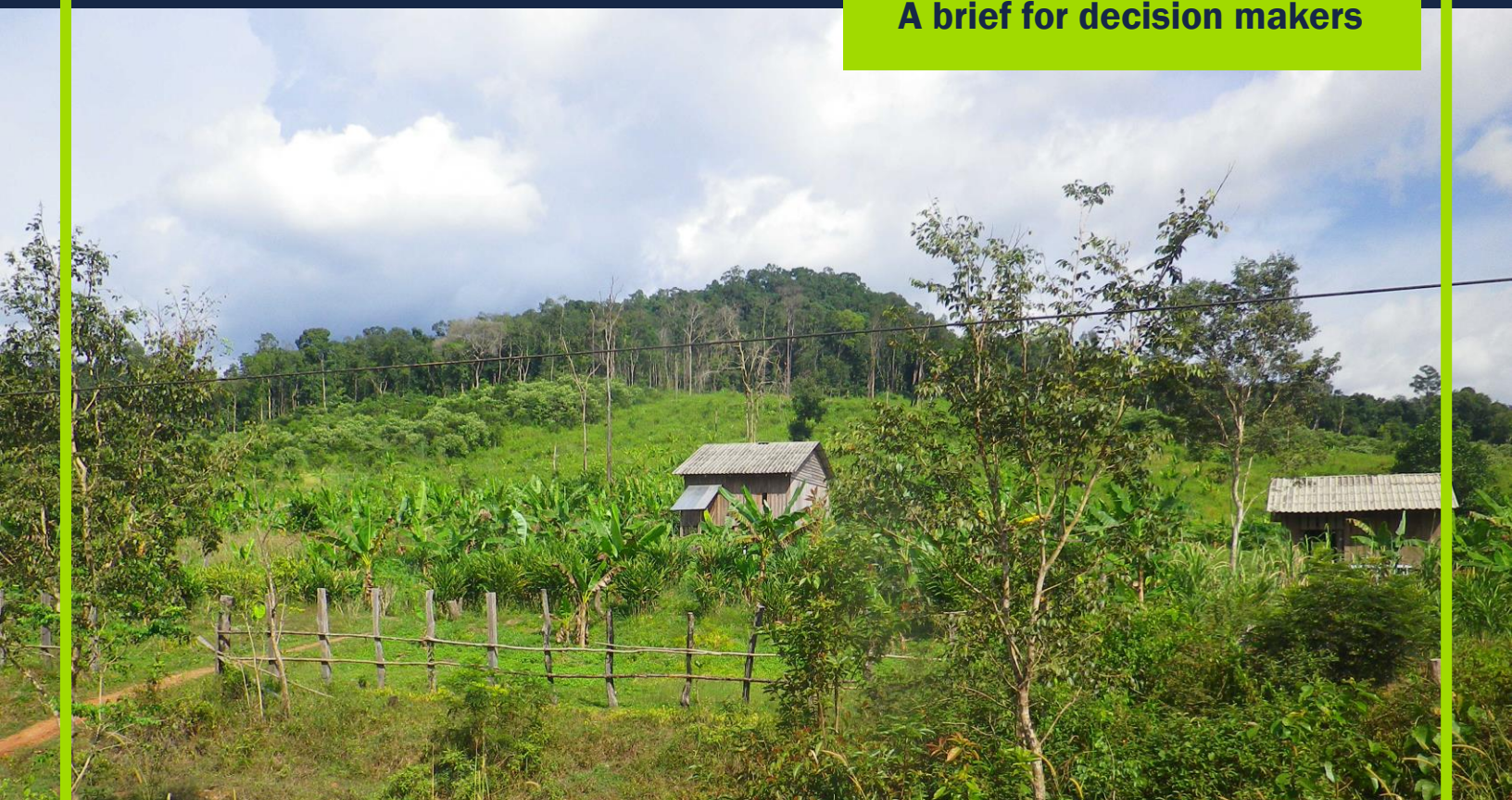


**A brief for decision makers**



# **Ecosystems-based adaptation in the forest and agriculture interface**

Operationalizing action in Mondulkiri and Koh Kong





## Introduction

Ecosystem adaptation (EbA) is the use of ecosystem services as part of the overall adaptation strategy to help people to adapt to the adverse effects of climate change that human resilience depends on (Convention of Biodiversity, 2009). Because it focuses on benefits humans derive from biodiversity and ecosystems, it includes a wider range of areas of work such as forest and coastal habitat restoration, agroforestry and small livestock and associated sustainable livelihoods.

