



ADB RETA 7987

The GMS Core Environment Program and Biodiversity Conservation Corridors Initiative Phase II

Concept Note

Climate Change Adaptation Activities under the GMS Core Environment Program (CEP)

I. Background

1. In 1992, the six countries of the GMS (Cambodia, the People's Republic of China, the Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam) – with assistance from the Asian Development Bank (ADB) – launched a subregional economic cooperation program (GMS Program). The GMS Program aims to strengthen economic growth by focusing on 3Cs – 'connectivity', 'competitiveness' and 'community' – as building blocks for subregional cooperation. Over the past two decades, the GMS Program has helped increase prosperity in the subregion through investments of more than US\$15 billion for roads, airports, railways, hydropower, tourism infrastructure, and urban development.

2. In 2005, the GMS countries responded to growing concern about the environmental impacts of rapid economic development by launching the Core Environment Program and Biodiversity Conservation Corridors Initiative - hereafter referred to as the Core Environment Program (CEP). Administered by the ADB and overseen by the environment ministries of the six countries which form the Working Group on Environment (WGE), CEP aims to achieve "an environmentally friendly and climate resilient GMS Program." The Environment Operations Center (EOC), as secretariat to the WGE, provides coordination and technical support. CEP is co-financed by the ADB, the governments of Finland and Sweden, and the Nordic Development Fund.

3. Phase I of CEP (2006–2012) helped improve environmental management in the GMS by strengthening strategic planning processes, supporting enhanced biodiversity and livelihoods in key conservation landscapes, and improving national monitoring systems. In recognition of the program's achievements and continued relevance, a new five-year phase was approved in 2011 and implementation began in mid-2012. CEP Phase II (2012-2016) comprises of the following four components: *Component 1: Environmental Monitoring, Planning and Safeguards* (Output: Environmental planning systems, methods, and safeguards improved); *Component 2: Biodiversity Landscapes and Livelihoods* (Output: Management of transboundary biodiversity conservation landscapes and local livelihoods improved); *Component 3: Climate Change* (Output: Climate-resilient and low-carbon strategies developed); and *Component 4: Institutions and Financing* (Output: Institutions and financing for sustainable environmental management improved).¹

4. CEP Phase II will promote climate-friendly development within the GMS through the integration of climate change mitigation and adaptation considerations for key development sectors. Activities will focus on vulnerability assessments and adaptation strategies, including ecosystem-based adaptation and risk financing modalities, for rural communities dependent on agriculture or tourism-

¹ For more information, visit www.gms-eoc.org

based livelihoods. Low-carbon strategies and monitoring, reporting, and verification systems will be developed for transport, energy, and other relevant sectors. Activities under this output will also support reduced emissions from deforestation and degradation readiness.

5. This concept note focuses on **the climate change adaptation initiative** under CEP Phase II. The aim of the initiative is to build capacity in the GMS to:

- assess the vulnerability of landscapes, ecosystems and natural resource dependent communities to climate change risks;
- identify and pilot climate change adaptation measures, including those incorporating ecosystem-based approaches (EBA) and risk financing modalities;
- integrate and institutionalize climate change considerations into development plans such as area-based plans, sector plans and community development plans; and
- leverage investment opportunities for climate change adaptation measures for rural communities in the GMS.

II. RATIONALE AND CONTEXT

6. **The GMS is increasingly vulnerable to climate change.** The Intergovernmental Panel on Climate Change (IPCC) forecasts a 2.4-2.7°C rise in mean annual temperature, a 7% increase in wet season rainfall, and longer and drier dry seasons in the Southeast Asian region by the end of this century. These changes are expected to result in more frequent extreme and severe weather events, including typhoons, floods, storm surges, and protracted droughts. GMS countries recorded an 8-fold increase in the cost of damages associated with weather related disaster events in the years 2000-2009 (USD108 billion) compared to 1980-1989 (USD14 billion). Recent studies have suggested that the cost of climate change could be as high as 6.7% of gross domestic product (GDP) per year by 2100 in Thailand and Viet Nam, significantly higher than the global average. Major GMS investments in energy and transport, particularly in the Mekong delta and along the coastal areas, are vulnerable to sea level rise. Preliminary studies suggest that USD 5 billion worth of ongoing and planned GMS transport and energy projects are located partially or fully in areas that will be affected by 1 meter sea level rise.

