited, inconsistent resources; over dependence on external sources
Fair Governance	Decentralisation of resource management; devolution of authority, allocation of property rights	Tensions and conflicts, power imbalance, partial support from high-level authorities, limited resources, inconsistent policy implementation

Variety

The three cases examined include, to different extents, a variety of actors in terms of number of such actors participating in resource management, and diversity of sectors and levels involved. All case studies encompass both state and non-state actors that are, in the PKWS and TGL cases, located at multiple levels of governance (i.e., from local to international). In the PKWS and TGL, these actors include international donor agencies, researchers, government officials, resource users and villagers. Whereas in South Australia

Fisheries Management includes mostly actors from the state level, e.g., Department for Primary Industry and Regions SA and Fisheries Council of South Australia (Table 4).

Table 4: Example of actors (current and past) involved in decentralisation of coastal resource management in the Peam Krasaop Wildlife Sanctuary (PKWS), Tam Giang Lagoon (TGL) and South Australia Fisheries Management (SAFM).

Level	Case Study		
	PKWS	**TGL**	**SAFM**
International	▪ International Development Research Centre	▪ International Development Research Centre ▪ Canadian International Development Agency	
National	▪ Ministry of Environment		
Sub-national	▪ Provincial Department of Fisheries ▪ Provincial Department of Rural Development ▪ Provincial Department of Rural Affairs ▪ Department of Women's Affair	▪ Province People Committee ▪ Province Fishing Association ▪ District Department of Agriculture and Rural Development ▪ District Department of Natural Resources and Environment ▪ Commune People Committee ▪ Co-management Board	▪ Primary Industry and Regions SA ▪ Fisheries Council of South Australia ▪ Steering Committees ▪ Fisheries Management Committees ▪ Fishery Associations
Local	▪ Village Resource Committees ▪ Commune Councils ▪ Village Chiefs	▪ Village Fishing Associations ▪ Resource users	

In some cases, such as the PKWS, the number of actors expanded as decentralisation evolved (Marschke and Nong, 2003). Over time, new partners have been engaged, such as the Ministry of Agriculture, Forestry and Fisheries, at the national level, and the Department of Women's Affairs, at the provincial level. Another example from the PKWS was a discussion between government authorities and Village Management Committees on addressing mangrove destruction, which led to the formation of a taskforce comprising government departments, the military, policy and villagers.

In addition, some of the actors aggregate in their composition a variety of other actors. For example, the Co-management Board in the TGL consists of representatives the Commune People Committee, commune police, Fishing Association, leaders, and unions (e.g., farmers, women). Its advisory board comprises of a variety of relevant provincial and district technical agencies and departments. Likewise, the Fisheries Council of South Australia consists of members with collective knowledge and expertise in relevant areas to

fisheries management (e.g., fisheries science, research and development; conservation; social science; law; business; Indigenous, commercial and recreational fishing).

The variety of actors, sectors and levels creates opportunity for considering multiple problem frames and solutions. For example, in the PKWS, addressing decline of resources involved a number of alternative approaches, such as awareness raising, investing in alternative livelihoods (tourism), developing links between resource users and authorities, mangrove replanting, and patrolling. Further, *variety* has significant implications for other dimensions of institutional adaptive capacity; particularly, learning, autonomy, resources and fair governance. For example, in the Tam Giang Lagoon, fishers perceive the Fishing Associations as a bridge for information from district and provincial authorities (*learning capacity*); links with commune authorities provide opportunity for engagement in addressing threats to Lagoon resources and dispute resolution strategies (*autonomy*); and, there is greater involvement in decisions regarding resource use and management through their membership in these associations (*fair governance*) (Armitage et al., 2011).

Involving a variety of actors, sectors and levels in policy- and decision-making may pose many challenges. Particularly, including key relevant actors and reconciling different perspectives, interests and levels of authority may be problematic at times. For example, in the TGL, the youth and women despite their participation in fishing activities have limited participation in the Fishing Associations. Thus, the Giang Xuan Fishing Association currently organise training for women to empower them to engage in coastal resource management. In the PKWS, the diversity of perspectives, interests and authority have in some cases underscored existing conflicts and tensions between actors. For instance, in Koh Sralao and Koh Kapic communities, the head of commune council and village chief consider Village Management Committees as adversaries.