### Ecosystem-based Approaches to Address Climate Change Challenges in the Greater Mekong Subregion

To safeguard the region's natural wealth and development gains in the face of climate change challenges, the Greater Mekong Subregion (GMS) countries need to strengthen the resilience of their natural and human systems. The GMS must also harness opportunities to reduce its contribution to climate change. Ecosystem-based approaches can help GMS countries address these challenges by making use of ecosystems and biodiversity to reduce greenhouse gas emissions and to assist people to adapt to a changing climate.

Source: Ornsaran Pomme Manuamorn and Jiao Xi. 2015. Ecosystem Based Adaptation to Address Climate Change Challenges in the Greater Mekong Subregion. GMS Environment Operations Center (EOC), Asian Development Bank, Bangkok 10330 Thailand.

Thus, it is a people-centered and, invariably a participatory process that helps reduce the vulnerability of communities. The role of Ecosystems based adaptation is well recognized by the United Nations Framework Convention on Climate Change (UNFCCC), Convention of Biodiversity (CBD), The UN Convention to combat desertification (UNCCD). It is also featured in the Sustainable Development Goals (SDG). The Ecosystems based adaptation approaches featured prominently in the work of ADB in Cambodia.

Cambodia, being an essentially rural economy, is more susceptible to the impact of climate change as a result of the increased risks of flooding and drought. Consequently, there is a need for appropriate climate change safeguards within the design of all projects concerned with natural resource management. Climate change is posing additional challenges to maintaining the natural capital in key biodiversity landscapes. The more extreme weather events affect the watersheds, especially those that are already seriously degraded, by making them more vulnerable to the increased risks of runoff, erosion and landslides. Climate change is resulting also in further declines in biodiversity with increased species loss and a gradual malfunctioning of ecosystems.

The BCCP project is seeking to enhance the management of the forest-based ecosystems in three countries of the GMS region, Cambodia as well as Lao and Vietnam. These GMS governments in collaboration with ADB have identified the most important biodiversity conservation landscapes with the region that are vulnerable to increased domestic pressures and environmental degradation.

In Cambodia the project is addressed the fragmentation of the biodiversity rich forest landscapes of Koh Kong (KKG) and Monduliri (MDK) provinces that may impair their ability to provide the critical ecosystems services that are necessary for sustaining local livelihoods and investments in hydropower, transport, water and food security enhancing sectors. The project is promoting sustainable resource use and restoring and enhancing these productive landscapes through conservation, development and livelihood improvement activities.

The project is using the two main approaches of ecosystem-based adaption (EbA) and mitigation through the use of ecosystems and biodiversity to help people adapt to the impacts of climate change whilst making use of the ecosystems and biodiversity to reduce greenhouse gas emissions.

### **THE BCC PROJECT: Its biodiversity ecosystems orientation**

The long-term impact of the BCCP is climate resilient sustainable forest ecosystems benefiting local livelihoods with an outcome of establishing biodiversity corridors in KKG and MDK with enabling policy, regulatory and management regimes. The effort aims at enhancing the climate resilience of communities within the project target areas. On December 2010, ADB approved the BCC project which was effective from 23 March 2011. Then on 13 December 2019, it approved the first extension of the closing date of both grants from 30 September 2019 to 31 December 2020.

The BCCP followed on from the GMS Biodiversity Conservation Corridors Initiative (BCI) pilot phase that was endorsed by the GMS Summit of Leaders in 2005 in Kunming and was implemented between 2006 to 2009 in the Cardamom Mountains Biodiversity Landscape in KKG province and the Eastern Plains Landscape of MDK province under the ADB Regional Technical Assistance (RETA 6289). In KKG province, the Project is supporting the maintenance and consolidation of the forest ecosystem connectivity between the Central and Southern Cardamom Protected Forests, linking Botum Sakor National Park, the Peam Krasop Wildlife Sanctuary (WS) and the Dong Peng multiple use area to the corridor. In MDK province, the Project is linking the core areas of MDK Protected Forest (PF) with Phnom Prich WS and Keo Seima PF in the South and with Lomphat WS in the north-west with the transboundary area to Yok Don National Park in Viet Nam to the East.

