#4

Greater Mekong

Giant ibis inhabit lowland forests and wetlands in the Mekong region. The species has declined as its habitat has been degraded and cleared, and because of hunting and disturbance. About 200 birds survive, most of them in northern and eastern Cambodia. The species is protected by law and is the focus of conservation efforts by government and NGOs.

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List of abbreviations and acronyms

ACB	ASEAN Centre for Biodiversity
ADB	Asian Development Bank
AHP	ASEAN Heritage Parks
ARREST	Asia's Regional Response to Endangered Species Trafficking (USAID)
ASAP	Asian Species Action Partnership
ASEAN	Association of South-East Asian Nations
ASEANAPOL	ASEAN National Police Network
ASOF	ASEAN Senior Officials for Forestry
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on International Trade in Endangered Species
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CSO	civil society organisation
DAC	Development Assistance Committee (OECD)
DNA	deoxyribonucleic acid
EAAFP	East Asian-Australasian Flyway Partnership
EBA	endemic bird area
EIA	environmental impact assessment
EU	European Union
EUR	euro
FAO	Food and Agricultural Organisation (UN)
FFI	Fauna & Flora International
FLEGT	Forest Law Enforcement, Governance and Trade (EU)
FSC	Forest Stewardship Council
G200	Global 200 Ecoregion
GEF	Global Environment Facility
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German technical assistance agency)
GM/GMS	Greater Mekong (sub-region)
IAS	invasive alien species
IBA	important bird area
ICCWC	International Consortium on Combatting Wildlife Crime
(I)NDC	(Intended) Nationally Determined Contributions
IUCN	International Union for the Conservation of Nature
KBA	key biodiversity area
KfW	KfW Entwicklungsbank (German government-owned international development bank)
KLC	key landscape for conservation
Lao PDR	Lao People's Democratic Republic
MAB	Man and Biosphere Programme (UNESCO)
MAFF	Ministry of Agriculture, Forestry and Fisheries (Cambodia)
METT	Management Effectiveness Tracking Tool
MoE	Ministry of Environment (Cambodia)
MoU	Memorandum of Understanding
MRC	Mekong River Commission
(M)tCO_2e	(mega) tonnes of carbon dioxide equivalent (unit of greenhouse gas emission)
NBSAP	National Biodiversity Strategy and Action Plan
NGO	non-governmental organisation
NP	National Park
NPA	National Protected Area (Lao PDR)
NTFP	non-timber forest product
ODA	Official Development Assistance

OECD	Organisation for Economic Cooperation and Development
PA	protected area
PADDD	PA downgrading, downsizing and degazettement
PES	payment for ecosystem services
PFES	Payment for Forest Environmental Services (Vietnam)
PRC	priority region for conservation
REDD+	Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks
RSPO	Roundtable on Sustainable Palm Oil
SDGs	Sustainable Development Goals
SEZ	Special Economic Zone
SMART	Spatial Monitoring and Reporting Tool
TRAFFIC	The wildlife trade monitoring network (collaboration of IUCN and WWF)
UK	United Kingdom
UN/UNDP/UNEP	United Nations/Development Programme/Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNODC	United Nations Office on Drugs and Crime
USA	Unites States of America
USAID	United States Agency for International Development
USD	US dollar
VPA	Voluntary Partnership Agreement (signed under the EU FLEGT programme)
WCPA	World Commission on Protected Areas
WCS	Wildlife Conservation Society
WEN	Wildlife Enforcement Network
WHS	World Heritage Site
WWF	World Wide Fund for Nature
ZSL	Zoological Society of London

0

Executive summary

Ha Long Bay World Heritage Site, Vietnam. Karst (limestone) ecosystems, with their caves, freshwater systems and forests, are home to many of the region's unique threatened species.

^
Van Long Nature Reserve, Vietnam, is an island of natural habitat in the densely populated Red River Delta. A forested limestone hill holds about 50 Delacour's langur, the largest and best protected population of this critically endangered monkey. The reserve is a popular tourist attraction.

0 _ Executive summary

The five countries of the Greater Mekong region (Cambodia, Lao PDR, Myanmar, Thailand and Vietnam) are the home of ancient civilisations, and have experienced dramatic political and social change in recent decades. Their economies have grown and poverty levels decreased, accompanied by rapid industrialisation and urbanisation, especially in Thailand and Vietnam. Associated with this has been intense and continuing pressure on land and resources.

The region encompasses permanent snowfields in northern Myanmar, extensive evergreen and semi-evergreen forests, large areas of karst, important river systems including the Mekong, and extensive freshwater lakes and swamps. The combination of varied climate, topography and vegetation has resulted in exceptional diversity of species and high levels of endemism. It is this, and the extent of habitat loss, that has resulted in the entire area being recognised as a global biodiversity priority, the Indo-Burma hotspot.

The biodiversity of the Greater Mekong is under threat as a result of habitat conversion and direct exploitation. Loss of habitat is a result of rapid expansion of commercial agriculture, as well as continuing expansion of smallholder farming. Urbanisation and improvements in infrastructure contribute to the pressure. Freshwater systems are under intense pressure from pollution, water abstraction and development of dams for hydropower. Increasing human populations, a culture of consuming wild products, and proximity to large markets for wild products in China as well as globally has led to intense pressure on the region's wildlife.

In response to the pressures on their environment, the governments in the region have designated over 750 protected areas covering some 14 % of the land area, and started to take action against the illegal wildlife trade. Some landscape-level approaches have been introduced, for example Vietnam's large-scale scheme for rewarding local people for managing and protecting forests. Collaboration with NGOs has contributed to the resources and expertise available to conservation work, and there is increasing recognition of the importance of involving local communities, which has contributed to resolving conflicts between local land use and conservation. The private sector has started to be more aware of its environmental impact, with examples of efforts to minimise and mitigate damage in the cement, oil palm and forestry industries. The countries of the region are all members of the Association of South-East Asian Nations (ASEAN), and therefore part of the ASEAN regional bodies established to improve biodiversity information and capacity building, and to address the illegal wildlife trade.

Despite these efforts, the pressures on the region's biodiversity and ecosystems are intensifying, and populations of threatened species are declining. Many protected areas are in practice unmanaged, with little or no resources available to them, and in some cases they have been degazetted and converted to other land use. Efforts to enforce laws against wildlife trafficking are hampered by lack of resources, limited capacity, corruption and lack of political support.

There are important opportunities to complement and build on the efforts already underway for improved management of biodiversity and ecosystems in the region. The most important of these strategic approaches are listed below.

- Improve international cooperation to address wildlife trafficking and the demand which is driving wildlife crime: support countries to strengthen enforcement at key points in the trade chain, address loopholes in their laws and policies, and address the issue through anti-corruption and anti-money laundering legislation. Work with the private sector to reduce their role in the illegal trade. Support education and campaigns to reduce demand.
- Strengthen the management of protected areas, including providing more resources for management in the field, addressing weaknesses in the legal status of protected areas and the risk of degazettement.
- Promote landscape approaches in high-biodiversity areas, especially around and between protected areas, as a way to integrate livelihoods and economic development. Key tools include planning and environmental assessment mechanisms, safeguard policies for infrastructure and industrial development projects, and participatory approaches to engagement with local communities and resource users.
- Build improved knowledge for biodiversity conservation planning and evaluation, including further work on the status and needs of specific species, update priority-setting processes, and target research to inform decision-makers on, for example, the natural capital value of ecosystems. Improve the sharing of information and lessons, including through ASEAN institutions.
- Enhance the role of civil society and the private sector. Local civil society is a small but growing stakeholder group in the region, and there are many opportunities to support capacity development. The private sector plays a key role in resource exploitation and use, and is beginning to become more sensitive to environmental standards and safeguards. Government policies and market pressure can both contribute to greater environmental awareness among leading companies.

1

Background

Red-shanked douc are found in the forests of Lao PDR, Cambodia and Vietnam, and are classified as endangered by IUCN. The region has an exceptional diversity of primates, many of them endemic and threatened.

1 _ Background

This chapter covers the five countries that are entirely within the Greater Mekong region: Cambodia, Lao Peoples' Democratic Republic (Lao PDR), Vietnam, Thailand and Myanmar. The southern provinces of China, which are often treated as part of the Greater Mekong and which have biological similarities with the South-East Asian countries, are covered in the East Asia sub-regional chapter.

Cai Rang floating market in the Mekong river delta, Vietnam. Rapid growth in the Greater Mekong region has improved the lives of millions of people, but environmental damage is threatening the future of the region's biodiversity and could undermine economic progress. A shift to more sustainable economy is vital for future prosperity.

In the past, poverty and population growth were the major drivers of this erosion of natural capital in the Greater Mekong. However, it is increasingly wealth and escalating per-capita demand for resources and products that is causing the depletion and loss of species and ecosystems. The region is a global centre of economic growth, situated in a global hotspot for biodiversity and neighbouring the world's second biggest economy. These factors combine to make the challenges of sustaining biodiversity and ecosystems while allowing continued economic development particularly acute. An indicator of the ferocious rate of change in natural systems is the fact that there are more species classified as critically endangered by the International Union for the Conservation of Nature (IUCN) in South-East Asia than in any other region globally.

This chapter covers wild biodiversity, and does not discuss the conservation of domesticated species and varieties. However the conservation of wild and domesticated biodiversity is closely linked: first, because the forests, wetlands and grasslands of the region hold the wild relatives and genetic origins of many of the domesticated plants and animals that humans depend upon today, and secondly because traditional multifunctional land-use systems are important for both wild and domestic biodiversity – and both are equally threatened by the uncontrolled spread of homogenous, capital-intensive, industrial agriculture. Many of the region's 100 000 varieties of rice may disappear with the introduction of modern varieties and the homogenisation of agriculture. In situ conservation of these genes within traditional agro-ecosystems is recognised as an essential compliment to ex situ conservation (gene banks, etc.)[1], and there may be close links between maintaining agricultural diversity and maintaining natural diversity within landscapes.

1.1 Socio-economic setting

1.1.1 Political and administrative context

The Greater Mekong region has been the home of Asian civilisations and empires including the 12th century Angkorian Empire, which controlled much of the area. The cultivation of irrigated rice produced the food and economic surplus that allowed these empires to grow, and the start of large-scale clearance of lowland forest in the region probably dates back to this period. With the exception of Thailand, the countries of the region were subject to colonisation from European countries that began in the late 16th century and accelerated in the 19th century. Indian and Chinese influences began far earlier, but the European colonisation accelerated the industrialisation of rice production and brought the first commercial production of rubber. By the mid-1950s the entire region was independent of colonial rule but the resulting states were weak and ill-prepared for independence, and as a result many were drawn into internal or externally driven conflict. These conflicts had a significant impact on the environment, for example through the use of defoliants by American forces during the Vietnam War.

Today, Vietnam and Lao PDR have single-party communist governments, but are increasingly liberalising their economies. Cambodia and Thailand are democratic constitutional monarchies, with the Government in Thailand currently controlled by a military council. Myanmar has made a historic transition from a military dictatorship following the country's first free, democratic elections in 2015, although conflicts between the state and ethnic armies continue in several areas[2]. Governance remains weak in some states, with three countries (Lao PDR, Myanmar and Cambodia) in the bottom quartile of Transparency International's corruption perception index[3].

The countries of the region are all members of ASEAN[4], an association that aims to strengthen peace and security and build social, cultural and economic ties between its members.

1.1.2 Population and livelihoods

The total population of the five countries was around 231 million in 2014[5], with a high proportion (60 % to 80 %) in rural areas. The mean national population density varies widely, however, from 29 people/km² in Lao PDR to 274 people/km² in Vietnam[6]. Lao PDR has the highest population growth rate, at around 2 % per annum. Rural to urban migration has been significant in most countries, though this does not necessarily reduce pressure on resources, as the demand from these expanding urban centres for firewood, medicinal plants, game meat, wild songbirds and other wild products is very high. Cambodia may be unique in having significant levels of rural to rural migration.

The hotspot is ethnically diverse. All the countries in the hotspot have a majority, lowland rice-cultivating ethnic group that typically dominates cultural and political life[7]. Upland areas are the home of minority groups, many with unique languages and

(1) Food and Agricultural Organisation's Commission of Genetic Resources for Food and Agriculture, http://www.fao.org/nr/cgrfa/cthemes/plants/en/, accessed 16 August 2016.
(2) The Guardian newspaper, UK, 9 March 2016.
(3) http://www.transparency.org/cpi2015, accessed 3 March 2016. From 1 (best) to 167 (worst), Cambodia was 150, Myanmar 147, Lao PDR 139. Vietnam was ranked 112 and Thailand 76.
(4) Other members are Malaysia, Indonesia, Philippines, Singapore and Brunei Darussalam.
(5) Asian Development Bank: https://www.adb.org/publications/basic-statistics-2015, accessed 28 May 2017.
(6) Downloaded from http://www.adb.org/publications/basic-statistics-2015, 3 March 2016.
(7) For example, Khmer in Cambodia, Lao in Lao PDR, Bamar in Myanmar, Thai in Thailand, Kinh in Vietnam. ADB (2012). Greater Mekong Subregion Atlas of the Environment,

Rice cultivation has been central to the social and economic development of the region. Irrigated wet rice cultivation occupies a large proportion of agricultural land and is the main occupation of 60 million people, as well as being an important export crop.

Bangkok, Thailand, is an economic centre for the region and has almost 10 million inhabitants. The economies of Vietnam and Thailand are already industrialised, and urban centres are growing rapidly throughout the region as people migrate from rural areas.

cultures. Many of the region's protected areas are in the uplands, and so the minority ethnic groups often form the principal local stakeholder groups in and around protected areas (PAs). The religion of the majority of people across the region is Buddhism, though many of the upland ethnic groups are animist or Christian (due to missionary influence that began in the colonial era).

Overall, South-East Asia has been one of the most successful regions of the developing world in poverty reduction, with an 84 % reduction in the number of people living on less than USD 1 per day between 1990 and 2015, and the proportion of undernourished people dropping from 31 % to 10 % over the same period[8]. All the countries in the region have seen an increase in the Human Development Index in the past decade, with Vietnam having achieved most to bring people out of poverty in percentage terms. However, poverty remains pervasive in Lao PDR, and in remote areas in all the countries. These remaining pockets of extreme rural poverty are often the areas where wildlife persist and protected areas are created, meaning that conservation efforts must still take into account livelihoods and welfare, even though the greatest threats to the environment in South-East Asia are a consequence of increasing consumption and global economic growth.

1.1.3 Economy

Economic growth in the Greater Mekong region is among the highest for any region of the world[9]. Thailand has long been classified as an upper middle-income country, and the other four countries are all lower middle income (Cambodia having moved up from 'low income' in July 2016)[10,11]. Significant industrialisation and urbanisation in Thailand and Vietnam is driving land conversion and creating environmental problems. Cambodia, Myanmar and Lao PDR remain predominantly smallholder agriculture economies, but industrial agriculture (oil palm, rubber, sugarcane, cassava, coffee and pulp fibre) is expanding rapidly. Rice (especially irrigated wet rice cultivation) occupies a large proportion of agricultural land and is the main occupation of 60 million people. The region produces 44 % of the world's rice, with all the countries exporting a surplus to global markets.[12]

All the countries in the region are pursuing investment-led economic growth strategies, and Vietnam has a policy objective of being a major industrialised nation by 2020. These strategies tend to de-emphasise the negative long-term environmental and social impacts (see section 2.2.1), with the building of dams on the Mekong and its tributaries a particular example of the failure to consider long-term social and environmental impacts in growth-led planning. Thailand's economy is more industrialised than that of its neighbours, and the government has stated that it follows a 'sufficiency economy philosophy', which emphasises a balance between economic development, human well-being and the environment[13].

Rapid economic growth in the region is associated with the highest rate of rural to urban movement in the world. In Lao PDR, only 38 % of the population is in urban areas (2014), but that figure is growing at almost 5 % per year, the fastest in the world. Second fastest is Thailand, where the proportion of people living in cities has increased from 29 % in 1990 to 49 % in 2014. Bangkok now holds 9.8 million people in an urban area of 1 335 km². [14]

1.2 Key biodiversity features

1.2.1 Geography and climate

Cambodia, Lao PDR, Myanmar, Thailand and Vietnam cover a total area of 1.9 million km² and make up more than 75 % of the Indo-Burma hotspot (see section 1.2.4).[15] The northern and central sections of the region have rugged terrain, including the Annamite Mountains in Lao PDR and Vietnam (extending into China) and the Tenasserim Range in Myanmar and Thailand. Northern Myanmar has permanent snowfields on Mount Hkakaborazi (at 5 881 m, South-East Asia's highest mountain). Low-lying floodplains, river deltas and coastal swamps along the Bay of Bengal, Andaman Sea, Gulf of Thailand and South China Sea dominate the southern part of the region. Four major transboundary rivers cross the region: the Ayeyarwady (Irrawady), Thanlwin (Salween), Mekong and Red, with a fifth (Chao Praya) in Thailand. Although the majority of the region's agricultural land is rain-fed, these rivers provide water for irrigated production systems that cover only 10 % of the region but account for half of its agricultural production[16], as well as forming economically important transport corridors.

Most parts of the region experience a strongly seasonal climate, with the south and west of the region influenced by a south-west monsoon season, and the north-east dominated by the north-east monsoon. The northern winter months are drier. Local variations create a complex array of microclimates.

1.2.2 Habitats and ecosystems[17]

Forests

Almost the entire region would originally have been forested, but by 2015 forests were estimated to cover 47 % of the region, or 884 310 km² (Table 1.1). This figure includes increases in

2nd edition, Asian Development Bank, Manila.

(8) http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf, accessed 3 March 2016.

(9) OECD forecasts that Vietnam, Cambodia, Lao PDR and Myanmar will experience GDP growth of between 6 % and 8 % annually in 2016 and 2017, while Thailand is predicted to grow by 3.3 %. See http://www.oecd.org/dev/asia-pacific/SAEO2016_Update_Executive_summary_v2.pdf, accessed 10 October 2016.

(10) Cambodia was one of the top performing low-income countries between 1990 and 2010. See: Shepherd A., L. Scott, C. Mariotti, F. Kessy, R. Gaiha, L. da Corta, K. Hanifnia, N. Kaicker, A. Lenhardt, C. Lwanga-Ntale, B. Sen, B. Sijapati, T. Strawson, G. Thapa, H. Underhill and L. Wild (2014). The Chronic Poverty Report 2014-2015. ODI, London, UK.

(11) Lao PDR was upgraded to low-middle-income status in 2011 on the basis of increases in gross national income, but the World Bank (2016) notes that poverty reduction has been slower than in its regional neighbours and that some Millennium Development Goals are off-track, with 44 % of children under 5 being stunted, 27 % severely underweight and a high maternal mortality rate. See http://www.worldbank.org/en/country/lao/overview, accessed 20 August 2016.

(12) http://blogs.worldbank.org/taxonomy/term/14832, accessed 25 April 2016. Rice exports do not necessarily equate to food security nationally, for example Lao PDR exports rice but suffers from food insecurity, though this has declined in the last decade.

(13) For example, see http://www.ipsnews.net/2016/08/thailands-sufficiency-economy-philosophy-and-the-sustainable-development-goals/, accessed 10 October 2016.

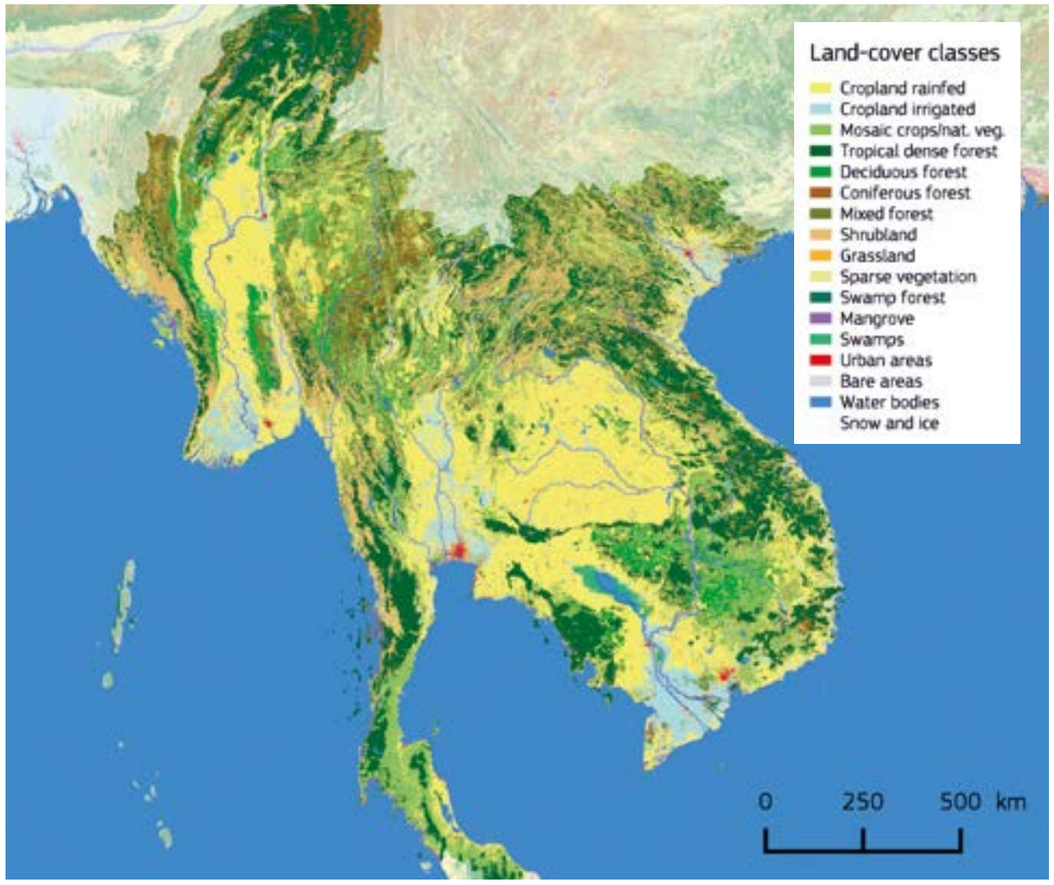
(14) Friend R., C. Choosuk, K. Hutanuwatr, Y. Inmuong, J. Kittitornkool, B. Lambregts, B. Promphakping, T. Roachanakanan, P. Thiengburanathum, P. Thinphanga and S. Siriwattanaphaiboon (2016). Urbanising Thailand: Implications for climate vulnerability assessments. Working Paper Series 30. IIED, London. Available at http://pubs.iied.org/pdfs/10770IIED.pdf, accessed 17 June 2016.

(15) Hotspots are terrestrial areas of exceptional biological richness, indicated by having over 1 500 species of vascular plants, which are under severe threat, and indicated by having lost more than 70 % of their original natural habitat. The world's 36 hotspots hold a significant proportion of species and ecosystems, but cover only 2.3 % of the land's surface. There are 8 hotspots in the area covered by this series of studies. https://www.cepf.net/our-work/biodiversity-hotspots, accessed 27 March 2018.

(16) ADB (2012). Environmental Atlas of the Greater Mekong Sub-region. Asian Development Bank, Manila.

(17) This section is based on CEPF (2012). Ecosystem Profile: Indo-Burma Biodiversity Hotspot, 2011 Update. Critical Ecosystem Partnership Fund, Washington, DC.

Figure 1.1 Land cover map of the Greater Mekong region



forest area in Lao PDR, Thailand and Vietnam, which are attributable to plantation forests and therefore of unknown but probably low value for biodiversity. It is estimated that only 5-9 % (100 000-200 000 km²) of the region's natural vegetation is intact and undisturbed[18,19,20] an indication of the long history of occupation, and the current pressure from human population growth, rapid economic development and changing consumption patterns.

One third of the remaining forest is in Myanmar, although the country with the greatest proportion of its land forested is Lao PDR. Cambodia has had consistently high rates of forest loss, at over 1 % per year, but in the last 5-year period has been overtaken by Myanmar, which has seen its deforestation rate increased from 0.9 % per year between 2000 and 2010 to 1.8 % per year between 2010 and 2015[21]. The causes of forest loss are primarily conversion to commercial agricultural plantations (see section 2.1.2) and logging (see section 2.1.4).

The region has a complex mosaic of natural forest types, a product of the interaction between altitude, soils, flood regimes, rainfall, and the length and intensity of the dry season. The two

(18) Costenbader J., J. Broadhead, Y. Yasmi and P. Durst (2015). Drivers Affecting Forest Change in the Greater Mekong Subregion: An Overview. FAO/USAID/LEAF Policy Brief, July 2015. Available at https://www.researchgate.net/publication/280082307, accessed 17 June 2016.
(19) Mittermeier R.A., P. Robles-Gil, M. Hoffmann, J.D. Pilgrim, T.B. Brooks, C.G. Mittermeier, J.L. Lamoreux and G.A.B. Fonseca (2004). Biodiversity Hotspots Revisited: Earth's Biologically Richest and Most Endangered Ecoregions. CEMEX, Mexico City, Mexico. 390 pp.
(20) Sloan S., C.N. Jenkins, L.N. Joppa, D.L.A. Gaveau and W.F. Laurance (2014). Remaining natural vegetation in the global biodiversity hotspots. Biological Conservation 177, pp. 12-24.
(21) http://www.fao.org/3/a-i4808e.pdf, table 2, accessed 10 August 2016.

Mangroves in the Mergui Archipelago, Myanmar. Mangrove forests grow on coasts and river deltas throughout the region. They provide a habitat for fish, marine animals and migrant birds. They also protect coastal ecosystems from waves and storms.

large, lowland river basins, the Irrawaddy/Salween lowlands in Myanmar, and the Mekong lowlands in Thailand, southern Lao PDR and Cambodia, would originally have been dominated by relatively **open-canopy, dry forest** (classified as central Indochina dry forest, Irrawaddy moist deciduous forest, and Irrawaddy dry forest by the World Wide Fund for Nature, WWF[22]). The majority of these forests have long been cleared for irrigated agriculture and settlements, but important areas remain in Cambodia, Lao PDR and in protected areas in Thailand. Smallholder and commercial agriculture are a threat to the remaining lowland forests throughout the region, and logging is a threat in the teak forests of Myanmar.

Further north, the uplands of northern and eastern Myanmar, northern Lao PDR and northern Vietnam support Asia's largest relatively intact area of **evergreen and semi-evergreen subtropical forest**. Closed canopy forests also extend along the line of hills that form the Thai-Myanmar border, forming the **Kayah-Karen montane rainforest** and the **Tenasserim semi-evergreen rainforest** areas. Rainfall is higher on the western, Myanmar, side of the mountains, which as a result has more evergreen species, while the Thai side has a higher proportion of deciduous species. A second spur of rugged high ground forms the border between Vietnam with Lao PDR and Cambodia, and supports the **Annamite rainforests**. Evergreen rainforest also occurs in the high rainfall areas of the **Cardamom Mountains**, isolated from the other uplands of the region in southern Cambodia and Thailand. The sub-tropical forests in hill areas are less threatened than the lowland forests, and generally better covered by protected areas, but nevertheless are being fragmented by conversion to cash crops and other land uses, especially at lower altitudes.