7. **Climate change threatens development gains and livelihoods in the GMS.** Key economic sectors, such as agriculture and livestock, are dependent on climate-sensitive natural resources including forests, water resources, biodiversity and other ecosystem services. Agriculture and forest plantations have expanded rapidly to meet the growing demand for food and fiber and accounts for a substantial portion of GDP, particularly in the lower-income countries (e.g. 36.4 % in Myanmar, 36% in Cambodia and 30.3 in Lao PDR)². The expanding demand for land resources due to agriculture expansion, growing urban and rural settlements, increased mining activity, and the expansion of infrastructure including roads and hydropower facilities have put greater pressure on the Subregion's forests and other natural areas. Assuming the current trajectory of development in the GMS continues, further economic growth combined with population growth and rapid urbanization are likely to increase demand for land, energy, food and water, putting tremendous pressures on the region's already stressed natural capital. Climate change is likely to exacerbate these anthropogenic pressures, potentially causing declines in agricultural yields, decreases in freshwater availability, further loss of forest cover, and degradation of biodiversity and ecosystem services.

8. **The rural poor are particularly at risk.** Currently, nearly 67 percent of the region's population lives in rural areas. Agriculture alone contributes to over 21% to the region's GDP and provides employment for 40 % of the population in the GMS. Inability to increase the resilience to climate change of rural communities might result in the slowing down or even reversal of progress towards development outcomes. A study conducted under CEP Phase I in selected biodiversity conservation corridors initiative (BCI) pilot sites located in Lao PDR, Thailand and Viet Nam indicated that the

² Agriculture value-added of GDP (%), ADB Key Indicators for Asia and the Pacific 2012

future challenges for the GMS will include managing land, water, and agricultural resources to better cope with climate change risks in order to sustain economic growth and alleviate widespread poverty. However, it is also recognized that there is considerable indigenous knowledge within communities on managing climate-related risks. Understanding how a community's vulnerability profile will change from climate and non-climate risks is essential for empowering local people to develop strategies for a climate-resilient future.

9. Climate change impacts also have social and gender dimensions. The extent of vulnerability to climate change differs across social groups (men and women, and ethnic/indigenous groups etc.) and households (disaggregated by poverty levels) within communities. While both women and men are engaged in most agricultural activities in the GMS countries, collection of natural resources such as water, fuel and non-timber forest products -- ecosystem services which will be affected by climate change-- is very often the responsibility of women. The lack of access to climate-related information and lower decision-making capacity of women, especially at the community level, can hinder their resilience to climate change. Moreover, in Lao PDR and Cambodia, female-headed households appear to be generally poorer than male-headed households, making them more vulnerable to shocks due to lack of material assets to provide safety nets. In most GMS countries, apart from Thailand, the education levels of women are lower than that of men in rural areas, hindering the adoption of new methods and technologies which could help diversify livelihoods from climate-sensitive sources. At the same time, women and indigenous groups may also have currently invisible knowledge and coping mechanisms, which climate adaptation strategies could build upon. Thus, a nuanced gender and social analysis of vulnerabilities and capacities within communities is needed to develop an effective adaptation strategy which is gender-sensitive and socially inclusive.

10. Apart from impacts on the people, climate change presents a risk to landscape management and biodiversity conservation in the GMS. With more extreme weather events, degraded and exposed watersheds will be more vulnerable to increased run-off, erosion, and landslides. Climate change is also expected to have impacts on biodiversity in the form of species extinctions, range shifts, and changes to species compositions and dynamics of ecological communities.³ Two to 41% of endemic plants and vertebrate species in the Indo-Burma Hotspot, which includes the GMS region, may become extinct due to climate change over the next century.⁴ Preliminary and limited vulnerability assessments for forest and wetland habitats and species in the GMS indicated the loss of distinctive riparian vegetation because of changes to river flows, and changes in the dynamics of wetlands.^{5,6} Apart from these direct impacts, climate change is also expected to exacerbate immediate anthropogenic threats to biodiversity. Climate refugees can clear and convert forests making ecosystems more vulnerable to degradation, creating vicious feedback loops. Loss and even extirpation of biodiversity from places that could be resilient to climate change due to severe hunting pressure and habitat degradation can decrease the probability of persistence and survival of species under changing climatic conditions.

