

Transboundary Landscape Management Tools and Key Strategies in the Lancang-Mekong Region



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Abbreviations

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BCC	Biodiversity conservation corridor
BCI	Biodiversity Conservation Corridors Initiative
BIOPAMA	Biodiversity and Protected Areas Management
CBD	Convention on Biological Diversity
CEP	Core Environment Program
CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
FFI	Fauna & Flora International
GIS	Geographic information system
GMS	Greater Mekong Subregion
GMS EOC	Greater Mekong Subregion Environment Operations Center
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
MAB	Man and the Biosphere
METT	Management Effectiveness Tracking Tool
NGO	Non-governmental organization
NTFP	Non-timber forest product
PF	Primary forest
TBL	Transboundary biodiversity landscape
TBPA	Transboundary protected area
TEOW	Terrestrial Ecoregions of the World
UNEP	United Nations Environment Programme
UNEP-IEMP	UNEP – International Ecosystem Management Partnership
UNEP-WCMC	UNEP World Conservation Monitoring Centre
WCPA	World Commission on Protected Areas
WDPA	World Database on Protected Areas
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

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Foreword

Sustainably managed landscapes can provide multiple benefits for both people and planet in support of the achievement of the Sustainable Development Goals. These include ensuring people have access to water; food security; and enhancing human health. Simultaneously, such landscapes also contribute to national commitments for global targets on both biodiversity and climate change. By improving ecological integrity, sustainably managed landscapes can improve resilience and help communities on the front line of climate change adapt to their new reality while providing a safe haven for our planet's precious biodiversity.

Importantly, the challenges of sustainable landscape management do not stop at national borders. Many natural resource-dependent communities live in biodiversity-rich areas which are prone to transnational challenges such as cross-border infrastructure development, international wildlife trade and border conflict. As such, they face an urgent need for transboundary cooperation. Transboundary landscape management, and its significant benefits for people and planet, is therefore at the heart of this report.

The report has much intrinsic value in providing knowledge and experience on transboundary landscape management in the Lancang-Mekong region, which is one of the world's richest biodiversity hotspots and fastest-growing areas. The report contains a collection of tools from the Lancang-Mekong region that are useful for transboundary landscape management in this region and beyond. It also presents five strategies for effective transboundary management across a variety of landscapes, highlighting case studies which demonstrate both conservation and livelihood outcomes.

Cooperation on the interconnectedness of human and natural systems is central to landscape management success and this cooperation can take place at various levels – between national governments, sub-national agencies, researchers and communities. This report presents an inspiring case for transboundary landscape management and promotes its extensive application.



Susan Gardner

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01

Introduction





1.1 Transboundary landscape management: Overview, history and definitions

Around the world, transboundary landscapes are some of the richest in biodiversity. It is estimated that a third of terrestrial high biodiversity sites are located along national land borders (Vasilijević *et al.* 2015). However, these areas are exposed to many challenges, including border fences, wildlife trade and transnational transportation infrastructure, and affected by different governance and sociological systems, as well as conflict between countries in some cases. Moreover, the line that divides neighbouring nations separates not only the land (or water) and the ecological integrity along those natural boundaries, but also the people living in the landscape. In many developing countries, these people are among the most marginalized and their livelihood strategies often depend on the natural resources around them (Geleto *et al.* 2022). Moreover, while transboundary landscape management's main goal is often biodiversity conservation, it also has the potential to generate substantial sociocultural and economic benefits and strengthen political relations (Vasilijević *et al.* 2015). Therefore, transboundary landscape management is significant for all aspects of the sustainable development of economic, environmental and social dimensions of achieving the "leave no one behind" principle.

Transboundary conservation initiatives first started in North America and Europe in the 1930s. The Waterton Glacier International Peace Park, inaugurated in 1932 to honour the long-lasting peaceful relations between Canada and the United States of America, is considered the world's first transboundary protected area (TBPA). In 1995, it was added to the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List as a transboundary site. Later, in 1932 in Europe, Poland and the former country of Czechoslovakia jointly established the bilateral Pieniny

mountain park, making this the first TBPA in Europe and the second in the world, with the intention of facilitating tourism in border areas and preserving their nature landscapes, as well as mitigating conflict over a border dispute from World War I (Erg *et al.* 2012; Steckhan 2021; Schoon n.d.). In other parts of the world, transboundary conservation was realized much later. It was only in the 1980s that transboundary conservation began to expand rapidly and globally, and the number of national-level designated protected areas began to increase. Currently, there are more than 200 transboundary conservation initiatives in various forms around the world, from informal agreements to international treaties, to encourage cooperation across the borderline in order to achieve shared conservation goals (Vasilijević *et al.* 2015). Examples of some of these famous initiatives include the Serengeti National Park (Tanzania) and the Maasai Mara National Reserve (Kenya) to facilitate the greatest natural mass wildlife migration on the planet (Nzioka 2023), the Iguazu and Iguazú National Parks between Argentina and Brazil that contain the world's widest waterfalls, and the Coral Triangle (located within the territories of Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands and Timor-Leste) known as the "Amazon of the Seas", which has the highest diversity of corals and fish in the world (Eschner 2017).

In terms of classification, the International Union for Conservation of Nature (IUCN)'s World Commission on Protected Areas (WCPA) Transboundary Conservation Specialist Group recommends the following typology for transboundary conservation areas (see Table 1).

Table 1: Typology of transboundary conservation areas (Vasilijević *et al.* 2015)

Type	Definition
TBPA	A TBPA is a clearly defined geographical space that contains protected areas that are ecologically connected across one or more international boundaries and involves some form of cooperation.
Transboundary Conservation Landscape and/or Seascape	A Transboundary Conservation Landscape and/or Seascape is an ecologically connected area that contains both protected areas and multiple resource use areas across one or more international boundaries and involves some form of cooperation.
Transboundary Migration Conservation Area	Transboundary Migration Conservation Areas are wildlife habitats in two or more countries that are necessary to sustain populations of migratory species and involve some form of cooperation.
Park for Peace	A Park for Peace is a special designation that may be applied to any of the three types of transboundary conservation area and is dedicated to the promotion, celebration and/or commemoration of peace and cooperation.

Other global and regional agreements and programmes related to transboundary conservation include the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention), and the UNESCO Man and the Biosphere Programme. In each of these, transboundary conservation is recognized in slightly different ways (Vasilijević *et al.* 2015).

1.2 The Lancang-Mekong region and transboundary landscape management

The Lancang-Mekong region in this publication refers to Cambodia, China (specifically Yunnan Province and Guangxi Zhuang Autonomous Region), Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam. The region is home to more than 300 million inhabitants, around 200 million of whom live in rural areas and depend on healthy natural systems such as forests, rivers and wetlands for their food security, livelihood and culture (Greater Mekong Subregion [GMS] n.d.). As one of the world's richest biodiversity hotspots, the region is home to a great number of endemic species, including 430 mammals, 800 reptiles and amphibians, 1,200 birds, 1,100 fish and 20,000 plants. Moreover, new species are continuously being discovered in the region; 2,216 new species were identified between 1997 and 2014 (World Wide Fund for Nature [WWF] 2015). A high proportion of threatened species live in this region, making many of them critically endangered, endangered or vulnerable.

At the same time, this is one of the world's fastest-growing regions. Over the past few decades, the region has witnessed rapid economic growth, resulting in increased prosperity. Unfortunately, much of this economic development has flourished at the expense of the natural environment, including the rich and unique biodiversity, as a result of unsustainable use of natural resources. Drivers of biodiversity loss include the Asia-wide demand for wildlife, timber and non-timber forest products (NTFPs); agricultural encroachment into forests; loss or fragmentation of forests caused by highway construction; clearing of forests for mining and hydropower projects; and increased forest exploitation due to high poverty levels.

Moreover, until the 1990s there was a long history of conflict in the border areas of this region. After little more than two decades of continued peace and increasing prosperity (albeit with intermittent border disputes), the countries have focused on their cooperation in

the border areas. This includes better connection through border management, customs procedures and transport infrastructure (Open Development Mekong 2018). Transboundary conservation has also received attention, gaining support from several organizations, such as the Asian Development Bank (ADB)'s GMS Core Environment Program (CEP), International Tropical Timber Organization (ITTO) and WWF. Meanwhile, the loss of biodiversity from terrestrial forested areas, inland waters and coastal zones are recognized by all countries as they give priority to the issues of biodiversity and habitats. Until now, there have been several forms

of cooperation initiatives related to transboundary landscape management in the region. Each of them focuses on key landscapes, as defined regarding the combination of both conservation and development aspects.

1.3 About this knowledge product and the target audience

This report aims to collect, analyse and disseminate the knowledge base for practitioners and policymakers on tools, key strategies and good practices on integrated ecosystem management in connection with livelihoods in transboundary landscapes of the Lancang-Mekong region to enhance knowledge on the value of ecosystem management, promote integrated management of key ecosystems and contribute to South-South learning. In particular, it allows readers to understand what possible tools for transboundary landscape management are, where the major transboundary landscapes are in the Lancang-Mekong region, how these are defined and established, what key challenges are to be addressed in these landscapes and what has already been done to address these challenges. Several best practice examples from different transboundary parts of the region and ecosystem types are also provided to show how transboundary management actions have been carried out. With these objectives, the publication consists of two core parts.

The first part details the inventory of tools for transboundary landscape management. These tools are applied in the transboundary landscapes in the Lancang-Mekong region and beyond. Their description of functions, characteristics and aim are also included, as well as criteria for tool selection.

The second part presents transboundary management in key landscapes of the Lancang-Mekong region through five strategies. These have been implemented in all countries in the region for decades and have involved a variety of stakeholders, from local communities to, in some cases, Heads of State. The strategies are as follows:

1. Transboundary biodiversity landscapes (TBLs)
2. The Indo-Burma Biodiversity Hotspot's priority corridors
3. WWF Ecoregions and priority landscapes
4. TBPAs
5. Others under international and regional designations

It also describes different types of tools, interventions, key results and achievements as well as challenges and lessons learned, with highlights from selected case studies.

A conclusion detailing main findings related to the key transboundary landscapes and tools is also provided at the end of the publication.

02

Tools for transboundary landscape management



2.1 Overview of tools

Many tools and methods now exist to facilitate the transboundary landscape management process. Different tools perform different functions and are useful at different stages in the process. The four essential stages of the transboundary landscape management process are as follows (Vasilijević *et al.* 2015):

1. *Diagnose* – To determine the need for transboundary landscape management. Steps include identifying compelling reasons to act, estimating capacity to work across boundaries and the scope of issue.
2. *Design* – To plan for the process according to the situation. Steps include determining who to lead, defining the geographic context, negotiating a joint vision and developing management objectives.
3. *Take action* – To secure resources and implement activities. Steps include assessing capacity to implement an action plan, securing financial sustainability, and developing and implementing the plan.
4. *Evaluate* – To learn and adapt. Steps include assessing progress and outcomes, and adapting the management and action plan.

These stages, which are the same as in any good adaptive management planning cycle, are just as relevant in a transboundary context. Therefore, the general tools

and methods commonly used in typical project process stages, e.g. stakeholder analysis conducted through focus groups and semi-structured interviews, can be applied. However, the information gathered during this analysis must reflect transboundary context that can also be helpful in designing an appropriate plan. Moreover, from existing literature, many of the tools that have been referred to in transboundary landscape management are mainly useful for context and planning; only a few can be applied in multiple stages.

2.2 Inventory of tools

This section compiles a number of tools that have been mentioned in the management of key transboundary landscapes in the Lancang-Mekong region, as presented in chapter 3. In addition, some other tools that have been applied in transboundary context of other regions, e.g. Europe and Africa, and could be adapted in the Lancang-Mekong region, are also included. Most of them are pieces of software that can be downloaded free of charge and some require expertise on geographic information systems (GIS), remote sensing and modelling. Some of them are global databases or atlases with certain features that can help define the geographic extent of the transboundary landscape in question. Moreover, some of the tools can be used with stakeholder input as part of a participatory approach. The inventory is presented in Table 2.

Table 2: List of relevant tools for transboundary landscape management (Process stages: Di – Diagnose; De - Design; T - Take action; E - Evaluate)

Name and website	Description	Process stages			
		Di	De	T	E
Global Forest Watch https://www.globalforestwatch.org/	Developed by the World Resources Institute, this web platform is a comprehensive, interactive online system for mapping forests, monitoring forest change, and capturing the underlying causes of deforestation and forest degradation. It is unique in providing global coverage at a high spatial (30m) and temporal (monthly) resolution and providing online interactive tools to further customize the data for specific planning needs (e.g. canopy density, areas of interest, time frame). With satellite data, advanced computer algorithms and cloud computing power, it offers an openly accessible suite of tools designed to enable experts and non-experts to access information about forest change and mobilize action. The tool(s) are simple to use, making the data and analytical functions accessible to a wide range of non-technical decision makers (GMS Environment Operations Center [EOC] 2017a; World Resources Institute n.d.).	√	√		

Name and website	Description	Process stages			
		Di	De	T	E
Protected Planet https://www.protectedplanet.net/en	Protected Planet, developed by UNEP and IUCN and managed by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), is among the most comprehensive resources of global, spatially explicit protected area information and other effective area-based conservation measures available. The website enables users to access data for information-based decision-making, policy development, and business and conservation planning. Its key feature, i.e. the World Database on Protected Areas (WDPA), is a comprehensive global database on terrestrial and marine protected areas, comprising both spatial data (i.e. boundaries and points) with associated attribute data (i.e. tabular information). This global atlas can be used during the initial stages of transboundary conservation area planning to access appropriate geographical maps, particularly to illustrate the selected data sets in the database in and surrounding the identified conservation area (GMS EOC 2017b; van Riet 2017; UNEP-WCMC 2022; Protected Planet n.d.).	✓	✓		
Terrestrial Ecoregions of the World (TEOW) https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world	TEOW, developed by WWF, is a biogeographic regionalization of the Earth's terrestrial biodiversity that uses ecoregions to represent the original distribution of distinct assemblages of species and communities around the world. This tool can be applied in the region at landscape scale. Each ecoregion is portrayed with regard to geographical location, area description, floral and faunal biodiversity features, current conservation status, and types and severity of threats. The TEOW map provides features that are useful for conservation planning ¹ at the global and regional scales for incorporating aspects of nature conservation and environmental protection into land-use planning (Olson <i>et al.</i> 2001; Food and Agriculture Organization of the United Nations n.d.).	✓	✓		
WWF-SIGHT https://wwf-sight.org/	Another useful tool from WWF is an online mapping tool and approach that provides an up-to-date way of visually comparing and analysing development projects and activities against key environmental data around the world. It provides crucial support for effective policy advocacy with governments, companies and investors through constructive dialogue about alternative and more sustainable land-use and development scenarios that would avoid possible damage to wildlife and habitats and the associated business risks. Currently, there are two versions of WWF-SIGHT. WWF-SIGHT 1.0 is open to the public, only providing information on the global distribution of certain natural resources and infrastructure, without specific details. WWF-SIGHT 2.0 is not currently accessible to the public. It includes information on natural resources plus some business data and detailed information about projects, e.g. railways, highways and factories. With WWF-SIGHT 2.0, overlay of the layers of key protected areas and infrastructure (railways, highways, etc.) can be carried out to analyse the impact of infrastructure on biodiversity (WWF 2017; Belt and Road Initiative International Green Development Coalition 2020).	✓	✓	✓	

¹ See more details in Chapter 3 (3.3 WWF Ecoregions and Priority Landscapes).