Learning Capacity

The involvement of multiple actors, sectors and levels (*variety*), as discussed above, has significant implications for learning. Such *variety* has the potential to enhance learning capacity through, for example, combining information and knowledge (e.g., local and technical), sharing of experiences through networks, and learning from other actors through joint activities (Table 5).

Table 5: Examples from the case studies of activities and entailed learning.

Activities	**Learning** (about)
▪ Field visits/tours ▪ Regular meetings ▪ Multi-actor forums ▪ Training workshops ▪ Planning (e.g., problem identification, finding solutions, drafting plans) ▪ Implementation (e.g., mangrove replanting, monitoring) ▪ Environmental education/awareness raising	▪ Problems and potential solutions ▪ Different actor's perspectives and expectations ▪ Relevant regulation and policies ▪ Rights and duties ▪ Management approaches ▪ Local and technical knowledge ▪ Status and dynamic of the system and its resources

The Participatory Management of Mangrove Resources (PMMR) project, in the PKWS, adopted a "learning by doing" approach. Such approach proposes that decentralisation may be an experimental, reflective and adaptive process. Thus, the PMMR team spent its first few years developing activities to facilitate learning – i.e., activities by which actors could exchange ideas and perspectives, and capacity building. These included a number of awareness raising and trainings workshops, and study tours covering a range of topics (e.g., environmental management, good governance, project management, livelihoods improvement, coastal conservation, and mangrove inventory and restoration). Learning capacity has been supported by similar approach and activities in the TGL initiative. For example, capacity building involved activities, such as training of Fishing Association officers (at provincial, district and sub-district levels) on planning, organizational development and management; workshops for identifying inputs for policy development; and multi-actor workshops aiming at building consensus on guidelines for allocation of fishing rights and authorised management actions.

Learning may have led to change in attitude and behaviour of those involved in decentralisation of resource management. For example, in the TGL case, government officers at the commune level have attributed the change in vision and management strategies to learning from their involvement in coastal resource management. Such vision and strategies have shifted from short-term and top-down to integrated, long-term and participatory (Tuyen et al., 2010). Also, fishers have perceived emerging horizontal arrangements resulting from decentralisation as enabling exchange of experiences with other villages and communes (Armitage et al., 2011). In SAFM, learning has created impetus for some fishery sectors, such as the Marine Scale Fishery to seek greater involvement in management.

On the other hand, factors that may hinder learning capacity in the context of resource management, include: inadequate resources to support learning activities, conflict and tensions among actors, and power imbalance (these are discussed above, in the section on

variety). In the case of SAFM, the change in membership of committees and the Fisheries Council may lead to loss of institutional knowledge. Another critical factor constraining learning capacity is weak leadership (see e.g., Marschke and Sinclair [2009] for discussion on learning in the context of the PKWS).

Autonomy

In all cases, legislation has been enacted providing for decentralisation of resource management (Table 6). This involved transferring some level of authority over the design and reform of management arrangements to actors at sub-national and/or local levels. In the PKWS case, the Ministry of Environment and the Fisheries and Forestry Administration have policies that allow for sharing some responsibility with Village Management Committees for protection and management of coastal resources. These committees' responsibilities include developing management plans and implementing local-based action, such as patrolling, mangrove replanting, and awareness raising. Some of these actions can only be undertaken with the approval and/or collaboration of government authorities. For example, the Village management committees are only allowed to undertaking patrolling – which may involve confiscating fishing gear and issuing fines – accompanied by a member of a technical department or local police. In many cases, assistance from local authorities is not assured (Marschke, 2012). Further, the Village Management Committees do not have the authority to address large-scale or external issues impacting local-based activities. Sand mining and illegal fishing by trawlers are illustrative of such issues.