11. GMS countries still largely lack capacity to integrate climate change in development decisions. To adapt to the impacts of climate change, planning tools based on medium- to long-term scenario analyses capturing climate risks and unfolding socio-economic dynamics need to be developed and institutionalized. Such tools should be integrated in the planning for land and water use, agricultural production, community livelihoods development, and landscape management and

³ Critical Ecosystem Partnership Fund. Ecosystem Profile. Indo-Burma Biodiversity Hotspot. 2011 Update (Final version, October 2012). http://www.cepf.net/Documents/final.indoburma_indochina.ep.pdf. Accessed Feb 14 2013.

⁴ Malcolm, J. R., Liu, C., Neilson, R. P., Hansen, L. and Hannah, L. 2006. Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology* 20: 538-548.

⁵ Blate, G. 2009. The Greater Mekong and climate change: biodiversity, ecosystem services and development risk. Vientiane: WWF Greater Mekong Programme.

⁶ MRC. 2010. State of the basin report 2010. Vientiane: Mekong River Commission Secretariat.

biodiversity conservation at regional, national and sub-national levels. However, current regional and national institutions lack the capacity to develop and deploy such planning tools in the region. Additionally, the lack of quality data on land use, water, soil and agriculture is a major limitation when designing adaptation interventions.

12. Participatory community-based approaches to adaptation should be promoted. Current adaptation interventions are largely driven by top-down government decisions. Social and household recognition of climate change risks remains low due to the absence of information and awareness of potential consequences. Local institutions (e.g. district, village/commune administrations) are yet to be mobilized to plan for the adverse impacts of weather variability and to increase awareness of climate change risks among households and individuals. To support adaptation planning at the community level, planning tools should be developed based on participatory platforms, particularly those that integrate communities and are validated with information generated in a local setting. In the planning process, it is important to account for the differences in vulnerabilities and capacities of different social groups within communities, such as women and men, ethnic minority and indigenous peoples and households from different poverty brackets etc. Given that the multiple stakeholders involved in adaptation decision making have varying degrees of technical capacity, it is also important that planning tools are simple to understand and easy to apply.

III. PROPOSED PROJECT

13. To safeguard development gains in the GMS, it is imperative that GMS countries are able to understand, track, plan and respond to emerging climate change risks. To support GMS countries in building capacity in these areas, CEP Phase II proposes to employ a programmatic approach to climate change adaptation which includes elements of trainings, assessments, planning, monitoring, and pilot interventions. Such an approach would also target interventions at the strategic level (i.e. landscape-wide, policy and planning level), institutional level, and community level. The following table summarizes the proposed activities to be implemented under the climate change adaptation initiative of CEP Phase II (Table 1).

Table 1: Levels of intervention, activities and expected outcomes

Level of intervention	Activities	Expected outcome	Contribution to the overall CEP targets
A. Strategic level	<ul style="list-style-type: none"> • Conduct climate vulnerability assessments in key transboundary landscapes in the GMS. • Promote the incorporation of climate change into development planning and biodiversity conservation in the GMS. • Develop a framework to integrate Ecosystem-based Adaptation (EBA) into conservation strategies of 	Climate resilience and EBA measures integrated into management of focal transboundary landscapes	<p>Improved biodiversity conservation and climate resilience across the GMS</p> <p>Forest patch sizes maintained in GMS biodiversity conservation corridors and landscapes</p>