In the flood plains of the great rivers of the region, especially in Cambodia, seasonal inundation has created swamp forests, often in a mosaic with deciduous dipterocarp forests and semi-evergreen forests, grasslands and wetlands. These areas are easily accessible and highly suitable for irrigated agriculture, and as a result freshwater swamp forest has been extensively cleared throughout mainland South-East Asia, with 95 % of forests around the Tonle Sap Lake now cleared, for example[23].

In the river deltas and along the coasts, higher salinity and regular tidal inundation create **mangrove ecosystems**. Between 1980 and 2005, 20 % of the region's mangroves were cleared as a result of clearance for the expansion of aquaculture and felling for firewood and timber. Most of the 9 732 km² remaining in 2005 was in Myanmar (5 070 km², mostly in the Ayeyarwady delta and along the Rakhine coast) and Thailand (2 400 km²), with some important areas in the Mekong delta in Vietnam. The greatest losses were in Vietnam (41 % reduction in mangrove cover) and Cambodia (24 % reduction).[24] More recently, mangrove loss in Myanmar has been attributed to the expansion of irrigated rice cultivation.[25] The restoration of

(22) See http://www.worldwildlife.org/biomes, accessed 15 July 2016.
(23) Conservation International, http://www.conservation.org/where/pages/greater-mekong-region.aspx, accessed 17 June 2016.
(24) WWF (2013). Ecosystems in the Greater Mekong: Past trends, current status, possible futures. http://awsassets.panda.org/downloads/greater_mekong_ecosystems_report_020513.pdf
(25) Richard D.R. and D.R. Friess (2016). Rates and drivers of mangrove deforestation in Southeast Asia, 2000–2012. PNAS 113(2), pp. 344-349. DOI: 10.1073/pnas.1510272113

Table 1.1 Forest cover and forest cover change per country in the Greater Mekong

Country	Forest area 2015 (km²)	Land area (km²)	Forest area as % of land area (2015)	Average annual forest change, 2010-2015 (km²/yr)	Average annual forest cover change, 2010-2015 (%/yr)
Cambodia	94 570	176 520	54	-1 274	-1.3
Lao PDR	187 610	230 800	81	+1 892	+1
Myanmar	290 410	657 550	44	-5 464	-1.8
Thailand	163 990	510 890	32	+300	+0.2
Vietnam	147 730	310 070	48	+1 290	+0.9
Total	884 310	1 885 830	47	-3 256	-0.4

Source: FAO Global Forest Resources Assessment (2015).[26]

mangroves needs careful planning, and poorly planned and sited mangrove afforestation damages mudflats, sea-grass beds and their wildlife.[27]

Karst ecosystems

The region has extensive limestone (karst) formations, some forming ranges of hills, others isolated islands of karst surrounded by lowland (and often intensively cultivated) plains. The unique structure, chemistry and microclimate of these areas means that they have a high proportion of endemic species, many of them threatened by virtue of their small populations and sensitivity to changes. Karst is generally unsuitable for agriculture, but the patchy forests that grow in these landscapes are often under heavy pressure for firewood, and the unique species, including plants, may be directly persecuted for the illegal wildlife trade.

Freshwater ecosystems

The region's five major rivers and their catchment areas support a wide variety of freshwater ecosystems, from mountain streams to meandering lowland rivers and lakes, including South-East Asia's largest lake, Tonle Sap in Cambodia[28], which is flooded and drained by a branch of the Mekong. Connectivity between these ecosystems is essential to allow migration of fish to their spawning grounds, and to maintain the flow of sediments and nutrients that enrich downstream agriculture and fisheries. This connectivity is threatened by the proliferation of hydropower dams (see section 2.1.3).

Coastal ecosystems

In some coastal areas, currents, tides and sedimentation have combined to create extensive tidal mudflats, which are vital resting and feeding sites for migrating shorebirds. These ecosystems are highly vulnerable to the effects of climate change (section 2.1.9).

1.2.3 Species diversity, endemicity and extinction risk

The complex topography and varied climate of the region has produced a wide variety of terrestrial and freshwater ecosystems that support a great diversity of species – around 13 500 vascular plants, over 400 mammal species, 1 200 birds, 500 reptiles and 300 amphibians. About 7 000 of the plants and many other species are endemic to the region[29], with endemicity higher in mountain regions, including the Annamite Mountains, the highlands of southern China and northern Vietnam, and Myanmar's northern highlands. The region's freshwater ecosystems support the Irrawaddy dolphin and some of the world's largest and most famous freshwater fish, including the Mekong giant catfish, giant barb and giant freshwater stingray, as well as the richest non-marine turtle fauna in the world. New species continue to be discovered and described in the region, with 2 200 new species identified between 1997 and 2014[30], including new species of freshwater turtle, a new bovid (saola, discovered in 1992) and a new monkey, the Burmese snub-nosed monkey.

(26) http://www.fao.org/3/a-i4808e.pdf, accessed 10 August 2016. Note that other data gives current forest cover in the region as low as 34 %, e.g. WWF Mekong. See http://wwf.panda.org/what_we_do/where_we_work/greatermekong/
(27) For example, http://www.rappler.com/science-nature/environment/89163-unscientific-mangrove-rehabilitation-yolanda, accessed 15 July 2016.
(28) WWF identifies 13 distinct but interconnected freshwater ecosystems in the Mekong basin. WWF (2013). Op. cit.
(29) Conservation International (2011). At http://www.eoearth.org/view/article/150621/, accessed 4 March 2016.
(30) WWF. http://greatermekong.panda.org/discovering_the_greater_mekong/species/ , accessed 27 April 2016.

Forest on the edge of Tonle Sap Lake, Cambodia. Almost the entire region would originally have been covered with forest, but most has been degraded or destroyed. The dry forests of the lowlands and the semi-evergreen rainforests in mountain regions are especially biodiverse.

Important populations of Asian elephant remain in Myanmar and Thailand, but they are declining as a result of killing for ivory, conflict with farmers and loss of habitat. Only bull elephants have tusks, and 'tuskers', with exceptiionally long tusks, are now very rare.

Amphibians are also largely dependent on wetlands, with 39 listed as threatened but a great deal is still unknown about their taxonomy and status[31].

In total, 795 species in the Indo-Burma hotspot have been assessed by IUCN as globally threatened. Many more, especially invertebrates, have yet to be assessed and, given the extent of habitat loss and harvesting in the region, it can be expected that the full list of threatened species will be much larger. Some groups have a high proportion of species threatened: 75 % of Asia's freshwater turtles are globally threatened, for example, with more than 50 % meeting the criteria for endangered or critically endangered. Tables 1.2 and 1.3 summarise the numbers of threatened species across the region and per country.

The region has numerous charismatic species that play a key role in biological communities, but which also have great cultural or symbolic importance and are thus key species around which conservation programmes can be built and funding leveraged. They include the tiger, Asian elephant, Sumatran rhinoceros (which may survive in Myanmar), and several unique and highly threatened primates, as well as species discovered in the last 25 years, including the saola, giant muntjac, Annamite striped rabbit and Laotian rock rat. One flagship species, the Javan rhinoceros, has already become extinct in the region, and a wild ox, the kouprey, and Schombergk's deer are thought to be globally extinct. Kitti's hog-nosed bat, the world's smallest bat and also possibly the smallest mammal, is found in limestone caves in western Thailand and south-east Myanmar.

The region's coastal ecosystems are particularly important for several globally threatened migratory waterbirds[32], including black-faced spoonbill and spoon-billed sandpiper. The white-eyed river martin, an enigmatic bird last recorded in 1978, may survive along the region's rivers, while the population of another threatened waterbird, the giant ibis, is the subject of successful biodiversity-linked incentive schemes (see section 3.3).

1.2.4 Geographic priorities for conservation

The exceptional diversity, uniqueness and vulnerability of the region's species and ecosystems are underlined by all the main analyses of global biodiversity priorities. The results of these analyses are reviewed briefly below, and the methodology used to integrate them and derive the geographic priorities for this study is described in section 5.1.

Biodiversity hotspots

The Greater Mekong region as defined within this chapter comprises 75 % of the Indo-Burma biodiversity hotspot[33] (the remainder of the hotspot is covered by the East Asia, South Asia and island South-East Asia chapters). The entire hotspot covers 2.4 million km², including parts of southern China (Hainan Island, and the southern parts of the provinces of Yunnan, Guangxi and Guangdong), the Andaman Islands (India), small areas of north-east India, Bangladesh and Malaysia. The extreme north of Myanmar is in the neighbouring Himalayas hotspot.

(31) CEPF (2012). Ecosystem Profile: Indo-Burma Biodiversity Hotspot, 2011 Update. Critical Ecosystem Partnership Fund Washington, DC.
(32) Round P.D. (2008). The Birds of the Bangkok Area. White Lotus, Bangkok; Zöckler C., E. Syroechkovskiy and P.W. Atkinson (2010). Rapid and continued decline in the Spoon-billed Sandpiper Eurynorhynchus pygmeus indicates imminent extinction unless conservation action is taken. Bird Conservation International 20, pp. 95-111.
(33) Mittermeier R.A. et al. (2004). Op. cit.

Balanophora fungosa is a parasitic plant which grows on the roots of rainforest trees in South-East Asia and Australasia. This specimen is from the Cardamom mountains in Cambodia.

Flooded forest, Tonle Sap, Cambodia. Ten key biodiversity areas have been identified in the landscape, forming a single KBA corridor. The area is also included in the Mekong Global 200 Ecoregion, and parts of it are a biosphere reserve and a Ramsar site.

Table 1.2 Number of terrestrial and freshwater threatened species by major taxonomic group and country

Taxonomic group	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam	Total Greater Mekong
Mammals	34	45	44	50	51	83
Birds	27	24	48	51	47	78
Reptiles	19	17	30	27	43	62
Amphibians	4	9	2	4	30	39
Fish	26	55	16	55	35	116
Invertebrates	1	21	7	39	30	94
Plants	36	41	60	149	198	323
Total	147	212	207	375	433	795

Source: IUCN Red List.[34]

Table 1.3 Number of terrestrial and freshwater threatened species by threat category and country

Threat category	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam	Total
Critically endangered	28	34	39	75	93	152
Endangered	54	68	78	123	141	261
Vulnerable	65	110	90	177	199	382
Total	147	212	207	375	433	795

Source: IUCN Red List.[35]

([34]) IUCN Red List: http://www.iucnredlist.org/, accessed June 2016.
([35]) Ibid.

Table 1.4 Priority areas identified within the Mekong countries

Country	No of terrestrial KBAs	No of terrestrial corridors
Cambodia	40	9
Lao PDR	43	12
Myanmar	132	12
Thailand	114	19
Vietnam	110	18
Total[i]	439	57

Source: Critical Ecosystem Partnership Fund (CEPF) (2012) for Cambodia, Lao PDR, Thailand, Vietnam; CEPF (2013) for Myanmar.
(i) The total for the corridors is less than the sum of the country totals because 14 of the corridors are in two or three countries.

Global 200 (G200) Ecoregions are the regions that are most representative of their biome, within a particular geographic realm[36]. There are 12 G200 Ecoregions[37] in the region (Fig. 1.2).

Endemic bird areas (EBAs)[38] are identified by BirdLife International, based on the original breeding ranges of land bird species that have a global distribution of less than 50 000 km². There are seven EBAs in the region (Figure 1.3).

Parts of the region are also classified as 28 centres of plant diversity[39].

To provide an inclusive summary of the results of the global priority setting exercises for the region, the hotspots, G200 Ecoregions and EBAs are combined to identify broad 'priority regions for conservation'. This classification results in the identification of the entire area as a priority, and so is not a useful basis for the development of conservation programmes. To overcome this, a more focused landscape-level of analysis, key landscapes for conservation (KLCs), is described in section 5.1.

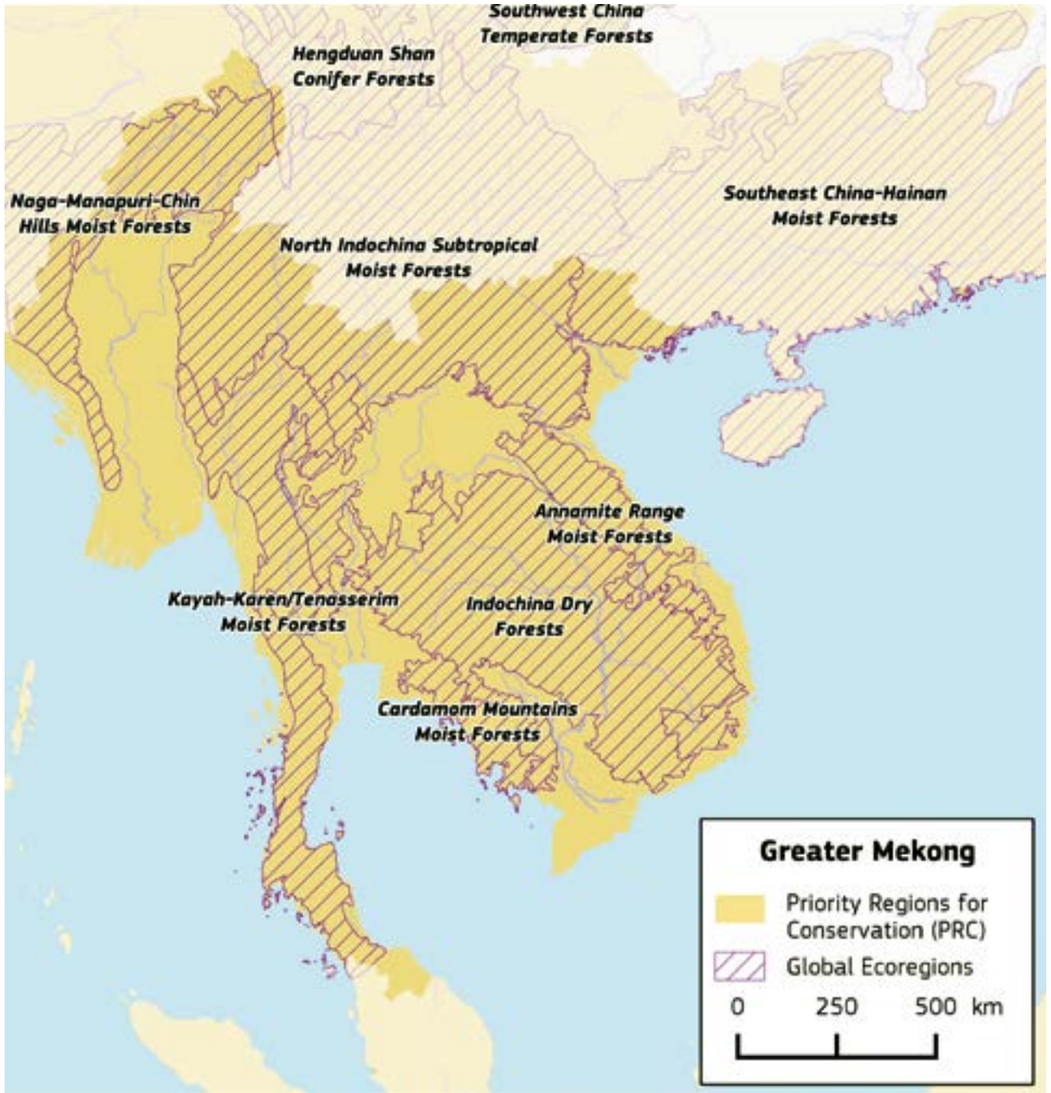
Site-level priority setting

Using standard methodologies to identify priority sites for the conservation of threatened species, 439 key biodiversity areas (KBAs) have been identified in the five countries[40,41]. The highest number of KBAs is in Myanmar (132), followed by Thailand and Vietnam. The KBA analysis includes the 248 important bird areas (IBAs) identified in the region by partners of the BirdLife International network.

Of the 439 KBAs, 306 fall within 57 landscape corridors. These corridors total over 800 000 km² (43 % of the hotspot) and are identified either because they hold important habitats and ecosystem services, or because they are necessary for the conservation of wide-ranging and low-density species, such as elephant, Irrawaddy dolphin or tiger. The corridors are the basis for identification of KLCs (see section 5.1) for this region.

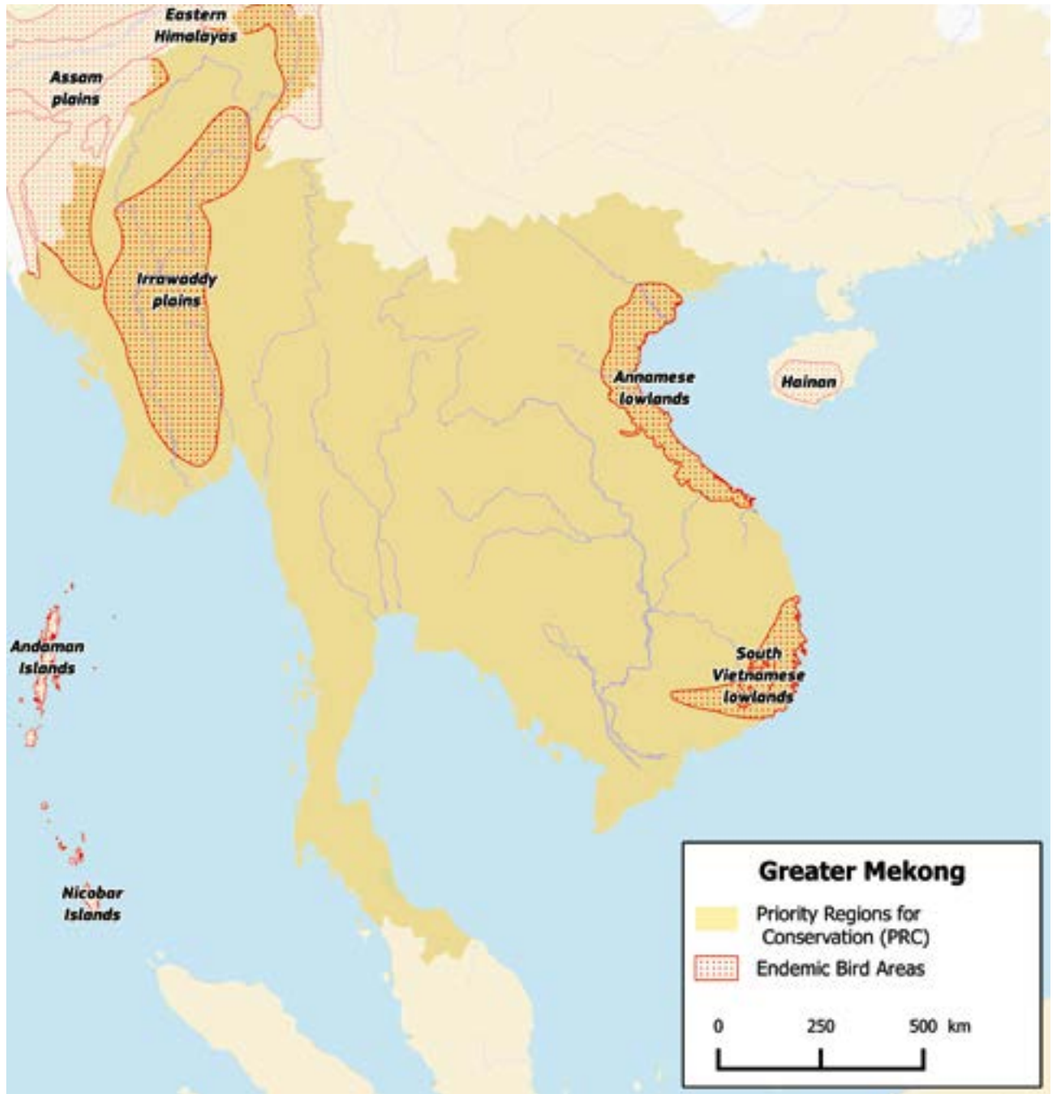
([36]) http://www.worldwildlife.org/biomes
([37]) Olson D.M. and E. Dinerstein (2002). The Global 200: priority ecoregions for global conservation. Annals of the Missouri Botanical Garden 89, pp. 199-224.
([38]) Stattersfield A.J., M.J. Crosby, A.J. Long and D.C. Wege (1998). Endemic Bird Areas of the world: priorities for biodiversity conservation. BirdLife International, Cambridge, UK, as updated by http://www.birdlife.org/datazone/
([39]) Davis S.D., V.H. Heywood and A.C. Hamilton (Eds.) (1995). Centres of plant diversity: a guide and strategy for their conservation. Volume 2: Asia, Australasia and the Pacific. IUCN Publications Unit, Cambridge, UK.
([40]) CEPF (2012). Op. cit.
([41]) Wildlife Conservation Society (2013). Myanmar Biodiversity Conservation Investment Vision. WCS, New York.

Figure 1.2 Priority regions for conservation and Global 200 Ecoregions in Greater Mekong



Note: Not all G200 Ecoregions are labelled. See Annex 1 for a full list.

Figure 1.3 Priority regions for conservation and endemic bird areas in Greater Mekong



Note: Not all EBAs are labelled. See Annex 1 for a full list.

2

Conservation challenges

Owston's civet is found in the lowland and montane evergreen forests of eastern Lao PDR and Vietnam. The species is targeted for meat and traditional medicine, but the main threat appears to be snaring, which indiscriminately catches all ground-dwelling species. (Photographed in captivity.)

2 _ Conservation challenges

2.1 Key direct threats

2.1.1 Wildlife crime and unsustainable exploitation

The forests of the Greater Mekong are in danger of becoming 'empty forests', with tree cover but without many of the plants and animals that should occur there, as a result of unsustainable hunting and collecting to supply a growing international market.[42] Trade in wildlife has a long history, but the advent of communications and transport networks linking the forests to the markets supplying the mega-cities of Asia, as well as to Europe and the United States of America (USA), has increased the pressure on many species to the point where they are facing extinction, and introduced demand for species which were previously not hunted. While there are examples of successful investigations and enforcement actions against wildlife crime, all those interviewed for this study agreed that the scale of the problem far outstrips the current level of effort to address it.

The demand for wildlife from the region includes more than 1 000 plant and animal species used for traditional medicinal products (e.g. bear gall bladder, tiger bone, gecko, rhino horn, pangolin parts, dendrobium orchids)[43], culinary delicacies (e.g. freshwater turtles, pangolin, swiftlet nests), ornaments and clothes (e.g. tiger and leopard skin, elephant ivory, crocodile), and the exotic pet trade (e.g. freshwater turtles, snakes, birds, primates). Lao PDR, Thailand, Vietnam and China (including Hong Kong) are the four countries with the greatest volume of illegal wildlife trade in Asia (import, export, and transhipment), and with Cambodia and Myanmar (along with India, Indonesia, Malaysia, Nepal and Philippines) are among the 30 top countries in the world for the supply and trafficking of elephant, rhino, turtle and big cat products.[44] Consultation with multiple scientists and conservationists in 2011[45] concluded that hunting and trade was the single greatest threat to biodiversity in the region, and that the pressure was increasing. Of the 795 species from the region listed on the IUCN Red List of Threatened Species[46], direct exploitation ('biological resource use') is the greatest threat to 123 of them, and a contributory factor in the precar ious situation of many more.

Hunting and the loss of biodiversity have wider ecosystem impacts. Species that are not the direct targets of hunting may be killed due to the random nature of trapping with snares, fishing nets and bird nets. Apex predators such as tigers suffer from the reduction in the availability of prey species (e.g. deer, pig).

Wildlife crime can usefully be divided into hunting, trafficking and market demand.

Hunting for the illegal commercial wildlife trade is widespread throughout the region, taking place within protected areas (there is hunting in 70 % of protected areas in Myanmar, for example[47]) and the wider landscape. Hunters may be specialists with specific knowledge of the target species and techniques for trapping them (e.g. for tigers, elephants) who are hunting in response to orders from buyers, but may also be local people who hunt opportunistically, with peaks during times of cash need (e.g. before major festivals and social events) and during quiet periods in the agricultural calendar. Economic (or actual) extinction of target species in the areas closest to markets results in an increased hunting effort over a wider area and/or for a wider range of related species. As an example, the hunting of pangolins has expanded from China, first to Vietnam, Lao PDR and Cambodia, and now to the Philippines, Indonesia, Malaysia, South Asia and even Africa[48]. In the process the list of species affected by trade has expanded from Chinese pangolin (now listed as critically endangered by IUCN), to include all four species of pangolin in Asia (Sunda pangolin, also critically endangered, and Philippine and Indian pangolins, listed as endangered), and the four African pangolin species (all listed as vulnerable by IUCN).

(42) FAO (undated). Forest Biodiversity Conservation: GMS Forest Policy Brief No 3. http://www.fao.org/fileadmin/templates/rap/files/NRE/policybrief3.pdf
(43) http://www.traffic.org/cop13/pdf/cop13briefing_SoutheastAsia.pdf
(44) Stokes E., S. Hedges, A. Holmes and S. Roberton (2014). A Strategic Approach to Combat Wildlife Trafficking in Africa and Asia. WCS, New York.
(45) CEPF (2012). Op. Cit.
(46) http://www.iucnredlist.org/
(47) CEPF (2012). Op. cit.
(48) In Africa, the hunting of pangolin for the Asian market is in addition to intensive exploitation for local consumption. See http://www.iucnredlist.org/

Confiscated rhino horn, Bangkok Airport. Demand for rhino horn decreased in the 1990s, a result of enforcement and use of alternatives. However demand from Vietnam has spiked, driven by reputed medicinal properties and the rarity value. Horn from across Asia and Africa is trafficked through the region.

Trafficking wildlife products across international borders and to markets is a highly organised and increasingly valuable business, estimated to be worth EUR 17 billion annually in South-East Asia and the Pacific[49] (including an estimated EUR 13 billion illegal timber trade – see section 2.1.2), making it the fourth largest illegal trade after drugs, weapons and human trafficking. It is attractive to criminal gangs because of the relatively low level of enforcement effort and light penalties applied to this trade in comparison to the other major forms of trafficking. The world's most trafficked mammal is probably the pangolin, with well over 1 million individuals trafficked in the last decade[50] and about 20 000 kg of pangolin scales seized between 2007 and 2015. The routes used by wildlife traffickers are flexible, shifting in response to efforts to enforce the law (as is currently happening in Thailand) and opportunities presented by new ports and roads (for example, the Mong La Special Development Region in Myanmar, on the border with China, which has been identified as an important transit centre for trade[51]). Trafficking occurs through all the countries in the Greater Mekong region, with Vietnam playing a role as a major hub for transport to China, as well as being a significant market itself, especially for South African rhino horn. However, there are also trafficking routes into the region through the USA and Europe, and conversely the region (and China) is a hub for processing wildlife products that are then trafficked onwards to western countries.

Rising **demand** from the growing population and increasing buying power of the population in China and Vietnam has made these countries a huge market for wildlife products from across the globe, not just from South-East Asia. However, Europe and North America are also an important market for some species. The marketing of wildlife now uses social media such as Facebook, Instagram and WeChat[52], as well as traditional markets.