Name and website	Description	Process stages			
		Di	De	T	E
Integrated Land and Water Information System (ILWIS) https://www.itc.nl/about-itc/organization/scientific-departments/water-resources/software-tools-models/ilwis3-and-toolbox-plugins/	The ILWIS software suite, developed over 30 years ago by the International Institute for Geo-Information Science and Earth Observation in Enschede, the Netherlands, is freely available. An important feature of the ILWIS is its powerful and user-friendly comprehensive spatial multi-criteria evaluation module. This module can be used for a variety of environmental and sustainable land management purposes, including protected area and corridor zoning, agricultural suitability analysis, environmental sensitivity evaluation and disaster risk assessments (GMS EOC 2017c).		✓	✓	✓
CLUMondo http://portal.gms-eoc.org/tools?cmbToolsId=32	One of the most frequently used land-use change models around the world, CLUMondo provides spatially explicit previews of potential future land conversion in response to different land demand scenarios. The new free version, launched in 2016, was commissioned by the ADB GMS EOC to improve functionality, usability and uptake in GMS, including on the biodiversity landscapes and corridors. It is a stand-alone piece of software used to calculate the effect of land demand scenarios on land conversion in the future. Key improvements include full integration of the statistical analysis, integration of a new land/ecosystem services demand module, and the ability to show results directly without the need to export to a GIS (GMS EOC 2017d).		✓	✓	✓
CorridorDesigner http://corridordesign.org/	CorridorDesigner, created by Northern Arizona University, is a set of ArcGIS tools for creating habitat and corridor models. Its three-step user-friendly process connects the best available habitat for multiple focal species. The “habitat suitability modelling”, which is its core input, assesses the quality of a habitat for a species within a study area or a modelled corridor (Esri 2010). The ADB GMS EOC’s Biodiversity Conservation Corridors Initiative (BCI) also applies the CorridorDesigner at the Tenasserim Landscape in Thailand ² (GMS EOC, Thailand, Department of National Parks, Wildlife and Plant Conservation and Wildlife Conservation Society [WCS] Thailand 2009).		✓	✓	✓
TerrSet https://clarklabs.org/	TerrSet (formerly known as IDRISI) is a software system for monitoring and modelling the Earth’s system for sustainable development developed by Clark Labs of Clark University. It has a long-standing history of continuous development (>30 years) and is also unique in having a user interface strongly structured around applications rather than individual functions. Its applications include the Habitat and Biodiversity Modeler, the Ecosystem Services Modeler, the Land Change Modeler and the Climate Change Adaptation Modeler. While this is not a free product, it offers a discount for low-income countries and selected international organizations (GMS EOC 2017e).		✓	✓	

² See chapter 3, case study 1: Application of tools in restoring the connectivity of the Tenasserim Landscape, Thailand.

Name and website	Description	Process stages			
		Di	De	T	E
Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) https://naturalcapitalproject.stanford.edu/software/invest	InVEST tool is a suite of free, open-source software modules used to measure and map different types of ecosystem services. Developed by the Natural Capital Project, a joint effort of Stanford University and WWF, InVEST aims to help local, national and regional decision makers incorporate ecosystem services into a range of policy and planning contexts for terrestrial, freshwater and marine ecosystems, including spatial planning, strategic environmental assessments and environmental impact assessments. InVEST models are based on production functions that define how an ecosystem's structure and function affect the flows and values of ecosystem services (Natural Capital Project 2010; GMS EOC 2017f). In the Dawna Tenasserim Landscape, InVEST was applied as part of an integrated socioeconomic analysis of impacts on transboundary road construction between Thailand and Myanmar (WWF Greater Mekong 2015).		✓	✓	✓
Management Effectiveness Tracking Tool (METT) https://www.protectedplanet.net/en/thematic-areas/protected-areas-management-effectiveness-pame?tab=METT	METT, developed by the World Bank and WWF, is a questionnaire-based tool for assessing protected area management effectiveness. Since being first published in 2002, it has become the most widely applied protected area management effectiveness tool globally, used in over 120 countries. A relatively quick and simple way of collecting information about the status and trends of management in protected areas, METT provides information to help drive management improvements. It is suitable for protected area managers, national protected area agencies, donors and non-governmental organizations (NGOs) aiming to improve area management, and as a component of national reporting to the Convention on Biological Diversity (CBD). METT has been used in the Critical Ecosystem Partnership Fund (CEPF)-funded projects in the Indo-Burma Biodiversity Hotspot and is encouraged to be used in Association of Southeast Asian Nations (ASEAN) Heritage Parks (Stolton <i>et al.</i> 2019; CEPF 2020a; ASEAN Centre for Biodiversity n.d.).			✓	✓
Spatial Monitoring and Reporting Tool (SMART) https://smartconservationtools.org/	Developed by nine conservation organizations, SMART aims to assist protected area and wildlife managers to better monitor, evaluate and adaptively manage patrolling activities. SMART can help standardize and streamline data collection, analysis, and reporting, making it easier for key information to get from the field to decision makers. Freely available, SMART comprises a suite of tools that enables users to collect, store, communicate, and evaluate data on wildlife and conservation areas in order to monitor and evaluate conservation efforts to improve conservation management (SMART Partnership n.d.). SMART is being used by a growing number of practitioners in protected areas in the Lancang-Mekong region (CEPF 2020a), including the central Annamite landscape between the Lao People's Democratic Republic and Viet Nam.			✓	✓

Name and website	Description	Process stages			
		Di	De	T	E
<p>Gender Tracking Tool</p> <p>https://www.cepf.net/grants/before-you-apply/cepf-gender</p>	<p>This tool, developed in 2017 by CEPF, is required for all CEPF-funded grantees (including those in the Indo-Burma Biodiversity Hotspot) to complete at the beginning and end of their projects. It aims to let grantees self-assess if and to what extent gender aspects are integrated into their work. The tool consists of an Excel sheet with seven questions, each with three to four answers to choose from. Each choice displays a specific score, all of which are added up at the end. These questions are related to, e.g. staff trained on gender topics, sex-disaggregated data collection and financial resources allocated for gender incorporation. After answering all the questions, the grantees send the tool back to the regional implementation team, as part of their reporting process (CEPF 2021; CEPF 2022).</p>			✓	✓
<p>Competence Standards for Protected Area Jobs in South East Asia</p> <p>https://www.cbd.int/doc/pa/tools/Competence%20standards%20for%20protected%20area%20jobs.pdf</p>	<p>Developed by ASEAN Regional Centre for Biodiversity Conservation in 2003, this publication consists of recommendations for the skills and knowledge ideally required for jobs in 24 key protected areas, divided into 17 technical categories and five levels. The document contains details of all standards and guidance and how to use them. These standards have been developed as a non-prescriptive tool to assist protected area management authorities, training and educational organizations and conservation projects to improve human resource development, staff performance and training. They have been developed through a review of best practices in South-East Asia and are intended to be adapted as required by their users to meet specific national requirements and training and development contexts. The use of these standards is encouraged for CEPF-funded projects in the Indo-Burma Biodiversity Hotspot (CEPF 2020a).</p>		✓	✓	
<p>Diagnostic tool for transboundary conservation planners</p> <p>http://www.tbpa.net/page.php?ndx=22</p>	<p>The tool was created in 2012 by IUCN's WCPA Transboundary Conservation Specialist Group, with an upgraded version (version 2.0) released in 2020. Its general aim is to support the decision-making process leading to the institutionalization of transboundary conservation. Specifically, the tool assists in feasibility evaluation for efficient transboundary conservation design and implementation processes; improvement of ongoing transboundary conservation implementation; and strengthening of participatory approaches (Global Transboundary Conservation Network n.d.).</p>	✓	✓	✓	✓
<p>Integrated Management Effectiveness Tool (IMET)</p> <p>https://rris.biopama.org/node/18795?ms-clkid=39e32cb6d04011ec98da4810988058ed</p>	<p>IMET was developed by the Biodiversity and Protected Areas Management (BIOPAMA) Programme (jointly implemented through IUCN and the Joint Research Centre of the European Commission) with its latest version (version 2.11) released in September 2023. Its main purpose is to support comprehensive protected area planning, monitoring and evaluation. It facilitates a proactive results-based approach to adaptive protected area management and provides a comprehensive decision support system. So far, it has been applied in a number of TBPA, as well as national-level protected areas, Ramsar Sites and World Heritage Sites (UNEP-WCMC 2018; BIOPAMA n.d.).</p>	✓	✓	✓	✓

To give brief example of tool application in transboundary landscape management in the Lancang-Mekong region, many spatial tools have been applied by the ADB in biodiversity conservation landscapes. Among these tools, spatial multi-criteria analysis was employed to identify biodiversity corridors in the central Annamite landscape, with criteria including proximity to current protected areas, roads and settlements. Weighting factors included forest status and function, among others (Linde and Quyen 2015). Moreover, other GIS tools have been used at the ADB GMS EOC's biodiversity conservation corridor (BCC) sites in Cambodia, the Lao People's Democratic Republic and Viet Nam as part of the baseline assessment and monitoring to measure forest cover, road density and forest fragmentation (Linde 2011).

2.3 Criteria for selecting tools

As there exist a number of tools for supporting the transboundary landscape management process, it is essential to select the one(s) that match(es) the purpose and practicality required. The list below offers general criteria to guide tool selection.

The user's transboundary landscape management purpose and context should match the objective, scope, limitations and applicability of the tool.

The data required by the tool must be ensured to be available at the scale and in the format required.

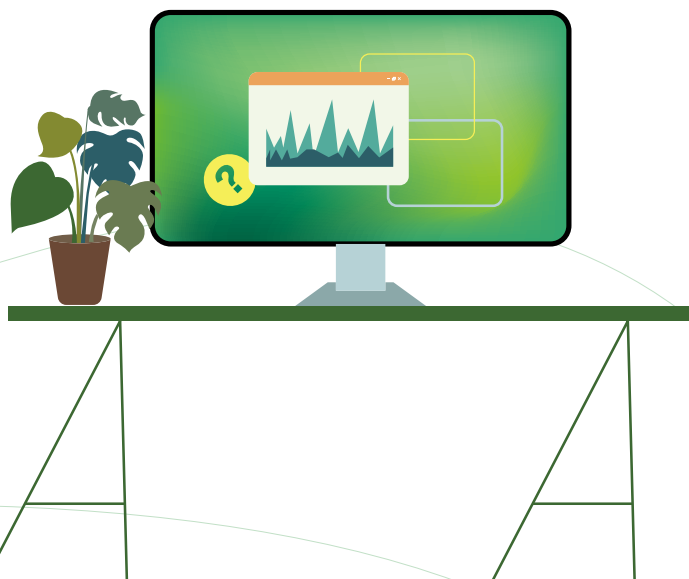
The technical capacity required to use the tool must match the skills and expertise of user team members.

Since some tools are not free of charge, and there are potential additional costs for purchasing data and hiring external experts, it is important to consider financial availability for the whole process.

The tool's methodology, including on analysis and results, must be accepted by users and stakeholders –particularly national governments.

Gender, ethnic minorities and marginalized groups, such as women, youth and persons with disabilities, should be considered in terms of the selected tool whenever possible.

Equitable stakeholder participation of men and women should be considered in order to obtain different aspects and ensure ownership and success of the process.





03

Transboundary management of key landscapes in the Lancang-Mekong region

This chapter presents transboundary landscape management in the key landscapes through five strategies. These are initiatives of international or regional efforts (e.g. biodiversity hotspots, ecoregions), the concept of transboundary collaboration applicable in the region (i.e. TBPA), and related designations for transboundary conservation at both the international and regional levels (e.g. World Heritage, ASEAN) that can potentially embrace all existing key transboundary landscapes identified in the Lancang-Mekong region. This chapter attempts to cover all six countries, discussing a wide range of topics, including forests, freshwater systems, gender, indigenous peoples, private sector participation, biodiversity conservation, ecosystem management and sustainable livelihoods.

3.1 Transboundary biodiversity landscapes

In 1992, ADB launched its GMS Economic Cooperation Program to enhance economic relations in the region. Connectivity is at the heart of this cooperation and the “GMS Economic Corridors” initiative adopted in 1998³ has become one of the most prominent. At the same time, there were strong concerns that the continued rapid economic development along these road-based economic corridors would further threaten the already stressed ecosystems and natural habitats. Therefore, in 2005 the BCI was inaugurated and defined as “areas of suitable habitat that provide links between protected areas” with the intention to “maintain and improve the cover, condition, and biodiversity of forest lands and associated ecosystems in priority biodiversity conservation landscapes intersecting ADB supported GMS economic corridors”. This is to ensure that “while the economic corridors enhance ‘physical connectivity,’ BCCs support ‘ecosystem connectivity’ to accommodate movements of species between core areas. These corridors are embedded within wider conservation landscapes, which provide services based on ecosystem functions” (ADB 2012).

The BCI is undertaken by the ADB CEP alongside partners including the environment ministries of the six GMS countries as well as NGOs such as Fauna & Flora International (FFI), WWF and WCS. The initiative has been implemented since 2005.

With the intention of enhancing the development and economic benefits derived from natural systems in protected areas and across the landscapes linking them, the key roles of the BCCs are: “(1) conserving habitat for species movement and for the maintenance of viable populations, (2) conserving and enhancing ecosystem processes and ecological services, and (3) promoting and enhancing local community welfare through the conservation and sustainable use of natural resources” (ADB 2018). This is done by internalizing ecosystem services and biodiversity products in the development planning process, and promoting the conservation, rehabilitation and sustainable use of their natural resources.

