

## POLICY BRIEF

## CLIMATE CHANGE RESILIENCE IN COASTAL CAMBODIA – ADAPTIVE CAPACITY AND HUMAN DEVELOPMENT

## ADAPTIVE CAPACITY GAPS

- Lack of capacity to secure fisheries and agriculture activities in coastal villages to bring continuity to food security;
- Lack of capacity amongst coastal villagers to meet water resource needs economically during flood and drought cycles outside of rice production needs;
- Lack of capacity amongst coastal villagers to lower the impact of drought on home based food production systems to ensure food security throughout the year;
- Lack of capacity amongst coastal villagers to access development services appropriately, e.g. micro-finance institutions, livelihood technologies, and natural resource management capacity development; and
- Lack of capacity amongst coastal villagers to engage in local level participation in natural resource management initiatives to sustain a diverse set of rural livelihood strategies and family nutritional needs.

*Climate Change Vulnerability*

Climate Change Vulnerability in the context of Cambodian coastal communities constitutes elements of exposure, sensitivity, and adaptive capacity. *Exposure* to the impacts of climate-related hazards is limited beyond past and current conditions of wet and dry seasonal variations. However, in recent years, storms during the wet season are said to have intensified; during the dry season, intensified temperatures are experienced in conjunction with increased pest infestations affecting agricultural production. Of concern is a prolonged dry season – three (3) weeks beyond normal cyclic conditions leads to drought conditions describe by locals as an absence of available water sources for domestic and agricultural use. In terms of *sensitivity*, this is a combination of two factors, 1) the physical scarcity of useable water (quantity and quality) and 2) economic scarcity of water. Physical scarcity is attributed to elements of environment and policy, e.g. degrade watersheds, land use changes disrupting natural water flows, and a lack of capacity to ensure and manage water storage and distribution. Generally, coastal communities have far more adaptive capacities in place to deal with flood and storm conditions than drought, but, adaptive strategies in times of drought are more apt to lead to mal-adaptation than the building of resilience to drought conditions.

*Climate Change Adaptation - The individual, and household*

For coastal communities, adapting to climate change means adapting to losses; losses in areas of livelihood production, food security, human safety and general

health, and ecosystem services. Strategies to deal with losses are a combination of knowledge and asset inputs – from financial, to natural resources, to human and institutional resources.

*Livelihood losses and resilience*

When dealing with livelihood productivity and income losses, strategies focus on the replacement of lost assets, e.g. replanting of agricultural crops, and not on building resilience within their natural asset based livelihoods. Most locals tap institutional assets only in times of heightened stress or when approached by development service providers; many access costly formal and informal loans to compensate for livelihood productivity losses; few use financing to enhance their livelihoods, again, even fewer to build climate change resilience within their

- **EXPOSURE** is defined as “the nature and degree to which a system is exposed to significant climatic variations”;
- **SENSITIVITY** is defined as “the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli”; and
- **ADAPTIVE CAPACITY** is defined as “the ability of a system to adjust to climate change (including climate variability and extremes), to moderate the potential damage from it, to take advantage of its opportunities, or to cope” with combined capacity gaps respective of the constituents of adaptive capacity (Anshory, A., and Francisco, H., 2009).

This policy brief is based on the findings of a participatory research effort: Climate Change Adaptation - Factors of choice, effectiveness, and supporting systems, conducted in the provinces of Koh Kong and Sihanoukville, Cambodia in late 2010 and in January of 2011. The study is a continuation of work supported by the Asian Institute of Technology and the United Nations Environment Programme (AIT-UNEP), through the Climate Change Adaptation Knowledge Platform to disseminate and exchange adaptation knowledge to a wider audience. This policy brief was compiled by Robert W. Solar.

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livelihood profiles. Prolonged climate induced stresses will also prompted individuals to seek temporary labor activities. For some this has resulted in improvements to family health and nutrition, but social and safety risks associated with those having to migrate are considered significant. Overall, increased inputs, e.g. fertilizers and pesticides, increased production cost, and the increased use of micro-finance as a strategy to compensate for losses has created a cycle of debt, and only slowed/reduced the rate of production decline year on year.