In some places, **farms are beginning to supply the demand** for animal products – for example, a significant proportion of the turtle meat trade in China is now supplied by farmed animals[53] and the farming of Asiatic black bears and sun bears in China and Vietnam provides a large supply of bile for the traditional medicine market. Such approaches are in many cases already legal, with continuing pressure from the industry to legalise trade in a wider range of species, including the significant captive tiger population on farms in Vietnam and China[54]. However, this industry poses a new set of challenges to efforts to control the illegal wildlife trade. Illegal products from wild populations can be passed off as legally farmed products, making enforcement much more complicated, and wild populations

(49) United Nations Office on Drugs and Crime (UNODC): http://www.unodc.org/southeastasiaandpacific/en/what-we-do/toc/wildlife-overview.html
(50) Nellemann C., R. Henriksen, A. Kreilhuber, D. Stewart, M. Kotsovou, P. Raxter, E. Mrema and S. Barrat (Eds.) (2016). The Rise of Environmental Crime – a Growing Threat to Natural Resources, Peace, Development and Security. UNEP-Interpol Rapid Response Assessment.
(51) http://www.traffic.org/home/2015/12/31/illegal-pangolin-trade-in-myanmar-booming.html, accessed 20 April 2016.
(52) Krishnasamy K. and S. Stoner (2016). Trading Faces. A Rapid assessment on the use of Facebook to trade Wildlife in Malaysia. TRAFFIC, Petaling Jaya, Selangor, Malaysia; D. Banks, Environmental Investigation Agency, pers. comm., April 2017
(53) Horne B.D., C.M. Poole and A.D. Walde (Eds.) (2012). Conservation of Asian Tortoises and Freshwater Turtles: Setting Priorities for the Next Ten Years. Recommendations and Conclusions from the Workshop in Singapore, 21 to 24 February 2011.
(54) It is estimated that there are 7 000 tigers in farms in China, Vietnam, Lao PDR and Thailand. https://eia-international.org/where-are-the-tigers, accessed 28 April 2017.

Rosewood tree, Thailand. The illegal trade in rosewood (genus Dalbergia*) is driven by demand for furniture-making in China. Myanmar is the largest supplier, but Lao PDR, Vietnam and a number of African and South American countries also supply the market.* Dalbergia *species were added to CITES appendix II in 2017, to reinforce national enforcement efforts.*

may be exploited to provide stock for breeding on farms. The critically endangered Siamese crocodile, for example, has been unable to increase its population in the Mekong, despite protection, because of the demand from farms for wild-caught animals[55], and there is little or no breeding of bears on Chinese and Vietnamese farms, resulting in continued demand for wild-caught animals[56].

In addition, it is not clear if the supply of farmed animals will reduce demand for wild products. Unknown elasticity of demand, and market preferences (for example, for products from wild rather than farm-bred tigers, and bile from wild bears rather than farmed ones) means that the availability of farmed products may only increase the market.[57] Farmed products may be indistinguishable from illegal products, and so make enforcement complicated or impossible, and the legal sale of farmed products undermines campaigns to change public attitudes, because it reinforces the acceptability of consumption of the products. While some of these issues may be addressed through tight regulation and monitoring of farms, this would require significant resources and effective, corruption free mechanisms. Farming of some species that are threatened in the wild will continue to be counter-productive for conservation.

Wildlife crime **impacts on a large range of plant and animal species**, but the trade in products from large, charismatic species, especially elephant, tiger and rhino, has attracted the greatest attention. Campaigns have used these species to raise awareness of wildlife crime and leverage additional resources and political will to tackle the problem.

The trade in **African elephant ivory** is the subject of several international monitoring and law-enforcement efforts focused on poaching in Africa and on trafficking to Asia. Asia has generally been assumed to be a transit stop for ivory, rather than a source. However, Asian elephants have also suffered a sharp decline in populations, and the role of the ivory trade may be important (habitat loss and killing because of human-wildlife conflict are also important), even though Asian elephants are less vulnerable to poaching for ivory because only the males

([55]) IUCN species account: http://www.iucnredlist.org/details/5671/0, accessed 20 April 2016, and Simpson B.K. and M.R. Bezuijen (2010). Siamese Crocodile Crocodylus siamensis. Pp. 120-126 in Crocodiles. Status Survey and Conservation Action Plan. Third Edition, ed. by Manolis S.C. and C. Stevenson. Crocodile Specialist Group: Darwin.
([56]) http://www.iucnredlist.org/details/22824/0, accessed 16 August 2016.
([57]) Brant A. and G.C. van Kooten (2009). Can Domestication of Wildlife Lead to Conservation? The Economics of Tiger Farming in China. REPA Working Paper 2009-01, University of Victoria. Available at http://ageconsearch.umn.edu/bitstream/46994/2/WorkingPaper2009-01.pdf

The endangered slipper orchid Paphiopedilum godefroyae *grows on limestone cliffs close to the sea in southern Thailand. Mutiple threats to the species include intensive collecting for the ornamental plant industry, even though the international trade is banned under CITES.*

have tusks, and their tusks are smaller than those of African elephants. Recently introduced DNA[58] testing is starting to shed light on this issue. An additional threat to the Asian elephant population is the live animal trade, in particular from Myanmar to Thailand and China for use in circuses and the tourist industry[59]. Although Myanmar has a surfeit of domesticated adult elephants trained for the logging industry, the tourist trade prefers young calves direct from the wild, and although the overall numbers traded are small (estimated to be in the hundreds) they are enough to push isolated populations of elephant to extinction.

The trade in **rhino horn** has a long history, but had been significantly reduced by the end of the 1990s, with bans on international and domestic trade in place in all the important market countries (China, Vietnam, Taiwan, Japan and South Korea), and widespread adoption of alternatives in traditional medicine. However, a surge in demand from Vietnam in the mid-2000s appears to have occurred because rhino horn became associated with anti-cancer properties, as a hangover cure, and (because of its rarity and price) as an elite status symbol[60]. Rhinos are probably extinct in the Greater Mekong region (the last Javan rhino in Vietnam died in 2010, and reports of a population of Sumatran rhino in Myanmar have not been confirmed), but the demand prompted a sharp increase in poaching African rhinos, as well as increased pressure on some of the small populations in Indonesia, Malaysia, India and Nepal.

Trade in **live tigers and tiger body-parts** also has a long history but is now a critical threat to the species. Globally, between January 2000 and April 2014, a minimum of 1 590 tigers were seized by law-enforcement officials, at a time when the global population of wild tigers may have been little over 3 000 individuals[61]. The Greater Mekong region lies in the centre of the tiger's global range and has been a link in the transport of skins, bones, live cubs and other tiger products for centuries. Very few wild tigers remain within the region. Tigers are extinct in Cambodia[62] and Vietnam, and although Lao PDR has sufficient habitat to support 50 breeding females, the 2015 population estimate was only 2 individuals[63]. The killing of tigers was judged the greatest threat to their conservation in the range countries in the region in 2012[64]. Trade in tiger parts and products is forbidden under the Convention on International Trade in Endangered Species (CITES), but individual countries need to take action to enforce the convention. There is a small residual demand for tiger skins in Tibet for traditional clothing (chupas), but the primary consumers are now the military, business and political elite who purchase skins and taxidermies for luxury home décor. Demand is predominantly from China and Vietnam[65]. Tiger bone has long been used for producing traditional

([58]) DNA, deoxyribonucleic acid, a carrier of genetic code present in most living cells.
([59]) http://www.traffic.org/home/2014/7/6/thailand-must-act-to-prevent-resurgence-of-illegal-wild-elep.html, accessed 22 April 2016.
([60]) Nowell K. (2012). Species Trade and Conservation: Rhinoceroses – Assessment of Rhino Horn as a Traditional Medicine. CITES Secretariat. Available at: http://www.rhinoresourcecenter.com/index.php?s=1&act=refs&CODE=ref_detail&id=1389669784, accessed 27 March 2018.
([61]) http://www.traffic.org/tigers/, accessed 22 April 2016.
([62]) There are proposals to re-introduce tiger to Cambodia. See http://cambodia.panda.org/projects_and_reports/copy_of_tiger_landscape_22122010_1910/, accessed 28 April 2017.
([63]) Goodrich J., A. Lynam, D. Miquelle, H. Wibisono, K. Kawanishi, A. Pattanavibool, S. Htun, T. Tempa, J. Karki, Y. Jhala and U. Karanth (2015). Panthera tigris. The IUCN Red List of Threatened Species 2015: e.T15955A50659951. http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T15955A50659951.en. Downloaded on 28 April 2017.
([64]) Global Tiger Initiative Secretariat (2012). Managing Tiger Conservation Landscapes and Habitat Connectivity: Threats and possible Solutions: Experiences from Bangladesh, India, Indonesia, Malaysia, Myanmar, Nepal, Thailand and Vietnam. The World Bank, Washington, DC.
([65]) CITES: Review of the implementation of resolution Conf. 12.5 on conservation of and trade in tigers and other appendix-1 Asian big cat species. https://cites.org/sites/default/files/eng/com/sc/65/E-SC65-38-A01_0.pdf, accessed 28 April 2017.

Rice fields. Habitat clearance for agriculture is the main threat to many species and ecosystems. In the tropical lowlands, irrigated rice is economically important, but its expansion and intensification has resulted in converting the majority of lowland forests, grasslands and wetlands.

Rubber monoculture, Thailand. Traditional smallholder landscapes with a mosaic of farms, tree crops and wild areas can still support significant biodiversity. However, the shift to improved varieties, large-scale monoculture and the heavy use of agrochemicals results in the loss of many species.

Xayaburi Dam, Lao PDR. Hundreds of dams have been built on rivers in the region. Environmental impacts include upstream flooding, disrupted natural flood and siltation cycles, and obstructed fish migration. Xayaburi was the first dam built on the main channel of the Mekong river.

medicine, but is also increasingly being used to manufacture high-end 'wines'. Tiger teeth and claw jewellery is increasingly commonplace and tiger meat is valued as an exotic delicacy.

The trade in **other species** is lower profile but no less devastating for the species targeted. Asia has the richest turtle fauna in the world, and it is critically threatened by live trade for pets and as stock for farming, and trade in meat, shell, eggs and cartilage.[66] The trade in the dried cartilage from soft-shelled turtles is challenging to police because identification of the product requires specialist training, and it is often shipped labelled as something entirely different. A DNA barcode system is being developed to allow identification, but law enforcement agencies will require training in the methods needed to collect and store samples from which DNA can be extracted; also more labs are needed to undertake the analysis in a timely manner.

Hunting in response to human-wildlife conflict

A subset of hunting is directed at species that threaten (or are believed to threaten) crops and livestock. Human-wildlife conflict appears to be increasing, especially (anecdotally) in Thailand, Myanmar and Vietnam, as reduced natural habitat and in some cases increasing wildlife populations in protected areas result in greater interaction between people and wildlife. The problem is especially acute when human populations farm right up to or inside the boundaries of protected areas, and when wider landscapes are managed more intensively, reducing the habitat available to wildlife. While many of the species involved are not threatened (for example, wild pigs, long-tailed macaque), the killing may also be a threat to tiger, sun bear, leopard and Asian elephant. Furthermore, the indiscriminate methods sometimes used, including poisoning and trapping, pose a risk to wildlife that is not the target species. Elephants are the threatened species most frequently in conflict with people, but solutions are available.

2.1.2 Agricultural expansion and intensification

The conversion of forests to commercial cropland for rubber, tea, coffee, oil palm, sugar, cashew, Eucalyptus, Acacia, pines and teak, and wetlands and grasslands to irrigated rice, is widespread throughout the region, with the specific crop depending on local climate and topography. Expert consultations identified that this is the second most important threat to biodiversity after the illegal wildlife trade[67], and the IUCN Red List identified the problem as the most significant threat to 115 globally threatened species in the region. Clearance for commercial agriculture is increasing (and is expected to continue) as human populations grow, governments pursue an investment-led economic growth strategy and investors seek returns on capital. Cambodia, Lao PDR, Thailand and Vietnam have already granted large land concessions to foreign investors for the development of agricultural and fibre plantations. In some cases, commercial agricultural plantations directly impact on protected areas, for example in Cambodia, where it has been estimated that 5 469 km², or about 20 % of all such concessions, are within protected areas[68]. The process in Myanmar has been slower, as a result of the poorer infrastructure and uncertainty around land titling. However, the legal framework for foreign control of land is now in place, and land acquisition and plantation development can be expected to accelerate in Myanmar over the next decade as the country develops.

The majority of the region's remaining forests are in upland areas that are marginal for industrial agriculture, so that while smallholder agriculture is not the largest or most rapidly expanding land use in the region, it is in direct competition with protected areas for land. Traditional swidden cultivation systems, typical of upland communities, were sustainable at low population densities, but have expanded into new forest lands in response to migration, population growth and changing technology and markets. In many areas, swidden systems that supported considerable native biodiversity have been replaced by smallholder-managed permanent perennial crops such as teak, rubber, coffee, cardamom or cinnamon. While these are managed as part of a diverse mosaic of land uses within the landscape, they can still support significant biodiversity, but the more they form monocultures, the greater the loss of biodiversity. Expert consultation for the Critical Ecosystem Partnership Fund (CEPF) ranked smallholder agricultural expansion as the most important threat to biodiversity in Thailand, and second in Myanmar. In the lowlands, irrigated agriculture at various scales has replaced virtually all natural wet grassland habitats.

2.1.3 Dam building and water abstraction

Dam building was ranked in expert consultation[69] as the third most important threat to biodiversity in the region overall, and as the most important threat in Lao PDR, and second most important in Cambodia, because many rivers have not yet been dammed in these countries. There are at least 82 existing and 149 planned projects on the Mekong and its tributaries[70]. Five dams are already operational on the upper reaches of the Mekong itself, in China, with another 10 in Lao PDR, 10 in Vietnam, and 7 in Thailand on tributaries[71]. The first dam on the lower Mekong main channel, the Xayaburi dam in Lao PDR, is nearing completion[72], with a further dam at Don Sahong planned and several other proposed on the main channel. The Mekong River Commission (MRC) has recommended a 10-year

(66) Horne B.D. et al. (Eds.) (2012). Op. cit.
(67) CEPF (2012). Op. cit.

(68) Forest Trends (2014) quoted in Banks A., C. Sloth, D.H. Garcia and K. Ra (2014). Forest-Land Conversion and Conversion Timber Estimates: Cambodia Case Study. NEPCon, Copenhagen, Denmark, available at: https://www.nepcon.org/library/report/cambodia-case-study
(69) CEPF (2012). Op. cit.
(70) WWF-Living Mekong Program gives a total of 82 existing and 149 planned projects: Cambodia 4/33; Lao PDR 11/32; Vietnam 30/65; Thailand 11/0; Myanmar 21/15; China 5/34.
(71) Data from https://en.wikipedia.org/wiki/Hydropower_in_the_Mekong_River_Basin; King P., J. Bird and L. Haas (2007). The current status of environmental criteria for hydropower development in the Mekong Region: a literature compilation.
(72) WWF-UK: http://www.wwf.org.uk/about_wwf/press_centre/?unewsid=7715, accessed 20 August 2016.

Road building, Cambodia. Infrastructure is central to plans for economic development, including transboundary economic corridors. However, without appropriate impact assessments and mitigation, the improved access for markets and industry will cause increased hunting, logging and land clearance.

moratorium on dam building in the Mekong main channel to allow for further research. Dams are also affecting the Ayeyarwady river of Myanmar. The Salween river in China and Myanmar remains the largest un-dammed river in South-East Asia, but is the subject of plans for hydroelectric development by Thailand and Myanmar[73].

The proliferation of hydropower dams disrupts the natural flooding cycles of the river, affecting sedimentation and erosion patterns throughout the catchment, and altering the temperature and nutrient load of the water. It also causes flooding of terrestrial habitats upstream of dams, drying of wetlands downstream, and enables water transport to access previously remote areas. In future, the large delta region of the Mekong may be vulnerable to saltwater intrusion as a result of sea-level rise and reduced wet-season flooding. The changes affect freshwater turtles and birds which breed on seasonal sandbanks, wildlife dependent on seasonally flooded forests, swamps and grasslands, and the fish which depend on specific freshwater habitats, such as fast-moving water or deep pools. Finally, the physical structure interrupts the movements of migratory fish – which includes 87 % of the fish species in the Mekong.

The effects of dams on human livelihoods are also significant, with people displaced by artificial lakes, and fisheries disrupted as the fish population declines and changes. The impact on fisheries depends on the position and size of the dams, but modelling of the impact on fisheries of the proposed 11 dams on the Lower Mekong suggests that replacing the fish protein lost would require increases in land and water for food production of up to 25 % in Cambodia and Lao PDR[74].

2.1.4 Logging and wood harvesting

Timber harvesting was responsible for the depletion of the lowland forests of the region in the past, but as the valuable species in these forests declined, the logging industry shrank. Logging bans in Thailand, Vietnam, China and Cambodia contributed to the decline of the logging industry in those countries, but led to increased logging in Myanmar, Lao PDR and Indonesia. The logging bans may also have contributed to an increase in illegal logging, which still occurs widely throughout Cambodia.

Lao PDR retains a legal logging industry, although more timber is produced from land clearance associated with infrastructure projects. Clear felling of forest, ostensibly to clear land for infrastructure and dam projects, is responsible for an estimated 60 % of Lao PDR's timber production.[75] In one case study, 100 % of timber for a road project and 99 % for an associated mining project were extracted in violation of regulations, including the extraction of timber from outside concession boundaries, absent or inadequate pre-felling surveys, departure from the allocation of species and volume to be harvested, and harvest and export of prohibited species, as well as under-reporting of the volume and value in order to reduce royalty obligations.[76]

Roundwood exports are banned in an attempt to promote added value in-country, but evidence from Vietnam's customs shows that the regulations are weakly enforced and that unsustainable logging and roundwood export is widespread. High levels of illegal logging in the country are indicated by one leaked report, disclosing that documented receipts of timber from Lao PDR in Vietnam and China exceeded official quotas by a factor of 10.[77] Lao PDR's policy objective of increasing the country's forest cover remains elusive.

Myanmar also has a roundwood export ban. All logging in the country is controlled by the Myanmar Timber Enterprise, and the previously exemplary system for the sustainable management of teak forests has broken down as logging volumes have increased. Illegal logging is a significant problem, with timber being exported to China, Thailand and Vietnam – all countries with logging bans. Comparison of official export statistics and import-country data suggests that three-quarters of exports may have been illegal in the period 2000-2013[78]. The lifting of EU sanctions in 2012 ended a ban on trade in timber products with the EU. A surge in the popularity of furniture made from rosewood (known as Hongmu, a classification which includes 33 species of tree) in China has driven a spike in illegal logging of the six species that occur in Myanmar, including Burmese rosewood and Burmese paduak[79], as well as demand for rosewood species from Lao PDR, Nigeria and Ghana[80]. In 2013, 237 000 m3 of this timber was exported from Myanmar, which is the largest supplier, to China and volumes continue to increase despite seizures of illegal shipments.[81]

2.1.5 Settlement, transport and infrastructure

As an epicentre of global economic growth, the region has experienced rapid industrialisation and urbanisation, with inevitable pressure on land and water resources, especially in lowland and coastal areas. The implications for biodiversity are uncertain, but land-use change and resource extraction can be expected to accelerate as demand grows, and improved road access connects previously remote areas and communities with global trade chains and markets.

Two major infrastructure programmes are being implemented across the region. The Asian Development Bank's (ADB) Economic Corridors Programme is financing major road and urban infrastructure projects across the Greater Mekong countries, including the Phnom Penh-Ho Chi Minh highway, and the east-west economic corridor that will extend from the Andaman Sea (Myanmar) to Da Nang (Vietnam).[82] China's Belt and Road Initiative aspires to strengthen links between China, Eurasia and Africa through improved land and maritime connections, and includes a focus on transport corridors connecting south-west China with the Greater Mekong region, as well as stronger maritime connections.[83]

Myanmar, although lagging behind its neighbours, is embarking on rapid infrastructure development but transport corridors threaten to further subdivide many of the remaining blocks of relatively intact habitat in the region. One such project, the Dawei Special Economic Zone (SEZ), involves a plan to build South-East Asia's largest special economic zone and roads across the Tenasserim Mountains from Thailand to Myanmar. The planned roads and pipelines threaten to sever the ecological bridge of forest that links the Western Forest Complex with the forests of Kaeng Krachan National Park, through Myanmar. The situation is complicated by returning refugees and cross-border indigenous communities. Forest connectivity on the Thai side of the border has long been lost to agricultural clearance and major roads.

(73) https://www.internationalrivers.org/resources/11286, accessed 16 August 2016.
(74) Orr S., J. Pittock, A. Chapagain and D. Dumaresq (2012). Dams on the Mekong River: Lost fish protein and the implications for land and water resources. Global Environmental Change 22(4), pp. 925-932. http://dx.doi.org/10.1016/j.gloenvcha.2012.06.002
(75) Saunders J. (2014). Illegal logging and related trade: The Response in Lao PDR. Chatham House, London. Available at https://www.chathamhouse.org/publication/illegal-logging-and-related-trade-response-lao-pdr
(76) WWF-CarBi (2015). Assessment of the Scope of Illegal Logging in Laos and Associated Trans-boundary Timber Trade, published by the Environmental Investigation Agency and available at https://app.box.com/s/lol90n4su2pg3zqnu3lkqpr7hjpzoiem
(77) The 2015 WWF report. Assessment of Scope of Illegal Logging in Laos and Associated Trans-boundary Timber Trade (http://mylaff.org/document/download/3161) was published by the Environmental Investigation Agency: https://eia-international.org/leaked-report-reveals-huge-scale-of-illegal-logging-in-laos, accessed 17 June 2016.
(78) Environmental Investigation Agency (2014). Data Corruption: Exposing the true scale of illegal logging in Myanmar. Environmental Investigation Agency, London. Available at https://www.illegal-logging.info/content/data-corruption-exposing-true-scale-logging-myanmar?page=2, accessed 28 April 2017.
(79) https://eia-international.org/wp-content/uploads/Myanmars-rosewood-crisis-FINAL.pdf, accessed 5 August 2016.
(80) http://forest-trends.org/blog/2016/01/14/cites-can-help-solve-illegal-rosewood-crisis/, accessed 8 August 2016.
(81) 2016 data suggests a slowdown of timber imports into China, including rosewood, as a result of the economic downturn, and action by the Myanmar Government: https://news.mongabay.com/2016/03/drop-in-timber-smuggling-gives-breathing-space-to-myanmars-forests
(82) Asian Development Bank: http://www.adb.org/countries/gms/overview, accessed 17 June 2016.
(83) http://english.gov.cn/beltAndRoad/, accessed 19 August 2016.

Limestone quarry, Vietnam. Rapid economic growth has fueled demand for energy and minerals. Without safeguards and mitigation, extractive industries cause deforestation and air and water pollution. Karst mining poses a particular threat to rare and endemic primates, plants and invertebrates.

Shrimp farm in mangrove, Thailand. Vietnam and Thailand are the world's largest exporters of shimp. Development of aquaculture ponds drives the conversion of mangrove forest and tidal mud-flats, leaving coastal communities vulnerable to wave erosion and saltwater intrusion into soil and water supplies.

Village and rice fields inundated after cyclone Nargis, Myanmar, 2008. Climate change is expected to cause sea-level rise and increasingly intense storm events. These will have a particular impact on the coastal regions of Myanmar and the lower Mekong basin.

2.1.6 Oil and gas production and mining

Energy demand in the ASEAN region has doubled in 25 years and is expected to continue to grow rapidly. Renewables provide about a quarter of this demand, but coal is expected to become increasingly important as oil and gas production fails to keep up with increasing demand. At present the ASEAN region is a net exporter of coal and gas.[84,85] Concerns about human health and climate-change impacts of coal have fuelled campaigns to oppose the commissioning of new coal-fired power stations, and Vietnam recently announced that it had shelved its ambitious plans for increased coal burning capacity[86]. Oil consumption outstripped demand in ASEAN countries in the 1990s, and oil imports are expected to increase in future as oil fields in Indonesia, Vietnam and Thailand decline. Other than oil and gas, there are important existing mining operations extracting jade (Myanmar), copper, gold and bauxite (Lao PDR), and significant mineral reserves in all the countries of the region which have not yet been fully exploited[87] as a result of political uncertainty, regulatory frameworks that do not favour foreign investors, and limited infrastructure.

The biodiversity impacts of mining and drilling are felt during extraction, transport and after operations have ceased. They include loss of habitat through land-use change, pollution of air and watercourses, and changes in the water table. Associated infrastructure development (for example the Myanmar-China pipeline, which allows China direct access to methane from Myanmar and to import oil to Yunnan province via deep-water ports in Myanmar[88]) may also have a significant effect on ecosystems, especially where there is a risk of leakage and pollution. Both the land-use change and the subsequent burning of fossil fuels is an important contribution to the region's greenhouse gas (GHG) emissions and thus to climate change.

Extraction of minerals and stone is locally significant in the region, and is especially important because of the threat from the cement industry to the large areas of limestone karst habitat. The Hon Chong area in southern Vietnam has at least 31 endemic species dependent on 2.58 km² of karst[89], all of it subject to limestone quarrying, which has reduced the area from its original 4.47 km² extent. Continued quarrying will cause the extinction of these species, although some actions to mitigate impacts are now being taken by one of the companies at the site (see section 3.4). Many other karst areas across the region are also being destroyed, without any effort to mitigate impacts or even to document species before they disappear.

2.1.7 Aquaculture

Shrimp is the most traded seafood globally (by value), and Vietnam recently surpassed Thailand as the world's largest exporter of shrimp[90], with major markets in the EU and North America, although Japan and internal markets are also important. More than half of the shrimp production comes from aquaculture ponds. Clearance for aquaculture is, overall, the main driver of mangrove loss and probably other coastal habitats, such as mud flats. This is despite the fact that the rapid expansion of aquaculture in the 1980s and 1990s may be slowing; also rice cultivation, oil palm and urbanisation are increasingly driving mangrove loss in specific countries[91]. Aquaculture creates a continuing need for new land as disease and parasite loads reduce productivity after a few years, forcing abandonment of the ponds. Coastal communities in areas cleared of mangroves are more vulnerable to natural disasters (tidal surges and tsunamis), and suffer from saltwater intrusion into agricultural land and freshwater supplies. Traditional extensive aquaculture can be compatible with biodiversity, for example providing feeding opportunities for migrating shorebirds.

2.1.8 Invasive species

Invasive alien species (IAS) are widespread in the region. Introduced species that can take advantage of the alternation of natural habitats are expanding aggressively. The economic cost of IAS in South-East Asia as a whole is estimated at EUR 25.7 billion per year[92]. This is expected to increase as disturbance of habitats and climatic variability favours aggressive, generalist, invasive species. Research by the Thai working group on invasive species has catalogued 24 insect pests of agricultural importance in the country, 32 introduced aquatic species and 190 alien plants (however, another source documents 921 alien plants). Among the species classified by IUCN as the '100 worst invasive species', Thailand has recorded 1 micro-organism, 14 plants, 9 invertebrates, 5 fish, 1 bird and 8 mammal species.

Data on IAS is patchy and often focuses on species of direct economic importance, such as agricultural pests, rather than those that may be of greatest significance for natural ecosystems and biodiversity. The biodiversity impacts of IAS are difficult to quantify and inadequately known. However, they include damage to freshwater ecosystems from predatory fish, for example the grass carp, introduced into Inle Lake (Myanmar), and from water plants such as water hyacinth. Terrestrial ecosystems are affected by changes to habitat structure when dominated by plants such as Mimosa, and Lantana. A potential future threat is the introduction of carnivorous ants, such as the fire ant, which is already established in parts of China. Introduced disease pathogens are a risk to specific groups, most notably the fungal disease chytridiomycosis, which has devastated amphibian populations in parts of the world[93] and has now been found in Thailand and Cambodia[94].