During the preparatory phase (2005–2006), the initiative started by conducting the BCC needs assessment and the BCC feasibility assessment. These assessment reports provided a solid foundation for developing the GMS BCC development strategic framework (2005–2014) and action plan (2005–2008).

The BCC needs assessment was conducted through analysis of at least five landscape-level ecoregion projects, along with spatial data overlaid with the GMS road-based economic corridors. This assessment identified ecosystem fragmentation threats and locations in conjunction with priority areas and

³ According to ADB (2018), economic corridors are an effective means of linking production, trade and infrastructure within a specific geographic area.

mitigation measures for biodiversity conservation and sustainable use within the GMS economic corridors. The BCC feasibility assessment investigated the ecoregional determinants of the occurrence and importance of biodiversity values and associated ecosystem services. Based mainly on both reports, the GMS BCC development strategic framework (2005–2014) and action plan (2005–2008) were developed; both providing details of what was to be undertaken in phase 1 and over the next 10 years. Specifically, the strategic framework mainly intended to identify and prioritize terrestrial BCCs of strategic importance, and review and analyse conservation and economic development policies to be harmonized among the GMS countries for effective and sustainable functioning of the biodiversity corridors. The outputs of the action plan included analysis of threats to high-value terrestrial biodiversity conservation and protected areas⁴, with specific reference to the GMS economic corridors, and assessment of conservation and development policy coherence for biodiversity corridor development. Both documents were endorsed at the Second GMS Summit in Kunming (July 2005) for the BCCs' implementation (ADB 2018).

In phase 1 (2006–2012), the initiative focused on piloting a biodiversity conservation landscape planning approach. It established eight biodiversity corridor sites and undertook community-level poverty reduction measures in these marginalized areas. Moreover, it sought additional financial support to scale up activities at selected sites.

This phase started with identification of GMS's critically important biodiversity landscapes, which are vulnerable to increased development pressures and environmental

degradation as well as globally and regionally high-value biodiversity landscapes/watersheds that need to be conserved to safeguard local livelihoods and investments in energy/hydropower, transport, water and sectors that enhance food security. **Eight pilot sites** were established for BCCs, based on criteria such as locating within the GMS economic corridors or their zones of influence; being of a transboundary nature with international biodiversity importance and high poverty incidence; and having the potential to reduce ecosystem fragmentation by linking two or more protected areas. These sites are:

1. Cardamom Mountains (Cambodia and Thailand)
2. Eastern Plains of Mondulkiri (Cambodia)
3. Ngoc Linh–Xe Sap (Viet Nam)
4. Tenasserim between the Western Forest Complex and Kaeng Krachan Forest Complex (Thailand)
5. Xe Pian–Dong Hua Sao–Dong Ampham (Lao People's Democratic Republic)
6. Xishuangbanna (Yunnan, China)
7. Cao Bang (Viet Nam)
8. Jingxi (Guangxi, China)

At each of the sites, the focus was to establish or enhance the corridor connecting protected areas at the site as well as to develop its sustainable use. The site activities were implemented by the government agencies with support from academic and NGO partners (e.g. WWF, WCS, IUCN, FFI). These included: (1) instituting an enabling policy environment; (2) strengthening institutional set-ups and capacities; (3) promoting participatory methods on conservation practices; and (4) developing opportunities to earn livelihoods and reduce dependence on forest resources (GMS EOC 2011).

⁴Two studies were conducted on value of ecosystem services along the corridors, i.e. the Xishuangbanna site (Yunnan, China) and Champasak Province (Lao People's Democratic Republic). Valuation of natural assets was then built into the methodology for sectoral environmental assessments for cross-border roads, hydropower, tourism, power development, cross-border tourism and land-use planning (ADB 2018).

At the Tenasserim pilot site, which links two important forest complexes in the western border of Thailand and having potential for transboundary management with Myanmar, WCS Thailand and the Department of National Parks, Wildlife and Plant Conservation in 2006–2008 conducted the assessment of wildlife and its habitat. It employed a landscape species approach in order to determine the status of wildlife and habitats along the corridor zone and adjacent core areas and to identify corridors or stepping stones for landscape species (i.e. the Asian elephant, gaur, serow, great hornbill, common muntjac, Indochinese tiger, Indochinese leopard and sambar). In designing corridors for landscape species, the team used the CorridorDesigner and other GIS tools to determine how to best design corridors and stepping stones in the Tenasserim Landscape (GMS EOC, Thailand, Department of National Parks, Wildlife and Plant Conservation and WCS Thailand 2009). The three main steps are as follows (Linde 2011):

1. Identify habitat areas, fragmentation and potential corridor strips/stepping stones through landscape-wide forest and land-use classification (10 classes).
2. Conduct field surveys to pinpoint incidences of landscape species and threats to wildlife in the landscape (e.g. encroachment, hunting, NTFP collection, livestock).
3. Extrapolate point survey data to get the abundance and distribution of the landscape species as well as threats to them.

The results were the corridor delineation that covers 787 km². Land-use management zones in the corridor were also divided based on the percentage of remaining primary forest (PF) per grid cell of 1 km² (i.e. “maintenance” for >50 per cent PF; “regeneration” for 1–50 per cent PF; and “restoration” for <1 per cent PF). This management zone classification has become a foundation for planning interventions in the corridor to improve connectivity for the landscape species (GMS EOC, Thailand, Department of National Parks, Wildlife and Plant Conservation and WCS Thailand 2009; Linde 2011).

Phase 2 (2012–2018) shifted from piloting on-the-ground interventions to a broader transboundary landscape approach. Based on the priority BCCs identified during phase 1, phase 2 subsequently expanded this approach to transboundary biodiversity conservation landscapes and enhanced important transboundary activities in three bilateral or multinational corridors.

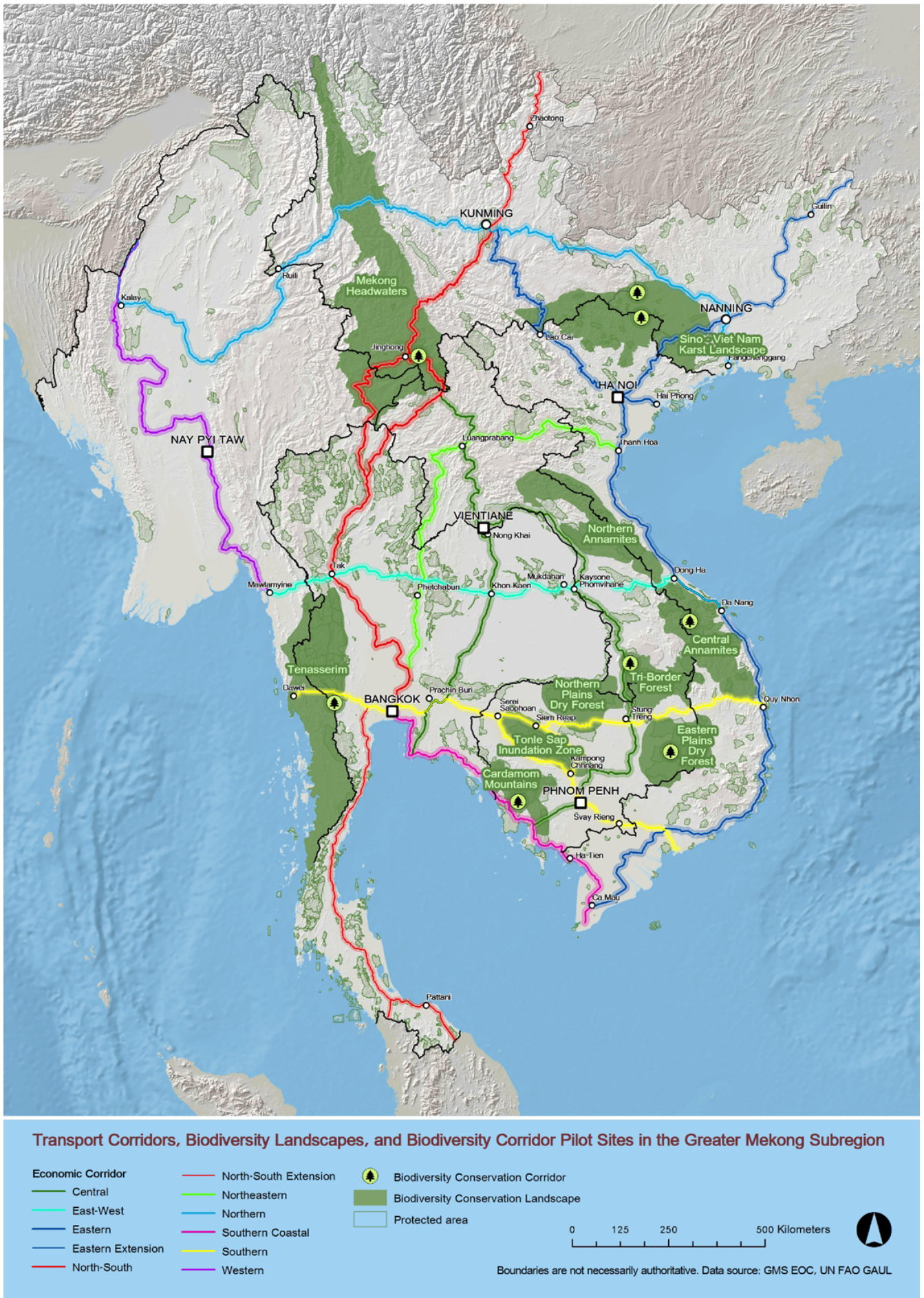
From the eight sites of BCCs identified during the last phase, in order to enhance transboundary cooperation for improving habitat connectivity and ecosystem functions while developing sustainable livelihoods for local communities, phase 2 extended them to **seven TBLs**. These are:

1. Cardamom and Elephant Mountains (Cambodia and Thailand)

2. Central Annamites (Lao People’s Democratic Republic and Viet Nam)
3. Eastern Plains Dry Forest (Cambodia and Viet Nam)
4. Mekong Headwaters (Lao People’s Democratic Republic, Myanmar, Thailand and Yunnan, China)
5. Sino-Vietnamese Karst (Cao Bang, Viet Nam and Guangxi, China)
6. Tenasserim Mountains (Myanmar and Thailand)
7. Tri-Border Forest (Cambodia, Lao People’s Democratic Republic and Viet Nam).

The overall objective was to improve TBL management to sustain their natural capital. Activities were composed of the development of the TBL management strategy, mainstreaming the TBL management strategy into policy planning and development, and establishing monitoring frameworks (Chan 2014; GMS EOC 2017).

Figure 1: The GMS economic corridors, biodiversity landscapes and BCC pilot sites (Credit: GMS EOC)



Since its inception, the BCI has gathered government agencies, conservation organizations and local communities to work together on integrated biodiversity conservation and livelihood improvement. These corridors provide vital habitats for many plant and animal species and ecosystem services that economic development activities both threaten and depend on.

After the concept of BCCs was firmly introduced, the GMS country leaders reached a consensus to adopt this innovative approach in the long term. The BCC initiative has helped protect the GMS's valuable natural capital while placing local people at the centre of forest protection measures. By ensuring that local communities are active partners and beneficiaries, this initiative has directly contributed to poverty reduction. One of the most valued interventions on this is the establishment of the Village Development Fund to help the poorest households, women and other marginalized groups, gain access to financial support in times of need and seize livelihood opportunities in due time. Improvement of socioeconomic conditions of BCC communities in terms of their financial assets was a key component of BCC activities at the local level, along with capacity-building on protected area and reforestation, among others (ADB 2018).

Key results of the BCCs are summarized below (McLeod 2018; ADB 2021):

- The biodiversity corridor approach has been successfully introduced in the GMS. This has resulted in better protection and management of more than 2.6 million hectares of the biodiversity corridors.

- Poverty reduction interventions have benefited over 30,000 local people through infrastructure

and development funds in villages and training programmes.

- Additional investments of US\$ 98 million for forest and biodiversity conservation have been leveraged.

- Gender equality and women's empowerment mechanisms were practised throughout the implementation to narrow gender disparities, e.g. livelihood development support in the conservation landscapes in phase 2 directly benefited in total 30,084 households with 175,672 people (42 per cent of whom were women).

- Biodiversity conservation and landscape management plans and policies have been developed and enhanced at the national level to recognize biodiversity corridors. These include the China National Biodiversity Conservation Strategy and Action Plan (2011–2030), Viet Nam's conservation policy (approved in 2014), and the national biodiversity corridors master plan of Thailand in 2012. This is in addition to the corridor-level management plans and policies that have been developed for the continuation and sustainability of the BCC interventions.

- Biodiversity conservation collaboration between government agencies, conservation NGOs and local communities, as well as between governments in the GMS, has been strengthened.

- Regional knowledge of biodiversity conservation and livelihood improvement in the GMS has been enhanced through various knowledge-sharing mechanisms, including the GMS Information Portal (<http://portal.gms-eoc.org>).

Figure 2: A man in Guangxi, China, with the pig farm he attained with a loan from a Village Development Fund (left); Project staff and villagers on patrol analysing forest-monitoring information on a tablet in Viet Nam (right) (Credit for both: GMS EOC)



Case study 2

Integrated conservation and livelihood actions along the Sino-Vietnamese Karst landscape

The large limestone karst formations covering Guangxi Zhuang Autonomous Region (China) and Cao Bang Province (Viet Nam) cover an area of 5,848,840 hectares. This diverse and spectacular landscape form many niche habitats for various threatened species, including the cao vit gibbon, a critically endangered species and one of the world's rarest apes, found only in this landscape. With its outstanding universal value, the landscape is part of the South China Karst, a UNESCO World Heritage Site. However, sugarcane plantations have caused a large-scale conversion of the landscape, leading to disconnection of the habitats and, therefore, difficulty for animals to maintain healthy and wide-ranging populations (McLeod 2018).