The BCCP Project has adopted a multipurpose, sustainable, biodiversity landscapes approach and covers 22 communes (12 in MDK<sup>[1]</sup> and 10 in KKG<sup>[2]</sup>) located across 10 districts with a total population of approximately 68,048 (2008 census) in both provinces and households numbering just over 14,000.

The Project in both KKG and MDK provinces is predominantly in mountainous areas covered with protected forests, national parks, and wildlife sanctuaries.

The Project scope includes (i) empowering communities to manage their forest resources through demarcation of boundaries, forest management planning, and achieving legal



approvals for Community Forests (CFs) or Community Protected Areas (CPAs); (ii) restoring habitat and degraded forest lands by planting native tree species and agroforestry that incorporates improved sources of non-timber forest products; (iii) improving livelihoods and income-enhancing small scale infrastructure; and (iv) generating short-term employment to project households through project activities.

## Types of EbA activities implemented

The BCCP has supported a range of activities that have supported EbA. Under the original project there has been support for the restoration, protection and maintenance of biodiversity corridors. Forest restoration has been achieved through a combination of Enrichment Planting (EP), which entails the introduction of valuable



species to degraded forest areas without the elimination of valuable species which already exist, and Assisted Natural Regeneration (ANR), which entails the protection and preservation of natural tree seedlings in forested areas. These have been implemented through a series of contracts with the communities with the completion of 1,742 hectares within seven CPAs and seven CFs, and 1,253 hectares of ANR in nine CPAs and nine CFs, as well as 34 hectares of forest planted within the biodiversity corridors.

Livelihood improvement activities have been supported through a contract with the World-Wide Fund for Nature (WWF), in partnership with local NGOs, to support the production, harvesting and marketing of a range of NTFPs including wild honey, bamboo products, medicinal plants, agroforestry, essential oils and eco-tourism. With the assistance of the International Institute of Rural Reconstruction (IIRR) and the CEDAC two NGOs based in Cambodia, Village Development Fund Saving Groups have been established in 37 villages located within the targeted CPAs and CFs with over 1,700 members and combined capital of over \$600,000 and providing short term loans to the members for chicken raising, pig raising, fruit tree and vegetable planting.

The AF for the project has aimed to strengthen the adaptive capacity and reduce the climate vulnerability of ecosystems and communities supported by the project. This includes (i) increasing water availability through the construction of eight rainwater harvesting ponds plus 22 other small-scale infrastructures for irrigation of home gardens and the introduction of drought-resilient crops; (ii) the rehabilitation of an irrigation scheme in MDK and supporting the adoption of system of rice intensification (SRI)

techniques; (iii) protecting 750 hectares of agricultural land from saltwater; and (iv) diversifying sources of income for households in a pilot catchment area in MDK province.

The use of rainwater harvesting ponds is a concept that is used in Cambodia to provide an opportunity to collect and store rainwater, which would otherwise be lost to runoff, and utilise this water for irrigating high value crops during the off season and providing an attractive livelihood opportunity for poorer households. Under BCCP, one of these ponds will be provided with a rubber lining together with a geotextile underlayment, as a pilot, which although entailing additional cost, will demonstrate the benefits of lower infiltration losses. The ponds will all be equipped with a stilling well and solar powered pumps to lift the water to overhead storage tanks which in turn feed the micro-irrigation systems for the home gardens. The other 22 small-scale irrigation sub-projects will derive their water either from boreholes, by extraction from streams or from community water tanks collecting rainwater from school roofs, and similarly feed water to micro-irrigation systems using solar powered pumping systems. It is expected that these subprojects will provide irrigation for at least 60 hectares of home gardens and will benefit at least 2,000 households.

The Srae Chrey irrigation system, which was built during the Pol Pot era, was poorly engineered and has never functioned effectively and the irrigation structures are all completely destroyed and cannot store water. The rehabilitation of the irrigation system is aimed to increase agricultural productivity through the provision of reliable and adequate irrigation facilities to enhance the living conditions of the beneficiary farmers in the face of increased drought risk. The system has a command area of 171 hectares and is expected to bring



*Seawater barriers constructed by BCCP in Koh Kong are serving to reduce the impact of sea water backflows. This had adversely affected the productivity of rice crops for years (and was expected to worsen in the wake of climate change). Following the establishment of two such barriers, farmers are now able to grow market-oriented rice varieties using SRI technologies and associated support services.*

benefits to at least 1,000 households. The SRI techniques that are introduced will include the distribution of climate resilient rice varieties and the introduction of cultural practices that include drought adaptation. The increased water availability may provide an opportunity for increased production of high value crops during the off-season.