Table 6: Example of key legislation and policies (current and past) supportive of decentralisation

Case	Legislation/Policy
Peam Krasaop Wildlife Sanctuary	▪ Sub-decree on Community Fisheries Management 2005, 2007 ▪ Guidelines for Community Fisheries 2007
Tam Giang Lagoon	▪ Fisheries Law 2003 ▪ Decision 3677/2004/QD-UB ▪ Decision 4260/2005/QB-UBND
South Australia Fisheries Management	▪ Fisheries (Management Committee) Regulations 1995 ▪ Fisheries Management Act 2007 ▪ Policy for the Co-management of Fisheries in South Australia

In the TGL initiative, similarly to PKWS case, legislation allows for collaboration between government authorities and resource users. Under the legislation Fishing Associations are formally established to manage fisheries and aquaculture within the lagoon. The Decision 3677/2004/QD-UB of the People's Committee of Thua Thien Hue Province is illustrative, it states: *"…fisheries organizations under the Vietnamese Fisheries Associations are the key*

counterparts for the government to cooperative manage fisheries activity and fisheries resources in the Tam Giang lagoon" (Article 1)". Further, Fishing Associations may also receive fishing rights. The decision 942/2009 of the People's Committee of Phu Loc district allocate fishing rights to the Giang Xuan Fishing Association – regarded as Vietnam's first ever allocation of fishing rights from district to a fisher's organisation. Like the Village Management Committees (in Cambodia), Fisheries Associations are also reliant on external authority – i.e., district and commune officials – to implement some actions (Tuyen et al., 2010).

Fisheries Council of South Australia, in the SAFM case, was mandated with the promotion of co-management; preparation and review of management plans; promotion of research, education and training; and provision of advice to the Minister on all fisheries related matters (Fisheries Council, 2013). The Council has mostly advisory roles; that is, the Minister remains the primary responsible for fisheries management.

It is interesting to note that decentralisation in the PKWS and TGL initiated without a legal mandate. That is, there was no legislation providing rights to resource users to manage coastal resources. Instead, informal arrangements provided support for decentralised management. For example, in the PKWS, endorsement by the Ministry of Environment and provincial government of guidelines and regulations developed by Village Management Committees provided the authority for these committees to undertake their activities.

In some cases, in the absence of a legal mandate, some authorities were reluctant to engage in decentralised management in the PKWS and TGL. In fact, some government officials did not fully embraced decentralisation even after a formal authority to control and management coastal resources was delegated to Village Management Committees and Fishing Associations. The following quote from an informant in the TGL is illustrative: *"… [administrators] did not want to share their power with local people… they did not fully support the development of this [decentralisation] institution yet*."

Despite the legal support to decentralisation and some level of authority transferred to local entities, these entities still have limited power in terms of decision-making and implementation. In the three case studies examined, ultimate responsibility for decisions remains with high level policy- and decision-makers. Further, as in the case of SAFM, autonomy may be constrained by numerous policies and legislation relating to fisheries management.

Leadership

Leadership qualities of actors varies across and within the case studies. However, strong leadership was regarded as an important attribute enabling decentralised resource management. In the PKWS case, for example, leadership and facilitation from the Participatory Management of Mangrove Resources team and Ministry of Environment proved to be critical in establishing and moving forward the decentralisation process. PMMR team facilitated a number of activities to build the capacity of the villagers and authorities to enable them to manage collaboratively the region's resources, as stated above (see the subsection on *learning capacity*).

Among the decentralised entities, a strong leadership from the Village Management Committee in Peam Krasaop community has helped to mobilise support from its members and villagers. Some of the Fishing Association executive boards consist of experienced, responsible and prestigious fishers – in some cases, the Association chairperson is also village chief. In these instances, leadership has proven to be enabling factors contributing to success of these entities (Marschke and Sinclair, 2009). In SAFM, leadership was considered, by focus group participants, as critical to decentralised management, and building and mobilising adaptive capacity. Conversely, weak leadership in Koh Sralao and Koh Kapic communities was regarded as a main contributor to ineffective and/or dysfunctional Village Management Committees. Likewise, in the TGL, the Co-management Board – established to facilitate coordination between Fishing Associations and local authorities – has a poor record of accomplishments given, in part, the weak leadership. In general, leadership qualities were eroded (e.g., the PKWS case), by limited resources, self-interest, power-imbalance, and conflicts and tensions among local actors.