Since 2009, CEP has been working in the landscape in partnership with the environmental agencies in Guangxi and Cao Bang to establish transboundary biodiversity corridors, consisting of a protected core zone and a sustainable agriculture use zone, to provide optimal habitats for wildlife in tandem with the co-existence of human beings. The particular focus is on the border forest area between the Bangliang Nature Reserve (in Guangxi, China) and the adjacent Trung Khanh Nature Reserve (in Cao Bang, Viet Nam), which is home to the only known cao vit gibbon population in the world, in order to protect and expand their habitat. The activities include detailed analysis of satellite images and topographic maps for the corridor design, biodiversity and land-use surveys, and identification of in total 14 biodiversity corridors, i.e. five corridors connecting six protected areas in Cao Bang; and nine corridors

connecting nine protected areas in Guangxi (McLeod 2018). The work in the corridors focuses on restoring, protecting and sustainably managing biodiversity through community participation, which included incentivizing both women and men to participate in forest protection and restoration ensuring that they have equal voice, and can influence changes in decision making levels, while also reducing their dependency on forest resources through alternative livelihood activities. In these communities, the poverty rate is higher than the national average and level of economic development is low. Development funds were established to provide loans to poor households for sustainable livelihood activities (e.g. environmentally friendly farming practices) and villagers have been trained in animal husbandry, agroforestry, commercial tree plantation and rural environmental management.

The funds were also used for forest restoration and in Cao Bang the community teams were mobilized to patrol the 2,000 hectares of the cao vit gibbon protected area. In both Guangxi and Cao Bang, the CEP's support resulted in several strategies, plans and guidelines for improving landscape and corridor management. These included biodiversity corridor master plans, technical guidelines for forest restoration and participatory land-use planning. Moreover, the environment officials on both sides of the border meet regularly, participate in joint training programmes and conduct activities to monitor the cao vit gibbon.

Figure 3: Limestone mountains in Guangxi, China (left); cao vit gibbon (right) (Credit for both: GMS EOC)



As of 2018, the overall achievements of this included forest connectivity improved in 675,700 hectares of biodiversity corridors; and poverty reduction interventions contributed to more than 650 households (over 3,200 people). Importantly, these efforts have led to the signing of a memorandum of understanding between the environmental agencies of both sides to strengthen biodiversity conservation collaboration

in transboundary areas, including development of a joint management strategy for transboundary conservation and creating new biodiversity corridors; collaboration on research, assessments and monitoring; and awareness-raising and capacity-building activities (GMS EOC 2015; McLeod 2018).

3.2 The Indo-Burma Biodiversity Hotspot's priority corridors

The concept of biodiversity hotspots for conservation priorities was introduced in 1988 with the overall objective of identifying the areas where “exceptional concentrations of endemic species are undergoing exceptional loss of habitat” (Myers *et al.* 2000). This concept was put forward by Conservation International (CI) which, in 1989, adopted the idea of protecting these areas as their guiding principle for investments because success in conserving species in these areas can have a massive impact in securing global biodiversity.

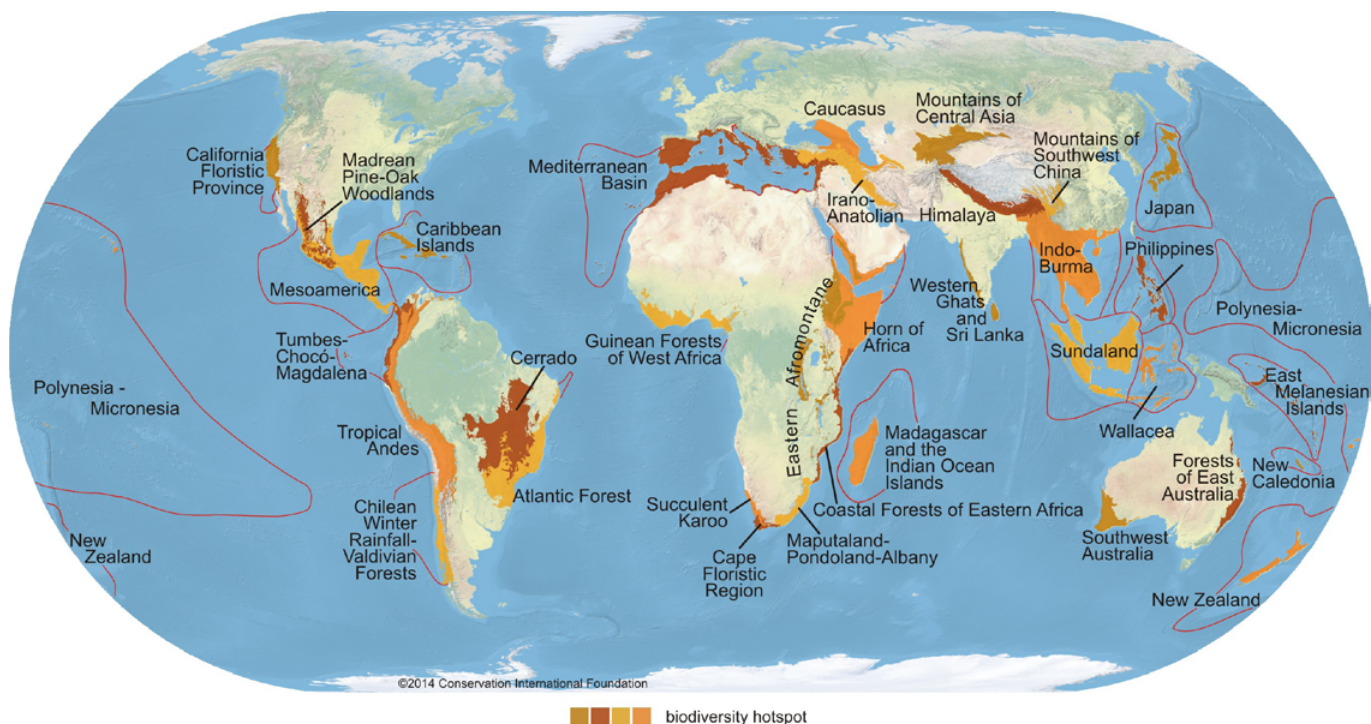
“Biodiversity hotspots” are areas which are both biologically rich and at high risk of destruction. Worldwide, there are **36** areas that qualify as hotspots. Although their intact habitats collectively occupy only 2.5 per cent of the Earth's land surface, they support about 43 per cent of endemic mammal, bird, reptile and amphibian species and more than half of the world's endemic plants. An area can be identified as a biodiversity hotspot if it is (1) irreplaceable: with a high percentage of plants found nowhere else on the planet, i.e. at least 1,500 vascular plants as endemics, and (2) threatened: having lost 70 per cent or more of its original natural vegetation (CI n.d.).

These 36 biodiversity hotspots (see Figure 4) are also home to around 2 billion people. This includes some of the world's poorest people and those highly dependent on healthy ecosystems for their well-being and livelihoods. Moreover, the hotspots provide vital ecosystem services for people, such as pollination, clean water and climate regulation. Importantly, since the hotspots are among

the richest and most important ecosystems in the world, and since many vulnerable people who are directly dependant on nature reside within them, it is estimated that with the small fraction of land surface represented by the hotspots, they deliver 35 per cent of the ecosystem services that vulnerable people rely on (CI n.d.). Therefore, conservation in the hotspots helps to promote sustainable management of critical natural resources and support economic growth.

As an important instrument to protect the biodiversity hotspots, CEPF was established in 2000. A joint initiative of Agence Française de Développement, CI, the European Union, the Global Environment Facility, the Government of Japan and the World Bank, CEPF aims to protect biodiversity, build long-term local conservation leadership and nurture sustainable development. It provides grants to non-profit, academic/research and private sector organizations working to protect biodiversity hotspots and improve human well-being. CEPF is currently investing in 10 hotspots, including the Indo-Burma Biodiversity Hotspot.

Figure 4: Biodiversity hotspots map (Credit: K. Koenig)



The **Indo-Burma Biodiversity Hotspot** comprises all non-marine parts of Cambodia, the Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam, plus parts of southern China (i.e., Hainan Island, southern parts of Yunnan, Guangxi and Guangdong Provinces, and Hong Kong and Macau Special Administrative Regions). It is the largest hotspot (with a total area of 2,308,815 km²), with a larger population (over 350 million people) than any of the other 35 hotspots. It is also ranked among the top 10 hotspots for irreplaceability and among the top five for threat, with only five per cent of its natural habitat remaining in pristine condition (CEPF 2020a).

The Indo-Burma Hotspot contains extraordinary biodiversity richness. It harbours between 15,000 and 25,000 vascular plant species, over 470 mammal species, 1,330 bird species, at least 1,440 fish species, more than 670 reptile species and 380 amphibian species (CEPF 2020a). Many of them are endemic and among

the world’s rarest, largest and smallest. As one of the major rivers in the hotspot, the Mekong River holds third place in the world for richness of species – after only the Amazon and the Congo (Dudgeon 2000) – and has a high degree of endemism of up to 24 per cent (Campbell *et al.* 2006). Moreover, more species of mammals, birds, reptiles and amphibians have been discovered in recent decades.

Examples of endemic species found in this hotspot (see Figure 5) include the saola (also known as the Asian unicorn; Indo-Burma’s terrestrial flagship species and one of the world’s rarest large animals; only discovered in 1992 with none in captivity; and Critically Endangered on the IUCN Red List), the Mekong giant catfish (the world’s largest freshwater fish, Critically Endangered on the IUCN Red List) and Kitt’s hog-nosed bat (the world’s smallest mammal by length, classified as near threatened on the IUCN Red List).

Figure 5: Saola, left (Credit: WWF Viet Nam); Mekong giant catfish, middle (Credit: WWF); Kitt’s hog-nosed bat, right (Credit: Our Breathing Planet)



However, enormous pressures on the hotspot's natural resources have resulted from a combination of human population growth and rapid economic development. Major threats to species, sites and landscapes include the hunting and trading of wildlife; agro-industrial plantations; hydropower dams; transportation networks; agricultural encroachment; and logging (CEPF 2020a). These threats have subsequently impacted the lives of people who depend on the ecosystem services provided by the hotspot ecosystems. An important example is the Tonle Sap, arguably the world's most productive freshwater ecosystem, the fish from which are a source of protein for 80 per cent of the population of Cambodia (Hortle 2007; Daly *et al.* 2020). A variety of threats, including clearance of flooded forest, agricultural development, unsustainable fishing practices and management, and changes in hydrological flows due to upstream developments, have negatively impacted the Tonle Sap system. In 2019, the flood pulse that charges the lake essentially failed, leading to 60 to 70 per cent decrease in fish caught (CEPF 2020a; Weatherby and Lichtefeld 2020).

CEPF began investment in the Indo-Burma Hotspot in 2008, since when there have been two phases of investment (phase 1 2008–2013 and phase 2 2013–2020). In each phase, CEPF provided grant following a strategy developed through an extensive stakeholder consultation (with civil society, governments and the donor community) process, and the results were documented in “ecosystem profile” for each phase. The fundamental principle for conservation investment strategy is to target where it can maximize the conservation impact and support the livelihoods of some of the poorest people at the same time. The biological basis for CEPF investment in the Indo-Burma Hotspot is provided by conservation outcomes, which are “the quantifiable set of species, sites and corridors that must be conserved to curb loss of global biodiversity” (CEPF 2020a). The lists of species outcomes, site outcomes and corridor outcomes are updated for each of the ecosystem profile to reflect new information on their status and experience from the previous phase on effectiveness of the investment. Likewise, each phase also has its investment thematic priorities, which are defined through a stakeholder consultation process based on analysis of the main threats to biodiversity and their root causes.

The strategy for the first phase supported civil society initiatives on conservation efforts for freshwater biodiversity and trade-threatened species as well as on

mainstreaming of biodiversity conservation goals into development policy and planning. The second phase built on the first phase with additional investment priorities, including on safeguarding priority globally threatened species, empowering local communities and strengthening the capacity of civil society. Key results of the previous CEPF investment (concluded in 2020 with a total of US\$ 15.4 million of funding given to 189 projects) include long-term conservation programmes established for 31 priority species, protection and management strengthened for 1.4 million hectares, and tangible benefits received by 162 local communities through improved food security, land tenure and access to ecosystem services, etc. Themes include protection and management of biodiversity in Key Biodiversity Areas, reduction of cross-border illegal wildlife trade and community-based conservation, among others (CEPF 2020b).

During the current phase (2020–2025), the geographic focus for funding covers **five priority corridors** (see Figure 6):

1. Chindwin River (Myanmar)
2. Mekong River and its major tributaries (Cambodia, Lao People's Democratic Republic, Thailand)
3. Northern Plains Seasonally Inundated Forests (Cambodia, Lao People's Democratic Republic)
4. Sino-Vietnamese Limestone Karst (China, Viet Nam)
5. Tonle Sap Lake and Inundation Zone (Cambodia)

There is also a network of limestone karst sites in Myanmar.

These corridors have been selected based on several criteria. For example, they need urgent conservation action and support globally significant populations of critically endangered and endangered species; globally significant populations of one or more landscape species; and (near-)unique or otherwise exceptional examples of ecological and evolutionary processes. Besides, this phase focuses on 136 priority species that require species-focused action along with site-based and landscape-scale conservation (CEPF 2020b). Examples of these priority species include the cao vit gibbon, saola, Mekong giant catfish and Irrawaddy dolphin. The overall objective is to demonstrate effective and scalable approaches to major conservation issues that leverage the skills and experience of civil society actors. This phase of strategic directions includes, among others, mitigation of zoonotic disease risks by reducing illegal wildlife trade and consumption of and threats to wildlife;

demonstration of scalable approaches for integrating biodiversity and ecosystem services into development planning in the priority corridors, and; strengthening the capacity of civil society to work on biodiversity, communities and livelihoods at the regional, national, local and grass-roots levels.

CEPF recognizes that gender can influence access, power, priorities, ownership, control and use of natural resources, and, importantly, that gender consideration can affect the quality of stakeholder engagement, benefits for project participants, and long-term conservation goals. Therefore, as part of CEPF's

monitoring framework, CEPF measures the changes in understanding of and commitment to gender issues of the project grantees. By using the Gender Tracking Tool before and at the end of the project, the project grantees are required to answer questions to self-assess their organization, regarding if and to what extent gender has been integrated into their operations. The results of baseline and final assessments are then reported to analyse the impact of CEPF-funded projects in this regard. For the Indo-Burma Hotspot, from 2017 to 2021, 60 per cent of the project grantees have reported an increase in integration of gender (CEPF 2021; CEPF 2022).

Figure 6: Priority Corridors for CEPF Investment in the Indo-Burma Biodiversity Hotspot (Credit: CEPF). Note: This map does not show the Myanmar limestone karsts, a network of small sites dispersed throughout the country, since these sites are too small to appear on a map of this scale.