2.1.9 Climate change

Existing evidence of changing climate in the region is inconclusive, with no evidence of changes in rainfall in the south-east monsoon in the Lower Mekong Basin, but there are indications of increased air temperature, drought and precipitation in Yunnan province, across the Vietnamese border in China. The Intergovernmental Panel on Climate Change forecasts a 2.4 to 2.7 °C rise in mean annual temperature, a 7 % increase in wet season rainfall, and a drier dry season by the end of this century[95]. Sea levels in South-East Asia may rise by 70 cm by 2100 and continue rising even if global warming is stabilised[96], and the impacts will be strengthened by increased frequency of storms and surges. The vulnerability of human populations and livelihoods to such disasters has already been demonstrated by the Ca Mau typhoon (Vietnam, 1997) and cyclone Nargis (Myanmar, 2008).

Climate change impacts on wild species by altering the availability of food, the structure of vegetation, hydrology, disease and parasite loads, fire intensity and frequency, and numerous other ecological variables. In theory, some species may respond to climate change by altering their distribution (e.g. moving to higher altitudes or latitudes) to keep up with shifting patterns of temperature, rainfall and climatic parameters. However, their ability to do this will depend on the pace of change and the

(84) International Energy Agency (2015). Southeast Asia Energy Outlook, 2015. See http://www.iea.org/publications/freepublications/publication/WEO2015_SouthEastAsia.pdf
(85) http://aseanup.com/overview-of-oil-and-gas-in-southeast-asia/, accessed 18 August 2016.
(86) http://www.greenpeace.org/international/en/press/releases/2016/Coal-dropped-from-Vietnams-future-energy-plans/, accessed 19 August 2016.
(87) Asian Development Bank: http://www.adb.org/countries/gms/overview, accessed 17 June 2016.
(88) http://www.forbes.com/sites/ericrmeyer/2015/02/09/oil-and-gas-china-takes-a-shortcut/#4ca8532d2d40, accessed 21 August 2016.
(89) FFI (2016). https://www.iucn.org/news/bugs-distinction-brink-extinction
(90) Portley N. (2016). SFP Report on the Shrimp Sector: Asian Farmed Shrimp Trade and Sustainability. Sustainable Fisheries Partnership Foundation. 22 pp. Available from www.sustainablefish.org
(91) Richard D.R and D.R. Friess (2016). Rates and drivers of mangrove deforestation in Southeast Asia, 2000-2012. PNAS 113(2), pp. 344-349. DOI: 10.1073/pnas.1510272113
(92) UNEP: https://www.unenvironment.org/news-and-stories/story/invasive-species-huge-threat-human-well-being, accessed 28 April 2017.
(93) CEPF (2012). Op. cit.
(94) McLeod (2008) and Gaertner (2011) referenced in https://en.wikipedia.org/wiki/Batrachochytrium#cite_note-37
(95) CEPF (2012). Op. cit.
(96) IPCC 5th Assessment Report, quoted by Raitzer D.A., F. Bosello, M. Tavoni, C. Orecchia, G. Marangoni and J.N.G. Samson (2015). ADB in Southeast Asia and the Economics of Global Climate Stabilisation. ADB, available at http://www.adb.org/sites/default/files/publication/178615/sea-economics-global-climate-stabilization.pdf

Sugarcane field, Thailand. In pursuit of economic growth, governments in the region have encouraged foreign investment in land and extractive industries. In some cases this has led to the displacement of people, deforestation and damage to protected areas.

availability of suitable areas to colonise; in reality, the large-scale changes in natural habitats and other pressures on biodiversity make it unlikely that many species will be able to adapt to climate change by shifting their range. The species that are particularly vulnerable are those limited to montane regions (e.g. the high mountains of Myanmar) or isolated karst habitats, lowland wetlands, those that depend on a range of habitats across migration routes (fish, birds), or those that are susceptible to disease (e.g. amphibians and the chytrid fungus) and temperature change (e.g. sex determination in reptile eggs). Lowland and coastal habitats will be affected by rising sea levels, with impacts including salt intrusion, erosion, and storm and flood events.

In addition, biodiversity will be impacted by climate change-induced changes in human populations, land-use practices and economic activities. Natural habitats will be affected by human populations that shift in response to sea-level rise and altered drought, rainfall and flood regimes. An assessment of vulnerability to climate change and ability to cope concluded that the coastal regions of Myanmar and the lower Mekong basin region of Cambodia were the most vulnerable to climate change, in terms of both the likely scale of impacts and lack of capacity to adapt and respond.[97,98]

The countries of the region are relatively minor contributors to greenhouse gas emissions globally (Table 2.1), although their contribution can be expected to grow as economic growth continues. It is notable, however, that a significant proportion of the emissions from Cambodia, Lao PDR and Myanmar are from land-use change and forestry. The negative figure for Vietnam reflects the lower rate of forest loss and extensive re-forestation programmes.

2.2 Drivers of threats

The central driver of threats to biodiversity in the region is the complex interaction between growing human populations, greater affluence leading to greater demands for resources, and the pursuit of capital-intensive economic growth in response to these changes. Changes in human societies and economies beyond the boundaries of the region – in China and the west – are also responsible for driving the intensification of resource use, including the escalation of the trade in wildlife products. Weak governance and corruption lessen the effectiveness of policy- and law-making, undermining efforts to shift to a more sustainable development pathway.

2.2.1 Emphasis on economic development

As noted in section 1.2.3, parts of the region are already industrialised, and all of the region's governments are pursuing a policy of growth based on greater economic integration, including through the ASEAN economic community, which was launched on 31 December 2015, with four aims: integrate the region into a single market and production base; turn South-East Asia into a highly competitive region; ensure equitable development across ASEAN; and fully integrate ASEAN into the global economy. The economic community encourages its members to reduce bureaucracy encountered in transporting goods across international borders in the region, but there has apparently been little consideration given to how these more open borders will facilitate wildlife crime, with an informant for this study reporting that only one ADB environmental impact assessment for a road project, in China, had made any mention of the risk of facilitating wildlife trafficking.

The investment required for economic growth comes from private sector companies, which in turn requires that countries establish legal and policy frameworks that allow these companies adequate security. Between 2000 and 2010, foreign direct investment in Cambodia grew fivefold, from EUR 114 million to EUR 602 million, while in Lao PDR it grew from EUR 23 million to EUR 269 million. A fifth of investment flowing into South-East Asia originates in the European Union, with China and investors from within the region (e.g. Singapore and Hong Kong) also playing a significant role. Rubber, biofuels and sugar are the crops that attract the largest investments.[100]

Myanmar lagged behind the other countries of the region for decades as a result of closed military rule and sanctions from western countries. Resource exploitation (primarily mining and exploitation of teak forests) was controlled by the military. The past decade has seen gradual political change, and in 2008, legal changes created a market for land for the first time, ending the monopoly over land and creating an opportunity for foreign involvement in land ownership. Although there has been investment much of it may be speculative, and it is constrained by continuing land rights conflicts, a judicial system that makes contracts difficult to enforce, and poor infrastructure.

Table 2.1 Greenhouse gas emissions

Country	Total net GHG emissions 2013 (all sources) ($MtCO_2e$)	Net GHG emissions from land-use change and forestry 2013 ($MtCO_2e$)	Net GHG emissions 2013 (tCO_2e per capita)
Cambodia	51.66	24.57	3.43
Lao PDR	29.96	18.47	4.55
Myanmar	201.45	102.70	3.80
Thailand	384.37	14.94	5.70
Vietnam	239.09	-17.67	2.66

Source: World Resources Institute.[99]

2.2.2 Increased pressure on resources

While the demand for timber, shrimp, coffee and many other products is global, growing wealth in China and Vietnam has stimulated a rapidly increasing demand for wildlife products, which are valued in those countries, especially for traditional medicines and luxury foods. Larger, more urban populations are changing consumption patterns across the continent, with important implications for land use. For example, consumption of meat and dairy products is increasing, and requires larger areas of land than it would take to produce the equivalent amount of plant-based food[101]. Improved transport links, air shipping and refrigeration allow the market to be supplied from increasingly remote regions.

Although greater wealth and increased consumption globally drive some pressures on biodiversity, poverty and livelihood insecurity are often the drivers of conflict between local populations and protected areas. Social and political marginalisation, remoteness from markets, lack of access to information and funding all combine to limit the options available to populations around protected areas. In such circumstances, their response to rising living costs and market opportunities is to intensify and expand land use, hunting and other activities based on using the natural resources immediately around them.

(97) Mekong River Commission (2012). The Impact & Management of Floods & Droughts in the Lower Mekong Basic and The Implications of Possible Climate Change. MRC Working Paper. Available at http://www.mrcmekong.org/assets/Publications/basin-reports/FMMP-working-paper-110820.pdf, accessed 21 July 2016.
(98) http://unesdoc.unesco.org/images/0024/002435/243557E.pdf, accessed 25 April 2016.

(99) CAIT Climate Data Explorer (2015). World Resources Institute, Washington, DC. Available online at: http://cait.wri.org, accessed 3 May 2017.
(100) Polack E. (2012). Agricultural land acquisitions: a lens on Southeast Asia. IIED, London. Available at http://pubs.iied.org/pdfs/17123IIED.pdf, accessed 5 March 2016.
(101) Cao Y. and L. Defa (2013). Impact of increased demand for animal protein products in Asian countries: Implication on global food security. Animal Frontiers 3(3), pp. 48-55. DOI: 10.2527/af.2013-0024. https://academic.oup.com/af/article/3/3/48/4638641, accessed 27 March 2018.

Forest clearance for oil palm plantation in Thailand. Cambodia, Thailand and Vietnam have banned logging, but poor enforcement means that there is a large illegal cross-border trade with Myanmar and Lao PDR. Land clearance for commercial plantations also creates an opportunity to extract timber.

2.2.3 Weak governance

Cambodia, Myanmar and Lao PDR are in the bottom quartile of the corruption perceptions score, while Thailand and Vietnam are in the third quartile with rankings ranging from 76 (Thailand) to 150 (Cambodia) from 168 countries (Table 2.2). The natural resources' sector is particularly prone to corruption, including bribery, fraud, conflicts of interest (regulators and regulatory institutions benefitting from resource exploitation) and state capture (disproportionate influence over regulatory decisions by companies)[102]. These practices undermine considerations of equity, sustainability and the use of objective data in decision-making, and weaken the mechanisms designed to limit negative impacts of economic development, such as land-use planning, zoning, environmental impact assessment and licensing of exploitation of natural resources. In addition, the prevalence of decision-making based on short-term (typically annual and 5-year) political and planning cycles tends to undervalue ecosystem services and underestimate negative environmental impacts.

Corruption may be difficult to prove or to challenge, especially where there is a lack of transparency, inadequate or disputed data, poor public participation, limited capacity or bias on the part of the institutions contracted to undertake environmental impact assessment (EIA) studies, and limited capacity on the part of the agencies charged with enforcement of environmental regulations. In Lao PDR, corruption, unclear legislation and poor enforcement capacity combine to allow blatant disregard for regulations in the conduct of logging operations. One estimate is that bribes and other unofficial payments make up 35 to 40 % of the overheads of logging companies[103], and that as a result companies are able to bypass limits on the location, volume and species to be felled.

A provisional assessment in Lao PDR rated forest governance as less than 25 % for 7 out of 12 indicators, noting (i) the lack of a national policy on illegal logging, (ii) inconsistent policies in the forestry, agriculture and land sectors, (iii) lack of clarity in forest zonation, and (iv) absence of effective independent oversight, either within the government or from civil society[104]. On a more positive note, illegal logging is frequently reported and was highlighted as the most important economic crime in the state controlled Vientiane Times in 2014[105]. However, the increasingly difficult working environment for international and campaigning civil society organisations (see section 3.3.1) makes it difficult to obtain independent information. Similar forest governance problems are found in Cambodia, and in Myanmar, where they are exacerbated by the fact that the government does not have control over the entire country (see section 2.2.4).

(102) UNDP (2008). Tackling corruption, Transforming Lives: Accelerating Human Development in Asia and the Pacific. UNDP, Colombo. Available at http://www.undp.org/content/dam/undp/library/corporate/HDR/Asia%20and%20Pacific%20HDR/RHDR_Full%20Report_Tackling_Corruption_Transforming_Lives.pdf
(103) Saunders J. (2014). Op. cit.
(104) Saunders J. (2014). Ibid.
(105) Saunders J. (2014). Ibid.

Table 2.2 Corruption Perceptions Index scores, 2016

Country	Corruption perception score 2016 0: very corrupt 100: very clean	Ranking of countries 2016 1: least corrupt 168: most corrupt
Cambodia	21	156
Lao PDR	30	123
Myanmar	28	136
Thailand	35	101
Vietnam	33	113

Source: Transparency International[106]

2.2.4 Civil unrest, conflict, insurgency

In recent decades, wars and internal conflicts have uprooted populations and complicated natural resource governance in Cambodia, Lao PDR, Myanmar and Vietnam. The displacement of populations and the actions of governments seeking to raise funds and secure control has made long-term planning and effective conservation work difficult, but two decades of relative stability are now allowing some progress. Only Myanmar still has significant armed opposition to the government, with 15 ethnic armed organisations, but 8 of these have now signed a peace accord and entered into talks with government[107]. The armed movements in Myanmar have allowed or engaged in timber extraction, mining and other natural resource-based trade to fund their operations, but conversely their presence has delayed the influx of capital investment and foreign companies, which drive large-scale land-use change. Thailand has been free of major conflict but has suffered regular political upheaval and military coups, and continuing conflict in the south.

2.2.5 Unsustainable use driven by tenure insecurity and conflict

All the countries in the region have strong traditions of customary land ownership vested in local people, often with strong concepts of sustainability and resource stewardship within them. However, in most cases these systems and norms have been weakened or eliminated by wars, population movements, cultural assimilation and the influence of modern markets and economic opportunities. The emphasis on growth through economic integration and capital investment, described above, requires the allocation of large areas of land to commercial entities, and this tends to be in conflict with the legal recognition and registration of customary rights and complex traditional land-use systems. In the absence of strong protection for their land and resource rights, local people have little incentive to invest in the sustainable management of land and natural resources. Another consequence of the emphasis on investment and large-scale economic development is the tendency for protected areas to be declared on marginal and unproductive lands, avoiding the opportunity costs that might accrue to industry and government, but often creating costs for local communities in terms of loss of access to resources.

In Myanmar, isolation from international processes and the creation of numerous 'ethnic armies' to defend land and resource rights against central state control have resulted in the persistence of a strong ethnic basis for land tenure in some parts of the country. Myanmar is in a process of political transition and the new National Land Policy recognises these ethnic nationalities and their land rights, though how this recognition interacts with centrally determined protected areas and forest reserves is not clear. Customary forest- and land-management arrangements could potentially be integrated with conservation management of protected areas, but current policies do not yet do this effectively, and there is also the risk that local people view the establishment of protected areas as an attempt by central government to assert control over their traditional lands. The current political changes in Myanmar are likely to result in government restructuring and decentralisation, making the future direction of land tenure and state management of land and forests in Myanmar highly uncertain.

(106) http://www.transparency.org/news/feature/corruption_perceptions_index_2016#table, accessed 28 April 2017.
(107) http://www.saferworld.org.uk/south-asia/myanmar, accessed 20 August 2016.

3

Ongoing conservation efforts

Red-headed and slender-billed vultures, Preah Vihear protected forest, Cambodia. Lack of food, poisoning and loss of nesting trees threatens the vulture population. Seven 'vulture restaurants' have been set up across Cambodia to supplement the vultures' natural food supply.

3 _ Ongoing conservation efforts

3.1 Government

3.1.1 Institutions for conservation

All of the countries in the region have government institutions mandated to manage protected areas and enforce conservation legislation. Table 3.1 lists the institutions with primary responsibility for biodiversity conservation-related issues in the region.

3.1.2 Protected areas

PA coverage

One of the most important contributions to biodiversity conservation by government is the creation of protected areas. In some countries, they date back to early colonial days (e.g. in Myanmar), while in Cambodia they are a relatively new phenomena, with the first 23 protected areas declared by Prince Sihanouk in 1994[108] and further sites since then bringing the total to 44. The region's 756 PAs cover 14 % of the land surface[109], an average for the world as a whole but still some way below the agreed target of 17 % by 2020[110]. Coverage for the hotspot including southern China is 16 %[111], but varies from 26 % in Cambodia to 7 % in Myanmar (Table 3.2).

Most PA systems have been developed on the basis of royal and colonial hunting reserves, watershed protection reserves, as well as early conservation initiatives, rather than being based on an analysis of the distribution and status of threatened species and biodiversity. Key biodiversity areas (KBAs), which are identified on the basis of the presence of threatened species, provide a useful picture of the current distribution of threatened biodiversity against which to measure PA coverage. Overlaying KBAs with protected areas (Table 3.3) for the Greater Mekong region shows that Thailand has the highest proportion of protected KBAs (83 %), partly because it already has an extensive and well-developed PA system, but also because land-use change outside PAs had depleted biodiversity before the identification of KBAs, resulting in a higher degree of congruence between KBAs and protected areas. In contrast, Myanmar has only about 18 % of its KBAs within protected areas. A separate analysis of the representation of land-cover types and threatened vertebrates[112] in the hotspot concluded that protected area coverage should be increased to 21 % of the region's land area, requiring an additional 102 000 km², with the greatest increases required in Myanmar (36 900 km²) and Cambodia (14 500 km²).

PA funding

One of the most comprehensive efforts to define the costs of effective protection is a study of the funding and management costs of tiger source sites[113], including those in the Greater Mekong region. The cost of protecting these sites is around EUR 715 per km² per year, while across South-East Asian tiger range states the combined commitment from governments, donors and non-governmental organisations (NGOs) was on average EUR 280 per km² per year, a shortfall of EUR 434 per km² per year.

Government financing for PAs is very limited across the region. In **Cambodia**, the National Parks and Protected Areas Department of the Ministry of Environment has a small budget for infrastructure only. Monitoring and field operations in protected areas are heavily dependent on technical support and funding from international NGOs (see section 3.3.2). In **Myanmar**, the Government provides about EUR 1 million per year for protected areas, but distribution is very unequal (varying from EUR 1.50 per km² to EUR 64 000 per km²). Only 20 PAs receive funding and have staff. Donor funding for protected areas provided 59 % of the total funding for PAs over the 5 years, 2010 to 2015.[114] Only in Thailand has funding for PAs been relatively consistent, with the National Parks, Wildlife and Plant Conservation Department of the Ministry of Natural Resources and Environment receiving EUR 2 million per year, a figure which

(108) Walston J., K.U. Karanth and E.J. Stokes (2010). Avoiding the unthinkable: What will it cost to prevent Tigers becoming extinct in the wild? Wildlife Conservation Society, New York.
(109) Data from the World Database on Protected Areas, dated. Available at: https://www.protectedplanet.net
(110) CBD Aichi Target 11: https://www.cbd.int/doc/strategic-plan/targets/T11-quick-guide-en.pdf, accessed 11 March 2016.
(111) This figure includes the parts of the hotspot in southern China, where there are some very large nature reserves. Tantipisanuh N., T. Savini, P. Cutter and G.A. Gale (2016). Biodiversity Gap Analysis of the protected areas system of the Indo-Burma Hotspot and priorities for increasing biodiversity representation. Biological Conservation 195, pp. 203-213.
(112) Tantipisanuh N., T. Savini, P. Cutter and G.A. Gale (2016). Biodiversity Gap Analysis of the protected areas system of the Indo-Burma Hotspot and priorities for increasing biodiversity representation. Biological Conservation 195, pp. 203-213.
(113) Walston J. et al. (2010). Op. cit.
(114) Emerton L., U.A. Kyin and R. Tizard (2015). Sustainable Financing of Protected Areas in Myanmar. Wildlife Conservation Society, Yangon. Available at http://goo.gl/cGip0X

Table 3.1 Summary of the division of responsibility for conservation between government agencies

Country/agency	Mandate
Cambodia	
Ministry of Agriculture, Forestry and Fisheries (MAFF)	CITES management authority, management of production forests and fisheries, and issuing of Economic Land Concessions.
Department of Fisheries Conservation, Fisheries Administration of the MAFF	Fish, aquatic reptiles and freshwater mammals; CITES aquatic scientific authority.
Department of Wildlife and Biodiversity, Forestry Administration of the MAFF	Manages forests and wildlife outside MoE protected areas; CITES terrestrial scientific authority.
Ministry of Environment (MoE)	Newly formed ministry, which is taking over responsibility for protection of forests, leaving MAFF responsible for management of production; Ramsar Convention Administrative Authority; focal point for United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CBD).
General Department for the Administration of Nature Conservation and Protection of the MoE	Manages national parks and wildlife sanctuaries, including Tonle Sap Lake, and other Ramsar sites.
Lao PDR	
Ministry of Natural Resources and Environment (MONRE)	Manages all forest except production forest(i); Ramsar Convention Administrative Authority.
Department of Forest Resource Management (DFRM) and Department of Forestry (DOFI), Ministry of Agriculture and Forestry (MAF)	Manages all production forests(i); CITES management authority; Lao Wildlife Enforcement Network node.
Biotechnology and Ecology Institute, Ministry of Science and Technology	CITES scientific authority.
Myanmar	
Forest Department and Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation	Management of forest lands, including logging and protection forest, management of protected areas and wildlife data (Nature and Wildlife Conservation Division of Forest Department), environmental impact assessments and social impact assessments (Environmental Conservation Department); CITES management authority; scientific authority for terrestrial species; Ramsar Convention Administrative Authority.
Department of Fisheries, Ministry of Agriculture, Livestock and Irrigation	CITES scientific authority for marine/aquatic species, conservation of aquatic resources, including aquatic protected areas.
Thailand	
Department of National Parks, Wildlife and Plant Conservation of the Ministry of Natural Resources and Environment	CITES management authority and scientific authority, management responsibility for protected areas, oversight of zoos, enforcement of National Parks Act and Wildlife Conservation Act.
Royal Forest Department of the Ministry of Natural Resources and Environment	Management and protection of forests, but not forests in protected areas.
Office of Natural Resources	Ramsar Convention Administrative Authority.
Vietnam	
Forest Protection Department of the Ministry of Agriculture and Rural Development	Protected areas and wildlife law enforcement; CITES management authority.
Biodiversity Conservation Agency, Vietnam Environment Administration of the Ministry of Natural Resources and Forestry	Environmental law, biodiversity survey, wetland conservation; Ramsar Convention Administrative Authority.
Institute of Ecology and Biological resources, Vietnam Academy of Sciences and Technology	CITES scientific authority.

(i) In 2017 the DFRM was moved from MONRE to MAF. Information on the division of responsibility for forest management may therefore require updating.

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Ranger team, Alaungda Kathapa National Park, Myanmar. Governments have declared a network of protected areas, but only a few have adequate staff and funding. Donor and NGOs support has been important in priority parks, but is not a substitute for sustained government commitment.

^

Eld's deer is endemic to the dry forests of the lower Mekong basin. In Lao PDR, NGOs, local government and communities are collaborating on land-use planning, patrolling and livelihood improvement schemes to try and ensure the long-term future of the species and its habitat.

^

Inle Lake, Myanmar, is a biosphere reserve. The lake is famous for its floating hydroponic agriculture, and has endemic fish and snails. The ecosystem is being degraded by waste and sewage pollution from the growing population, tourism development, introduced invasive plants and fish, and sediment from deforested catchments.

Table 3.2 Summary of protected area coverage in the Greater Mekong region

Country	No terrestrial PAs	Area terrestrial PAs (km²)	% of total land area
Cambodia	44	47 034	26
Lao PDR	32	38 433	17
Myanmar	53	47 081	7
Thailand	194	104 024	20
Vietnam	222	24 962	8
Total region	756	326 268	14

Source: CEPF 2012; WCS 2013 (for Myanmar); World Database on Protected Areas.

Table 3.3 Coverage of KBAs by protected areas, by country

Country	No of terrestrial KBAs	No of terrestrial KBAs protected	% of terrestrial KBAs protected
Cambodia	40	22	55
Lao PDR	43	22	51
Myanmar	132	24	18
Thailand	114	95	83
Vietnam	110	36	33
Total	439	199	45

Source: CEPF 2012; WCS 2013 (for Myanmar).

remained stable from 2006 until 2010[115,116]. This level of funding is adequate to support basic PA running costs, including staff and vehicles.

The impacts of a lack of resources for PA management include low staff morale, lack of accountability, little incentive for good performance, and lack of interest or opportunity to develop technical capacity or knowledge. At many sites, effective patrolling and other management only happens in the context of a donor programme or with the support of an international NGO. A confounding problem is that even where parks are able to attract significant income from tourist revenues, this income must be surrendered to central government, and is not available for the management of the park.

An EU-funded review of protected area financing in Myanmar[117] identifies a range of options for improving the funding of PAs, many of which are relevant across the region. The study proposes increasing the diversity of funding sources, measures to increase retention of funds generated by the PA and reinvestment, and measures to improve financial management in PAs. Diversifying sources of funds includes market-based instruments (user fees, payment for ecosystem services), enhanced allocations from national budgets (e.g. debt for nature swops, allocations from a wider range of departmental sources), and private sector engagement (donations, cost-sharing, biodiversity offsets, concessions and leases).

In addition to increases in central government funding for park management, there have been attempts to diversify the types of funding available to PAs. The Vietnam Conservation Fund was a EUR 11.5 million sinking trust fund set up to channel financial support and technical advice to special-use forests (protected areas), with grants made on the basis of a competitive proposal process, and implementation supported by technical advisors[118]. A similar fund in Lao PDR combined endowment with a sinking fund. More recently, Conservation International has established a trust fund, which will eventually finance the conservation management of the Cardamom mountains of Cambodia[119]. Other strategies proposed include investment in the tourism and ecosystem services potential of parks, including REDD+[120], and allowing parks to collect revenue and use it for protection.

(115) CEPF (2012). Op. cit.
(116) For example, the Huai Kha Khaeng Wildlife Sanctuary in the Western Forest Complex of Thailand is reported to receive a budget of around EUR 538 000 per year, which is considered adequate against a benchmark of funding per km². A. Pattanavibool, WCS, pers. comm. (2016).
(117) Emerton L. et al. (2015). Op. cit.
(118) Emerton L. et al. (2015). Ibid.
(119) http://www.conservation.org/projects/Pages/cambodia-central-cardamom-protected-forest.aspx, accessed 17 June 2016.
(120) REDD+, as used by the UNFCCC, is 'reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks'.

Ranger patrol, Huai Kha Khaeng wildlife sanctuary in the western forest complex, Thailand. The SMART patrol system, which uses field and GPS data to make patrolling more targeted, was introduced here in 2007 and has contributed to a reduction in poaching and an increase in the tiger population.