Resources

The pilot projects aiming at introducing decentralised resource management in the PKWS and TGL were supported by external resources. Human, financial, technical resources were provided by international donor agencies, such as the Canadian International Development Agency and International Development Research Centre, researchers and government authorities. As discussed above, the PMMR team in the PKWS facilitated a wide range of activities to build the capacity of community, resource users and authorities to engage in collaborative, decentralised resource management. In the TGL research team was initially engaged in activities towards establishing the Fishery Associations and facilitating user group meetings (Tuyen et al., 2010). Over the years, national and international non-government organisations have supported a number of

projects in the PKWS and TGL. These projects include those on mangrove planting, climate change adaptation, resource inventory, and alternative livelihoods.

In addition to external financial and technical support, some communities (e.g., Peam Krasaop) in the PKWS may be able to use funding from other activities to support resource management. That is the case of Peam Krasaop that has used financial resources generated from ecotourism to fund conservation, development and poverty alleviation activities. In the TGL, Fishery Associations collect an annual membership fee and exploitation fee which help support their operations. Local actors have also been able to mobilise human and technical support through their networks. For example, some communities in the KPWS have worked with consultants and NGOs to develop grant applications to support resource conservation.

Nevertheless, resources have overall been limited, inconsistent, and, very often, over reliant on external sources; which has constrained management activities. The PKWS initiative is illustrative where the absence of a speed boat and limited technical support impact the capacity of Village Management Committees to engage in patrolling. Similarly, limited financial resources may constrain the capacity of Fishery Associations in the TGL to sustain their activities and operations (Tuyen et al., 2010). Limited financial resources also hinders further development of co-management in SAFM, for instance, through trialling of co-management in different fisheries.

Fair governance

Overall, the resource management initiatives examined have helped improve principles of fair governance, such as legitimacy, equity, responsiveness and accountability. It is important to note that Cambodia and Vietnam decentralisation is taking place in a complex and evolving political context, characterised by rather centralised government systems. In this context, the transfer of authority (yet somewhat limited) over resource use and management to local non-state actors is a very positive outcome. Further, local entities to which such authority has been transferred, such as Village Management Committees comprise elected villagers and resource users.

Fishing Associations and Village Management Committees have entailed the participation of villagers and resource users in local rule- and decision-making over resource use and management. In the case of SAFM, Fishery Management Committees offered in the past a platform for stakeholders to provide input into the state's fisheries management. These have implications for the ability of the governance system to timely respond to local concerns and needs (responsiveness).

In the TGL, as mentioned above, fishing rights have been formally transferred to Fishing Associations – such rights can only be granted if at least 75% of a village is part of the Fishing Association (Marschke et al., 2012). Therefore, such allocation of rights provides legitimacy to local resource management. Legitimacy also manifests in terms of compliance (Jentoft, 2000); in this regard, levels of compliance with locally-made rules are somewhat high in some case sites (Tuyen et al., 2010). For instance, Giang Xuan Fishing Association regulations are mostly respected and have resulted in change in fishing practices locally (e.g., resizing of fishing corals, reducing the number of fishing gears, and ending electric fishing).

Despite supporting legitimacy, equity, responsiveness and accountability in some cases, fair governance remains challenging. Tensions and conflicts, power imbalance, partial support from high-level authorities, limited resources, and inconsistent policy implementation are some of the factors constraining fair governance. Importantly, as seen previously, the ultimate authority to make decisions in all cases examined remains with high-level government authorities.

6. Discussion and Conclusions

This study examined how institutions support adaptive capacity to environmental change in the context of decentralisation of resource management in the Peam Krasop Wildlife Sanctuary (PKWS, Cambodia), Tam Giang Lagoon (TGL, Vietnam) and South Australia Fisheries Management (SAFM, Australia). More specifically, it examined adaptive capacity in terms of six institutional dimensions proposed by Gupta et al. (2015): *variety, learning capacity, autonomy, leadership, resources and fair governance*.

The six dimensions of institutional adaptive capacity examined varied within and across the case studies examined. These dimensions may both facilitate and constrain adaptive capacity – depending on enabling and constraining conditions at play. For instance, a variety of actors, sectors and levels participating in resource management has entailed shared management and diverse approaches to problem-solving in the PKWS. On the other hand, such variety became problematic when different perspectives, interests and authority proved challenging to negotiate. In this case, variety has underscored existing conflicts and tensions between actors.