With its weight of up to 300 kg and length of 3 metres, the Mekong giant catfish (*Pangasianodon gigas*) holds the title of the world's largest freshwater fish in the Guinness World Records. It is an endemic species to the Mekong River, where it migrates extensive distances to spawn. Historically, it occurred throughout the Mekong mainstream and major tributaries in Cambodia, the Lao People's Democratic Republic, Thailand and Viet Nam, and possibly Myanmar and south-western China (Hogan 2012). Now it can be found only in the mainstream of Mekong in Myanmar, the Lao People's Democratic Republic, Thailand, Cambodia and Viet Nam. Once relatively common further north along the Lao-Thai border, nowadays it is extremely rare in the area. Based on the decrease in the number of specimens caught, it is estimated that in the past few decades the Mekong giant catfish population has declined by about 90 per cent. Only a few hundred possibly now still remain in the wild. Threats to the Mekong giant catfish include infrastructure development that blocks migration routes and isolates populations, resulting in fewer opportunities to breed. Navigation projects that have destroyed critical spawning grounds, as well as pollution, siltation and overfishing, also contribute to the decline of the Mekong giant catfish (Thompson 2010).

Figure 7: Mekong giant catfish (Credit: Z. Hogan)



CEPF funded the project “Engaging with key actors in reconciling biodiversity conservation and development objectives, using the critically endangered Mekong giant catfish as a flagship species for biodiversity conservation” from 2011 to 2013. With the aim to conserve the Mekong giant catfish and other large migrating fish through a regional management plan and conservation of catfish spawning sites in northern Thailand and the Lao People's Democratic Republic, the project location was along the Mekong stretch between Chiang Rai Province (Thailand) and Bokeo Province (Lao People's Democratic Republic) (WWF 2009). It was led by WWF in partnership with the Lao Government (the Department of Livestock and Fisheries of the Ministry of Agriculture and Forestry, and the Provincial Agriculture and Forestry Office in Bokeo Province), the Thai Government (the Department of Fisheries of the Ministry of Agriculture and Cooperatives, and the Chiang Rai Provincial Fisheries Office) and local fishing communities in the two provinces. The project has developed fisheries co-management arrangements with nine new fish conservation zones around the spawning area of the mainstream Mekong, and a transboundary sustainable fishery management agreement between the two countries on joint and sustainable management of the river and its aquatic resources to locally protect fish stocks. The fish conservation zones cover in total around 33 hectares, but the benefits are wider due to the migratory nature of many of the species. On both sides, law enforcement was also enhanced: a moratorium on catching the Mekong giant catfish for scientific purposes in Thailand was successfully advocated, and the Lao Fisheries Law has banned the catch of the Mekong giant catfish in the Lao People's Democratic Republic. The project also produced a state of knowledge report and fish catch monitoring report on this poorly understood species, and improved community awareness of the need to conserve the Mekong giant catfish (WWF Greater Mekong 2013).

3.3 WWF ecoregions and priority landscapes

An ecoregion, as defined by WWF, is a “large area of land or water that contains a geographically distinct assemblage of natural communities that:

1. share a large majority of their species and ecological dynamics;
2. share similar environmental conditions; and
3. interact ecologically in ways that are critical for their long-term persistence” (WWF n.d.a).

Olson *et al.* (2001) introduced TEOW as a new global map of terrestrial ecoregions that provides an innovative tool for biodiversity conservation. This detailed global biodiversity map has sufficient biogeographic resolution to precisely present the complex distribution of the Earth’s natural communities so that distinctive biotas can be recognized. Boundaries of ecoregions are approximately the original extent of natural communities before major land-use change. As ecological processes most strongly interact within ecoregion, this concept broadens the scope of factors in conservation planning, to include not only species distributions, but also ecological phenomena. Moreover, distributions of a broad range of fauna and flora worldwide are reflected in the ecoregions, making TEOW useful for conservation planning at global and regional scales (Olson *et al.* 2001).

Another distinctive feature of ecoregions is that their units are of finer level resolution, compared with other global priority analyses such as the biodiversity hotspots (which are the threatened regions with high concentrations of endemic species). Therefore TEOW can complement them to assess biodiversity attributes. While approximately the average size of WWF ecoregions is 150,000 km², the biodiversity hotspots have a rough mean of 787,760 km² (Olson *et al.* 2001). In this case, the 25 terrestrial biodiversity hotspots amalgamate 414 ecoregions. By employing finer units for biodiversity assessments, this encourages the smaller but highly distinctive areas to receive sufficient conservation attention.

Worldwide, 867 terrestrial ecoregions have been defined (see Figure 8). Among them, **44 ecoregions** are located within the Lancang-Mekong region (see Figure 9 and Table 3).

Figure 8: The 867 terrestrial ecoregions worldwide (Source: Olson *et al.* 2001)

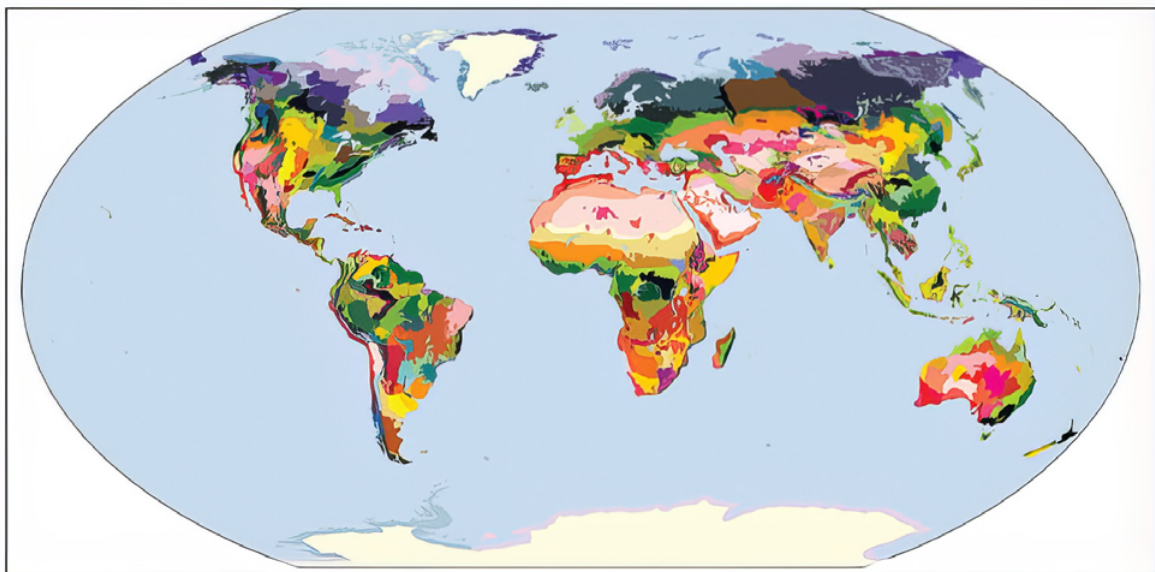


Figure 9: Terrestrial ecoregions within the Lancang-Mekong region (Credit: GMS EOC)

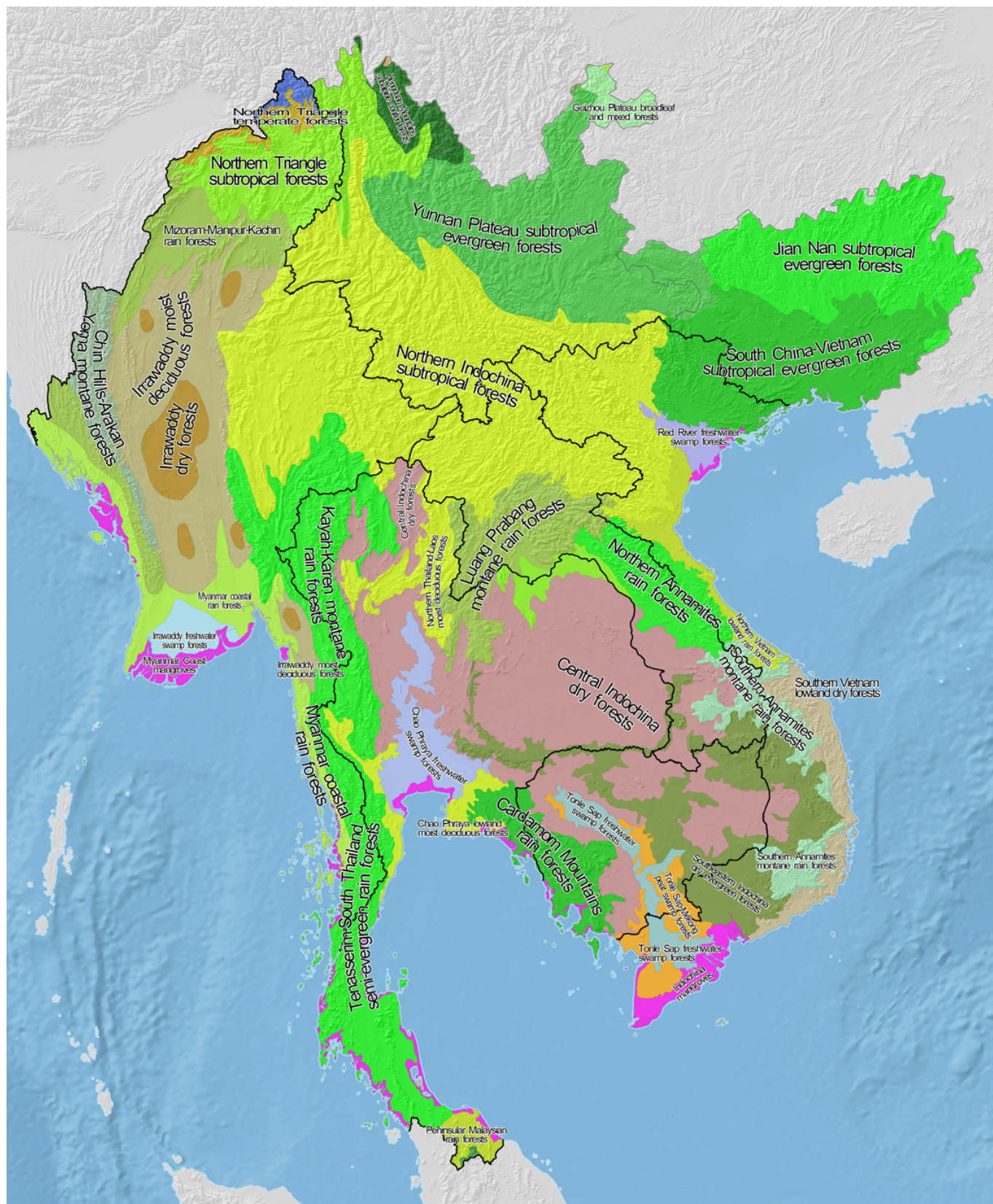


Table 3: Terrestrial ecoregions within the Lancang-Mekong region (Source: Open Development Mekong 2015)

Ecoregion	Countries
1. Cardamom Mountains rainforests	Cambodia, Thailand, Viet Nam
2. Central Indochina dry forests	Cambodia, Lao People's Democratic Republic, Thailand, Viet Nam
3. Chao Phraya freshwater swamp forests	Thailand
4. Chao Phraya lowland moist deciduous forests	Thailand
5. Chin Hills-Arakan Yoma montane forests	Myanmar
6. Eastern Himalayan alpine shrub and meadows	Myanmar
7. Eastern Himalayan broadleaf forests	Myanmar
8. Eastern Himalayan subalpine conifer forests	Myanmar
9. Guizhou Plateau broadleaf and mixed forests	China
10. Hengduan Mountains subalpine conifer forests	China
11. Indochina mangroves	Cambodia, Thailand, Viet Nam
12. Irrawaddy dry forests	Myanmar
13. Irrawaddy freshwater swamp forests	Myanmar
14. Irrawaddy moist deciduous forests	Myanmar
15. Jian Nan subtropical evergreen forests	China
16. Kayah-Karen montane rainforests	Myanmar, Thailand
17. Lower Gangetic Plains moist deciduous forests	Myanmar
18. Luang Prabang montane rainforests	Lao People's Democratic Republic, Thailand, Viet Nam
19. Mizoram-Manipur-Kachin rainforests	Myanmar
20. Myanmar Coast mangroves	Myanmar, Thailand
21. Myanmar coastal rainforests	Myanmar
22. Northeast India-Myanmar pine forests	Myanmar
23. Northern Annamites rainforests	Lao People's Democratic Republic, Viet Nam
24. Northern Indochina subtropical forests	China, Lao People's Democratic Republic, Myanmar, Thailand, Viet Nam
25. Northern Khorat Plateau moist deciduous forests	Lao People's Democratic Republic, Thailand
26. Northern Thailand-Laos moist deciduous forests	Lao People's Democratic Republic, Thailand
27. Northern Triangle subtropical forests	Myanmar
28. Northern Triangle temperate forests	Myanmar
29. Northern Vietnam lowland rainforests	Viet Nam
30. Nujiang Lancang Gorge alpine conifer and mixed forests	China
31. Peninsular Malaysian montane rainforests	Thailand
32. Peninsular Malaysian rainforests	Thailand
33. Qionglai-Minshan conifer forests	China
34. Red River freshwater swamp forests	Viet Nam
35. Sichuan Basin evergreen broadleaf forests	China
36. South China-Vietnam subtropical evergreen forests	China, Viet Nam
37. Southeast Tibet shrublands and meadows	China
38. Southeastern Indochina dry evergreen forests	Cambodia, Lao People's Democratic Republic, Thailand, Viet Nam
39. Southern Annamites montane rainforests	Cambodia, Lao People's Democratic Republic, Viet Nam
40. Southern Vietnam lowland dry forests	Viet Nam
41. Tenasserim-South Thailand semi-evergreen rainforests	Myanmar, Thailand
42. Tonle Sap freshwater swamp forests	Cambodia, Viet Nam
43. Tonle Sap-Mekong peat swamp forests	Cambodia, Viet Nam
44. Yunnan Plateau subtropical evergreen forests	China

Conservation strategies at the scale of ecoregions can aim to protect a full range of representative areas, conserve certain elements, and safeguard the populations and ecological processes, especially those that require the largest areas or are most sensitive to anthropogenic disturbances (Olson *et al.* 2001). Ecoregion-level conservation has recently gained attention, with increased funding from donors, conservation organizations and governments. Apart from WWF themselves, the ecoregion concept has been applied by the World Bank, the United States Agency for International Development (USAID), the World Resources Institute, The Nature Conservancy, museums, herbaria and others. The ecoregion map can be used as a base map for discussion with logging companies, wood product retailers, mining companies, and road development authorities, among others, to reduce the loss of forest biodiversity as well as a strategic tool for conservation investments (Olson *et al.* 2001).