	transboundary landscapes		
B. Institutional level	<ul style="list-style-type: none"> • Build capacity of GMS institutions and practitioners in: <ul style="list-style-type: none"> - using information from climate modeling and monitoring; - conducting climate vulnerability and adaptation assessment, focusing on agricultural communities, taking into consideration poverty levels, gender, ethnicity of household members 	<p>Climate vulnerability assessment framework and supporting planning tools developed by mobilizing partnership with regional and national institutions.</p> <p>A pool of GMS institutions and practitioners trained to apply the framework and tools to conduct on-the-ground assessments to help agricultural communities, especially vulnerable groups, identify adaptation options and mainstream them in a relevant policy/planning context.</p>	<p>Environmentally friendly and climate-resilient GMS Economic Cooperation Program (ECP)</p> <p>Climate change coping strategies tested in and benefitted by at least 150 community groups, with at least 35% women beneficiaries</p>
C. Community level	<ul style="list-style-type: none"> • Facilitate community participation in climate vulnerability assessments and identification of adaptation options, taking into account women and other vulnerable groups. • Testing and replication of cost-effective adaptation options, including EBA measures and climate risk financing strategies and instruments for community members and institutions that support them such as Commune Development Funds (CDFs) 	<p>Climate resilience of agricultural communities, especially vulnerable groups, in the GMS enhanced.</p>	<p>Climate change coping strategies tested in and benefitted by at least 150 community groups, with at least 35% women beneficiaries</p> <p>At least four investment proposals on low-carbon technologies and/ or climate change adaptation prepared</p>

A. Strengthening climate resilience and integration of EBA measures into management of transboundary landscapes

14. Intact ecosystems are more climate-resilient, and will also be in a better position to support the livelihoods of rural, natural resource-dependent communities in the wake of climate change. Because ecosystem services are best captured at landscape scales, CEP will promote improved

recognition of the importance of connectivity of ecosystems and the multiple benefits provided by ecosystem services in the landscapes.

15. Good conservation and management practices are needed to increase resilience of the landscapes and ecosystems against the threats from climate change. For the GMS to develop climate-integrated landscape conservation strategies, there is a need (i) to better understand projected climate change scenarios and likely climate-related impacts and risks to key ecosystem functions at the landscape level; and (ii) to identify potential options for the landscapes to improve climate resilience using on ecosystem-based approaches.

16. Because many of GMS' ecosystems and the biodiversity-rich conservation landscapes span national boundaries, conservation strategies require a transboundary approach. The transboundary approach is necessary to capture large-scale ecological processes such as species migrations and dispersal; pollination and seed dispersal to maintain forest viability and agricultural investments;^{7,8,9} hydrological flows and carbon cycles, etc. that transcend national and local political boundaries. The transboundary approach will also help to identify climate refugia for species and ecological communities, including climate corridors to permit the potential need for migrations to refugia.

17. Addressing climate change in conservation management at the regional scales will also benefit from knowledge exchange across the region and across transboundary landscapes, especially since some countries or landscapes have more experience and expertise in specific methodologies, tools, and lessons learned from project implementation. Sharing such information will increase the efficiency of conservation planning, strategy development and strategy implementation for transboundary landscapes in the GMS.

18. Building on CEP Phase I work on biodiversity conservations corridors (BCC), as well as on regional initiatives such as the GEF-funded GMS Forest and Biodiversity Program (GMS FBP) and the World Bank-World Wide Fund for Nature (WWF) EBA project, CEP Phase II will support the following activities to strengthen climate resilience and integration of EBA measures into the management of transboundary landscapes:

- Conduct climate vulnerability assessments in key transboundary landscapes in the GMS;
- Customize the EBA framework developed by the World Bank and WWF for landscape-level application;
- Develop recommendations for integrating climate resilience and EBA considerations into conservation strategies of the key transboundary landscapes;
- Use knowledge from landscape-level assessments to help identify and prioritize climate-vulnerable components in transboundary landscapes, providing inputs to community level pilots;
- Create or strengthen existing regional knowledge base and exchange mechanisms to enable climate-integrated conservation of transboundary landscapes;

19. The activities are proposed to be implemented in six (6) transboundary landscapes in the GMS. The potential landscapes are: 1) Mekong Headwaters (China, Lao PDR, Myanmar); 2) Sino-Vietnamese Limestone (China, Viet Nam); 3) Annamites (Lao PDR, Viet Nam); 4) Eastern Plains Dry Forests (Cambodia, Viet Nam); 5) Tenasserim Mountains (Myanmar, Thailand); and 6) Tri-Border Forests (Cambodia, Lao PDR, Viet Nam) (Figure 1). The six landscapes are proposed on the basis of the following criteria: transboundary spatial location; representation of all six GMS

⁷ Harrison, R. D., Plotkin, J. B., Detto, M., Itoh, A. & Stuart, J. 2013. Consequences of defaunation for a tropical tree community. *Ecology Letters*. doi:10.1111/ele.12102

⁸ Garibaldi, L. A. *et al.* 2013. Set of Crops Regardless of Honey Bee Abundance. *Science*: 339:1608.