#### ***Food security losses and resilience***

Apart from accessing 'food relief' in recent years, villagers have been strategically combining 'natural resource production' based knowledge to that which tracks community movements – getting to available natural resources at the right time and ahead of others. As a strategy in motion, exploitation of one natural asset after the next occurs, e.g. movement to substandard alternative agriculture locations, heightening extractive pressure on lakes, rivers, and then mangrove forests resources to meet daily food requirements, then to forests based food resources as a last resort. The aforementioned is combined to a reduction in food consumption for women and children; and to trading labor for cash or food supplements, small informal money borrowing for food/ and of food if needed. Of interest and of heightened concern is the level and rate that 'community unity' is degrading as villagers compete for a limited resource base. With some villages, relationships have deteriorated between government stakeholders mandated to regulate the use of the natural resource base; in others, it is within the community itself where relationships have degraded. Additionally, trying to access natural food sources comes with some degree of 'social-safety' risk, i.e. seen as intruders if from another village or commune not involved in the management of the resource base. Overall, food security is a long way

off, and expressions of 'disunity' and 'exclusion' are working against natural resource management and climate change resilience building objectives in the areas.

#### ***Human safety, health losses and resilience***

Knowledge inputs come from formal channels of communication related to broader weather conditions for those fishing far out at sea, and informal channels of communication for more localized weather conditions to secure human safety at sea. As a result, safety levels for marine fishers have increased significantly; also contributing to livelihood security by minimizing the loss of material assets. Other knowledge uses focus on local medicines (from the natural resource base) and other remedies to address health matters related to increase and prolonged hot periods, primarily heat stroke and fever. Medical facilities and micro-finance institutions are used to offset costs associated with extreme cases of deteriorating health; informal borrowing is used in less extreme cases to purchase medicines. Adaptations to this have yielded little results in lieu of building resilience to 'general health' losses. Knowledge of and the use traditional medicines from the natural resource base are on a downward trend: 1) because the surrounding ecosystems are degraded, i.e. traditional medicines are no longer available, and 2) an upward trend respective of availability and access to modern health services. Important to note is that the mobilization of 'health and safety' assets are centered on addressing the impact of a hazardous condition, and to a far lesser degree on building awareness and resilience to this. In most cases, moderate to extreme difficulties yield higher debt, lower health levels, and lower income levels from lost productivity.