As the distribution of species and communities hardly overlaps with political boundaries, another benefit of the ecoregion perspective is that it can help in designing networks of conservation areas and identifying if those areas are complementary or redundant across politically administrative units (Olson *et al.* 2001). However, as ecoregional conservation generally involves large planning areas that span multiple administrative jurisdictions, WWF also focuses their conservation work at landscape level.

Landscapes are usually defined as smaller than ecoregions but larger than individual protected areas. A landscape is essentially a geography-based management unit for implementing the conservation work of WWF. Landscapes have a foundation in ecology and geography, but the boundaries are often determined in accordance with WWF's management convenience, political, and logistical considerations (Y. Kandasamy, personal communication, May 25, 2022). They typically consist of three distinct elements:

1. Core conservation areas (where the natural capital conservation is of greatest importance)
2. Buffer zones and corridors (often with a combination of conservation and production objectives); and
3. A remaining matrix (covering heavy infrastructure, human settlement, agricultural and industrial production) (WWF n.d.b).

The aims of landscape-scale conservation include the assurance that the most important conservation areas are protected; the protected areas are linked by corridors as safe passages for wildlife; and agriculture, forestry and infrastructure development are well-managed and occur in the right places. Ultimately, this will ensure that ecosystems continue to provide the resources and services essential for society (WWF Greater Mekong 2013). Moreover, landscape-level conservation that improves or maintains ecological integrity can contribute to increased resilience and ability to adapt to climate change.

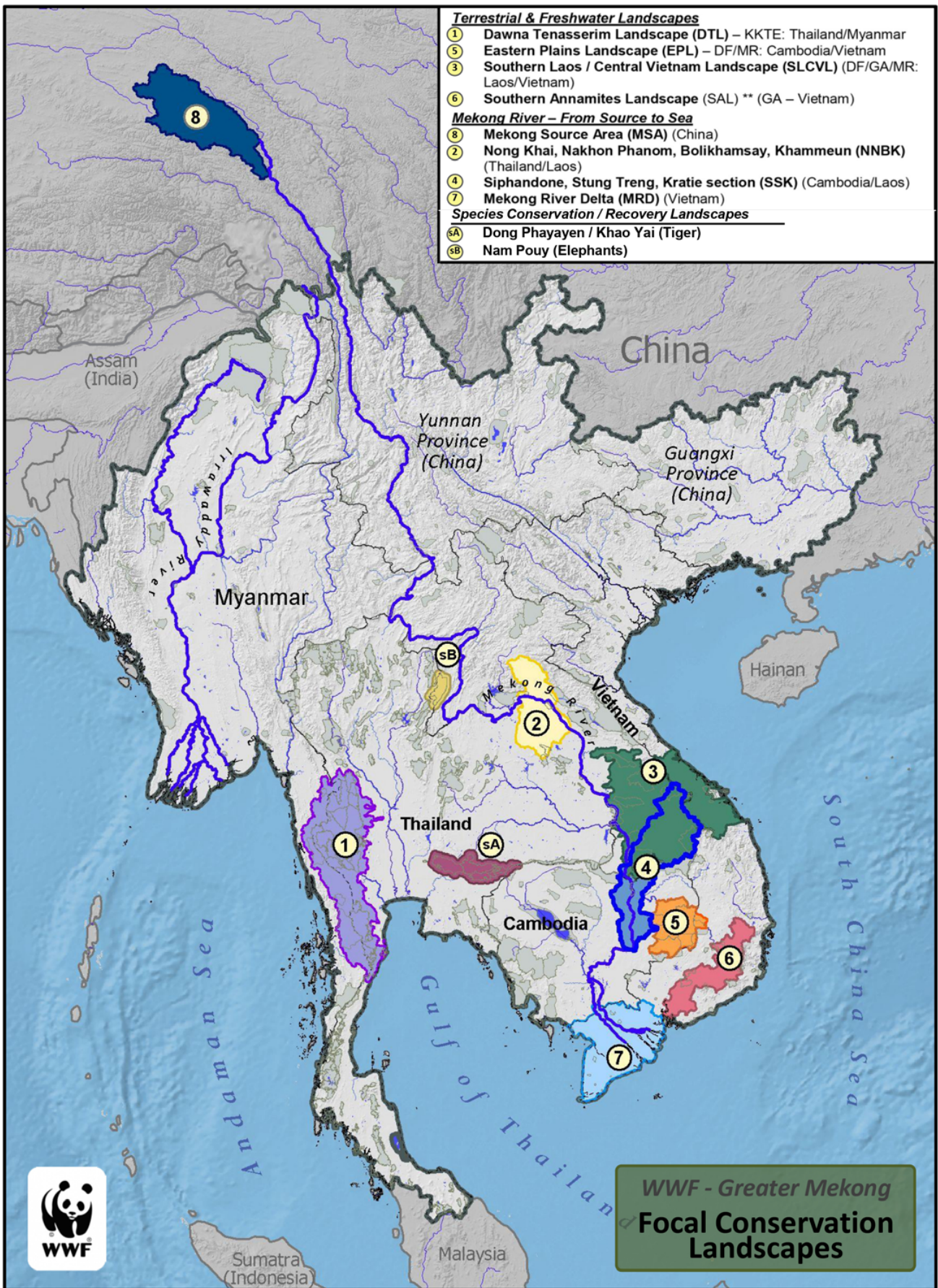
In the Lancang-Mekong region, WWF has identified **eight priority landscapes** that cover diverse habitats, for instance moist evergreen forests, deciduous dipterocarp forests, karst limestone forests, open grasslands and savannahs, upland plateaus, wetlands and riparian zones. These landscapes harbour at least 20,000 species of plants, 1,200 species of birds, 800 species of reptiles and amphibians, and 430 species of mammals. New species continue to be discovered (WWF n.d.b). Covering the total area of 290,000 km², the priority landscapes are (Figure 10):

1. Dawna Tenasserim Landscape (DTL) (Thailand and Myanmar)
2. Eastern Plains Landscape (Cambodia and Viet Nam)
3. Southern Laos/Central Viet Nam Landscape (Lao People's Democratic Republic and Viet Nam)
4. Southern Annamites Landscape (Viet Nam)
5. Mekong Source Area (China)
6. Nong Khai, Nakhon Phanom, Bolikhamsay, Khammeun (Thailand and Lao People's Democratic Republic)
7. Siphandon, Stung Treng, Kratie section (Cambodia and Lao People's Democratic Republic)
8. Mekong River Delta (Viet Nam)

WWF also has two other priority areas, Nam Pouy (elephant recovery) and Khao Yai/Thap Lan Complex (tiger recovery).

Within these landscapes, WWF works with a broad range of stakeholders to conserve the biodiversity and natural systems they support. WWF promotes an integrated approach to development that balances the different demands on these landscapes by placing the importance of natural capital at the centre of decision-making.

Figure 10: WWF's priority landscapes within the Lancang-Mekong region (Credit: adjusted from WWF)



With its size of almost 180,000 km² (~ 18,000,000 hectares), DTL is roughly the size of Cambodia. It contains South-East Asia's most extensive protected area network, and approximately 82 per cent of the landscape still remains forested. Stretching across the Myanmar-Thailand border, DTL is a crossroads of four different biogeographic zones: Indo-Burmese, Indochinese, Sundaic and Sino-Himalayan. Importantly, indigenous peoples and ethnic minorities are a key part of DTL, serving in many cases as guardians of the lands their ancestors have lived in for centuries. DTL has high species richness, especially birds and mammals. Many species found here are rare, endangered or endemic, including Kittl's hog-nosed bat, the world's smallest mammal by length.

DTL is also a land of cats. Seven of the nine cat species found in South-East Asia, namely the tiger, leopard, clouded leopard, Asian golden cat, jungle cat, marbled cat and leopard cat, live there with relatively intact and healthy populations. DTL is the best hope for tigers in the Lancang-

Mekong, as tigers have already disappeared in Cambodia, the Lao People's Democratic Republic and Viet Nam. Out of WWF's global 50 Tiger Heartlands, crucial sites for tiger recovery, five Tiger Heartlands have been identified in DTL. DTL is also a critical remaining habitat for significant elephant populations, with high numbers residing in Thailand's protected areas.

With its ecological and biodiversity significance, on the Thai side the landscape contains two (out of Thailand's three)⁵ UNESCO natural World Heritage Sites, namely the Thungyai-Huai Kha Khaeng Wildlife Sanctuaries and the Kaeng Krachan Forest Complex. On the Myanmar side, the Government and ethnic minorities managing large tracts of forested lands continue discussions on effective management for the benefit of local communities and biodiversity (WWF Myanmar 2020). Recognizing it as one of the Earth's most biologically significant areas for biodiversity conservation, DTL is one of WWF's global nine priority places (WWF Myanmar 2019).

Figure 11: Clouded leopard, left (Credit: VCG Photo); indigenous peoples in DTL, right (Credit: WWF)



The forests of DTL and their dwellers are under pressure. The threats include infrastructure development (such as roads), habitat fragmentation, agricultural expansion and logging, poaching for the illegal wildlife trade, and unsustainable harvesting of NTFPs and wild meat. Since 1993, WWF has worked in the landscape with partners to maintain and improve its integrity and connectivity (WWF n.d.c). These include:

- wildlife population surveys (particularly for tigers and elephants)
- community forest management and restoration to maintain and enhance landscape connectivity
- innovative approaches to addressing human-elephant conflict, e.g. using an early warning system
- deforestation monitoring through drone technology
- advocacy for sustainable infrastructure design
- livelihood initiatives for biodiversity-friendly production to improve overall economic well-being and reducing pressures on forests (WWF Myanmar 2018; Gupta *et al.* 2019)

Agricultural companies were also engaged, for instance in biodiversity-friendly bamboo and cacao production, through the establishment and support of producer groups (in which 26 per cent are women) for livelihood improvement projects that reduce pressures on forests on the Myanmar side (Gupta *et al.* 2019).

Moreover, there have been many transboundary activities. Among them is under WWF's Tiger Heartlands, with a priority to create and secure the connectivity of the sites for tiger populations through integral management of the transboundary tiger ranges. WWF in Myanmar and

Thailand have also developed WWF Landscape Tiger Recovery Plans. For wildlife monitoring, camera traps have been installed on both sides of the border to assess wildlife and key species in this cross-border forest complex (WWF Myanmar 2018). In terms of livelihood improvement, WWF in Myanmar has promoted agroforestry (e.g. cocoa and coffee intercropped in rubber plantations) as an alternative livelihood opportunity, and organized an exchange visit of smallholder farmers to a sustainable cacao agroforestry production site in Thailand with planned study exchanges, because cocoa demand is considerably greater than supply in Thailand. To address the illegal wildlife trade, a transboundary strategy for DTL has been established, covering assessment of the situation in the landscape, training of both men and women border officials on countering trafficking and organized crime, and border management support through sniffer dogs. WWF also supports the discussions on transboundary Salween Peace Park, including by identifying how conservation activities can contribute to peacebuilding (WWF Myanmar 2018; Gupta *et al.* 2019).

Another significant success is that WWF's recommendations have been incorporated in the design of the 138-kilometre Dawei Road from the Thai border through largely forested areas in Myanmar. After years of engagement with government officials, financing agencies and civil society organizations on both sides in advocating for the biological and social importance of the area for the road construction, agreement on sustainable design principles has been reached. Those recommendations include wildlife crossing measures with fencing, establishment of a critical conservation zone along the crossings, and direct benefits to local communities from monitoring and maintenance of the wildlife crossing measures (Gupta *et al.* 2019).

⁵ In total, Thailand has three UNESCO natural World Heritage Sites (UNESCO n.d.a).

Case study 5

Conservation of the Mekong River Irrawaddy dolphin along the Lao-Cambodian Border: protecting a majestic endangered mammal while sustaining local livelihoods

Siphandon (meaning 4,000 islands) is located in Champasak Province in southern Lao People's Democratic Republic, near the border with Cambodia. It is a 50-kilometre-long stretch of riverine archipelago in the Mekong River, where the river is expansive and forms many channels, creating numerous islands, sandbars, rocky rapids and seasonally flooded habitats, including Asia's largest complex of waterfalls. It has long been a popular international tourist destination, where one of the most famous tourist spots is the world's largest waterfall by width, the Khon Prapeng.

A Key Biodiversity Area for mammals, birds, reptiles and fishes, Siphandon is also a priority landscape of WWF. Siphandon habitats are crucial to successful migrations of fish species in the Mekong, where most fish species are migratory. As much as 75 per cent of fish catch in Tonle Sap Lake relies on fish that migrate to the deep pools in Kratie, Siphandon and others during the dry season (Poulsen *et al.* 2002). Fishery is an important source of income for local communities there, and the area provides the highest number of fish consumed in the country (WWF Laos n.d.).

Figure 12: Aerial view of Siphandon showing numerous islands and rapids, up (Credit: Tạp chí Lào – Việt); Khon Prapeng Waterfall, down (Credit: mismatchedpassports.com)



Not far downstream from the falls lies a deep pool straddling the Lao-Cambodian border, which was home to one of the last groups of the Mekong Irrawaddy dolphin (Mather *et al.* 2009). The Irrawaddy dolphin (*Orcaella brevirostris*) is found in three rivers, the Ayeyarwady (Myanmar), the Mahakam (Indonesia) and the Mekong (Cambodia and the Lao People's Democratic Republic). Once present throughout the Mekong from the Lao-Cambodian border down to the Mekong Delta in Viet Nam and Tonle Sap, the population has greatly declined in the past few decades. Now they inhabit only the stretch of the river between Cambodia and the Lao People's Democratic Republic. Globally, less than 300 Irrawaddy dolphins remain (WWF 2021), including fewer than 90 individuals in the Mekong as of 2020 (Associated Press 2022). The main threat to Irrawaddy dolphins in the Mekong is accidental drowning in gillnets, particularly with fishing becoming increasingly intensive. Other threats include overfishing and illegal fishing methods that directly kill dolphins or deplete their food sources; irrigation and dam systems that reduce their habitat; and pollution (e.g. pesticides, heavy metals, plastic particles) that has also been implicated in dolphin mortality (WWF Cambodia n.d.).