⁹ Kunz, T. H., Braun de Torrez, E., Bauer, D., Lobo, T. & Fleming, T. H. 2011. Ecosystem services provided by bats. *Annals of the New York Academy of Sciences* 1223, 1–38 .

countries, with transboundary links between neighboring countries; representation of globally important forest ecoregions of the GMS; and climate vulnerability.



Figure 1: Key Transboundary Landscapes in the GMS

20. Outputs from the landscape-level climate vulnerability and EBA analyses will inform the development of transboundary landscape conservation strategies, an activity supported under Component 2 (*Biodiversity Landscapes and Livelihoods*). The outputs will also complement and inform other activities under the CEP Phase II climate change adaptation initiative, including development of a regional data archive on climate scenarios, community-level climate vulnerability assessments and identification of adaptation options in rural communities etc.

B. Building capacity for GMS institutions and practitioners to conduct climate vulnerability assessments and plan for climate change adaptation

21. In 2010, CEP Phase I completed a study on biodiversity, food security, water resources and livelihoods in the GMS.¹⁰ The study identified a need to better understand the impacts of climate change on agriculture and rural livelihoods through an appropriate assessment methodology.

¹⁰ ADB and Murdoch University (2010). "Risks and Adaptation to Climate Change in BCI Pilot Sites in PRC, Thailand and Viet Nam", Final consultant report for TA 6289 (REG): Greater Mekong Subregion – Core Environment Program (CEP) and Biodiversity Conservation Corridors Initiative (BCI) Phase 1 (2006 – 2009), July 2010

Specifically, while there have been many regional- and national-level studies on the potential impacts of climate change on the GMS, there is still a need for local-level assessments which translate climate projections into an improved understanding of climate risk and vulnerability at the sectoral and community levels. The methodology used must be simple, practical, and participatory. As adaptation to climate change is site-specific, local-level assessments help identify context-appropriate adaptation options and guide adaptation investments. Understanding the gender and social dimensions of vulnerability at the local level is also critical.

22. To address the knowledge gap, CEP Phase I undertook a study to develop and test a participatory assessment methodology to investigate vulnerability to climate change and identify potential adaptation options in agricultural communities in the GMS. The methodology incorporates the use of participatory rural appraisal (PRA) tools i.e. participatory hazard mapping, cropping and event calendars, household surveys and group discussions. During 2011 and 2012, the methodology was tested on selected agricultural communities in three countries: Xe Pian-Dong Hua Sao in Lao PDR, Tenasserim in Thailand, and Ngoc Linh-Xe Sap in Viet Nam. A knowledge product was produced to disseminate the methodology and findings from the country assessments, with an objective to stimulate discussions on further improvement and wider-scale application of the assessment methodology in the GMS.

23. Building on the above work in Phase I, CEP Phase II will build capacity for GMS institutions and practitioners in conducting climate vulnerability assessments and plan for climate change adaptation under uncertainty. Targeted beneficiaries are GMS government officials, local development practitioners, field operatives, researchers from local universities, staff of local and international NGOs etc. The capacity building initiative will be guided by the following objectives:

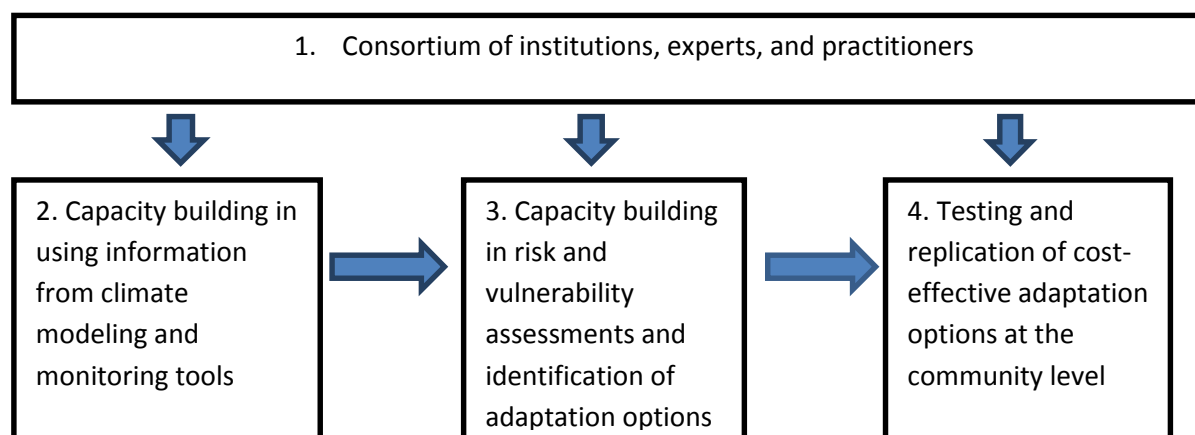
- a) Generate regional information and facilitate knowledge exchange on climate change impacts and adaptation;
- b) Develop and deploy climate risk assessment and planning tools and strengthen the linkages between the policy and scientific communities in applying the tools;
- c) Introduce and incubate innovative measures to enable communities and households to better plan for and adapt to climate change.

22. To achieve the above objectives, CEP Phase II will pursue a programmatic approach to capacity building which encompasses the following activities:

- 1) Mobilize and establish a loose consortium of institutions (universities, research institutions etc.), academic experts and practitioners to develop a regional knowledge base and facilitate knowledge exchange in the GMS on climate risk and adaptation best practices;
- 2) Build capacity of GMS institutions and practitioners in using information from climate modeling and monitoring tools, especially in the specific planning contexts of the GMS, and applying and regularly updating information coming out of the tools;
- 3) Strengthen capacity of GMS institutions and practitioners to conduct climate risk and vulnerability assessments and plan for adaptation using appropriate planning tools;
- 4) Support the testing and replication of cost-effective adaptation options at the community level.

23. CEP will mobilize a loose consortium of institutions, academic experts and practitioners to exchange experiences and lessons through workshops, roundtables and other sharing mechanisms. The consortium established under activity 1) will provide cross-cutting technical and implementation support to activities 2), 3), and 4). The consortium will also serve as a mechanism to share and institutionalize knowledge generated from activities 2), 3) and 4), thereby sustaining the linkages and impacts of the capacity building program beyond the timescale of CEP interventions. The vision for the consortium is not to create a new network or platform which replicates other existing networks and platforms. The idea is to facilitate loose collaboration of institutions and practitioners to provide knowledge, expertise, and guidance around a well-defined activity such as

development of a climate risk assessment framework, development of a regional data base for climate change, and the piloting of adaptation options.

Figure 2: Proposed Relationships between Activities

24. The capacity building initiative (Figure 2) will be implemented in collaboration with a regional institution with strong expertise in applying the science of climate change to support policy making at the national and local levels (for example, the Southeast Asia START Regional Center, Chulalongkorn University). The collaboration with such a regional institution will be central to the implementation of the following activities:

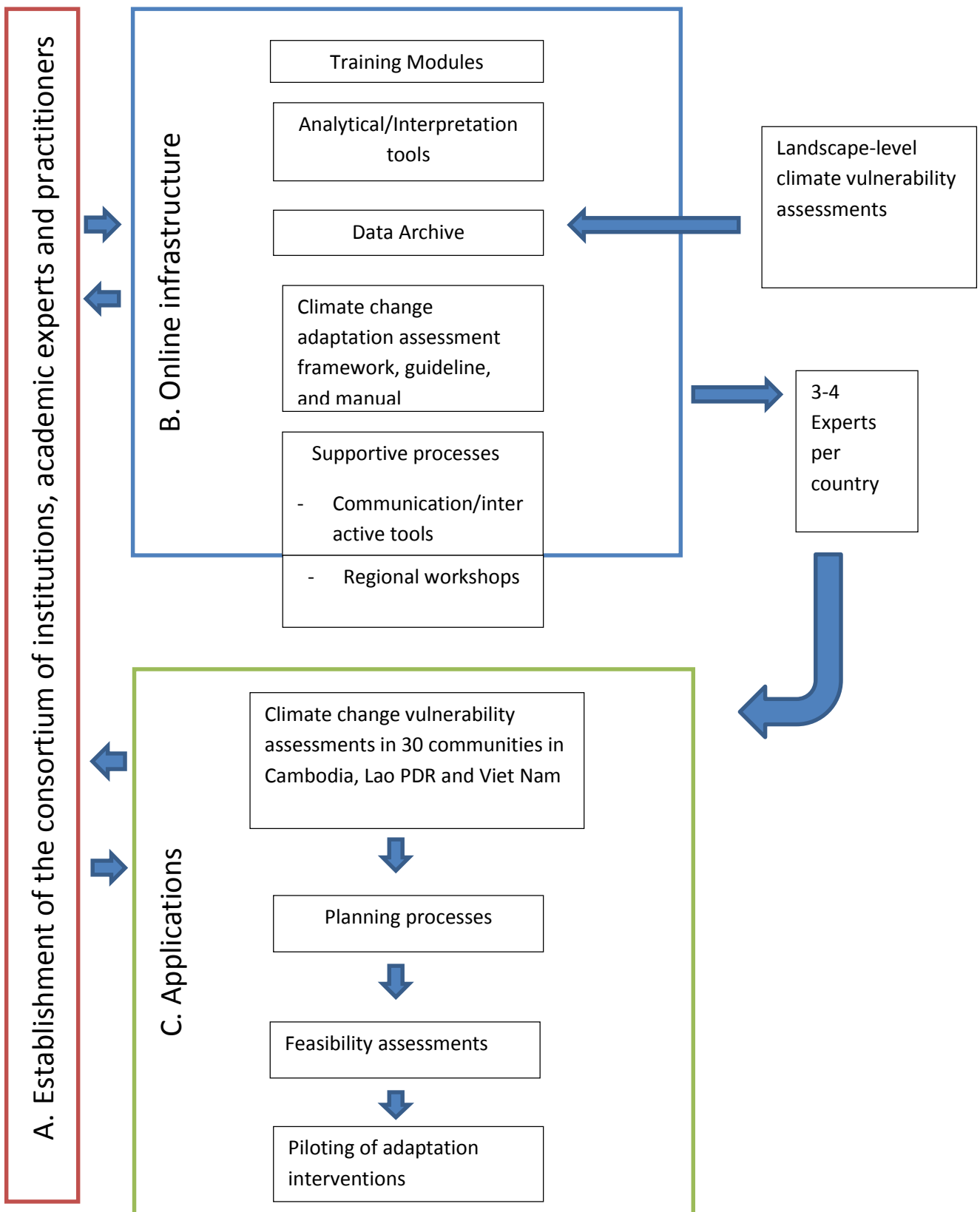
- 1) Enhance the **climate vulnerability assessment methodology**, based on the one developed and piloted in CEP Phase I, through a consultation process. The enhanced methodology will assist practitioners and communities to identify an adaptation strategy and plan, and also incorporate the consideration of climate change impacts on ecosystems and services (such as forest ecosystems, agro-systems etc.) which underpin the livelihood of communities at risk. The methodology will be as simple as possible, which aims at practitioners with non-technical background;
- 2) Develop a **guideline** for community-level climate vulnerability assessment. The final guideline will be synthesized from a consultation process;
- 3) Assist CEP to mobilize and establish a **consortium of institutions, academic experts and practitioners** and support activities of the consortium. The key roles of the consortium will be to facilitate knowledge exchange and the creation of a regional knowledge base in the GMS on climate risk and adaptation best practices.
- 4) Assist CEP in **recruiting 3-4 practitioners per country** to form a national team to work with the target communities in BCC sites in Lao PDR, Cambodia and Viet Nam in applying the climate change vulnerability methodology developed under this initiative;
- 5) Conduct a series of **training workshops** for GMS practitioners. The training will include the climate vulnerability methodology and other basic concepts on climate change adaptation, as well as incorporate techniques such as scenario envisioning exercise.
- 6) Develop, and host, an **on-line technical support system** which contains training materials and on-line tutoring to provide GMS practitioners with understanding on the climate vulnerability assessment methodology and processes as well as other basic concepts on climate change adaptation planning. The system will contain a data archive with analytical tools to provide information for climate risk and vulnerability assessment. This system will aim at being a facility for GMS practitioners to review and regain understanding on the assessment process and information on climate change needed for the assessment activity.