#### ***Ecosystem services losses and resilience***

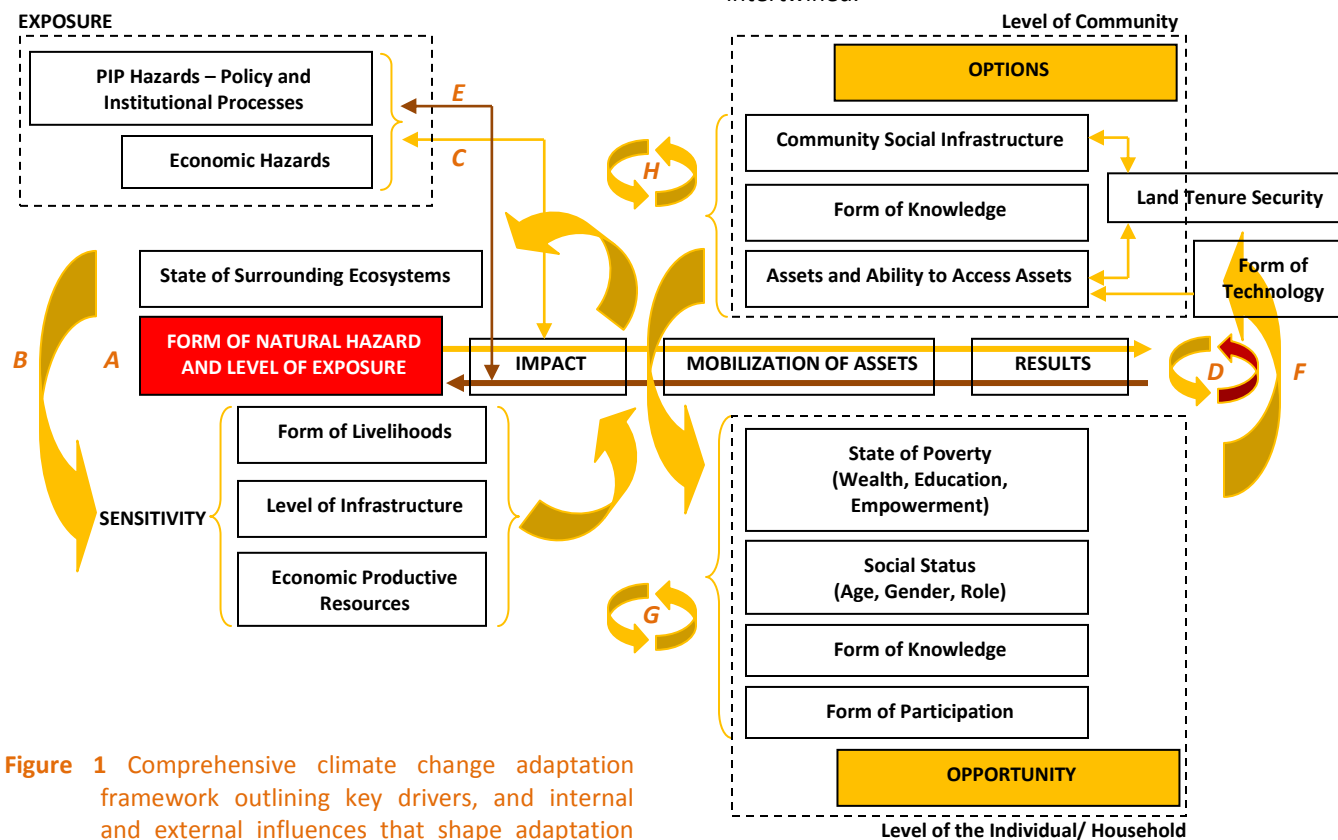
There is a wealth of knowledge inputs around law, policy, and governance processes in play, and in some cases villages have been engaged in natural resource management (NRM) activities. Assets used to deal with ecosystem services loss focuses on the use of human assets and institutions (government and non-government based) to communicate and report problems associated with the legal governance of the resource base, e.g. illegal fishers, loggers and intrusions on agricultural land. In some cases, group and or individual social capital is used to exert pressure over how and who will benefit more from ecosystem services/ or who will absorb more loss. Adaptation has resulted in minor inputs into community based natural resource management, mangrove reforestation to lessen impacts of storms for communities living on the coastal fringe; and few individuals have moved towards 'organic' farming to preserve soil fertility

and water quality. Inputs have had positive impacts on curbing ‘abuse’ internally, but not from external actors. This has strained relationships between locals and government agencies/ officials. Dealing with the loss of ecosystem services is seen by villagers as one of the most important, yet problematic areas to advance. Noted efforts into water resource management, as seen from a livelihood point of view, are not done in a way to protect/ rebuild ecosystem services – rather in a way to ensure water availability for rice production needs. This vein of thinking also holds true when referring to how farmers are dealing with losses in soil fertility for agricultural purposes, e.g. increased inputs of commercial fertilizers. There is a growing interest in community based forms of NRM and an understanding of roles and responsibilities, but inputs to facilitate this are small. In general, losses equate to higher debts, lower income levels, and food insecurity for most families.