The two bio-engineered sea barriers are located in KKG province, which are located within degraded mangrove forest areas, and feature the use of a combination of native species planting together with local natural materials to strengthen the existing barrier and provide

protection of arable land from tidal waters through establishing a more stable barrier and improving the ecological features and the integrity of the shoreline. The use of salt tolerant native plants is an integral part of the bio-engineering since they have extensive root systems compared to other vegetation and these roots help to anchor the soil in place and stabilise the sea barrier by limiting erosion. Maintaining the native vegetation in this way helps to sustain the natural biodiversity and reduce invasion by other species. The work entails the construction of 11 km of bioengineered sea barriers and the introduction of salt-resilient crops to 400 households providing significant improvements

to their livelihood opportunities compared to their existing rice based farming systems with very low yields.

In MDK province the Keo Seima Wildlife Sanctuary (WS) covers an area of almost 300,000 hectares and was established in 2009. The BCCP has supported EbA activities within the O'Por catchment area of the WS in an area known as a Community Based Production Forest (CBPF).

Working in partnership with a local NGO, the World Conservation Society (WCS), the BCCP has provided support to the local communities within this catchment to develop and trial methods for sustainable forest management for the purposes of poverty alleviation, maintenance of forest cover, conservation of social and biodiversity values and the enhancement of climate resilience and benefitting at least 900 households.

The work necessitated the conversion of the existing CBPF into a Community Protected Area (CPA) which is now under the jurisdiction of the MoE. The interventions have been largely successful through the improved community wellbeing resulting from increased incomes, tenure rights and climate resilience through diversification of livelihood activities. Incomes are being enhanced through the development of a bamboo enterprise and the establishment of community bamboo collection and growing groups to enable further diversification of livelihood activities that included the harvesting of Non Timber Forest Products (NTFPs). The diversification of income sources is a key climate change adaptation measure and an essential tool in the EbA measures and this has been achieved by the creation of the small enterprise based on sustainable harvesting of NTFPs from the CPA as

an alternative to the previous reliance on rainfed rice cultivation.

The creation of a community patrol team within the CPA has allowed the members to become more engaged in protection of their natural resources and the conservation of the protected area. The community have been assisted to compile forest resource inventories and resource use assessments to provide data for the development of CPA management plans and business plans which outline harvesting rules and limits as well as guidance for forest regeneration.

The CPA management plan is based upon the identification of 'zones' comprising different ecosystems with appropriate management strategies identified for each zone. Thus, in the illegally cleared zone where no forest or ground cover exists there is a need for support for ecosystem recovery which focusses on the planting of quick growing seedlings that halt soil erosion and provide shade for the soil, improving water retention and allowing other vegetation to return. In the long term through continued coordination and cooperation it will be possible to sustain agricultural food production, conserve biodiversity and ecosystems and support local livelihoods through sustainable CPA management with this catchment area and provide a model for other communities to replicate.

Additional livelihood opportunities have been identified through support for the emergence interest in eco-tourism and the need for improved facilities to support these ventures. To date, 14 livelihood improvement sub-projects supporting alternative livelihoods (NTFPs, agro-processing and ecotourism) have benefitted at least 766 households (85% of target) so far.



Within and around the Community Forest Areas (CF) a broader range of sustainable livelihood projects are being implemented including market gardens on commercial vegetable production (with drip systems allowing for off-season production of vegetables), small livestock (native chickens and pigs), fruit tree production on farms and homesteads, establishment of producer groups with links to markets facilitated, and of course the Village Development Fund and Saving Groups.

The establishment of Village Development Fund Savings Groups in 37 villages has provided an opportunity for households within the CPAs and CFs to avail more easily of loans to invest in livelihood improvement including small business establishment. The interest earned on the VDFSGs is also being used to finance patrolling activities within these areas to reduce the encroachment and illegal tree and NTFP extraction.