PA effectiveness

Although field experience and case studies suggest that the management effectiveness of PAs is low, data to support this is limited, with measurement of PA effectiveness uncoordinated and sporadic, within countries and across the region. Many standards for the measurement of PA effectiveness exist, with one of the most widely used being the Management Effectiveness Tracking Tool (METT) framework[121], now a compulsory element of Global Environment Facility (GEF) funded PA projects. Although there are issues with the consistency of approach and the degree of consultation which takes place when METT assessments are carried out, they provide a standard which can be used to monitor changes over time and between PAs. A different approach is now being promoted through the IUCN Green List, which is an independently assessed quality standard for PAs that is being trialled in several countries in the region.[122]

Staff and institutional capacity is closely linked to effectiveness. Opportunities for training of protected area managers in the region are limited. In Myanmar, Lao PDR and Vietnam there are well-established forestry schools or courses, but these tend to treat forestry as a technical subject and do not cover the range of skills required of modern PA managers. A successful initiative is from the Royal University of Phnom Penn, Cambodia, which has a biodiversity conservation masters course, which trains mid-level managers and includes practical management skills (e.g. budgeting, planning) and a research placement in a PA, supported by a grant. For many staff, applied, on-the-job training based on achieving competency in core skills is likely to be cost-effective[123]. The ASEAN Centre for Biodiversity has developed competency standards for protected area managers[124], as has the IUCN and the World Commission on Protected Areas (WCPA)[125]. Institutional capacity development needs to be closely integrated with personnel development to ensure that personnel can deliver changes in policy and approach to the management of protected areas and, conversely, that the capacity of personnel is taken into account in planning the management of protected areas.

(121) The METT framework was originally developed by World Bank and the World Wide Fund for Nature (WWF). It assesses PA performance against criteria organised into six areas: context, planning, inputs, processes, outputs and outcomes. Further information at http://www.europarc.org/wp-content/uploads/2015/05/2009-Management-Effectiveness-Tracking-Tool.pdf

(122) https://www.iucn.org/theme/protected-areas/our-work/green-list

(123) ompetency-based training emphasises delivering knowledge, skills and attitudes that are directly relevant to and can be applied to challenges or constraints faced by personnel in their work, with development focused on achieving an agreed standard of competency. The approach encourages a range of informal and practical methods of learning and assessing progress, rather than formal training courses and written assessments.

(124) Appleton M.R., G.I. Texon and M.T. Uriarte (2003). Competence Standards for Protected Area Jobs in South East Asia. ASEAN Centre for Biodiversity, Los Baños, Philippines. Available at http://www.arcbc.org.ph/arcbcweb/pdf/competence_standards.pdf

(125) Appleton M.R. (2014). Competencies for Protected Area Personnel: A Global register. Draft Overview and User Guide. WCPA/BIOPAMA. Available at http://worldparkscongress.org/drupal/sites/default/files/documents/docs/Competence%20user%20guide%20V2%20WPC%20Nov%202014%20(1).pdf

Linking capacity development to career progression can help raise the profile and status of a career as a ranger (or other PA personnel), encouraging personnel to stay with the service and high-quality candidates to apply for positions. Providing capacity building for stakeholders in the PA other than the management agency (e.g. communities, private sector managers) can be a useful way of building goodwill and shared understanding.

Some governments in the region are working to improve representativeness and management effectiveness, often with the support of civil society organisation (CSO) partners and external donors. In **Cambodia**, the Ministry of Environment is developing a review of protected areas, including prioritisation of potential corridors connecting them, as part of the new Environmental Code. **Lao PDR** is also in the process of reviewing its forest estate, including protected areas. The reorganisation will classify forest and other habitats for conservation, protection or production. In **Myanmar**, the policies of the new government (March 2016), and targets for expansion of community-managed forests favour expansion of community-based protected areas based on clarification of rights.

The most important advance in management effectiveness has been the widespread implementation of the SMART (Spatial Monitoring and Reporting Tool)[126] approach to improve the management and implementation of law enforcement in protected areas, including the use of the SMART patrol database. The SMART approach combines a site-based management tool with capacity building and standards for protected area management. The tool enables rangers to collect and analyse data on patrols and illegal activity, allowing patrol effectiveness to be measured and efforts to be targeted at the highest priority areas[127]. The approach is increasingly viewed by governments and donors (e.g. the German Government) as the standard for effective park law enforcement. Its implementation is supported by a consortium of international conservation NGOs[128], and it has been adopted nationally by Thailand, with the Governments of Cambodia, Myanmar and Lao PDR endorsing its use in their protected areas. Fauna & Flora International (FFI) and BirdLife International have also supported SMART implementation in their projects. As knowledge and experience of the approach has developed in the region, the opportunities for exchanges and learning between sites have increased.

Examples of the use of SMART include:

- in the core reserves of the Western Forest Complex of Thailand, since 2007, where the approach has resulted in increases in prey densities, reduced poaching, and an increase in tiger density from 1.74 tigers per 100 km² to 2.39 tigers per 100 km².[129]
- in the Nam Et-Phou Louey National Protected Area (NPA) in Lao PDR, where it was successful in lowering hunting pressure over the 200 000 km² core zone. The models of enforcement, outreach and monitoring developed in the park were subsequently implemented in six other national protected areas and six provincial protected areas in the country[130].

SMART patrolling can do little to stop official, legal threats to protected areas. Over the last 20 years the PA downgrading, downsizing and degazettement (PADDD) tracking database[131] has records of 141 instances of downgrading or downsizing PAs, from 24 in Cambodia, 8 in Vietnam, 3 in Thailand, 1 in Myanmar and 1 proposed in Lao PDR. The majority of the changes in Cambodia[132] are as a result of industrial agriculture, with mining also contributing to the problem. In one example in 2011, 532 km² of the Virachey National Park were downgraded to allow development by industrial agriculture (primarily rubber)[133]. Downgrading and degazettement is a product of tensions between central and local governments, often exacerbated by decentralisation, poor coordination between agencies, and the low political priority accorded conservation compared to immediate economic development opportunities. One of the ways to build political support for PAs is to demonstrate their economic value, using a total economic valuation approach, and working to integrate the results into national decision-making, for example into national accounts and registers of assets[134].

Transboundary protected areas initiatives

The Greater Mekong region has 12 380 km of internal land borders, and many of these cross areas of high importance for conservation, such as the Western Forest Complex (Thailand), the forests of the Tenasserim Range (Myanmar), Siem Pang Wildlife Sanctuary and Virachey National Park (NP) (Cambodia), Chu Mon Ray NP (Vietnam) and the Dong Amphan National Biodiversity Conservation Areas (Lao PDR). The change in jurisdiction complicates conservation management and wildlife crime enforcement activities, but some useful examples of

(126) A similar system, MIST, was implemented in the region from 2007 to 2012 but has been superseded by SMART.

(127) SMART partnership (2016). Annual Report 2015. Available at http://smartconservationtools.org/wp-content/uploads/2016/01/SMART-2015-Annual-Report.pdf

(128) The SMART consortium includes CITES-MIKE (Monitoring the Illegal Killing of Elephants), Frankfurt Zoological Society, Global Wildlife Conservation, North Carolina Zoo, Panthera, Peace Parks Foundation, Zoological Society of London, Wildlife Conservation Society and World Wide Fund for Nature.

(129) Walston J. et al. (2010). Op. cit.

(130) Ibid.

(131) http://www.padddtracker.org/view-paddd

(132) Responsibility for the management of Cambodia's protected areas has now shifted to the newly created Ministry of Natural Resources and Environment, which has initiated a review of PAs. It is not yet clear how this will impact on the issuance of economic land concessions in protected areas (see also section 2.1.2).

(133) Known as protected area downgrading, downsizing and degazettement or PADDD. See Symes W.S., M. Rao, M.B. Mascia and L.R. Carrasco (2016). Why do we lose protected areas? Factors influencing protected area downgrading, downsizing and degazettement in the tropics and sub-tropics. Global Change Biology 22, pp. 656-665. DOI: 10.1111/gcb.13089

(134) Global Tiger Initiative Secretariat (2012). Op. cit.

Three tonnes of pangolin scales, equal to about 6 000 animals, seized by Thai customs. Demand in China has almost wiped out the Chinese pangolin, and suppliers now focus on South-East and South Asia, and Africa. All eight of the world's pangolins were listed on CITES annex I in 2016, banning all trade.

UNODC training for law enforcement officers on collecting evidence of wildlife trafficking, Vietnam. UNODC is a member of the International Consortium on Combating Wildlife Crime, which encourages capacity development, collaboration and data-sharing between governments and NGOs.

transboundary approaches are addressing these issues, and are listed below.

- A Memorandum of Understanding (MoU) between Guangxi Autonomous Region (China) and Cao Bang Province (Vietnam) was signed in May 2015 with an objective of strengthening collaboration in the management of the Sino-Vietnamese Limestone Landscape.[135]
- China, India and Myanmar have developed a framework for regional cooperation in the management and conservation of the Brahmaputra-Salween [=Thanlwin] Landscape, which includes the Kachin state, northern Myanmar, in collaboration with the International Centre for Integrated Mountain Development[136].
- The China-Lao PDR Transboundary Biodiversity Conservation Collaboration links the Xishuangbanna Reserve in China with Lao's Nam Ha NPA.
- An International Timber Trade Organisation-led cooperation between Cambodia, Lao PDR and Thailand to support conservation of the forest where the borders of the three countries meet, called the Emerald Triangle Protected Forests complex, has completed its third phase (2012-2015).[137]

3.1.3 Tackling wildlife crime

Political support

In the predominantly top-down bureaucracies of the Greater Mekong countries, significant shifts in patterns of trade and consumption are possible when there is support from the centre[138]. In the past, wildlife crime was perceived by governments to be connected to local tradition, subsistence and food security, but investigations and awareness campaigns have demonstrated that it is a global organised crime, with links to other trafficking, the spread of disease, and revenue raising for insurgency and terrorism. In response, the Heads of State of Vietnam, Lao PDR, Cambodia, Myanmar and China have all made statements and joined conferences on the issue, the Vietnamese prime minister issued a Directive on the issue in 2014[139], the Lao prime minister ordered greater action in 2015, and in October 2015 ASEAN ministers agreed to add 'Wildlife and Timber Trafficking' to the list of priority transnational crime threats, mandating follow-up through the ASEAN Senior Officials Meeting on Trans-National Crime[140].

Legislation

Laws are in place to control the illegal wildlife trade in all countries of the region. In September 2015, the USA and China announced that they will ban the domestic ivory trade. In addition to the existing bans on ivory import and export, this closes an important loophole which had allowed smuggled ivory to be passed off as legitimate domestic trade. The timetable for implementation is not yet confirmed, but in July 2016 the USA enacted a partial ban, and in December 2016 China announced that the ban would be in effect by the end of 2017[141].

Given the international nature of the trade, an appropriate listing of species in trade under the CITES convention is important to focus resources on action for the most threatened species – a recent important example being the listing of all eight pangolin species in Annex 1 of the convention at the September 2016 meeting of the parties[142]. Listings, or changes to listings, may be justified as new information emerges about threats and populations[143] and national CITES management authorities have a key role to play in compiling the data, reporting (e.g. MIKE reporting, reporting on levels of ivory stockpiles, reporting on implementation of the Asian big cat resolution) and proposing the changes at CITES meetings. In practice, the quality of reporting and data provided is patchy.

CITES recognises the need for wildlife trade to be demonstrably 'traceable, sustainable and legal', and national legislation should apply the precautionary principle and ban trade in species and products where this has not yet been demonstrated. Legislative frameworks in Lao PDR and Myanmar do not yet comply with these standards[144], although both countries were reported to have 'enacted CITES legislation' in January 2016. The United Nations Office on Drugs and Crime's (UNODC) 2014 assessment of Lao PDR described it as having 'a weak legal framework, structural weakness in inter-agency coordination and a very low rate of success in the interdiction and prosecution of wildlife and forest crimes'.[145]

Legislation is important to reduce the negative impact of wildlife farming, and at the October 2016 CITES global meeting, Lao PDR announced that it was 'looking for ways to phase out tiger farms'[146]. However, farming of some species is already allowed in Vietnam, China and Cambodia, and discussions are underway about legalising farming and trading in products from endangered species. China already issues permits for legal trade of the skins of captive tigers. Across the region, permitting and monitoring farming takes no account of the state of the wild population, even though farming complicates enforcement and undermines demand-reduction efforts, and does not distinguish between conservation and commercial breeding, allowing farms to claim to be breeding for conservation when they do not contribute to the conservation of the species in the wild. In Cambodia, the Forestry Administration is developing a revised law on wildlife protection and trafficking, and while many of the provisions are welcomed by civil society organisations, there is concern about the inclusion of provisions allowing wildlife farming.

(135) ADB Project briefing: http://www.adb.org/projects/44323-012/main#project-pds, accessed 3 March 2016.
(136) http://www.icimod.org/?q=14101, accessed 14 March 2016.
(137) See http://www.itto.int/partner/id=2536, and information available by logging into facebook at: https://www.facebook.com/EmeraldTriangle/app/160430850678443/, accessed 14 March 2016.
(138) Vietnam's success in banning fireworks and opium are two examples of centrally directed action against widespread behaviours.
(139) https://cites.org/eng/news/sundry/2014/20140318_vn_pm.php, accessed 22 April 2016.
(140) https://www.unodc.org/southeastasiaandpacific/en/2015/10/asean-wildlife-timber/story.html, accessed 22 April 2016.
(141) https://www.theguardian.com/environment/2016/dec/30/china-ban-ivory-trade-2017-elephants-wwf, accessed 27 January 2017. Hong Kong has scheduled a ban for 2021.
(142) https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/9303/CITES-CoP17-Victory-Today-for-Pangolins.aspx, accessed 15 October 2016.
(143) For example, Horne B.D. et al. (2012). Op. cit., recommend that 13 turtle species be included in CITES Appendix II, and 25 species transferred from Appendix II to I.
(144) CITES assesses national legislation implementing the convention, requiring designation of a responsible CITES authority, and prohibition of trade in violation of the convention, with provision for penalties and /or confiscation of specimens traded. CITES (2016). National Laws for Implementation of the Convention. https://cites.org/sites/default/files/eng/com/sc/66/Inf/E-SC66-Inf-19.pdf
(145) https://www.unodc.org/documents/Wildlife/WLFC_Annual_Report_2014.pdf
(146) Statement by H.E. Mr Sommad Pholsena, Lao PDR Minister of Natural Resources and Environment at the 67th Meeting of the Standing Committee to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), ahead of the 17th Conference of the Parties (CoP17) to CITES in Johannesburg, South Africa, as reported on https://eia-international.org/groups-welcome-intention-laos-phase-tiger-farms, accessed 15 October 2016.

Wildlife crime breaks laws on trade, tax, animal and plant health, imports and exports, and can be addressed using the laws and agencies dedicated to these domains. It can also be tackled through trade governance mechanisms – the EU's Timber Regulation and Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan, and the USA's Lacey Act are leading examples. The Trans-Pacific Partnership, a free-trade agreement with the USA[147] and 12 other Pacific Rim countries (only Vietnam is a member in the Greater Mekong region) is recognised as having strong safeguards against greater illegal trafficking. These include agreements to 'effectively enforce environmental laws', 'fulfil obligations under CITES', and 'take measures to combat and cooperate to prevent trade in wild fauna and flora that has been taken illegally'[148].

Enforcement

Across the region there is inadequate capacity and resources to investigate reports, identify species and to distinguish legal from illegal trade. Some of the most effective action has taken place where there has been collaboration between agencies with responsibility for wildlife (environment police, forest police, protected areas authorities, etc.), other agencies (police, border security and customs, tax and trade authorities), and NGOs with specialist knowledge and information. Thailand has the strongest record in allowing the involvement of NGOs in convening enforcement agencies and coordinating data exchange between them, and this has resulted in successful seizures and prosecutions[149]. Cambodia has taken sporadic action against tiger poachers, including jailing a prominent trader for 7 years in 2005[150], and the Forestry Department of Myanmar has worked with the Wildlife Conservation Society (WCS) to investigate wildlife trafficking in the towns close to the Hukuang Valley and Taninthayi forests. NGOs also support enforcement operations by operating hotlines, developing community informant networks and monitoring markets.

Where there is success in securing a prosecution, the penalties for wildlife crimes are often inadequate to provide a deterrent, either because the law does not provide for heavy penalties or a lack of understanding of the seriousness of the crime. Seizures are promoted as evidence of success, while success in arrests, prosecutions and seizure of assets remains limited. The people arrested are most often those transporting the wildlife products, while the organisers and financial backers of the business are unaffected. Corruption and involvement of political elites in the lucrative trade further undermines enforcement.

A practical challenge facing law enforcement operations is what to do with confiscated live animals. Many cannot be released back into the wild, and governments, in collaboration with partners, have taken some action to establish facilities to house turtles, pangolins and other species that have been confiscated during enforcement operations. For some species that are highly threatened by the illegal wildlife trade, the establishment of assurance populations (viable populations kept in captivity or safely in semi-captivity, sometimes outside their native range) has been recommended. Here, governments have taken action, or permitted efforts by NGOs and zoos. There are now, for example, assurance populations for 24 of the 56 threatened species of freshwater and terrestrial turtles and tortoises in Asia.[151]

Transboundary coordination

Insurgency, insecurity and limited resources for field operations limit the ability of authorities to control the long international land borders of the Greater Mekong region, making them highly porous. Action against wildlife traffickers needs data sharing and communication between agencies on both sides of the border, but lack of resources and differences in software and systems all make collaboration more difficult. International agencies and forums provide a framework within which police, customs authorities, NGOs and others can collaborate, but they need to be strengthened, and interregional networking (between Asia and Africa, for example) particularly needs to be improved. The five greater Mekong countries are members of the ASEAN Wildlife Enforcement Network (ASEAN-WEN), created in 2005 under the ASEAN Senior Officials for Forestry (ASOF) grouping, and each country has a national network. In 2016 the ASOF instructed the WEN to work more closely with the ASEAN expert group on CITES and the ASEAN secretariat to reduce costs and enhance financial sustainability. The ASEAN National Police Network, ASEANAPOL, is also seeking to work more closely with the WEN following the decision to add wildlife trafficking as a priority transnational crime[152]. Other international networks include the International Consortium on Combatting Wildlife Crime (ICCWC), which brings together CITES, Interpol, UNODC, the World Bank and World Customs Organisation[153], and the Asian Regional Partners Forum on Combating Environmental Crime[154], which operates under the auspices of United Nations Environment Programme (UNEP) and brings together 25 governments, NGOs and international agencies.

Data gathering and sharing is key to successful investigation and enforcement, and is the focus of actions by international agencies, governments and NGOs. UNODC has supported research and dissemination, while international NGOs have developed a system that allows them to cross-reference each other's databases without compromising the confidentiality of individual databases. The use of DNA testing has expanded with the advent of cheap, rapid tests, which can help determine species and identify the population from which a wildlife product came, depending on the availability of comparison databases. To date, testing has not been on a wide scale – for example only 18 of 117 seizures of ivory globally between 2000 and 2015[155] were tested – but the technique is starting to be used to identify whether elephant ivory is from Asian or African sources. For Asian elephants, there is an opportunity to combine information on Asian elephant faecal DNA (collected by ongoing field projects) to provide a database against which seizures can be compared.

Awareness and demand reduction

Action to influence the behaviour of buyers has been the focus of NGO campaigns (see section 3.3), with government support in some cases. These campaigns have had some success, for example in reducing demand for shark fin and rhino horn, and actions on ivory and tiger products are ongoing. Demonstrating impact from these campaigns is difficult, however, and requires more attention to establishing baselines, monitoring behaviour change and learning from experience. Experience shows that demand reduction campaigns work best when they are complemented by strong laws and effective enforcement, and that awareness raising needs consistent, long-term messaging from NGOs and other stakeholders to governments.

(147) The USA pulled out of the agreement on 23 January 2017.
(148) https://ustr.gov/about-us/policy-offices/press-office/press-releases/2015/october/summary-trans-pacific-partnership, accessed 28 April 2017.
(149) For example, successful collaboration between Thai and Indian authorities through the WEN mechanism, with technical and financial support from NGO Freeland, leading to the arrest of a senior wildlife smuggler. http://www.freeland.org/press-releases/thai-enforcers-smash-wildlife-trafficking-ring/, accessed 22 April 2016.
(150) Walston J. et al. (2010). Op. cit..
(151) Horne B.D. et al. (Eds.) (2012). Op. cit.
(152) http://www.freeland.org/blog-posts/senior-asean-officials-direct-wildlife-enforcement-network/, accessed 22 April 2016.
(153) https://www.cites.org/eng/prog/iccwc.php, accessed 22 April 2016.
(154) http://www.unodc.org/southeastasiaandpacific/en/2010/02/arpec/story.html, accessed 22 April 2016.

Reforestation at Bao Loc, Vietnam. The country has initiated a scheme where ecosystem service users pay farmers to plant and maintain tree cover, and a 'savings book' scheme which rewards communities for protection and management of state 'special forests'.

3.1.4 National and local policies

A vast array of government policies, regulations and programmes are relevant to conservation of biodiversity. This section notes some of the more progressive and innovative ones.

Logging bans were put in place in Cambodia, Thailand, Vietnam and China in 1996, 1989, 1997 and 1998, respectively. Promulgated in response to flooding events, they closed down industries that were already in decline as a result of lack of accessible commercial timber. The demand for timber in these countries is now met from plantations (which may have expanded at the expense of natural forest), and from legal or illegal sources from other countries, including the neighbouring countries in the region, which still have significant timber resources (Myanmar, Lao PDR). A large illegal trade is reported between Cambodia and Vietnam.

Vietnam's **Payment for Forest Environmental Services** (PFES) programme was launched nationwide in 2010 through Government Decree No 99. The scheme obligates ecosystem service users to pay registered forest owners for the provision of ecosystem services, including water, biodiversity and natural beauty for tourism and forest carbon sequestration. Users include water supply, hydropower and tourism companies. Since its initiation the scheme reports that it has generated EUR 124 million in revenue, which has led to the management

(155) See BBC Wildlife Magazine, 12 April 2016, 'Ivory Smuggling: 9 things you should know', available at http://www.discoverwildlife.com/news/ivory-smuggling-9-things-you-should-know; and Environmental Investigation Agency information sheet, Large Scale Ivory Seizures v.3, August 2017. Available at https://eia-international.org/wp-content/uploads/Large-Scale-Ivory-Seizure-Map-2000-July-2017.pdf , accessed 13 March 2018

Ba Be National Park, Vietnam, is a Ramsar wetland of international importance, and one of 37 ASEAN heritage parks. Its international status raises the profile of the park and contributes to a thriving tourist industry.

of over 3.5 million hectares of forest by over 300 000 households.[156] Challenges for the future include balancing the preferences and priorities of government, communities and private sector payers on the level and timing of payments, and on finding an appropriate balance between effectiveness and equality. Vietnam is currently considering adding REDD+ into the PFES system, but there are challenges connected with the more global nature of avoided emissions payments[157]. In addition to the private sector scheme, the Vietnamese Government makes payments to forest owners who plant and maintain 'special use' forests through payments into community bank accounts, known as the 'savings book' approach[158]. The 'program 661' scheme has been used to pay villagers to protect natural regeneration of forest, for tree planting and for planting economically useful tree crops in and around national parks, including Ba Be and Chu Mom Ray.

REDD+ approaches have been implemented on a project basis in several countries in the region, with at least 37 projects operating in 2012[159], of which 22 had a site-based component. The UN REDD agency is active in Cambodia, Vietnam, Lao PDR and Myanmar, supporting the development of country frameworks for REDD+ implementation. The potential of REDD+ to generate sufficient funds to incentivise forest conservation is currently dependent on voluntary markets.

Various mechanisms to allow **local communities** to share benefits and responsibility for management of protected areas and forest resources have been initiated. These have the potential to reduce conflict with protected areas, and simultaneously engage communities in protection of a park. There is considerable potential to expand and accelerate this approach in Myanmar and Lao PDR, where there are significant areas of natural habitat outside protected areas. The Myanmar Government has a target of 40 % of state forests being managed under community licences, but has only actually issued 3 %[160]. The Lao PDR National Protected Areas system aims to involve local stakeholders in designation and management, although finding the right balance between rural development and biodiversity conservation has proved challenging, and progress has only been made where donor projects are active[161].

3.1.5 International agreements and institutions

All the countries in the region are signatories of the main biodiversity conventions, with the exception of the Convention on the Conservation of Migratory Species of Wild Animals (CMS). They are also parties to the UN Convention on Transnational Organised Crime and the UN Convention Against Corruption, both relevant for combatting wildlife crime, as well as regional agreements.

Global environmental conventions

There are 40 sites declared under the Ramsar Convention in the region, but other international mechanisms are under-used, with only 15 sites under the United Nation's Man and Biosphere Programme (MAB), and five natural World Heritage Sites (WHS)[162]. Twenty PAs within the region are also ASEAN Heritage Parks (AHPs – see section on ASEAN below). Table 3.4 summarises the number of sites under international conventions, and Table 3.5 the status of species-focused conventions in the region. In addition, an informal, voluntary agreement for the protection of important sites for migrating shorebirds, the East Asian-Australasian Flyway Partnership (EAAFP), operates in the region.

The production of National Biodiversity Strategy and Action Plans (NBSAPs) under the auspices of the CBD can be an important platform to update the analysis of gaps in the protected areas system, the needs of threatened species, and for stakeholders to share information on their activities. The recent Myanmar NBSAP, for example, is the result of a year of consultation with government agencies, universities, NGOs and local CSOs. Other NBSAPs have suffered from lack of data and weak consultation processes. The Lao PDR NBSAP notes the lack of data on biodiversity other than birds and mammals in protected areas[163], while the Cambodian NBSAP notes that the country's clearing house mechanism is not needs-driven, stores limited information which is not updated, does not promote cooperation and does not offer information in the Khmer language.[164]

Some of these conventions also provide funds for conservation actions. The recently initiated Ramsar Indo-Burma Regional Initiative will support the designation and management of Ramsar sites in Myanmar, Cambodia, Thailand, Lao PDR and Vietnam, led by IUCN with the support of international NGOs and national governments[165], while the United Nations Educational, Scientific and Cultural Organisation (UNESCO) has a grants programme assisting conservation work in World Heritage Sites.

UNFCCC: Intended Nationally Determined Contributions (INDCs)[166]

All of the countries in the Greater Mekong region have submitted INDCs, with Cambodia, Thailand and Vietnam providing sector-specific GHG reduction commitments. Of these, Cambodia commits to an increase in national forest cover from 57 % to 60 % of land area by 2030, to be achieved by the reclassification of forests and the development of community forestry. Other countries offer targets in the land use, land-use

Table 3.4 Number of sites listed under international agreements and conventions

Country	Ramsar	MAB	WHS (natural)	AHP	EAAFP
Cambodia	4	1	0	2	*
Lao PDR	2	0	0	1	*
Myanmar[i]	2	1	0	7	3
Thailand	14	4	2	4	3
Vietnam	8	9	3	6	1
Total	40	15	5	20	6

Ramsar: the convention on wetlands; MAB: UNESCO Man and Biosphere programme; WHS: UNESCO Natural World Heritage Sites under the World Heritage Convention; AHP: ASEAN Heritage Parks, declared under the ASEAN convention; EAAFP: East-Asian Australasian Flyway Partnership sites.

**Candidate sites exist.*

(i) A proposal for a natural WHS in northern Myanmar is under development.