### *Drivers of climate change adaptation*

Driving forces behind adaption strategies constitute a spectrum of climate related cause and effect stimuli on ecosystems, combined to a spectrum of socio-economic

and political influences that shape adaptation strategies, the outcomes of these, and for whom. Stimuli in the form of a natural hazard (not disaster) seemingly sets of a cyclic pattern of influence starting with the level of stability and natural wealth within the surrounding ecosystems, and elements of sensitivity related to people’s general resilience to adversity, e.g. the nature of their livelihoods, the productivity of the natural resources they use, and the level of infrastructure supporting and protecting these livelihoods. On one level, the form and degree of impact is found to be a function of ‘sustainability’ as it would relate to the use and management of ecosystems. On another level, climate change impact and adaption is shaped by policy and institutional processes e.g. land use and management patterns, development patterns, and other economic factors influencing the behaviors of stakeholders. These influences indicate that climate change adaptation does not exist in a vacuum, nor is it static; rather that it is tightly intertwined with how sustainable development is expressed and achieved at the level of community, country and society continuously. Figure 1 provides a closer look into how climate change, the driving forces behind adaptation, and sustainable development are intertwined.



**Figure 1** Comprehensive climate change adaptation framework outlining key drivers, and internal and external influences that shape adaptation strategies and outcomes (*letters in italics refer to content discussed in this section*).

**Figure 1 in focus**

(A) The form of the natural hazard (not disaster) and level of exposure has been discussed in other sections; what is important to further discuss is how this links to the level of impact experienced. (B) This in itself has a cyclic pattern of influence starting with the level of stability and natural wealth within the surrounding ecosystems, and elements of sensitivity related to people's general resilience to adversity, e.g. the nature of their livelihoods, the productive natural resources they use, and the level of infrastructure supporting and protecting these livelihoods and the communities physically. On one level, the form and degree of impact is a function of sustainability as it would relate to the use and management of ecosystems, and that of a natural resource base livelihood operating sustainably, i.e. within the bounds of an ecosystems carrying capacity. Improvements on either side of the equation tend to result in a lesser impact. (C) However, within this form of 'regulatory' mechanism, the system is shaped by its exposure to external hazards such as policy and institutional processes e.g. land use and management patterns, development patterns, and economic factors influencing the behaviors of stakeholders. It should be noted that the level of climate change impact cannot be predicted without considering the given constituents together.

Climate change adaptation at the local level often begins with the mobilization of assets, and how this is done, supported, and or influenced determines the result.

However, participants in the participatory study have also noted that the end results of adaptation (D) also influences policy and institutional processes (E); and adjustments made influence the cyclic pattern put forth (B), the level of impact experience, and the nature of what stakeholders are adapting to.

The aforementioned denotes the dynamic and ever changing nature of climate change impacts... subsequently this is also true when considering adaptation strategies structured around the mobilization of and access of assets, e.g. factors of influence, limitations, and advantages. To researchers and participants in the study, adaptation strategies and their outcomes also operate in a cyclic process of influences; those operating at the level of the individual and or household, and those at the community level (F). Internally, each has a set of component factors that influence one another (G-H) as shown in Figure 1. Important to note is that at the level of the individual and household, internal factors (G) influence the level of OPPORTUNITY one has to access assets in order to gain resilience; conversely, the level of risk they are exposed to losing resilience towards climate change impacts heighten. At the level of community, internal factors influence the type of climate change adaptation OPTIONS available to the community as a whole (H). As such, land tenure security and the movement of usable and accessible technology into a community influences greatly the level of climate change resilience achieved.

**Development service providers responding to adaptation needs**

A multitude of development services providers (DSPs) are trying to address different areas of 'climate' hazards, e.g. food security and water management, but these remain less effective than thought by their providers. When considering the connectivity of climate hazards with social and economic risks, few providers integrate their climate change adaptation support profiles. DSPs are often described as replacement processes, e.g. replacing food, seeds, and or fish fry, or as a 'one-off' event where information flows from the provider to the recipient briefly before being left with basic start-up materials. Hence, knowledge digested is challenged to move from a state of information to active use in strategic planning and sustainable implementation, rather than supported. Continuous skills building is seldom provided, e.g. organizational development skills, financial management skills, literacy, and or the building of one's ability to recognize and act upon adaptation needs or to create opportunities. If considering the lack of capacity to access development services appropriately, this connects well to the aforementioned, and to similar troubles and challenges. For example, indicated is that villagers make use of micro-finance institutions, but seldom make use of these funds to enhance and or build resilience to their livelihoods, nor are these funds tied to other strategic development support services to assure funds could be applied effectively, e.g. appropriate skills training and