Mekong Irrawaddy dolphins have brought tangible livelihood benefits to local communities. Importantly, no trip to Siphandon was complete without going dolphin-watching, which considerably supported growth, generating much needed income to local communities (WWF 2014). In Siphandon, the business has benefited boat owners, restaurants, hotels, guesthouses and communities living around the site (WWF Laos 2012).

WWF, the Mekong River Commission, ADB and private tourism companies collaborated to conserve the dolphins at the transboundary pool between Cambodia and the Lao People's Democratic Republic while providing economic incentives for local communities. The work consisted of an environmental education campaign to encourage both women and men to actively participate in the protection of the dolphins at the transboundary pool, the installation of tourism infrastructure to raise awareness about the dolphins, and the establishment of equitable sharing of revenue obtained from the dolphins. The incentive to encourage the community to address the problem was the tourism revenue to

Figure 13: Mekong Irrawaddy dolphins (left); dead dolphin entangled in a fishing net (right) (Credit for both: WWF)



be directed to the community as compensation for removing fishing nets from the dolphin pool. The project developed promotional material, ecological information about dolphins and a dolphin-viewing platform. It also supported WWF's work on dolphin population monitoring and the establishment of a Transboundary Management Committee between Cambodia and the Lao People's Democratic Republic to strengthen the institutional mechanism for co-management of fisheries in the area (WWF 2010).

It is important to note that apart from this project, there were many other continuous efforts to protect the Mekong Irrawaddy dolphins in this transboundary area. However, the population

number continuously declined, from eight in 2007, to seven in 2009, six in 2012, three in 2018 and only one in 2021 (Phay *et al.* 2022). In February 2022, the last dolphin died after becoming entangled in a fishing net. With its death, the Mekong Irrawaddy dolphin is now extinct in the Lao People's Democratic Republic. This loss highlights the importance of lessons learned to push for stronger protection of the remaining dolphins in the Mekong, in particular by stopping the use of gillnets and other illegal fishing methods, as well as other measures to restore habitat in the transboundary area and elsewhere by maintaining flows and providing meaningful protection to dolphins and other river species.

3.4 Transboundary protected areas

A protected area, as defined by IUCN, is “a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.” This definition is in line with that of CBD. Protected areas have long been considered as a cornerstone of biodiversity conservation, with contributions to people's livelihoods, especially at the local level. Moreover, they are a primary source of drinking water and a key factor in ensuring food security. Well-managed protected areas yield substantial benefits far beyond their boundaries, which can contribute to cumulative advantages across national economy, poverty reduction and sustainable development.

The concept of the TBPA has emerged with the view that not only do TBPAs outperform isolated protected areas in achieving conservation objectives, but they also create opportunities for enhanced transboundary cooperation in their management. This concept has been promoted by many institutions globally, and it is also included as a goal under the CBD's Programme of Work on Protected Areas, as “to establish and strengthen regional networks, TBPAs and collaboration between neighbouring protected areas across national boundaries” (CBD Secretariat n.d.).

As mentioned in chapter I, the definition of TBPAs recommended by the IUCN WCPA Transboundary Conservation Specialist Group (n.d.) is “a clearly defined geographical space that consists of protected areas that are ecologically connected across one or more international boundaries and involves some form of cooperation.” With this definition, TBPAs can be subcategorized as two types: two or more adjoining protected areas across an international boundary, and a cluster of protected areas located in two or more countries but separated by areas that are not protected (Vasiljević *et al.* 2015).

The latest global assessment of TBPAs was conducted in 2007 by UNEP-WCMC (Vasiljević *et al.* 2015; E. Howland, personal communication, March 10, 2023). The assessment was based on reviewing the content (digital maps) of WDPA. The assessment resulted in a global inventory of TBPAs, which both fully fit the IUCN definition (i.e. involve international cooperation through legal or other means) and are internationally adjoining protected areas (that may still require further collaborative efforts of cooperation). Incorporating 3,043 individual protected areas or internationally designated sites, the inventory identified 227 TBPA complexes.

Among these, **14 fall within the Lancang-Mekong region**, as presented in Table 4.

Table 4: Transboundary Protected Areas and internationally adjoining protected area within the Lancang-Mekong region (Lysenko *et al.* 2007)

No.	Country	Protected area	
1.	China	Xishuangbanna Nabanhe, Xishuangbanna	
	Lao People's Democratic Republic	Nam Ha	
2.	China	Huanglianshan	
	Lao People's Democratic Republic	Phou Dene Din	
	Viet Nam	Muong Nhe	
3.	China	Chaotianma Guanyinshan Jinpingfenshuiling	
	Viet Nam	Hoang Lien Sa Pa	
	China	Nongxinshuiyuanlin	
4.	Viet Nam	Pac Bo	
	China	Gulongshanshuiyuanlin	
5.	Viet Nam	Trung Khanh	
	Lao People's Democratic Republic	Nam Et Phou Loey	
6.	Viet Nam	Sop Cop	
	Lao People's Democratic Republic	Nakai-- Nam Theun and Phou Hin Poun Hin Nam No Nam Chuane	
7.	Viet Nam	Nui Giang Man Phong Nha Phong Nha-Ke Bang Pu Mat Vu Quang	
	8.	Cambodia	Lomphat Mondulkiri Phnom Nam Lyr Phnom Prich Virachey
		Lao People's Democratic Republic	Dong Ampham Nam Kading Phou Kathong
		Viet Nam	Chu Mom Ray Yok Don
		9.	Myanmar
Thailand			Namtok Huay Yang Sadej Naikom – Krom Luang Chumporn
Myanmar	Tanintharyi		
10.	Thailand	Kaeng Krachan Mae Nam Pachi	

No.	Country	Protected area
11.	Lao People's Democratic Republic	Nam Pouy
	Thailand	Doi Phukha
		Lam Nam Nan
		Mae Charim
		Sri Nan
12.	Lao People's Democratic Republic	Phou Xiengthong
	Thailand	Kaeng Tana
		Pha Tam
13.	Cambodia	Banteay Chhmar
		Preah Vihear
	Thailand	Boon Trik – Yod Mon
		Dong Phayayen – Khao Yai
		Dong Yai
		Hua Tabtan-Hadsamran
		Huay Sala
		Khao Pravihan
		Pang Sida
		Panom Dong Rak
		Phu Chong – Na Yoi
		Ta Phraya
		Thap Lan
Yod Dom		
14.	Cambodia	Central Cardamom Mountains
		Phnom Sankos
		Samlaut
	Thailand	Klong Kruewai Chalerm Prakiat
		Namtok Klong Kaew

Case study 6

The Emerald Triangle Protected Forests Complex: promoting tri-national transboundary biodiversity conservation

The Emerald Triangle Protected Forests Complex landscape comprises five protected areas in Thailand (the Pha Taem Protected Forest Complex), two protected areas in the Lao People's Democratic Republic (Phou Xing Thong and Dong Khanthung), and one protected area in Cambodia (Preah Vihear), with the total area of approximately 6,500 km² along 317 km of international borders (Trisurat 2015). It is part of the Southeastern Indochina Dry Evergreen Forests Ecoregion, which is recognized as a globally outstanding source of the large vertebrate fauna within its landscape. Several endangered and iconic species, including

the Indochinese tiger, Asian elephant, gaur and banteng, migrate seasonally across the three borders. Besides, it is also home to many people whose livelihoods are highly dependent on natural resources and cultures deeply attached to the environment. However, biodiversity in the landscape is threatened by poaching and encroachment. Its original forest has been cleared or seriously degraded. In the Thailand part, the major cause of deforestation in the past several decades has been land clearance for agriculture, especially expansion of rubber plantation in response to the international demands (ITTO

2010). Therefore, tri-national collaborative efforts to maintain the integrity of remaining habitats and to reduce anthropogenic pressures are essential for the survival of many species in the landscape.

To address some of those issues, in 2001 the Government of Thailand, with support from ITTO and funding from Japan, initiated the transboundary biodiversity conservation cooperation framework with Cambodia and the Lao People's Democratic Republic. The project phase 1 (2001–2003) mainly set off the joint management planning process for the transboundary biodiversity cooperation framework among the three countries. The project phase 2 (2008–2010) focused on strengthening the tri-national cooperation and implementing biodiversity conservation activities with local community involvement and livelihood improvement for communities living inside or nearby the buffer zones of the protected areas to ensure sustainable use and management of natural resources. The project phase 3 (2012–2015) sought to harmonize the transboundary

biodiversity conservation and management of the three countries (Trisurat 2015; Vasilijević *et al.* 2015). Cooperation covers joint research, information sharing, training for park rangers, development of sustainable management strategies, among others. The incorporation of gender perspectives was considered in the process, e.g. during community meetings and participatory mapping on land-use and land-cover change in Cambodia (Dany *et al.* 2016). The project's key achievements include establishment of an institutional mechanism for the transboundary biodiversity cooperation; development and implementation of management plans that incorporate research results on wide-ranging species and ecological processes; strengthened capacity of stakeholders in biodiversity conservation and monitoring; and improvement of local livelihoods with reduced dependence on resources of the protected areas (Vasilijević *et al.* 2015; ITTO n.d.).

Figure 14: A view of the Mekong River in the Emerald Triangle Protected Forests Complex, left (Credit: T. Vijiapan); girls and boys in Thailand learn about the importance of biodiversity conservation (Credit: Royal Forestry Department)



3.5 International and regional designations for transboundary landscape management

All the nations in the Lancang-Mekong region are signatories to a range of global and regional agreements to promote environmental protection and sustainable development that recognize transboundary conservation. Some of those international and regional designations are described below.

3.5.1 World Heritage Convention

The Convention aims to identify and conserve cultural and natural sites and monuments of outstanding universal value. The World Heritage Sites are nominated by national governments for recognition by UNESCO. As of May 2022, the total of properties inscribed on the World Heritage List is 1,154. Among these 218 are natural, 39 are mixed and the remaining 897 are cultural. The Lancang-Mekong region contains nine natural World Heritage Sites (see Table 5). Globally there are currently 43 transboundary sites, including 16 natural, 3 mixed and 24 cultural sites. **None** of the natural transboundary World Heritage properties fall within the Lancang-Mekong region, and are mostly located in Africa and Europe. However, the Hin Nam No National Protected Area (Lao People's Democratic Republic) is currently on the Tentative List, meaning that the Lao Government intends for it to be considered for nomination. If inscribed, it will become the first transboundary UNESCO natural World Heritage Site in the region, together with the existing World Heritage Site Phong Nha-Ke Bang National Park in Viet Nam (see case study 7).

3.5.2 UNESCO Man and the Biosphere Programme

The UNESCO Man and the Biosphere (MAB) Programme promotes a scientific basis for enhancing the relationship between people and the environment. Under this programme, biosphere reserves are established as “learning places for sustainable development” through interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including biodiversity management. Those biosphere reserves, nominated by national governments, are areas of terrestrial and coastal ecosystems which are internationally recognized within the framework of the UNESCO MAB Programme. Each site promotes solutions to reconcile the biodiversity conservation with sustainable use. As of May 2022, globally there are 727 biosphere reserve sites,

including 22 transboundary sites (UNESCO n.d.b). Those transboundary biosphere reserves have been initiated as a means to conservation of organisms, ecosystems and genetic resources crossing national boundaries (IUCN 2015). The Lancang-Mekong region contains 23 MAB sites; about half are located in Viet Nam (see Table 5). However, currently **none** of the transboundary MAB reserves are located within the Lancang-Mekong region.

3.5.3 Ramsar Convention

The Ramsar Convention's mission is conservation and the “wise use” of wetlands through local, national and international actions. The wise use defined by the Convention is generally the conservation and sustainable use of wetlands and the services they provide for the benefit of people and nature (Ramsar Convention Secretariat 2014). The Convention's contracting parties designate at least one wetland site for inclusion in the List of Wetlands of International Importance, which currently covers 2,439 sites worldwide. In total, the Lancang-Mekong region contains 43 Ramsar sites, or Wetlands of International Importance, and Thailand holds the highest number of sites (see Table 5). As many internationally important wetlands extend their ecologically coherent systems beyond national borders, the Ramsar site authorities on both or all sides of the border can notify the Ramsar Convention Secretariat on their official agreement to collaborate on the management of those transboundary sites (Gardner 2018). As of 2019, globally there are 20 transboundary Ramsar sites. Among these, 16 are located in Europe, and **none** are in the Lancang-Mekong region (Ramsar Convention Secretariat 2019), although one site in China, the Guangxi Beilun Estuary National Nature Reserve, is situated to the north of Beilun River, a transboundary river between Viet Nam and China (Ramsar Sites Information Service 2022).

3.5.4 Association of Southeast Asian Nations Heritage Parks

ASEAN promotes economic growth, social progress, cultural development and peace in South-East Asia among its 10 member states. China is a dialogue partner, while the other five countries of the Lancang-Mekong region are member states. ASEAN covers cooperation on nature conservation and biodiversity, to conserve and sustainably manage South-East Asia's rich

biodiversity towards enhancing economic, social and environmental well-being. The ASEAN Heritage Parks programme was established in this regard, with the ASEAN Centre for Biodiversity serving as the Secretariat, as a regional network of representative protected areas to enhance collaboration among the member states in preserving their shared natural heritage. The ASEAN Heritage Parks are “national protected areas of high conservation importance preserving a complete

spectrum of representative ecosystem to generate greater awareness, pride, appreciation, enjoyment, and conservation of ASEAN’s rich natural heritage” (ASEAN Secretariat 2017). As of 2022, there are 51 ASEAN Heritage Parks, 28 falling within the Lancang-Mekong region, with Viet Nam having the highest number (see Table 5). Currently, there is **no transboundary category** for the ASEAN Heritage Parks.

Table 5: Number of sites in the Lancang-Mekong region designated under multilateral environmental agreements

Country	Natural World Heritage Sites	Man and Biosphere reserves	Ramsar sites	ASEAN Heritage Parks
Cambodia	0	1	5	2
China*	3	4	6	-
Lao People’s Democratic Republic	0	0	2	1
Myanmar	0	2	6	8
Thailand	3	5	15	7
Viet Nam	3	11	9	10
TOTAL	9	23	43	28

(Note: * = only in Yunnan Province and Guangxi Zhuang Autonomous Region)

Case study 7

Phong Nha-Ke Bang (Viet Nam) and Hin Nam No (Lao People’s Democratic Republic) in the central Annamites

The Annamites are a mountain range that stretches over 1,000 km east of the Mekong River, from central Lao People’s Democratic Republic to southern Viet Nam and eastern Cambodia. Its middle part, i.e. the central Annamites, provides a natural border between the Lao People’s Democratic Republic and Viet Nam.