The BCC project in both the protected areas and in community forest areas has unleashed a portfolio of efforts to restore and conserve degraded landscapes, reduce future reliance of forest resources through the provision of alternative and sustainable livelihood options, introduction of low carbon footprint activities that enhance both mitigation and adaptation. At the same time social consideration have received attention to ensure that the interventions are gender fair and equitable. Long-term consideration are being addressed by an extraordinary strong emphasis on capacity development of commune and village leadership and the wider community. The establishment of village development fund program is designed to provide local climate financing facilities aimed at building overall resilience of local communities.

## Some lessons from the BCCP (with occasional reference to literature)

1. The BCCP has been applying a range of interventions within the scope of EbA to address the continuing degradation of forest cover within protected areas and biodiversity conservation corridors by not only improving community management of the forest resources but also by promoting alternative livelihood opportunities and utilisation of NTFPs for the communities. The latter is viewed as critical to the success of the community management of the forest resources.
2. Ecosystem adaptation is the use of ecosystem services as part of the overall adaptation strategy to help people to adapt to the adverse effects of climate change that human resilience depends on (Convention of Biodiversity 2009). Because it focuses on benefits humans derive from biodiversity and ecosystems, it includes a wider range of areas of work such as forest and coastal habitat restoration, agroforestry and small livestock and associated sustainable livelihoods. Thus, it is a people-centered and invariably, a participatory process that helps reduce the vulnerability of communities. In EbA efforts, healthy ecosystems are featured to reduce the impacts of climate change.
3. Forest landscape restoration (FLR) is an important dimension in the ADB supported BCCP efforts. Forest landscape restoration aims to regulate ecological integrity and



enhance human well being in deforested and degraded forest areas. It has the potential to provide multiple benefits from increasing crop yields and improving water availability and mitigating climate change. It involves efforts to restore the productivity and functionality and productivity of degraded/degrading forests and involves a range of interventions.<sup>[1]</sup>

4. Mosaic restoration is one way to describe what current effort in two BCCP sites in Koh Kong and Mondulkiri. Mosaic restoration integration (back) of trees into mixed use landscapes. Smallholder farmers can play a major role in forest restoration. If business development and market access can be enhanced for smallholders, their rights to land secured and capacities built they can play a major role in the restoration of degraded portions of forests. Agroforestry features high on the list of options as demonstrated by the efforts in BCCP. The provision of alternative livelihoods and the enhancement of agricultural outputs (e.g. native chicken raising, market linkage, drip systems for market-oriented gardens) can reduce the reliance on forests and forest ecosystems.
5. Multifunction landscapes as found across parts of Mondulkiri and Koh Kong offer local (food, fodder, income, etc.) and distant public goods (carbon sequestration). Smallholders value multifunctional mosaics because they diversify risks and “spread out” opportunities (based on seasonality). Low-income farmers benefit from ecosystem services generated by forests (water, biodiversity, nutrients, etc.).

1. Ecosystem-based approaches are considered cost effective due to the multiple environmental, economic, and social benefits they can provide for human well-being and economic development.
2. Ecosystem-based approaches can strengthen the management of transboundary biodiversity landscapes in the GMS, but will require stronger transboundary collaboration for effective implementation.
3. Information gaps remain for spatial, temporal, policy, and cost–benefit conditions for effective ecosystem-based approaches.
4. The technical and institutional capacity of GMS countries must be strengthened to apply ecosystem-based interventions.
5. Ecosystem-based approaches need to be mainstreamed into development and conservation policies.
6. Sustainable financing, utilizing public and private resources, is needed for effective implementation.

Source: Ornsaran Pomme Manuamorn and Jiao Xi. 2015. Ecosystem Based Adaptation to Address Climate Change Challenges in the Greater Mekong Subregion. GMS Environment Operations Center (EOC), Asian Development Bank, Bangkok 10330 Thailand.

[1] Paulin Buffle & Chris Buss. Forest & Farm Producers & forest landscape restoration. IUCN, Switzerland

6. Women rely on a diverse and healthy forest ecosystem for cash income, for food, fuel and fodder. As a result, they are also more likely to know more about forest resources than men. Unfortunately, women face gender-based constraints to accessing natural resources including land, forests, etc. Access to resources can be enhanced by better “targeting” of women, by supporting *local* financing mechanisms for their livelihoods, providing training (ensuring that they have at least half the slots for capacity building opportunities, etc.).
7. Some barriers have been encountered in the transportation of unprocessed NTFPs including bamboo which requires special permits to be transported to other parts of the country. This issue is being tackled by joint action on the part of the MOE and MAFF to review the existing legislation (IUCN).

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