these mimic closely that of a narrowly supported economic development framework – resilience through growth, and growth through increased input; and that of a 'relief' response – adaptation through replacement of loss, rather than the building of broad base resilience to climate change impacts. Additionally, social and cultural hazards that are exacerbated in the fold of climate change impacts; neither specific adaptive responses nor services provided focus on lowering related risks to women and or the poorest of the poor, e.g. safety, health, food security, and or dignity. Hence, social and cultural risks are seemingly not recognized as a priority to invest resources in to lowering levels of risk/ vulnerability involved.

Further DSP gaps respective of supporting climate change adaptation have been the lack of attention providers give to boosting or maintaining ecosystem services, nor attention to fostering two-way collaborative relationships to improve all aspects of natural resource management and community empowerment. This carries significant importance despite what loss villagers are trying to adapt to. Indicated within the study is that the degree of climate change resilience obtained locally is strongly linked to the degree in which a village participates in its development and their efficiency in utilizing and accessing assets. Field experiences have also drawn clear links between climate change impact, ecosystem carrying capacities, and the level of input into natural resource

management. Seen is that most coping/ autonomous adaptation strategies maintain basic levels of subsistence, however, this is steadily decreasing for villages that have low levels of participation in and access to development services offered... lesser for villages with less ecosystem diversity... lesser for those living in degraded ecosystems. Unfortunately, few within the research area are seen to be building resilience to climate change. Widespread is a downward trend of resident resilience to a multitude of natural and socio-economic hazards over the last five years.

### **Reflecting on choices made and perspectives of mal-adaptation**

Climate change adaptation is a very reactive response at the village level, often deteriorating the natural resource base, creating cycles of debt, and at times creating disunity amongst resident social and governance structures. For the most part, local adaptation responses are coping strategies – coping with crushing poverty<sup>1</sup>, and a lack of viable opportunities and options to build resilience to climate change impacts. Intuitively, this drives mal-adaptation. However, it is important to state that mal-adaptation is not 100% a factor of choice, but a matter of situation stemming from a lack of capacities to enact good adaptive ideas.

At higher levels of governance, the commune, district, and province, the degree of adaptation planning increases accordingly. In many ways this can be attributed to a disconnection from the need to meet daily subsistence needs as an individual, and a connection to role and responsibility processes to support local development... but this also does not mean that mal-adaptation cannot happen when taking a planned approach. Seen is that land use changes and water management activities can bring ‘benefit’, e.g. increase land area for agricultural cultivation, but with climate change impacts, production costs, and production losses due to extreme weather events, the intent can produce a reversal of benefits.

At the village level, risk, vulnerability and climate change impact are all equated to various forms of loss, and village responses to these are just to meet daily needs... if this is done then it would be seen to them as a good strategy, if not... try again tomorrow. At district levels of

planning, a good adaptation response, for example, is noted when the level of rice production rises per hectare; mal-adaptation when governance over the resource base becomes problematic. These simple and real examples from the field indicate in some way that to know if mal-adaptation has occurred or not definitively, is a matter of ‘whose perspective’, ‘their context’, and ‘what context’ has been left out when reporting gains or losses. Hence, it is ‘context’ that has to change to bring about efficient planning and support for adaptation, irrespective of the level of stakeholder. Highlighted in Figure 1 is the ‘form of knowledge’, ‘form of participation’, ‘opportunity’, ‘options’ and many other factors that drive and influence adaptation outcomes. These influences can be broken down into the following constituents – and if supported in a positive way, mal-adaptation can be avoided:

- Information, and development services flowing into and out of targeted areas;
- Patterns of vulnerability created by gender, income and social position;
- Diversity of livelihood systems within a targeted area or region;
- Ability of people to secure and access alternative sources of food, productive goods, and non-farming sources of income;
- Social and institutional capital, access, and cooperation (education, self-help groups, government departments and agencies, banks, Non Government Organizations and social networks etc.);
- Physical infrastructure (communication and early warning systems, roads, houses, water supply systems, dikes, and reservoirs etc.);
- Ability of households in the targeted area to obtain secure sources of water for domestic use; and
- Natural resource conditions, use, and equitable management.