The central Annamite landscape has an extremely diverse flora, as it comprises elements of four floristic regions: Indian, Malaysian, Sino-Himalayan and Indochinese. The landscape is also a major centre of endemism for both flora and fauna species, particularly mammals, as well as a number of globally threatened species, including the saola. The landscape also features the largest

karst ecosystem forest in South-East Asia, and hosts the world’s largest cave, Son Doong Cave, discovered in 2009.

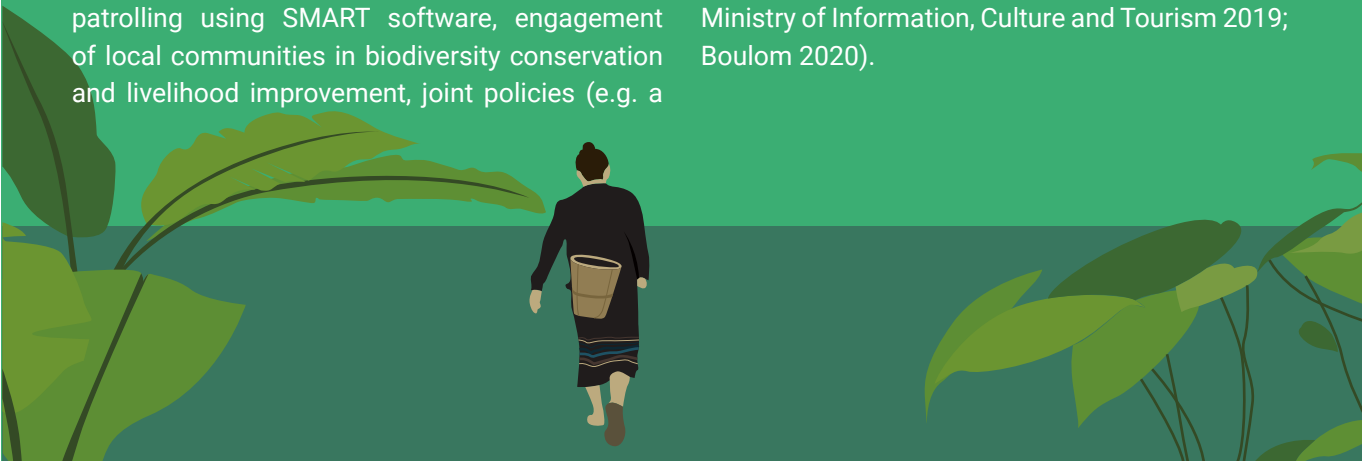
Not only a natural wonder, the forests also provide essential goods and services that benefit local communities, especially ethnic minorities and other disadvantaged populations living in extreme poverty. NTFPs account for approximately half of their income (GMS EOC 2011; USAID 2017). Therefore, for over 20 years, the landscape has attracted many international organizations to support transboundary cooperation, notably ADB, WWF, IUCN, FFI, USAID and the German Development Cooperation.

Figure 15: Son Doong Cave, left (Credit: Oxalis Adventure and GAC); NTFPs from Hin Nam No National Protected Area, right (Credit: T. Ziegler)



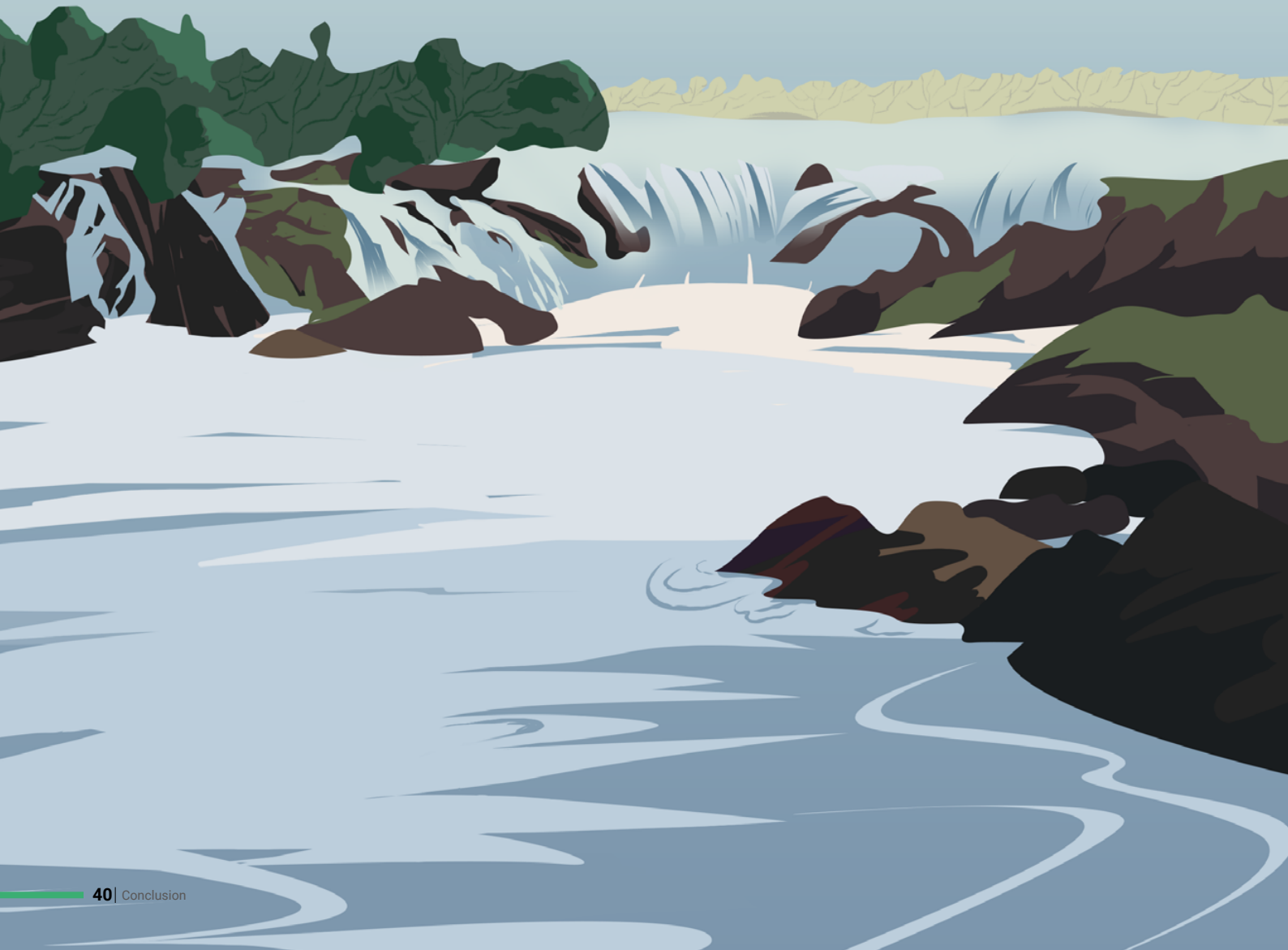
The Phong Nha-Ke Bang National Park (Quang Binh Province, Viet Nam) and Hin Nam No National Protected Area (Khammouane Province, Lao People's Democratic Republic) are among the approximately 20 protected areas in the central Annamite landscape. Although there are differences in the legal frameworks, management and socioeconomic development of local communities, both protected areas have been facing similar challenges, particularly pressures from trading in forest products, which directly affect the livelihoods of local communities who have relied on these resources for generations. Transboundary cooperation to address those challenges include regular exchange of knowledge between the protected areas, research collaboration, joint training on wildlife trade law and enforcement, biodiversity monitoring and patrolling using SMART software, engagement of local communities in biodiversity conservation and livelihood improvement, joint policies (e.g. a

Transboundary Biodiversity Protection Plan, and a Hunting and Wildlife Trade Control Action Plan), as well as several memoranda of understanding and other agreements between the two countries. These have resulted in the achievements of more solid legislative framework and practical cooperation. Importantly, as a remarkable legacy of the long-standing friendship between the Lao People's Democratic Republic and Viet Nam and with a view to create the most important protected karst area in South-East Asia, in 2020 the Hin Nam No National Protected Area was nominated as a transboundary extension to the existing World Heritage site of Phong Nha-Ke Bang National Park. Once inscribed, this will become the first UNESCO transboundary natural World Heritage site in South-East Asia (IUCN 2015; Vasilijević *et al.* 2015; Lao People's Democratic Republic, Ministry of Information, Culture and Tourism 2019; Boulom 2020).



04

Conclusion



Transboundary ecosystem management has been gaining attention worldwide. Its primary objectives cover not only the conservation of ecosystems, particularly important biodiversity areas and wildlife habitats, but also enhancing the livelihoods of those (often marginalized) groups of people living along the boundaries. At the same time, the Lancang-Mekong region has also been under the spotlight for investment and development, including in transboundary areas for large infrastructure projects like the ADB GMS economic corridors and the more recent Belt and Road Initiative. As one of the world's most important regions in terms of both biodiversity and economic growth, it is crucial for countries in the Lancang-Mekong region to collaborate on conservation and ecosystem management in transboundary landscapes. Governments, development partners and conservation organizations have realized this necessity, and thus transboundary collaboration

initiatives aiming to both conserve the natural environment and sustain livelihoods of people in the areas have commenced over the past decades.

This publication compiles 15 different tools for the management of key transboundary landscapes in the Lancang-Mekong region and beyond. Those can be used in the management processes of issue diagnosis, action design, action implementation and evaluation. The publication also presents transboundary management in key landscapes in the Lancang-Mekong region under five strategies, with the intention of covering all the important transboundary areas in every county in the region, led by international or regional organizations like WWF, ADB and CI. Drawing from these two core parts of the publication, some key issues that are worth further attention are summarized below.

01 *Prioritizing the transboundary landscapes*

Each of the initiatives under different organizations has defined its key transboundary landscapes using different sets of criteria. For instance, while the key criterion of the ADB GMS's TBLs is proximity to the GMS road-based economic corridors, the CI's biodiversity hotspots focus only on the high levels of endemism and habitat loss. Therefore, these initiatives have come up with different lists of their priority transboundary landscapes. However, in spite of these different criteria, a few landscapes have been identified as "priority" under multiple initiatives. These include the Sino-Vietnamese Karst/Limestone Corridor⁶, DTL⁷ and Siphandon⁸. Therefore, these landscapes are perhaps worth investing more efforts in. Moreover, currently there is no transboundary cooperation for the internationally designated sites, such as the World Heritage Sites, MAB reserves, and Ramsar sites in the Lancang-Mekong region. Therefore, there is also an opportunity to start with those transboundary landscapes in this regard to maintain their viability and ecological integrity.

02 *Considering connectivity at transboundary landscape level in infrastructure development*

Infrastructure development – both on land and in water – is frequently cited as the main threat, not only for biodiversity, but also local communities in the transboundary landscapes. While in some cases these infrastructure projects are inevitable, it is essential to consider sustainable design and involve civil society and local communities to propose alternative development scenarios and appropriate mitigating measures, as evidenced by the DTL case.

03 *Collaborating in technical matters despite national political conflicts*

Although the region is recently relatively peaceful, there have still been intermittent border disputes, posing another challenge to transboundary conservation in the area. This was particularly the case for the Emerald Triangle Protected Forests Complex, where conservation was neither a priority nor a practical option, and mistrust and disagreement over borders continue at the highest governmental

⁶ A transboundary biodiversity landscape under the ADB CEP and a priority corridor for the Critical Ecosystem Partnership Fund in the Indo-Burma Biodiversity Hotspot.

⁷ A priority landscape of WWF Greater Mekong and a transboundary biodiversity landscape under the ADB CEP.

⁸ A priority landscape of WWF Greater Mekong and a priority corridor for CEPF in the Indo-Burma Biodiversity Hotspot.

levels. This further causes women and other vulnerable populations to experience financial challenges, especially those whose livelihoods depend on cross-border trade, hence increasing their vulnerabilities. However, despite the heightened political tensions affecting the national decision to collaborate, technical cooperation could still proceed. These include joint research between universities in parallel with conservation, livelihood improvement and awareness-raising activities. Nonetheless, the Emerald Triangle project also remarks that political support is essential for the ultimate success and sustainability of any transboundary conservation project (ITTO and CBD Secretariat 2017).

04 *Optimizing biodiversity conservation and livelihoods improvement*

Transboundary landscape management often, if not always, aims not only to focus on biodiversity conservation, but also to include livelihoods improvement actions to be sustainable and less dependent on natural resources. For local communities, their linkages with biodiversity include income, food and medicine, among others. They can be active partners in conservation, but tangible and immediate benefits directly linked to their actions are necessary in order for their contributions to be effective and sustained. The implementation of sustainable livelihood and income-generating activities in the framework of a conservation project is crucial for success, along with the promotion of social ownership of transboundary conservation initiatives among local communities to develop a sense of the importance of biodiversity and forest conservation (ITTO and CBD Secretariat 2017).

05 *Enhancing capacity and collaboration in tool application*

The most common challenges faced in using the tools in the region include data availability and data sharing in transboundary landscapes. For those tools that require technical expertise, such as spatial tools,

technical capacity is still limited (Linde and Quyen 2015). In some cases, it would be possible to request training from the tool developer(s), as they often would like to further promote their tool application. If funding is limited, this training could be organized as webinars or recorded videos. Moreover, there is a need for the tools to be used more widely and for their use to be enshrined in national policy (CEPF 2020). Accordingly, close collaboration with local and national government agencies in application of the appropriate tools should be encouraged.

06 *Improving knowledge required to keep up with other regions*

Last but not least, there is relatively limited information on transboundary landscape management in the Lancang-Mekong region in general and in Myanmar in particular, for example in peer-reviewed journal articles and studies under the Transboundary Conservation Specialist Group of IUCN's WCPAs. This region remains far behind most of the world (especially North America, South America, Europe and Africa) in terms of available information on this topic. Moreover, the limited information which does exist is often not updated. Thus, there is an opportunity to further document the cooperation experience, for instance planning, implementation and day-to-day management; monitoring and evaluation; detailed application of tools; formal versus informal cooperative management; innovative approaches and technologies; adaptive management; inclusion of indigenous peoples, gender balanced participation of both women and men, local communities and gender considerations; specific challenges, benefits and results; and other lessons from practice, to share with other parts of the world.

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