This on-line technical support system will also be a platform for further replication or up-scaling of adaptation planning activities in the future.

- 7) Advise and monitor **pilot climate vulnerability assessments**, which will be performed by trained local practitioners forming a national team for each country. Additional training will be provided to each national team, if necessary.
- 8) **Review and revise the developed framework, methodology, and guideline**, based on feedback from the field assessments.

25. Through the activities above, the immediate target of CEP Phase II is to building capacity of GMS institutions and practitioners to **conduct climate vulnerability assessments and identify cost-effective adaptation options in at least 30 communities in Cambodia, Lao PDR and Viet Nam**. The geographical focus of this work will be in communities located in the sites of the Biodiversity Conservation Corridors (BCC) investment projects. With the support of the CEP program, its partner institutions, and the established consortium, 3-4 experts in each GMS country will be trained to conduct climate vulnerability assessments and identification of adaptation options in the selected communities in each country. Based on the country assessment experience, it is expected that the online capacity building infrastructure be further modified, upgraded, and up-scaled to support climate change adaptation work in the GMS beyond the initial scope of CEP Phase II. Figure 3 summarizes the overall design of the capacity building initiative and its linkage with the landscape-level climate vulnerability assessment activity.

Figure 3: Proposed Capacity Building Framework and Supporting Infrastructure



C. Testing and replication of cost-effective adaptation options for rural communities in the GMS

26. Rural communities in the GMS are particularly vulnerable to climate change due to their dependence on agriculture for livelihoods. A CEP Phase I study found that agricultural communities in BCI sites in Lao PDR, Thailand and Viet Nam will likely face an increase in extreme weather events in terms of higher temperature, floods and droughts. Higher average annual temperatures are projected in all the BCC pilot sites, which may negatively affect plant growth and lead to reduced agricultural yields. There will also be higher flood risk during the rainy season, particularly with respect to flashfloods. Furthermore, development policies can further shape adaptive capacity by limiting or expanding climate change adaptation options of agricultural communities in the GMS. Among others, government policy which affects land use and access to resources, such as conservation policy and large economic concessions for hydropower and mining, has strong implications for livelihood options of GMS agricultural communities, especially vulnerable groups such as women and ethnic minorities.

27. Building on the outcome of the community-level climate vulnerability assessments, this activity aims to develop pilot projects to strengthen climate resilience of agricultural communities, focusing on vulnerable groups within the communities. The pilot projects will be implemented by mobilizing partnership with existing community-level institutions. The long-term goal is for the pilots to leverage further ADB's and other investments for scaling up. Potential pilot project activities include:

- Ecosystem-based adaptation (EBA) measures such as protection, restoration and enhancement of watershed and riparian forest functions for water discharge regulation and flood control, improved water resource management etc.;
- Demonstration projects on agriculture intensification and/or crop diversification using climate stress tolerant varieties;
- Development of risk financing mechanisms as part of a climate change adaptation strategy for rural communities. Initial work is a scoping assessment to identify viable local-level financial instruments and strategies that could provide households with financial protection against climatic shocks. Community Development Funds (CDFs) will be looked at as a potential mechanism for risk financing initiatives such as savings, micro-insurance, and risk pooling;
- Establishment of an IT-based early warning system and training resources on emergency responses and disaster preparedness;
- Construction of small infrastructure to retain water in the landscape;
- Strengthening the role of community-based institutions, such as CDFs, community groups, and community conservation agreements, to implement climate change adaptation interventions.