Hence, preventing the risk of mal-adaptation occurring begins with strengthening positive influences and addressing those less desirable, e.g. 1) through enhancing the connectivity of knowledge, use of participatory planning, and by instituting comprehensive support programs to deliver planned adaptation and development actions, and 2) by using the aforementioned to target the most vulnerable and to avoid crisis situations – situations that require reactive responses.

<sup>1</sup> Poverty is taken in a broader context: A lack of basic human needs, such as clean water, nutrition, health care, education, clothing and shelter, and a lack of ability to participate effectively in one’s own development – claiming and benefiting from true expressions of human rights and human dignity.

## PROCESS RECOMMENDATIONS

■ **RECOMMENDATION 1** – Institutionalize multi-stakeholder communication and consultative processes between development service providers and recipients. This small step could improve the connectivity of knowledge, e.g. around ecosystem services, livelihoods, and natural resource management. Communication and consultative processes can also improve people’s participation in their development; a major factor to successful adaptation. Multi-stakeholder collaboration can also bring about the efficient use of limited resources – combining resources to create good models sites for extension learning, even innovation to guide others away from mal-adaptation;

■ **RECOMMENDATION 2** – Establishment of a policy driven mechanism that provides incentive to develop and or harness existing local committees and associations to improve the movement of knowledge and experiences in and out of vulnerable areas. The mechanism should create transparency and collaboration between the actors involved, i.e. ensuring knowledge needs are met in content and form, updated, and disseminated systematically;

■ **RECOMMENDATION 3** - Increase participation in, and or initiate community forms of natural resource management beyond law enforcement, e.g. the rehabilitation of ecosystems to equitable decision-making process over land use and management issues. Actions should also extend to the formal recognition of community based groups; their rights, roles and responsibilities, and returns, i.e. to bring about their own actions towards positive adaptation strategies;

■ **RECOMMENDATION 4** – Encourage micro-finance providers to work with other DSPs to ensure loans for livelihood purposes are tied to oversight and appropriate capacity development activities. Thus, reducing unwanted cycles of debt, improving desired outcomes, and improving collaborative efficiencies amongst DSP profiles; and

■ **RECOMMENDATION 5** – Require that DSPs consistently target programmatically the most vulnerable, e.g. poorest of the poor and women headed households, to avoid crisis situations that often lead to mal-adaptation responses.

## ACTION POINTS TO BUILD RESILIENCE

### *KNOWLEDGE and LEARNING NEEDS to build resilience*

- Development of knowledge and supporting distribution systems around the seasonality of water usage in order to enhanced water management and infrastructure needs;
- Learning of better ways to transfer skills and technology to local stakeholders, and move such towards active capacities; and
- How to build positive value towards multi-stakeholder interactions – changing of Minds, Attitudes, and Processes (MAP).

### *ACTION NEEDS to build resilience*

- Fisheries and agriculture training courses, information dissemination, and multiple model site establishment;
- Supporting infrastructure – dikes, reservoirs, and water delivery systems;

- Rebuild and improve function and management around ecosystem – streams, rivers, natural canals, watersheds, and PEOPLE;
- Land use planning and management done in a way that brings fairness, diversity and stability to rural natural resource based livelihoods;
- Development service profiles that highlight processes of empowerment for all stakeholders, e.g. knowledge of legal protection and advocacy processes, building of capacities to access and use knowledge networks, to the building of applied skills at multiple levels to support climate change adaptation and sustainable development initiatives; and
- Development service profiles that create an enabling environment for participation, e.g. participatory planning facilitation, to partnership



building processes that bring about institutionalized Authority Partnerships.



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