(156) Vietnam Forest Protection and Development Fund (2014). Payments for forest environmental services in Vietnam: Findings from three years of implementation. Available at http://www.gms-eoc.org/uploads/resources/539/attachment/PFES%20in%20Vietnam.pdf
(157) Hasan A. (2016). PFES and REDD+ in Vietnam – A two-pronged approach to forest conservation. CIFOR. http://blog.cifor.org/39399/pfes-and-redd-in-vietnam-a-two-pronged-approach-to-forest-conservation?fnl=en
(158) https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Local-presence/Asia/Vietnam/, accessed 25 April 2016.
(159) CEPF (2012). Op. cit.
(160) Wildlife Conservation Society (2013). Myanmar Biodiversity Conservation Investment Vision. WCS, New York.
(161) International Centre for Environmental Management, undated: http://www.mekong-protected-areas.org/lao_pdr/docs/lao_lessons.pdf, accessed 14 March 2016.
(162) A proposal for a site in northern Myanmar is under way.
(163) Government of Lao (undated). Biodiversity Conservation Report in Lao PDR. Available at http://chm.aseanbiodiversity.org/laochm/index.php?option=com_content&view=category&layout=blog&id=89&Itemid=41
(164) Kingdom of Cambodia (2016). National Biodiversity Strategy and Action Plan, p. 152. Available at http://www.chm.gdancp-moe.org/publications/national-biodiversity-strategy-and-action-plan.html
(165) https://www.ramsar.org/document/about-the-indo-burma-ramsar-regional-initiative-ibrri, accessed 14 March 2016.
(166) This section is based on ASEAN Social Forestry Network and NTFP Exchange Program (undated). Intended Nationally Determined Contributions from Forestry in ASEAN Countries. Available at http://ntfp.org/wp-content/uploads/2016/06/Policy-Paper-INDCs.pdf

Table 3.5 Status of the biodiversity-related conventions in the region

Country	CITES	CMS	CBD	UNFCCC	MRC
Cambodia	Party	Non-party[i]	Party	Party	Member
Lao PDR	Party	Non-party	Party	Party	Member
Myanmar[(i)]	Party	Non-party[i]	Party	Party	Dialogue partner
Thailand	Party	Non-party[i]	Party	Party	Member
Vietnam	Party	Non-party[i]	Party	Party	Member

CITES: Convention in International Trade in Endangered Species of Wild Fauna and Flora; CMS: the Convention on the Conservation of Migratory Species of Wild Animals; CBD: Convention on Biological Diversity; UNFCCC: United Nations Framework Convention on Climate Change MRC: Mekong Agreement and the Mekong River Commission.

(i) Countries are not party to the convention but have signed some of the agreements under the convention on marine turtles (Cambodia, Myanmar, Thailand, Vietnam) and dugong (Myanmar, Thailand).

change and forestry sector but less detail on how they will be achieved: Lao PDR refers to a plan to increase forest cover to 70 %; Myanmar to increasing the permanent forest estate to 30 % and the national protected areas system to 10 %; and Vietnam to an increase to 45 % forest cover with an emphasis on REDD+. Only Thailand makes no reference to land use and forestry as part of mitigation strategies, referring to it instead as part of adaptation, where an increase in community-managed forest is a mechanism to increase the resilience of selected ecosystems. Lao PDR's INDC has been upgraded to the country's Nationally Determined Contribution, submitted on 6 September 2016[167].

The **UN Sustainable Development Goals** (SDGs), adopted by Heads of State, including all the countries in the region in September 2015, recognise the links between environment and sustainable development. Goal 14 (life under water) and 15 (forest conservation, land degradation, conservation of wild and domestic biodiversity) are directly relevant to biodiversity, while 7 (energy), 8 (work and economic growth), 9 (industry and infrastructure) and 11 (sustainable cities and communities) address broader drivers. The SDGs specifically recognise wildlife trafficking as a key issue.[168]

ASEAN institutions and mechanisms

'Conservation and sustainable management of biodiversity and natural resources' is one of four areas under the 'sustainable' section of the ASEAN socio-cultural community blueprint 2025[169], with 10 strategic measures focused on regional co-operation to halt biodiversity loss and promote sustainable management of marine and terrestrial environments, address transboundary haze pollution, promote capacity development, promote the role of the ASEAN centre for biodiversity (see below), and the implementation of the CBD strategic plan for biodiversity and the Aichi targets.

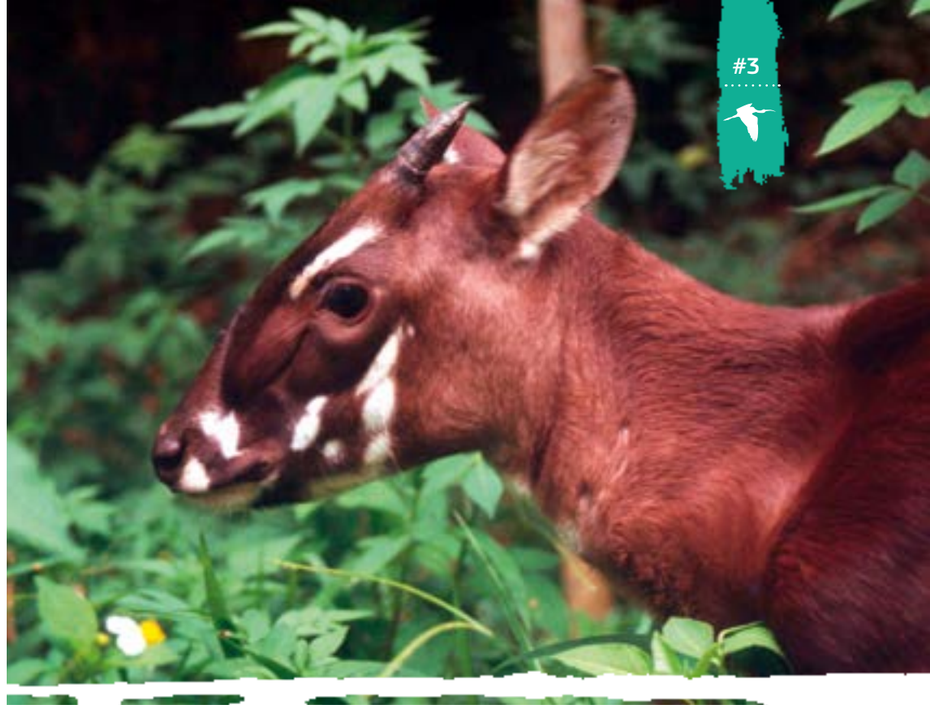
The ASEAN Centre for Biodiversity (ACB) originated as an EU-funded project called the ASEAN Regional Centre for Biodiversity Conservation, created to service the biodiversity management needs of the 10 ASEAN countries, including support to capacity development, data management, research and reporting to international agreements. In 2005, the institution became an ASEAN agency, with the continued support of the EU, the German development bank KfW Entwicklungsbank (KfW), the German technical assistance agency Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and other bilateral donors, as well as some of the ASEAN States themselves. The governing board of the organisation is the ASEAN Senior Officials on Environment and the ASEAN Secretary General, with technical oversight from the ASEAN Working Group on Nature Conservation and Biodiversity. The focus of the centre continues to be capacity development, information management, awareness raising and sustainable financing[170]. Major programmes include the ASEAN Clearing House Mechanism[171], support to the ASEAN Heritage Parks network[172], and the publication of analyses and reviews, including the ASEAN Biodiversity Outlook[173] and the Protected Areas Gap Analysis in the ASEAN region[174]. The ACB is an important entry point for supporting biodiversity conservation in the region because of its strategic role working with ASEAN Governments on, for example, delivery of the CBD's Aichi targets, a strategy for the delivery of ASEAN's 2025 Environmental Objectives and capacity building for wildlife law enforcement.

ASEAN Heritage Parks (AHPs) are existing protected areas proposed by national governments for nomination as AHPs because of their unique biodiversity and ecosystems, wilderness and outstanding values. By listing parks under the ASEAN Heritage Parks Declaration (which replaced the 1984 ASEAN declaration on Heritage Parks and Reserves in 2003[175]), countries commit to managing the parks effectively in order to maintain ecological services, preserve genetic diversity, ensure sustainable utilisation of species and ecosystems, and maintain wilderness that has scenic, cultural, educational, research, recreational and tourism values[176]. Currently, 40 AHPs cover all 10 ASEAN member states. ACB acts as a secretariat for the AHP network, and a number of donor programmes have supported the network through ACB, such as the KfW-funded small grants programme (see section 3.5), active in Myanmar (and the Philippines and Indonesia), and the EU-funded 'Biodiversity Conservation Management of Protected Areas in ASEAN'.

The Mekong River Commission

The MRC is an intergovernmental body established in 1995 by the Governments of Cambodia, Lao PDR, Thailand and Vietnam with the aim of jointly managing their shared water resources and developing the economic potential of the river. The two upstream countries, China and Myanmar, are 'dialogue partners' of the MRC. Member countries are required to inform the commission of any plans for dams.

Starting in 2007, the MRC began addressing the threat of climate change in the region and initiated the Climate Change and Adaptation Initiative in 2009. The initiative now has EU funding (see section 3.5) and technical support from the Global Climate Change Alliance[177] for strategic analysis and planning, including an assessment of climate change risks to wetlands and biodiversity in the region, capacity development, pilot project implementation in each of the MRC countries and mechanisms for regional cooperation.



Captive female saola, Vietnam. The saola was discovered in 1992 and is only found in the Annamite mountains on the Lao-Vietnam border. Ninteen local and international NGOs, universities and governments have formed the Saola Working Group to coordinate research, monitoring and protection of the species.

(167) http://www4.unfccc.int/ndcregistry/Pages/All.aspx, accessed 18 September 2016.
(168) Goal 15 on the sustainable use of terrestrial ecosystems includes commitment 15.7:'Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products'. https://sustainabledevelopment.un.org/post2015/transformingourworld, accessed 22 April 2016.
(169) The others are environmentally sustainable cities, sustainable climate, sustainable consumption and production. See http://www.asean.org/wp-content/uploads/2016/04/8.-March-2016-ASCC-Blueprint-2025.pdf, accessed 21 July 2016.
(170) http://aseanbiodiversity.org
(171) http://chm.aseanbiodiversity.org/
(172) There are 38 AHPs, all in ASEAN countries.
(173) The 2011 ASEAN Biodiversity Outlook and the 2017 ASEAN Biodiversity Outlook 2 are available on the ACB website, http://chm.aseanbiodiversity.org/index.php?option=com_wrapper&view=wrapper&Itemid=378. See also http://www.aseanbiodiversity.org/index.php?option=com_content&view=article&id=96&Itemid=114&current=110, accessed 25 April 2016.
(174) http://www.aseanbiodiversity.org/index.php?option=com_content&view=article&id=172&Itemid=179&current=110, accessed 25 April 2016.
(175) http://environment.asean.org/asean-declaration-on-heritage-parks/, accessed 21 July 2016.
(176) See http://chm.aseanbiodiversity.org/index.php?option=com_wrapper&view=wrapper&Itemid=110
(177) The Global Climate Change Alliance was launched in 2007 by the European Commission to strengthen dialogue and cooperation on climate change between the EU and developing countries http://www.gcca.eu/technical-and-financial-support/regional-programmes/gcca-lower-mekong-basin-ccai

A monk blesses a young Siamese crocodile before releasing it into the wild, Myanmar. A programme run by the Government and the NGO FFI collects hatchlings of this endangered species and rears them for a year in captivity. This 'head-starting' gives them a much greater chance of survival in the wild.

3.2 Community-based conservation

The Greater Mekong has many indigenous communities, although the extent to which they retain their traditional culture and resource management practices varies with the political history of the country. In some areas customary forms of resource management remain, while in others community-based resource management is being promoted by government agencies in the hope of achieving conservation and development gains, and mitigating conflict with local stakeholders. Myanmar has over 250 forest user groups, though as yet there is little progress in actually involving indigenous communities in PA management. Thailand has hundreds or perhaps thousands of community forests, and there are growing numbers in Cambodia, facilitated by the Community Protected Areas legislation[178]. In Vietnam, examples of collaboration between PAs and local people include payment for planting and protection of natural forests in Ba Be, Chu Mon Ray and Kon Kinh National Parks.

The Buddhist monasteries found throughout most of the region can be an effective catalyst for local action for conservation. Examples include village-level reforestation by the green shade movement in Cambodia[179], the involvement of monks in the conservation of the Cardamom Mountains through the Association of Buddhists for the Environment, and efforts by monks living in Alaungdaw Kathapa National Park, Myanmar to educate the 100 000 annual religious visitors about the environment[180].

Hunting and collecting is important for the majority of rural households in the region. In Cambodia and Lao PDR, 80 % of households depend on biomass energy for cooking and lighting, and up to 90 % of the income of marginal rural communities in Lao PDR is from non-timber forest products (NTFP) [181]. Environmental service valuations in three forest areas in Cambodia, Vietnam and Lao PDR concluded that non-timber forest products were worth EUR 2.91 per hectare per year (EUR 6 million per year over the study area)[182]. Establishing whether these critical livelihood activities are a threat to biodiversity is difficult[183], although evidence from NTFP studies globally suggests that if there is a market and tenure rights cannot be protected, over-exploitation is very likely. However, alternative and integrated approaches to the problem are needed, as law enforcement alone risks causing conflict and impoverishing local communities.

(178) Farrari M.F. (2006). Rediscovering Community Conserved Areas in South-east Asia: peoples' initiative to reverse biodiversity loss.
(179) http://www.arcworld.org/projects.asp?projectID=115, accessed 19 September 2016.
(180) ASEAN Centre for Biodiversity (2010). The ASEAN Heritage Parks: A Journey to the Natural Wonders of South-east Asia. Los Baños, Laguna, Philippines.
(181) ADB (2015). Investing in Natural Capital for a Sustainable Future in the Greater Mekong Subregion. ADB, Philippines. See http://www.adb.org/sites/default/files/publication/176534/investing-natural-capital-gms.pdf
(182) ADB (2015). Ibid.
(183) Sunderland T.C.H., O. Ndoye and S. Harrison-Sanchez (2011). Non-timber Forest Products and Conservation: What Prospects? Chap. 10 in Shackleton S., C. Shackleton and P. Shanley (Eds.). Non-timber Forest Products in the Global Context. ISBN 978-3-642-17982-2.

3.3 Civil society[184]

3.3.1 CSOs in the Greater Mekong

Thailand has the most active and diverse CSO community in the region, but the number and influence of domestic civil society organisations is rapidly increasing in Vietnam and Myanmar, while Cambodia and Lao PDR continue to restrict CSO freedom. Vietnam requires CSOs to be approved, and to obtain permission before they can receive funds from foreign donors. Cambodia now requires CSOs to be politically neutral and to register, with ministers given wide powers to cancel registration[185], while Lao PDR has an unclear framework for CSO regulation, allowing room for interpretation by the authorities (CSO activity is only tolerated on humanitarian issues). In Lao PDR a significant part of the sector are the youth and workers' organisations that function as CSOs but are under state control. The CSO sector in Myanmar is limited in number and capacity, but is developing rapidly in response to increasing political freedoms and increased access to donor funding. The Myanmar Government began to be more open to CSO input in 2010, and has allowed CSO participation in consultations on major national projects such as the Dawei SEZ and Myitsone dam[186].

Overall, domestic CSOs in the region are able to play a role supporting government, but find it difficult to take a critical or challenging position against state policies and actions. Some domestic CSOs are starting to influence public debates about environmental issues, but engagement in politically sensitive issues such as dam building or other major projects with impacts on human rights remain rare, and the majority continue to focus on grassroots economic empowerment and basic needs.

Domestic CSOs face the challenges of limited capacity. A CEPF[187] survey of 17 CSOs in Cambodia, Lao PDR, Thailand and Vietnam concluded that lack of human and financial resources were the greatest internal constraints they faced. Only 13 % of those surveyed had funding for more than 2 years ahead. The scale of their operations was also limited, with none having projects greater than EUR 769 000 in scale, although 60 % had a project over EUR 76 000. Symptoms of this lack of financial security are staff on short-term contracts and high staff turnover. The survey also found that CSOs do not have the full set of skills required to address conservation issues, with capacity for community engagement normally greater than for direct biodiversity work. Perhaps reflecting the environment in which they operate, the survey also found that accountability and transparency (publication of reports, accounts, etc.) were limited.

Universities and research institutions form an important component of the CSO community in the region, often acting as a repository for social and environmental data, and as a source of expertise for projects. The institutions are often more trusted by government than agenda-led CSOs, and so can have significant influence on policy formulation. This is especially the case in Vietnam and Thailand, both of which have a history of evidence-based policy-making.

International NGOs have a long history of providing technical assistance to governments and working directly with local communities and protected area managers. Political changes now allow them to invest more in the development of local civil society, and grant mechanisms, such as the Critical Ecosystem Partnership Fund, to support CSO-led conservation in the region. However, international NGOs are also subject to control by national governments, with requirements to register with and report to official bodies in all countries, and in some cases (e.g. Cambodia) requirements to obtain approval for individual projects. Networks of domestic and international NGOs have often formed around projects and specific issues. Their effectiveness has varied, dependent on funding and leadership, and also on the level of scrutiny from government, but successful networks include the Save the Mekong Coalition, which has allowed CSOs to jointly voice their concerns over the dam building[188].

3.3.2 CSO approaches and projects

International conservation NGOs such as BirdLife International, Conservation International, Fauna & Flora International, Wildlife Alliance, WCS, WWF and the Zoological Society of London (ZSL) play a vital role in supporting the management of national parks and protected areas in the region, especially in Cambodia, where the government provides very limited operational funding, but also at some sites in Lao PDR, Myanmar and Vietnam. In some cases, protected areas are dependent on NGOs for funding equipment and topping up salaries, a situation that is unsustainable, which can lead to misconceptions among local stakeholders about who is responsible for the protected area, and raises questions about the commitment of national governments. CSOs have pioneered new approaches and undertaken many grassroots projects addressing critical biodiversity

(184) CSO is defined as legally constituted non-government organisations, as well as informal groups, community groups, and interest groups such as cooperatives, unions or religious and social groups.
(185) The 2015 Law on Associations and NGOs restricted the freedom of CSOs and is reported to have been used to shut down NGOs and disrupt NGO events. See http://www.icnl.org/research/monitor/cambodia.html, accessed 20 July 2016.
(186) WCS (2013). Myanmar Biodiversity Conservation Investment Vision. Wildlife Conservation Society, Yangon, Myanmar.
(187) CEPF (2012). Op. cit.
(188) See for example https://www.internationalrivers.org/resources/9206

Giant ibis, Cambodia. An NGO project in the northern plains of Cambodia has paid farmers a premium price for rice grown using 'ibis friendly' agricultural methods.

conservation issues. Those that specifically impact on biodiversity conservation can be divided into species-focused, site-focused and issue-focused. Examples of species-focused projects include the following:

- Myanmar snub-nosed monkey, northern Myanmar: FFI and local partners are undertaking research and advocating protection of the species' small, known global range[189,190];
- Cao Vit gibbon, Tonkin snub-nosed monkey, western black-crested gibbon, Vietnam: community-based approaches to conservation of endangered primates restricted to small forest areas, implemented by FFI, People, Resources and Conservation Foundation, and Centre for Plant Conservation;
- Irrawaddy dolphin, in a 125 km stretch of the Mekong in Cambodia and Lao PDR: WWF support to reduce dolphin by-catch through improved fisheries management, and preserve habitat by advising the government on more sustainable hydropower[191,192];
- Cat Ba langur, Vietnam: community engagement and enforcement of protection of an endangered primate found on a single limestone island in north Vietnam, implemented by Munster Zoo and Zoologische Gesellschaft für Arten- und populationsschutz;
- Vulture species: Cambodia vulture conservation project, implemented by BirdLife International, WCS, WWF, Sam Veasna Centre and Angkor Centre for the Conservation of Biodiversity working with government departments;
- Sarus crane research and habitat restoration in the lower Mekong delta in Cambodia, undertaken by BirdLife International and partners;
- Giant ibis in northern Cambodia, where rice field intensification threatens a forest mosaic landscape. Since 2009, WCS has implemented a conservation enterprise development programme where local communities get a premium income from the sale of high-quality rice, produced in a bird-friendly agricultural system[193];
- Freshwater turtles: programmes to create assurance populations of threatened turtles and terrapins by Singapore Zoo[194], with the intention that these populations are the basis for breeding programmes and returning surplus offspring to the wild[195];
- Multiple tiger conservation projects implemented by WCS, WWF, Zoological Society of London (ZSL), FFI and others;
- Campaign work (e.g. by TRAFFIC, Animals Asia) in Lao PDR, Vietnam and China to stop the exploitation of Asiatic black bears and sun bears in bile extraction for traditional medicine[196].

While examples of site-based projects include the following:

- Western Forest Complex (Thailand), where WCS has been supporting national parks for 14 years, focusing on four core sites, while WWF and ZSL support five further sites;
- Nam Et-Phou Louey NP (Lao PDR): WCS has supported improved enforcement and patrolling since 2002;
- Conservation in the eastern plains dry forests and northern plains dry forests of Cambodia, Vietnam and Lao PDR: BirdLife International (Western Siem Pang, Cambodia, recently declared a reserve[197]); WWF (Mondulkiri Protected Forest, Cambodia) and WCS are supporting the management of four out of the five protected areas and working to establish effective on-the-ground monitoring and law enforcement;
- Thap Lan National Park (Thailand): Panthera and Freeland are supporting management;
- Dong Phayayen-Khao Yai (Thailand): Freeland is supporting integrated approaches with SMART patrols, training, human-wildlife conflict mitigation, and alternative livelihood promotion.

Issue-focused CSO actions include addressing wildlife crime, with the Environmental Investigation Agency, Freeland, International Fund for Animal Welfare, TRAFFIC (an alliance of WWF and IUCN), WCS, WildAid and WWF working as partners in many initiatives by governments (section 3.1.3), and international agencies and donors (section 3.1.5). The roles they play include investigating and monitoring the trade, and providing figures and analysis to guide policy-making by governments, international organisations and multinational agreements; capacity building and training of officials, decision-makers[198]; maintenance of databases (including the Elephant Trade Information System, managed by TRAFFIC for CITES) and facilitation of information sharing; campaigning in source and market countries[199], aiming to influence policy-makers and consumers; operating facilities to receive, treat and where possible release live animals confiscated during law enforcement.

NGOs have also acted as catalysts in the creation of multi-stakeholder groups focused on the conservation of particular species or habitats, as the following examples demonstrate.

- The saola working group, a collaborative partnership with 19 members representing Vietnamese, Lao PDR and international NGOs, universities and governments, was formed under the Asian Wild Cattle Specialist Group of the IUCN Species Survival Commission. Partners are implementing actions, including research and monitoring of hunting and other threats, which feed into improved enforcement and monitoring of the saola population, and site-based conservation action focused on saola landscapes in the Annamite Mountains of Vietnam and Lao PDR[200,201].
- The Asian Species Action Partnership (ASAP)[202] was formed under the auspices of IUCN in 2008. ASAP has 43 partner conservation organisations and works with the IUCN Species Survival Commission specialist groups. The network aims to mobilise support, facilitate collaboration, pool resources and galvanise political will for the conservation of 174 critically endangered species in Asia.
- NGOs have worked to find alternatives to killing animals (especially tiger and elephant) involved in human-wildlife conflict. Kaeng Krachan National Park (Thailand) recorded 1 705 incidents of human-elephant conflict in the 9 years 2005-2013, causing an estimated EUR 408 000 worth of crop damage and elephant deaths. In 2006, experiments showed that alarm fences and night patrol teams were the most effective response, and this approach was promoted to villagers. Since then elephant damage has decreased, and over 90 % of raids can now be stopped. (In 2013, night patrols encountered elephants 352 times, and were able to stop or divert them 321 times, preventing at least 134 incidents and saving farmers an estimated EUR 66 000). Farmers are now able to re-cultivate land that they had abandoned because of the conflict, improving their livelihoods[203].

A range of NGOs also works on community natural resource management issues, including for example the NTFP-Exchange programme in Vietnam and Cambodia.

(189) Wildlife Conservation Society (2013). Conservation Vision for Myanmar.
(190) http://www.fauna-flora.org/species/myanmar-snub-nosed-monkey/, accessed 14 March 2016.
(191) WWF-Cambodia (2015). Strategic Plan FY [funding year] 2016-2020.
(192) http://wwf.panda.org/what_we_do/endangered_species/cetaceans/about/irrawaddy_dolphin/index.cfm, accessed 28 April 2017.
(193) http://cambodia.wcs.org/Conservation-Initiatives/Communities-and-Livelihoods/Wildlife-Friendly-Products.aspx, accessed 24 April 2016.
(194) https://wrscomsg.wordpress.com/2016/05/20/worlds-rarest-tortoises-race-against-extinction-at-singapore-zoos-new-tortoise-shell-ter/, accessed 9 September 2016.
(195) Horne B.D. et al. (Eds.) (2012). Op. cit.
(196) http://www.iucnredlist.org/details/22824/0, accessed 16 August 2016.
(197) http://www.birdlife.org/worldwide/projects/forests-hope-site-western-siem-pang-forest-cambodia
(198) See, for example, Freeland's work on capacity strengthening for PA rangers and managers, based on the ASEAN Centre for Biodiversity's competence standards for PAs: http://www.freeland.org/programs/protect/, accessed 22 April 2016.
(199) See, for example, IFAW's campaigns on ivory using prominent Chinese spokespeople, http://www.ifaw.org/united-kingdom/news/chinese-cultural-icons-plead-lives-elephants-media-blitz, and WildAid's campaigns on tiger, pangolin, rhino and elephant: http://wildaid.org/programs, accessed 22 April 2016.
(200) See http://www.savethesaola.org/#/about/4560926004, accessed 20 July 2016.
(201) http://www.savethesaola.org/the-saola/, accessed 9 September 2016.
(202) http://www.speciesonthebrink.org/about-us/
(203) WCS (2014). Saving Wildlife in the Kaeng Krachan Forest Complex. WCS, New York.

Forest canopy in the Nakai-Nam Theun Biodiversity Conservation Area, Lao PDR. The reserve protects the watershed that feeds the Nam Theun hydropower plant. The power company contributes towards the costs of the PA.

Rubber plantation, Thailand. Tyre production uses 70 % of the world's rubber; 90 % of this is grown in South-East Asia, where planting rubber is a major driver of deforestation. In 2016 Michelin and General Motors put in place policies to ensure that the rubber they buy does not cause deforestation.