The fact that institutional dimensions of adaptive capacity may both serve as an enabler and/or deterrent may be explained by the very nature of institutions. That is, institutions may inherently both expand and/or limit human decision-making and action (Ostrom, 2005). It may also be explained by the interdependent nature of these dimensions; that is, they can reinforce and/or undermine each other (Gupta et al., 2010). For example, in the PKWS and TGL, external financial and technical resources were critical to support learning activities facilitated by the PMMR team (*resources* have supported *learning capacity*). Such activities aimed, among others, at enhancing the ability of villagers, fishermen, government authorities and technical staff to participate in decentralised resource management (*learning* has reinforced *variety*). *Resources* also helped mobilise *leadership* by reducing the transaction costs of participation. *Leadership*, in turn, proved critical to mobilise external technical *resources* and authority (*autonomy*). Later, policies and legislation were put in place, formalising and providing legitimacy and legal authority for local actors to take part in resource management (*autonomy* has supported *governance* and *variety*). Conversely, limited *resources* and *authority* have constrained *leadership* qualities of local actors; and, inconsistent policy implementation and law enforcement have undermined local authority in some instances (*governance* has constrained *autonomy*).

The constraints to resource management highlighted in the assessment of the six institutional dimensions of adaptive capacity are common to decentralised initiatives

elsewhere (see e.g., Larson and Ribot, 2004, Larson and Soto, 2008). They are indicative that democratic decentralisation of natural resources, similar to the case studies investigated here, is rather challenging to implement and results are therefore variable (Larson and Soto, 2008). According to the literature on decentralisation of natural resources, these constraints arise fundamentally from governments transferring inadequate powers to local actors (Larson and Ribot, 2004). In fact, limited authority and resources of Village Management Committees, Fishing Associations and Fisheries Councils comprises critical constraints. Further, as highlighted previously, decentralisation takes place, particularly in the PKWS and TGL, in complex and evolving socio-economic and political contexts characterised by centralised government regimes. These are compounded by unclear reasons underpinning governments' motivation towards decentralisation. In Cambodia, for example, it is believed that perceptions among government bureaucrats may include those of decentralisation as a means to extent control to the local level, as a threat to central control, or even as a genuine means to engage people in decision-making (Marschke, 2012).

Despite the constraints, our findings indicate that, to a certain extent, resource management institutions have enabled actors to: organise themselves; learn and improve resource management; mobilise leadership, resources and authorities; and, progress towards improved governance. These illustrate the creation and mobilisation of adaptive capacity, which in some cases resulted in positive outcomes in responding to environmental change.

Nevertheless, responding to issues involving complex external factors seems to be beyond the means of the institutions examined. These issues usually comprise some of the most pressing environmental change issues, such as climate change. Responding to such issues requires action at multiple levels of governance. At the local level, one of the first steps would be reinforcing existing enabling conditions and minimising those constraining adaptive capacity of local institutions. At sub-national and national levels, in addition to building and mobilising adaptive capacity at those levels, institutions need to provide and reinforce enabling conditions at lower levels (Fidelman et al., 2013). These include providing adequate financial and technical resources and authority so that adaptive capacity may be strengthened, and adaptation may emerge at the local level. In some cases, such as the PKWS and TGL, reinforcing enabling conditions may also include creating livelihood alternatives to exploitation of coastal resources, alleviating poverty, reducing inequality, and building human and social capital.

7. Future Directions

This study focused mostly on adaptive capacity at the local (Peam Krasaop Wildlife Sanctuary and Tam Giang Lagoon) and state (South Australia Fisheries Management) levels. As mentioned above, responding to issues featuring complex external factors (e.g., climate change) requires action at multiple levels, from local to international (see e.g., Fidelman et al., 2013). Future studies that examine adaptive capacity simultaneously at multiple levels, and how such capacity at one level helps support adaptive capacity at different levels would be mostly beneficial.

Also beneficial would be studies towards understanding the conditions that underpin institutional constraints to adaptive capacity. These conditions may involve dynamic factors preventing institutional change – i.e., factors that ensure the reproduction of poorly performing institutions. In this regard, the literature on institution reproduction and change (Campbell, 2010) may offer an adequate analytical approach.

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Appendices

Please note that appendices have been enclosed as a separate document.