3.4 Private sector initiatives

Private sector support to biodiversity conservation in the region is still limited, but the potential is large given the rapid economic growth, growing foreign investment and proliferation of business in the region. In Myanmar, three companies operating gas pipelines crossing the Tenasserim Range in the south-east pay into a biodiversity compensation fund[204]. To date they have provided funding of EUR 923 000 for each of two 4-year phases (2005-2008 and 2008-2012), and EUR 1.3 million for a third phase (2013-2016). The funds are paid to the Forestry Department to establish and manage the 1 680 km² Taninthayi nature reserve, and to deliver socio-economic benefits to the surrounding communities on the basis of 4-year work plans agreed by all parties. WCS has been closely involved in providing technical support for the project. Although the direct impact of the pipelines on biodiversity was not measured and is not being off-set by the project, the project is considered to have contributed to biodiversity conservation in an area of global importance. Voluntary commitments are in place to continue the support for at least the life of the pipelines, until 2028. A similar example is the payment of EUR 769 million a year by the Nam Theun 2 power company (Lao PDR) to support the management of the Nakai-Nam Theun Biodiversity Conservation Area.[205]

The cement industry has a specific and very significant role in the loss, and potentially the conservation, of karst areas, and the many unique and threatened species that they support (see section 2.1.6). One of the largest cement companies operating in the threatened Hon Chong hills of southern Vietnam has engaged relevant experts to survey the hills, and has collaborated with IUCN on the production of an action plan for sustainable mining. Some actions have now been taken to protect the area, although further progress is urgently needed, and the other companies operating in the area must also take action if extinctions are to be avoided[206].

Companies have also made direct payments to NGOs in support of specific conservation objectives. WWF in Vietnam has partnerships with the International Investment Bank (conservation of Asian elephant in Vietnam), HSBC bank (saola and forest protection), Coca-Cola (Tram Chim National Park management), giant ibis transport (conservation of giant ibis in Western Siem Pang, Cambodia) and Microsoft (mangrove restoration)[207]. Multiple corporate donors, including Samsung, Seagate and Animal Planet, support the ARREST wildlife trafficking consortium. FFI and WCS also have corporate partnerships in the region.

Some of the sectors that have the greatest impacts on biodiversity have launched voluntary initiatives to make their business more sustainable, although uptake in the region is limited.

- 912 **Forest Stewardship Council** (FSC, timber products) licences have been issued in the region[208], all but 13 of them in Thailand and Vietnam[209], and most for processing, not harvesting. The area certified is small: 828 km² in Lao PDR, 186 km² in Thailand, 560 km² in Vietnam, where there are two pilot sites for Forest Ecosystem Services certification, and the first community forests were certified in 2013[210]. Currently there are no FSC-certified forest concessions in Cambodia or Myanmar.
- **Roundtable on Sustainable Palm Oil** (RSPO) has only 67 members in the region, 14 of them palm oil growers, and of these 13 are in Thailand and 1 in Cambodia.
- **Sustainable Rice Platform** is a UNEP-International Rice Research Institute-coordinated initiative to promote sustainability in rice production.[211]
- The **Cement Sustainability Initiative** was established under the auspices of the World Business Council on Sustainable Development, and has 24 members representing 40 % of global cement production, including two Thai companies. The initiative charter requires reporting against environmental and social standards[212], including documentation of management of high-value biodiversity sites and protected areas (in line with the Global Reporting Initiative[213]), although reporting on the success of biodiversity management or status of the threatened species is not required. The initiative is a forum for industry, rather than a platform for interaction between stakeholders (c.f. the RSPO, for example).
- **Sustainable Natural Rubber Initiative:** Conversion to rubber plantations has historically been an important driver of land-use change in the region, and the issuing of a zero deforestation policy from the world's largest tyre manufacturer, Michelin[214], in 2016 is an important step forward for the industry.

RSPO and FSC have complaint mechanisms, which have been used to expel companies that have been found to be in breach of the certification criteria.[215] Sustainability and certification schemes also operate for shrimp production from aquaculture (section 2.1.7), but data from certification bodies suggests that less than 2 % of farms are certified across the region.[216]

(204) Pollard E.H B., S.W. Hlaing and J.D. Pilgrim (2014). Review of the Taninthayi Nature Reserve Project as a conservation model in Myanmar. The Biodiversity Consultancy, Cambridge, UK. http://myanmarbiodiversity.org/wp-content/uploads/2016/02/2014-Review-of-the-Taninthayi-Nature-Reserve-Project-25OCT2014Final.pdf
(205) The contribution to the management of three protected areas is claimed to have reduced illegal logging, although the dam remains the subject of debate about environmental and social impacts. See http://www.rfa.org/english/news/laos/dam-12092010165549.html
(206) FFI (2016): http://www.fauna-flora.org/news/bugs-of-distinction-on-brink-of-extinction/, accessed 19 August 2016.
(207) http://vietnam.panda.org/en/corporate_engagement/cr_programs/, accessed 24 April 2016.
(208) http://info.fsc.org/index.php, accessed 25 April 2016.
(209) http://forces.fsc.org/vietnam.28.htm
(210) http://wwf.panda.org/wwf_news/?208998/First-group-in-Vietnam-receives-FSC-certificate, accessed 25 April 2016.
(211) http://www.sustainablerice.org/index.html
(212) http://www.wbcsdcement.org/index.php/en. For example, LafargeHolcim reports that in 2015, 268 of its global portfolio of 855 quarries were high biodiversity value, and that of these, 215 (80 %) have a biodiversity management plan in place.
(213) https://www.globalreporting.org/resourcelibrary/sustainability-topics.pdf
(214) http://www.worldwildlife.org/press-releases/wwf-statement-on-new-zero-deforestation-policy-from-michelin, accessed 18 July 2016.
(215) For example, the expulsion of the Vietnam Rubber Group from the FSC for illegal forest destruction and taking land from indigenous peoples without consent. See https://www.globalwitness.org/en-gb/press-releases/vietnam-rubber-group-stripped-forest-stewardship-council-certification-forest-destruction-illegal-land-grabs-and-human-rights-abuses/, accessed 25 April 2016.
(216) Portley N. (2016). SFP Report on the Shrimp Sector: Asian Farmed Shrimp Trade and Sustainability. Sustainable Fisheries Partnership Foundation. 22 pp. Available from www.sustainablefish.org

3.5 International agencies and donors

Vietnam was the third largest recipient of gross Official Development Assistance (ODA) from Development Assistance Committee (DAC) countries globally in 2015-16[217], and the region as a whole received EUR 2.7 billion in ODA in 2015 (Table 3.6 and 3.7). Donor funding patterns in the region are shifting in response to changing priorities, budget cuts for donors and economic development in the recipient countries, with moves away from direct project funding towards budget support, and in some cases cessation of donor support[218]. As economies in the region grow, the relative importance of bilateral and multilateral aid is declining, and for the poorer countries (Lao PDR, Cambodia, Myanmar), western donor organisations are less important than aid and trade investment from neighbouring China, Vietnam and Thailand. In addition to providing aid and investment, Chinese companies are an increasingly important source of corporate social responsibility funding in the region.

Approximately 80 % of the ODA received by the countries of the region came from nine bilateral donors, with over 40 % from Japan. The other major donors were Germany, Australia, the USA, France, the EU, the United Kingdom (UK), Norway and Denmark (Table 3.7).

Between 2006 and 2010, spending on 700 biodiversity conservation programmes in the region totalled over EUR 240 million[220], of which 41 % came from development assistance donors, 39 % from national governments, and 19 % from foundations and other sources. In a region with such a concentration of critically threatened species, this is a relatively small investment. In addition, much of the funding was directed towards sustainable natural resource management and policy development. Little funding explicitly addressed the protected area management or wildlife crime issues identified as the greatest threat to biodiversity in the region. Significant funding is now available for climate-change mitigation and adaptation, but the amount and how much is being shifted from other environment budgets is unclear.

Bilateral donors

European Union

The EU provides bilateral aid to Cambodia, Lao PDR, Myanmar and Vietnam. Thailand is not eligible for bilateral aid but receives assistance under thematic budgets. In total, the EU allocated EUR 244 million[221] in the region in 2014, of which EUR 15.9 million was for 'multisector/cross cutting', which includes environment. The main (>EUR 1 million) EU-funded projects in the region since 2010 in the fields of biodiversity, global climate change and sustainable economy represent a total investment of over EUR 46 million, although some of this is shared with other regions. The bulk of the investment (7 projects, >EUR 22 million) is related to climate change, while there are another 6 projects (>EUR 12 million) addressing biodiversity issues and 6 projects (>EUR 11 million) on sustainable production and consumption.

Biodiversity-focused projects addressed the links between biodiversity and payment for ecosystem services (PES) in Thailand and the Cardamom mountains, Cambodia; the identification of key biodiversity areas and strengthening of the protected area networks in Myanmar; and the sustainable financing and economic and social benefits of protected areas in Myanmar, Cambodia and Lao PDR.

The EU was the initiator and funder[222] of the ASEAN regional centre for biodiversity conservation project with the Philippines' Department of the Environment and Natural Resources. It later became the ASEAN Centre for Biodiversity[223], a key institution promoting cooperation in biodiversity conservation and a reference in the region. The Biodiversity Conservation and Management of Protected Areas in ASEAN project is a 5-year (2017-2022), EUR 10 million programme, which will support ACB's work with ASEAN member states on biodiversity conservation, especially the management of ASEAN heritage parks[224].
A second regional programme, funded jointly with the Government of Germany, is the Sustainable Use of Peatland and Haze Mitigation in ASEAN, which has an overall funding volume of EUR 24.5 million. The programme targets peatlands in all five of the Greater Mekong countries, as well as Indonesia, Malaysia and the Philippines.

The EU has recognised its role as both a destination market and transit point for the global illegal wildlife trade and produced the **EU Action Plan Against Wildlife Trafficking[225]** (2016-2020), which aims to reduce the demand and supply of illegal wildlife products globally; address differences in the way that different Member States implement and enforce the shared rules of wildlife crime; and strengthen global partnerships between source, transit and consumer countries. The strategy addresses many of the actions highlighted in section 5 of this chapter and the synthesis report. In the Greater Mekong this might include raising awareness, reviewed protected species lists, work on livelihoods in source communities, engagement with private sector players and addressing corruption, while within the EU this could include improved detection, compliance, cross-border cooperation including data sharing, and capacity strengthening. The strategy includes EU support for international cooperation on Wildlife Enforcement Networks (WENs) and the ICCWC, but also recognises the potential role of EU trade policies and development funding in the effort.

Table 3.6 Net ODA receipts for each country in the Greater Mekong region, 2011-2015

Country	Net ODA (EUR million)				
	2011	2012	2013	2014	2015
Cambodia	381.77	482.46	411.00	419.23	360.08
Lao PDR	207.46	218.69	206.23	240.08	267.77
Myanmar	213.00	263.00	2 771.15	891.46	677.00
Thailand[i]	-140.85	-156.85	-79.92	212.31	-0.46
Vietnam	1 603.15	2 042.69	1 830.15	1 867.00	1 397.85
Total	2 264.54	2 850.00	5 138.62	3 630.08	2 702.23

(i) Negative figures indicate that debt interest and repayments were greater than funds received for the year. Source: Organisation for Economic Cooperation and Development (OECD).[219]

(217) OECD: https://public.tableau.com/views/AidAtAGlance/DACmembers?:embed=y&:display_count=no?&:showVizHome=no#1, accessed 28 April 2016.
(218) For example, the UK's Department for International Development has withdrawn from Cambodia; Dutch and Swedish bilateral agencies have pulled out of Vietnam.
(219) OECD (2016). Geographical Distribution of Financial Flows to developing countries 2016. http://www.keepeek.com/Digital-Asset-Management/oecd/development/geographical-distribution-of-financial-flows-to-developing-countries-2016_fin_flows_dev-2016-en-fr#page83. DOI: 10.1787/fin_flows_dev-2016-en-fr
(220) Based on a review of 700 conservation projects active during the 2006-2010 period by CEPF (2012). Op. cit.

Farmer Cil Yu Ha Vuong on forest patrol, Vietnam. An ADB project assisted community forest protection and the adoption of alternatives to shifting cultivation. It supported the country's PFES scheme, which pays farmers to maintain forests.

(221) EU (2015) 2015 Annual Report on the European Union's development and external assistance policies and their implementation in 2014. Available at: http://ec.europa.eu/europeaid/sites/devco/files/swd-2015-248-f1-other-staff-working_paper_en_0.pdf. This figure is the total allocation, as opposed to net ODA (actual disbursements minus any loan repayments) in Table 3.7.
(222) A grant to the Philippines Department for Environment and Natural Resources for an Asian Regional Centre for Biodiversity Conservation (ARCBC) of EUR 9.5 million, 1999-2004.
(223) The ACB was launched on 27 September 2005 as a permanent ASEAN institution. A financing agreement between the European Commission and the ASEAN Secretariat provided EUR 6 million for establishment and initial operations of the ACB, 2005-2010.
(224) Information from a presentation made by the Delegation of the EC to Manila, March 2017
(225) European Commission (2016). EU Action Plan Against Wildlife Trafficking. COM(2016) 87 final. European Commission, Brussels. Further details are in the synthesis report and at https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-87-EN-F1-1.PDF

Training for nature guides, Hlawga Wildlife Sanctuary, Myanmar. CEPF funding to the Harrison Institute supported the training, which aims to contribute to the development of sustainable tourism in Myanmar. Increasing local capacity allows local people to benefit from the growing eco-tourism sector.

In response to the crisis in wildlife trafficking in the region, the EU is providing EUR 5 million funding for a joint project of CITES and UNODC, the **Asia Wildlife Enforcement and Demand Management** project[226].

In Lao PDR, in an effort to facilitate collaboration on illegal wildlife trade issues, 11 national entities, the EU, the World Bank and the UNODC have formed **Working Group 15.7**[227] to work with government, civil society and the private sector to apply emerging global approaches to tackling wildlife trafficking.

Improving forest governance through a multi-stakeholder consultative process is key to reducing the level of illegal logging and partial deforestation. The EU works with countries that wish to supply verifiably legal timber to EU markets through the **Forest Law Enforcement, Governance and Trade** action plan (FLEGT), with the option to sign a Voluntary Partnership Agreement (VPA). The EU funds 53 FLEGT-related projects across the five countries, with a focus on improving forest data, transparency, governance and management, capacity-building of all stakeholders, and participation of civil society. Lao PDR, Thailand and Vietnam are currently negotiating VPAs.

The EU finances the World Bank-led WAVES partnership on Natural Capital Accounting (see under World Bank, below), and the Critical Ecosystem Partnership Fund (see below).

Japan

Japanese aid to the region will increase with a commitment made to provide EUR 4.6 billion over the next 3 years. The Japanese-Greater Mekong programme has 'sustainable development' as one of four pillars, emphasising disaster-risk reduction, climate change, conservation and water resource management.[228]

Germany

The German bilateral development bank, KfW, is a major supporter of the Vietnamese reforestation and land-management programmes using the 'savings book' approach, where families are rewarded for the establishment of new forests and the sustainable management of existing ones, contributing to enhanced soil fertility, biodiversity conservation and watershed protection[229]. Aid to Lao PDR also includes support to community development through multiple-use zones around protected areas, and KfW provides about EUR 10 million for improved management and community engagement in selected AHPs, disbursed through a small-grants programme managed by the ASEAN Centre for Biodiversity (ACB). The German technical cooperation agency GIZ supports protected area management projects in Hin Ham No National Protected Area in Lao PDR (EUR 6.3 million, 2010-2018) and Phong Nha-Ke Bang in Vietnam (EUR 6.3 million, 2007-2016). There are also GIZ regional projects on 'biodiversity-based products as an economic source for the improvement of livelihoods and biodiversity protection' working across the 10 ASEAN member states through the ACB (EUR 4 million, 2014-2019), and 'Institutional Strengthening of the Biodiversity Sector in ASEAN', supporting ACB to carry out its role in support of ASEAN governments (EUR 5 million, 2014-2019). Other projects in the region address flood management in the Mekong, REDD+ development and the promotion of the EU-FLEGT scheme. The German Federal Ministry for Economic Cooperation and Development (BMZ) and KfW launched the

(226) Further details of this Asia-wide project are in the synthesis report, and available at http://www.unodc.org/brussels/en/unodc-cites-asia-wildlife-enforcement-and-demand-management-project.html, accessed 17 June 2016.

(227) The name is a reference to target 15.7 of the Sustainable Development Goals, which is 'take urgent action to end poaching and trafficking of protected species of flora and fauna, and address both demand and supply of illegal wildlife products'. Members are Australia, France, Germany, Japan, Republic of Korea, Singapore, Switzerland, Thailand, United Kingdom, United States of America, Vietnam, EU, UNODC and the World Bank.

(228) http://thediplomat.com/2015/07/the-real-importance-of-japans-new-strategy-for-the-mekong/, accessed 24 April 2016.

(229) https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Local-presence/Asia/Vietnam/, accessed 25 April 2016.

Table 3.7 Net ODA receipts from OECD donors, 2015

Country (ISO code)	ODA (EUR million) (2015)								
	EU	Australia	Belgium	Canada	Denmark	Finland	France	Germany	Ireland
KHM	34.77	37.85	3.00	3.15	0.23	2.08	50.62	22.23	0.46
LAO	8.31	28.00	0.92	1.46	0.00	4.62	9.23	19.69	0.46
MMR	92.38	2.62	0.23	9.69	5.69	7.00	3.23	14.31	1.00
THA	9.85	3.38	0.00	0.00	-0.46	0.23	7.46	4.08	0.23
VNM	45.08	79.92	10.85	15.31	10.08	9.54	65.15	100.92	9.69
Total	190.38	191.77	15.00	29.62	15.54	23.46	135.69	161.23	11.85

Table 3.7 (continued)

Country (ISO code)	ODA (EUR million) (2015)									
	Korea	Luxembourg	Norway	Spain	Sweden	Switzerland	UK	USA	Others	Total
KHM	50.69	0.38	5.23	0.00	18.77	11.31	3.31	66.23	6.23	394.85
LAO	67.38	12.46	3.77	0.00	0.46	15.31	2.77	19.46	3.69	276.08
MMR	16.31	1.00	24.46	0.00	18.38	31.00	133.85	87.38	10.77	769.38
THA	3.62	0.08	0.69	0.08	3.69	1.38	4.46	33.38	1.31	9.38
VNM	167.08	8.69	7.38	-18.15	-0.69	19.08	14.46	61.62	10.08	1 442.92
Total	305.08	22.62	41.54	-18.08	36.69	78.08	158.85	268.08	32.08	2 892.62

Source: OECD.[230] Negative values appear when repayments on ODA loans exceed income from ODA.

(230) OECD (2017). Geographical Distribution of Financial Flows to Developing Countries 2017: Disbursements, Commitments, Country Indicators. OECD, Paris. Available at http://www.keepeek.com/Digital-Asset-Management/oecd/development/geographical-distribution-of-financial-flows-to-developing-countries-2017_fin_flows_dev-2017-en-fr/, accessed 15 December 2017.

^ *Upland farmers, Lao PDR. An EU-funded project is working with indigenous upland communities in Lao PDR to enable them to adapt their farming system to climate change, at the same time as improving their livelihoods. One successful innovation has been the development of tea agroforests.*

‹ *Training wildlife enforcement officers to use the WildScan App, Thailand. The app allows officers or the public to identify and report wildlife being illegally traded. International collaboration between NGOs, government and donors is a vital part of the response to the illegal wildlife trade.*

^ *Tam Dao National Park, Vietnam, was the site of a bilateral Vietnamese-German project piloting strategic environmental assessment. The participatory planning process contributed to integrating economic development and the conservation of biodiversity in the park's buffer zone.*

Integrated Tiger Habitat Conservation Programme in 2014. The programme currently supports two projects in the sub-region, in the north and south of Myanmar.

USA

The US Agency for International Development (USAID) supports Asia's Regional Response to Endangered Species Trafficking (ARREST) programme[231]. The programme brings together the 10 ASEAN member countries, the ASEAN-WEN, China, South Asian countries and NGOs and private sector organisations and encourages collaboration to reduce consumer demand and improve enforcement[232]. It has had some success in the Greater Mekong region[233]. The agency also has bilateral programmes in Cambodia and Vietnam.

Australia

Australian aid to the region is within the context of close political and economic ties with ASEAN, including the implementation of the newly established ASEAN-Australia-New Zealand free trade zone. It is focused on supporting the ASEAN economic community to create closer economic ties within the region, including improved international management of the Mekong water resources, and on responses to the trafficking of migrant workers.[234]

Significant regional programmes supported by bilateral donors include the Mekong River Commission's Climate Change and Adaptation Initiative, supported by the EU and Australia, Denmark, Finland, Germany, Luxemburg and Sweden.[235]

United Nations agencies

Among the UN Agencies, **UNODC** has broadened its remit to contribute to efforts against wildlife trafficking through its Global Programme for Combating Wildlife and Forest Crime. The programme focuses on strengthening policy and regulatory frameworks, capacity-strengthening work for enforcement officers and prosecutors, awareness promotion and exchanges, and catalysing cooperation across the region.[236] UNODC has produced the Wildlife and Forest Crime Analytic Toolkit, and works through the ICCWC partnership[237]. **UNODC, UNEP** and the NGO **Freeland** have recently completed the Partnership Against Transnational-crime through the Regional Organized Law-enforcement (PATROL) project, supported by Australia and the USA. The project aimed to build capacity amongst the law enforcement agencies of the five Greater Mekong countries, focusing on the development of the border liaison offices' system to address illegal human and drug movement, as well as environmental crimes.[238]

The **United Nations Development Programme** (UNDP) and **UNEP** have focused on the green growth agenda in the region, through the Poverty-Environment Initiative amongst others. UNEP also facilitates a range of regional forums on the environment, including the 5-yearly Asia Pacific Ministerial Conference on Environment and Development and (with ASEAN secretariat) builds capacity for mid-level officials through the ASEAN+3 Leadership Programme on Sustainable Consumption and Production.

UNDP's Biodiversity Finance Initiative (BIOFIN)[239], launched in 2012, is a global partnership addressing the biodiversity finance challenge, enabling countries to measure their current biodiversity expenditures, assess their financial needs in the medium term and identify the most suitable finance solutions to bridge their national biodiversity finance gaps. BIOFIN is active in 31 countries worldwide, including Thailand.

UNESCO has carried out Climate Change Vulnerability mapping for the Greater Mekong, and supports the declaration and management of World Heritage Sites and Biosphere Reserves (section 3.1.5).

Multilateral development banks

The World Bank and Asian Development Bank (ADB) are primarily focused on poverty reduction through economic development in the region, with ASEAN economic integration a key goal. However, they also participate in multi-donor efforts, and act as implementing agencies for GEF projects (see below).

ADB has supported a Biodiversity Conservation Corridors Initiative that aims to mitigate the impact of improved road networks in three economic corridors. The roads will impact important biodiversity regions including Thailand's Western Forest Complex and the Central Annamites in Vietnam and Lao PDR (and also the Shiwandashan Range in China). Phase 1 (2006-2010) invested EUR 10.3 million, mostly from the Netherlands and Sweden, while phase II (2011-2015, extended to 2016) brings EUR 21.8 million in funding from Finland, Sweden and the Nordic development fund. Programme activities have focused on strengthening national-level units and capacity building for local communities in six biodiversity corridors to manage forest resources and the development of alternative incomes. ADB is also supporting transboundary cooperation between Guangxi Autonomous Region (China) and Cao Bang Province (Vietnam) for the conservation of the Sino-Vietnamese Limestone Landscape, and between the Xishuangbanna Reserve (China) and the Nam Ha NPA (Lao PDR). The programme is part of ADB's Greater Mekong sub-region (GMS) Core Environment Programme[240], which is coordinated by an environment operations centre in Bangkok. The programme focuses on support for planning and safeguards, transboundary biodiversity landscapes, climate-change resilience, and institutions and financing for sustainable environmental management.

Relevant **World Bank** projects in the region include the Scaling-up participatory sustainable forest management project in Lao PDR (EUR 14.6 million, 2013-2018), which focuses on the community management of both production and conservation

(231) See Freeland, http://www.freeland.org/stop-wildlife-trafficking/arrest-asia/
(232) Further details of this Asia-wide project are in the synthesis report, and available at https://www.usaid.gov/biodiversity/wildlife-trafficking
(233) http://www.freeland.org/press-releases/usaid-program-boosts-wildlife-enforcement-awareness-asia/
(234) http://dfat.gov.au/geo/east-asia/development-assistance/Pages/development-assistance-asean-mekong.aspx
(235) http://www.mrcmekong.org/about-mrc/programmes/climate-change-and-adaptation-initiative/, accessed 21 July 2016.
(236) http://www.unodc.org/southeastasiaandpacific/en/what-we-do/toc/wildlife-overview.html, accessed 9 August 2016.
(237) https://www.unodc.org/unodc/en/wildlife-and-forest-crime/, accessed 25 April 2016.
(238) https://www.unodc.org/southeastasiaandpacific/en/patrol.html

(239) http://www.biodiversityfinance.net/about-biofin/what-biodiversity-finance
(240) http://www.gms-eoc.org/the-program

forests; the Lao Environment and social project (previously the Protected areas and wildlife project), now in its second phase (total >EUR 24 million), which supports site-level management of biodiversity conservation areas as well as policy and institutional development. The Climate change and green growth project in Vietnam (EUR 69 million, 2016-2017) is the first of a series of loans supporting climate-change adaptation planning and programming.

The **World Bank** and **UNEP** are both working on mechanisms to incorporate the valuation of ecosystems into the economic analysis that underpins policy-making through approaches such as total economic valuation[241], mapping essential natural capital[242] and natural capital accounting[243], including the World Bank-led WAVES partnership[244]. UNEP's natural capital evaluation approach also makes the links between environmental degradation and disaster risk, using the result to influence the risk analysis and financial products of the financial industry; and the Partnership for Environment and Disaster Risk Reduction promotes the link between sustainable environmental management and disaster risk reduction[245].

Multi-donor funds and initiatives

The **Global Environment Facility**[246] (GEF) has been one of the largest investors in biodiversity conservation in the region, through both biodiversity and climate-change dedicated funding. GEF is now in its sixth funding cycle (2014-2018), with a total allocation for the five countries of the Greater Mekong of EUR 80 million, of which 44 % (EUR 35 million) is allocated for biodiversity and 47 % (EUR 37.9 million) for climate change, with the remaining 9 % for land degradation. The largest overall GEF allocation is to Myanmar, although Vietnam's biodiversity allocation is the highest. Overall, Myanmar, Vietnam and Thailand are allocated about 25 % each of GEF resources, while Cambodia and Lao PDR share the remaining 25 %. The allocations are an increase of about EUR 5.3 million from the GEF 5 allocation, with all countries receiving more funds for biodiversity in GEF 6.

Between 2006 and 2016, 33 GEF projects in the five countries have addressed conservation of biodiversity, representing a total GEF investment of EUR 84.6 million, and over EUR 335 million in co-funding.[247] As of April 2016, 30 of these projects (EUR 80 million) are being implemented or are at various stages in the approval process, while 3 are ending. Twenty-nine are being implemented by government or multilateral agencies, 1 by an international NGO (WCS). Fifteen of the projects are in Vietnam, 2 in Cambodia, 7 each in Thailand and Vietnam, 5 each in Lao PDR and Myanmar. Five are regional (South-East Asia or the Greater Mekong), and 2 global. The projects show a strong emphasis on large-scale integrated landscape approaches, with 23 of the 33 projects (and EUR 65 million) focused in this area. Only 4 are explicitly focused on protected area management, and another 6 on strategy, policy and capacity building for biodiversity conservation. While landscape approaches are important (see section 4.3), they are complex, and risk losing sight of their biodiversity conservation objectives and spreading resources too thinly.[248] Without an appropriate balance between conservation and development, they may result in a 'doughnut' effect, with successful livelihood interventions surrounding a neglected protected area.

All of the Greater Mekong countries except Myanmar have GEF small-grants programmes making grants to local NGOs and community groups for conservation-related projects[249]. The fund provided over EUR 3 million in grants to CSOs in the region during the period 2006-2010[250].

The **Global Wildlife Programme** is a 7-year GEF-funded initiative[251], aiming to address the wildlife crime links between Africa and Asia. Initially focused on Africa, the programme has recently expanded to include Thailand and Vietnam.[252]

The **Global Tiger Initiative** is led by the 13 tiger-range countries, coordinated by a secretariat in Washington DC and funded by the World Bank with multiple other donors.[253] All five of the Greater Mekong countries are tiger-range state partners in the programme.

(241) Pascual U. and R. Muradian (2010). The Economics of valuing ecosystem services and biodiversity. Chap. 5 in The Economics of Ecosystems and Biodiversity. TEEB, London. Available at http://www.teebweb.org/wp-content/uploads/2013/04/D0-Chapter-5-The-economics-of-valuing-ecosystem-services-and-biodiversity.pdf
(242) For example, Dickson B., R. Blaney, L. Miles, E. Regan, A. van Soesbergen, E. Väänänen, S. Blyth, M. Harfoot, C.S. Martin, C. McOwen, T. Newbold and J. van Bochove (2014). Towards a global map of natural capital: key ecosystem assets. UNEP, Nairobi, Kenya.
(243) http://www.worldbank.org/en/topic/environment/brief/environmental-economics-natural-capital-accounting, accessed 9 September 2016.
(244) WAVES, Wealth Accounting and Valuation of Ecosystem Services, brings together a broad coalition of UN agencies, governments, international institutes, non-governmental organisations and academics to implement Natural Capital Accounting (NCA) where there are internationally agreed standards, and develop approaches for other ecosystem service accounts. WAVES is funded by the European Commission, Denmark, France, Germany, Japan, the Netherlands, Norway, Switzerland and the United Kingdom, and overseen by a steering committee. See https://www.wavespartnership.org/, accessed 9 September 2016.
(245) As promoted by the Partnership for Environment and Disaster Risk Reduction: http://drustage.unep.org/disastersandconflicts/what-we-do/risk-reduction/ecosystem-based-disaster-risk-reduction/what-we-do/partnership-environment , accessed 28 April 2017.
(246) GEF funding is from national governments: 39 have contributed to GEF since its creation, with 30 countries contributing EUR 3.4 billion for the GEF-6 period (2014-2018). Donor countries include 18 of the 28 EU Member States. See https://www.thegef.org/partners/participants for a full list.
(247) Data from https://www.thegef.org/gef/country_profile?countryCode=TH&op=Browse&form_build_id=form-x5-HGSEi1AXLS4jCRhnwuG-zubkoqvVIpK2JzEhDL4o&form_id=selectcountry_form, accessed 3 March 2016.
(248) Sayer J. (2009). Reconciling Conservation and Development: Are Landscapes the Answer? Biotropica 41(6), pp. 649-652. DOI: 10.1111/j.1744-7429.2009.00575.x
(249) https://sgp.undp.org/index.php?option=com_countrypages&view=countrypages&Itemid=219, accessed 25 April 2016.
(250) CEPF Ecosystem profile.
(251) Further details on his global project are in the synthesis report, and at http://www.worldbank.org/en/topic/environment/brief/global-wildlife-program. Initial GEF funding of EUR 100 million is expected to leverage an additional EUR 538 million.
(252) GEF added another EUR 30.7 million in June 2016, allowing expansion from 10 to 19 countries. Asian countries involved in the programme are now: Afghanistan, India, Indonesia, the Philippines, Thailand and Vietnam. See https://www.thegef.org/news/gef-steps-efforts-combat-wildlife-crime-additional-40-million-expand-program-0
(253) Further details of this global project is in the synthesis report, and at http://www.worldbank.org/en/topic/environment/brief/the-global-tiger-initiative

Community forestry management group, Cambodia. EU funding has supported local NGO Miup Baltong to work with forest communities to improve livelihoods and manage their resources sustainably.

The **Critical Ecosystem Partnership**[254] Fund (CEPF) provides small grants for civil society conservation action in biodiversity hotspots. CEPF's first phase of investment in the Indo-Burma hotspot (almost identical to the Greater Mekong region as covered in this chapter), from 2008-2013, provided USD 7.3 million through 123 grants for 66 CSOs[255]. Nearly half the granted amount in this phase was allocated for species conservation, in particular priority research and action on illegal wildlife trade. The current phase (2013-2018) has USD 8 million.

During the first phase, CEPF in Indo-Burma contributed to 12 of the 20 Aichi Biodiversity Targets in the countries of the Greater Mekong, through the following main Impacts[256]:

- Core populations of 32 globally threatened species secured from overexploitation and illegal trade;
- Formal protection extended over 1 500 km^2 through the creation and expansion of protected areas, improved management in 16 000 km^2 of protected areas, and biodiversity-sensitive management in more than 3 600 km^2 of production landscapes;
- Tangible socio-economic benefits conferred to 186 communities at project sites;
- Global threat assessments completed for 3 122 species, and urgently needed new information generated on six species;
- Nine civil society networks to coordinate conservation efforts were established or strengthened.

(254) CEPF is a joint initiative of l'Agence Française de Développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. See http://www.cepf.net/Pages/default.aspx
(255) An additional grant from the Macarthur Foundation in 2012 increased the allocation to USD 9.9 million and the period to 5.5 years.
(256) https://www.cepf.net/sites/default/files/indoburma_finalassessmentreport_may2014.pdf

4

Lessons learned

The Asian forest tortoise is found in parts of South and South-East Asia and is the largest tortoise in Asia. Unlike other tortoises, the female makes a pile of leaves in which to lay her eggs, and guards them until they hatch. The species is threatened by hunting for food and the pet trade. (Photographed in captivity.)

4 _ Lessons learned

The Greater Mekong region is part of the world's greatest concentration of biodiversity and critically threatened species, placing it at the cutting edge of biodiversity conservation globally. It is the most populated hotspot (see section 1.2.2), with some of the fastest rates of industrialisation and economic growth on the planet, but still has pockets of poverty, and a diverse range of ethnicities and cultures that need to be taken into account when formulating conservation strategies. This section highlights the lessons learned from efforts to protect biodiversity and promote more sustainable resource use in the region, and forms a basis for the priority actions in section 5.

4.1 Wildlife crime

Wildlife crime is the most serious threat to biodiversity in the region overall, but the response is not yet adequate. The networks of people engaged in wildlife crime have shown that they can adapt to pressure by finding new sources of supply, bringing new species and products into the trade chain, shifting international trafficking routes to avoid enforcement and take advantage of weak points, and creating new products and markets to take advantage of developments in social media and market preferences (section 2.1.1). A large number of governments, international organisations and NGOs have responded with the creation of forums and programmes designed to address the problem through data sharing and capacity building, and to channel resources to where they are needed for enforcement (sections 3.1.3, 3.3, 3.5), but the consensus is that the response has not yet been effective in reducing the trade, despite sporadic enforcement successes.

Key lessons and promising approaches to wildlife crime are listed below.

- Campaigns and education to reduce demand can be effective, and surveys show that consumers are more likely to change their behaviour if the authorities clearly prohibit trade, including trade in parts and products. However, this work requires long-term commitments and multipronged approaches that are rooted in a deep understanding of consumer behaviour. To date, most campaigns have been NGO-led, with variable levels of government support. Campaigns tend to focus on high-profile species, such as elephants, and there are currently few campaigns being implemented to reduce demand for tiger and other Asian big cat parts and products. In the long term, demand reduction is the most important solution to wildlife crime, but work on enforcement and legal aspects is urgent to limit the expansion of the problem and to help create the opportunity for consumer change to make a difference.
- Enforcement needs to be massively scaled up. It is most effective when good intelligence is backed up with collaborative action by agencies with a mandate to take action on conservation, law enforcement and, where relevant, customs, tax or corruption. The role of convening these actions has often been taken by international agencies, projects or NGOs, but scaling up enforcement requires that mechanisms for collaboration between agencies are institutionalised.
- Good enforcement needs good information. Intelligence gathering, information sharing and using technology for the detection of wildlife crime are all expanding, but there is potential for a much greater integration of efforts.
- Successful enforcement operations too rarely lead to anything more than the confiscation of goods and the prosecution of low-level traffickers. Tougher sentences are needed, along with enforcement targeting the people who finance and benefit from the trade. This often requires development of specific sentencing guidelines, a revision of the penal code and strengthening enforcement modalities, as well as greater awareness and expertise among police, prosecutors and judiciary.
- Political support is critical to ensuring adequate laws and their necessary enforcement. International commitments, funding and arguments based on economic impacts (loss of charismatic species important to tourism, tax and non-tax revenue losses), governance (links to organised crime and other forms of trafficking, corruption, disease transmission) and social/cultural impacts (loss of culturally significant species, livelihoods) are all important in getting the attention and achieving the support of decision-makers.
- The international dimension of wildlife crime underpins all of the points above, and makes communication and international collaboration essential. Key issues are harmonisation of domestic laws in compliance with international standards, data and intelligence sharing, and collaboration on demand-reduction campaigns. International platforms for cooperation exist but need to be strengthened.
- In source areas, where human-wildlife conflict and local subsistence hunting activities provide an excuse or an additional motive for wildlife crime, these issues need to be addressed together with the communities involved.

Wildlife forensics training course, Thailand. Addressing the illegal wildlife trade requires urgent enforcement action; stronger, more consistent laws and policies; and permanent changes in consumer attitudes and behaviour. International cooperation will remain central to combating the trade.

4.2 Protected areas

Protected areas continue to be the most effective way to ensure the survival of the full diversity of wild species and ecosystems, but the current level of management and protection are weak. Despite the large areas set aside by the governments of the region, there are species and ecosystems that are not adequately represented within protected areas, and many areas that do not effectively protect the biodiversity within them (section 3.1.2). The challenge is more than simply providing more resources, although this is needed. New approaches are required to allow protected areas to co-exist with poor rural populations and the rapidly expanding economies of the region. Key lessons and promising approaches on protected areas are listed below.

- Active presence of protected area staff in the field is a pre-requisite for ensuring the basic security of the site and for engaging with local stakeholders. The limited resources available to put people in the field can be used more strategically if spatial data on threats and patrol efforts is gathered and used to inform planning, for example through the SMART system now being introduced to many PAs in the region (section 3.1.2). Measures of management effectiveness should be used to monitor impacts and inform change. In the longer term, the systems for educating, developing and rewarding PA staff need to be expanded and improved.
- Local populations and governments perceive many PAs as an obstacle to livelihoods and economic development. Some of the issues (e.g. human-wildlife conflict) can be mitigated directly, while in other cases local interests can be accommodated without compromising biodiversity values if top-down, bureaucratic approaches to PA management can be relaxed. Better articulation of biodiversity conservation objectives would make it clearer where there are opportunities to negotiate collaborative arrangements without compromising critical biodiversity values.
- Where local populations and economies do experience unavoidable losses as a result of protected areas, these may be compensated by landscape-level approaches and projects (e.g. ecosystem services, small-enterprise development, tourism opportunities) or through targeted revenue or other assistance from central governments. Schemes such as these need attention to equity and efficiency, and the link between the scheme and persistence of biodiversity must remain explicit.
- Myanmar and, to a lesser extent, Cambodia and Lao PDR have important natural ecosystems outside PAs. There are opportunities to expand the formal network and to explore innovative approaches to protection, including community-based and private reserves.
- Political support from decision-makers and broad support for protected areas from the wider public are essential for addressing the issues above. Education, economic valuation and international recognition all have a role to play in creating and maintaining this support. International mechanisms such as World Heritage and ASEAN Heritage are currently underused, with only 5 natural World Heritage Sites in the region (2 in Thailand and 3 in Vietnam[257]), and 20 (of 40) ASEAN Heritage Parks.

([257]) A proposal for a site in northern Myanmar is under way.

Intensive smallholder land use bordering the Nam Et-Phou Louey National Protected Area, Lao PDR. Sympathetic land use around and between protected areas contributes to the conservation of biodiversity and ecosystems. It requires collaboration between park agencies, local people and local governments.

Lowland forest, sand bars and river ecosystems along the Mekong, Cambodia. Maintaining biodiversity-rich landscapes outside protected areas requires collaboration between government agencies, local communities and industry. Schemes that value ecosystem services can incentivise sustainable use.

4.3 Landscape approach to conservation

A landscape conservation approach contributes to the effectiveness of protected areas, and creates opportunities for harmonisation of development and conservation objectives. It aims to achieve biodiversity conservation without compromising economic development and livelihood goals by working with multiple stakeholders across a mosaic of land uses and jurisdictions.[258] They can alleviate pressure on PAs, addressing the drivers of threats, such as unsustainable land use or poor land-use planning, rather than only trying to deal with the immediate problems through enforcement. Landscape approaches also improve connectivity between PAs, and help maintain important biodiversity values in the landscape, including those that may not be effectively protected within the boundary of a protected area.

Key lessons and promising approaches to landscape approaches in the region are listed below.

- Myanmar, Cambodia and Lao PDR, in particular, have large areas of biodiversity-rich forests and wetlands outside protected areas. There are opportunities to maintain their values and provide connectivity between PAs, but most are classified as state forests, and weak forest governance is a major challenge in all three countries. Licensed community-based forest management may be an effective approach in some areas.
- Landscapes that retain high wild diversity are often also the centre of crop and livestock genetic diversity. Maintaining these species and varieties reinforces cultural links between people and the landscape, and encourages the maintenance of landscape mosaics, which are rich in wild and domesticated species. Documenting and maintaining the diversity of domesticated species and varieties in the landscape can be a useful way in to the maintenance of landscape diversity as a whole. Participatory approaches to biodiversity inventory[259] allow local and indigenous knowledge, beliefs and resource management practices to be documented in a way that is accessible to outsiders and at the same time raises awareness of issues among community members.
- There is much experience with tools for engaging with communities in landscapes, such as village-level land-use planning (Lao PDR), marketing of forest products (Cambodia), payment of incentives for planting and maintaining tree cover (Vietnam), incentives for biodiversity-friendly farming practices (Cambodia)[260] and payments for forest ecosystem services (see Vietnam's scheme, section 3.1.4). The target group's ability to participate in the scheme should be considered when selecting the choice of approach, as it affects equitability and sustainability, as well as effectiveness. Development of business opportunities should make an explicit link to sustainable landscape management, to ensure that the revenue generated remains in the local economy and reinforces the objectives of landscape management.
- Industrial land use can be 'greened' through improved safeguards and environmental impact assessments, financial incentives and disincentives for environmental performance, and enhanced market access (for example for certified products). Early engagement in the planning of investments increases the chance of harmonising development with landscape objectives. Proactive approaches seeking shared objectives may have greater traction with industry and decision-makers than simply opposing development that is incompatible.
- High-level political support assists in achieving coordination and joint decision-making across government departments responsible for different activities within the landscape (for example, conservation, forestry, agriculture, water management, marine resources, energy, infrastructure). A legal basis (forum, mechanism) for cooperation may be required.
- Landscape approaches require long-term donor commitment and flexibility in planning and implementation, with inception phases, which are important to allow for plans and details to be worked out. Donors need to accept that landscape approaches are complex, and impacts are uncertain and difficult to measure
- REDD+ shows some promise as a source of funding for sustainable land use at a project/landscape level (through the voluntary market).
- Decisions on land and resource use at landscape level are affected by national and regional-level processes. A supportive national policy and fiscal environment can increase the chance of success for landscape approaches. Examples of such policies could be: (i) ensuring transparency in planning and licensing processes; (ii) mainstreaming sustainability and transparency into the extractive industries sector, including through the Extractive Industries Transparency Initiative; and (iii) expanding the use of mandatory safeguards, voluntary certification and sustainability commitments by agricultural commodity industries.

(258) There is extensive literature on landscape approaches. The CBD has adopted 10 principles for landscape approaches: continual learning and adaptive management; common cause entry point; multiple scales; multifunctionality; multiple stakeholders; negotiated and transparent chain logic; clarification of rights and responsibilities; participatory and user-friendly monitoring; resilience; strengthened stakeholder capacity. See Sayer J., T. Sunderland, J. Ghazoul, J-L. Pfund, D. Sheil, E. Meijaard, M. Venter, A.G. Boedhihartono, M. Day, C. Garcia, C.v. Oosten and L.E. Buck (2012). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. PNAS 110(21), pp. 8349-8356. http://www.cifor.org/publications/pdf_files/articles/ASunderland1302.pdf

(259) For example, the multidisciplinary landscape assessment approach pioneered by CIFOR, http://www.cifor.org/mla

(260) Clements T., A. John, K. Nielsen, D. An, S. Tan and E.J. Milner-Gulland (2010). Payments for biodiversity conservation in the context of weak institutions: comparison of three programs from Cambodia. Ecol. Econ. 69, pp. 1283-1291.

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The gecko Cyrtodactylus sanpelensis is known only from a single cave in Myanmar. Many new species have been discovered in the forests and karst outcrops of the region in recent years, emphasising the importance of preserving the full range of ecosystems to prevent extinctions.

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Women living on Tonle Sap Lake, Cambodia, sell mats they weave from water hyacinth, an invasive species. The group is supported by Cambodian NGO OSMOSE, which receives support from CEPF. International support is vital for the growth of stronger civil society in the region.

4.4 Inadequate data on biodiversity

Poor data and limited access to data hinder effective decision-making, and prevent civil society or other stakeholders from engaging in policymaking processes. The lack of basic data on species distribution and populations and on the effectiveness of management interventions is a constraint to conservation work across the region.

Key lessons and promising approaches regarding data and research are listed below.

- Official systems for collecting and managing biodiversity data are weak, and this is symptomatic of the lack of use of biodiversity data in decision-making generally. Institutionalising a greater focus on management effectiveness and demonstrating impact will help to create a need for improved data.
- Monitoring the impacts of conservation (such as changes in key species populations, habitat extent, ecosystem service quality) is often lacking. A reliance on monitoring inputs (budget, staffing) or outputs (patrol intensity, arrests) may give a false impression of the status of the PA and its biodiversity. The expertise required for rigorous impact monitoring (i.e. comparing observed changes with counterfactuals to derive conclusions about impact, and controlling for multiple confounding factors[261]) is rarely available to protected area managers or policy-makers. However, thoughtfully planned monitoring of key indicators, such as habitat condition, species populations and measures of hunting pressure, can provide useful feedback to managers on the trends in their areas.

4.5 Civil society

The role played by civil society in the region is growing but faces obstacles, such as limited capacity and resources, and restrictions on CSO activity. With the exception of Thailand, civil society engagement in conservation in the region has been powered by international NGOs, but this is starting to change as local capacity increases.

Key lessons regarding civil society are listed below.

- The generally positive and improving environment for local NGOs in Myanmar, Thailand and Vietnam has contributed to the growth of the national NGO community. In these countries there are increasing opportunities for CSOs to take action on more sensitive issues, such as the negative impacts of infrastructure projects and private sector investments. Limited capacity is one of the main challenges facing CSOs in these countries, and donors could play a more pro-active role in enabling local civil society to access funding, engage with conservation issues and participate in international processes. The situation of civil society in Cambodia and Lao PDR is far more restrictive, with more limited opportunities for CSOs and the donors supporting them.
- International NGOs continue to perform a crucial role in bringing ideas, skills, resources and knowledge to the region to contribute to national efforts. They also play a key role in linking local issues and organisations with global forums, debates and campaigns.

4.6 Private sector

The private sector is paying greater attention to social and environmental sustainability, but progress is slow. Experience from other parts of South-East Asia shows that in some circumstances the private sector can set higher standards than those demanded by government, especially when it is facing consumer pressure from markets that are sensitive to environmental and social issues. However, achieving this requires improved transparency, independent civil society scrutiny, and action on the corruption that undermines legal and planning processes.

Key lessons and promising approaches from the private sector are listed below.

- The uptake of certification and other voluntary standards for social and environmental practices in the region is limited. However, some important sectors, including oil palm, pulp-paper, rubber and cement, are addressing sustainability issues through regional and global forums. There are opportunities to encourage these sectors in the Greater Mekong to adopt these standards.
- Examples of corporate action and support to conservation initiatives in the Greater Mekong region (see section 3.4) are rare, and those that exist are mainly from international companies that are sensitive to their image and reputation in international markets or are registered in jurisdictions that demand high standards of business practice.

([261]) Andam K.S., P.J. Ferraro, A. Pfaff, G.A. Sanchez-Azofeifa and J.A. Robalino (2008). Measuring the effectiveness of protected area networks in reducing deforestation. PNAS 105(42), pp. 16089-16094. Available at http://www.pnas.org/content/105/42/16089.full.pdf

5

Strategic approaches

A great hornbill delivers food to a female and chick inside a nest hole, Khao Yai National Park, Thailand. The future of biodiversity in this rapidly developing region depends on strengthened commitment to maintenance of protected areas, control of hunting and the sympathetic management of landscapes.

5 _ Strategic approaches

5.1 Priority geographies

Biodiversity and ecosystems are not distributed evenly across the Greater Mekong. While the identification of priority regions for conservation (PRCs, see section 1.2.4) provides one approach to the identification of the most important parts of this huge area, the PRCs are also very large, covering the entire land surface of the Greater Mekong region. To provide a more focused analysis of priorities, key landscapes for conservation (KLCs) are identified to highlight the areas that are most important for conservation. KLCs should be considered as priorities for funding of conservation-related actions, and should also be areas where potentially damaging projects (particularly infrastructure and large-scale land-use change) should be subject to specific scrutiny for biodiversity impacts.

5.1.1 Defining KLCs in Greater Mekong

Landscape-level priorities have been identified across the Greater Mekong region by CEPF, which defined KBAs (sites) and KBA corridors (landscapes) after a broad stakeholder consultation[262,263]. The map of KLCs for the Greater Mekong region adopts CEPF's KBA corridor analysis (see Figure 5.1).

KBA corridors are defined as large areas of ecological value, and they include the majority of KBAs identified for the region.

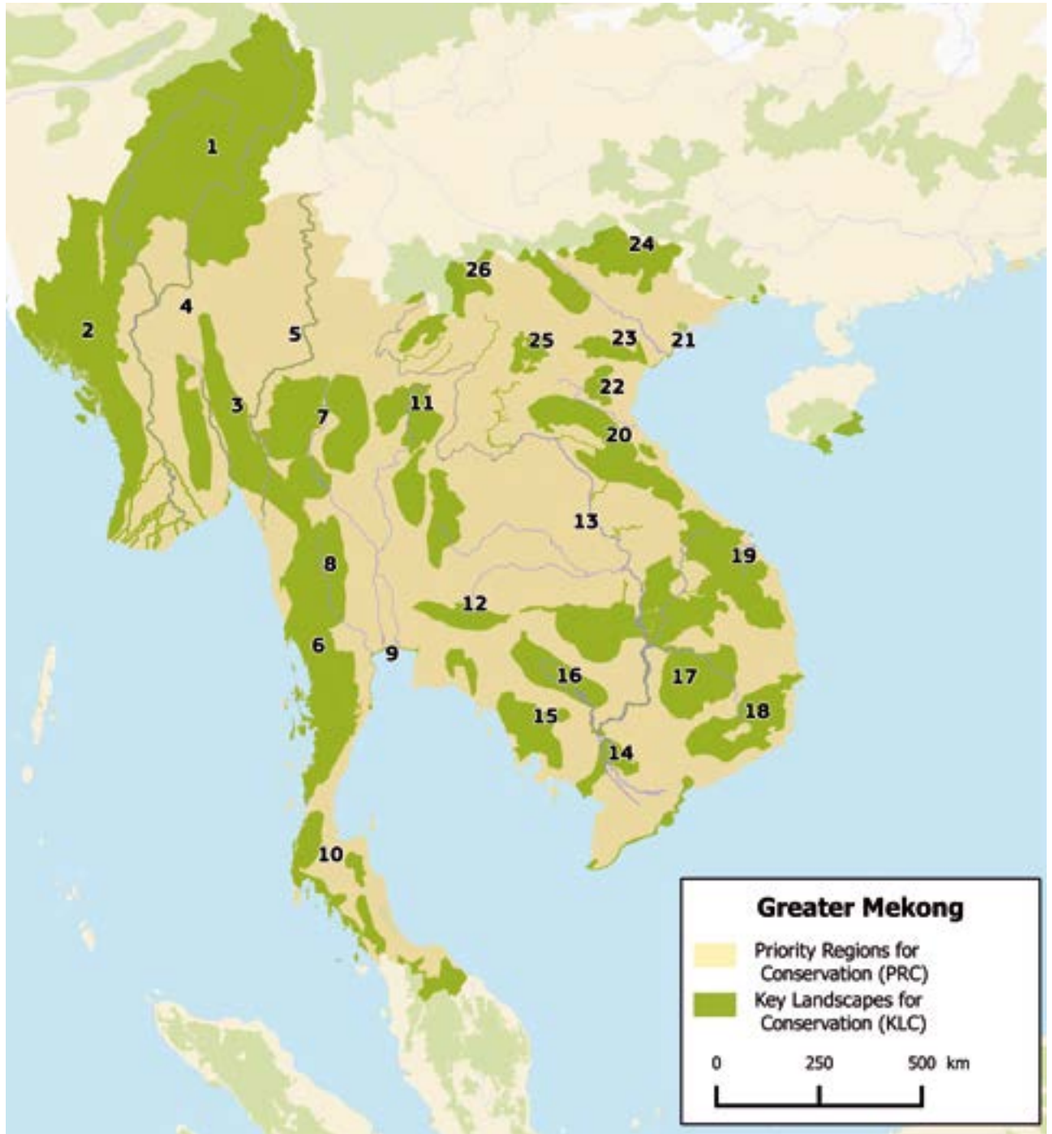
It is important to recognise that the entire Greater Mekong region is a global priority for biodiversity conservation (section 1.2.4), and so sites of importance for biodiversity will exist outside the KLCs identified here. The identification of KBA corridors that form the basis for KLCs is based on the best available data, but may change when new and improved information becomes available in future. In addition, presenting KLCs on large-scale maps does not effectively capture some linear ecosystems (e.g. rivers, mangroves) or fragmented ecosystems (e.g. karst), and does not attempt to represent the priorities for action on threats such as the illegal wildlife trade.

5.1.2 KLCs in Greater Mekong

CEPF has identified 57 corridors, totalling over 840 577 km² in area or 43 % of the region, and these are organised into 26 KLC groups (see Figure 5.1, Table 5.1). The KLCs include Himalayan ecosystems in northern Myanmar, lowland tropical rainforest and extensive karst systems, as well as important freshwater rivers and lakes. In addition to their exceptional biodiversity value, the KLCs contain important ecological processes, including bird migrations (shorebird stop-over sites, altitudinal migration, concentrations of birds of prey during migration), fish migration, fire-dominated ecosystems and seasonally flooded ecosystems.

(262) CEPF (2012). Op. cit.
(263) WCS (2013). Myanmar Biodiversity Conservation Investment Vision. Wildlife Conservation Society, Yangon, Myanmar.

Figure 5.1 Priority regions for conservation and key landscapes for conservation in Greater Mekong (see Table 5.1)



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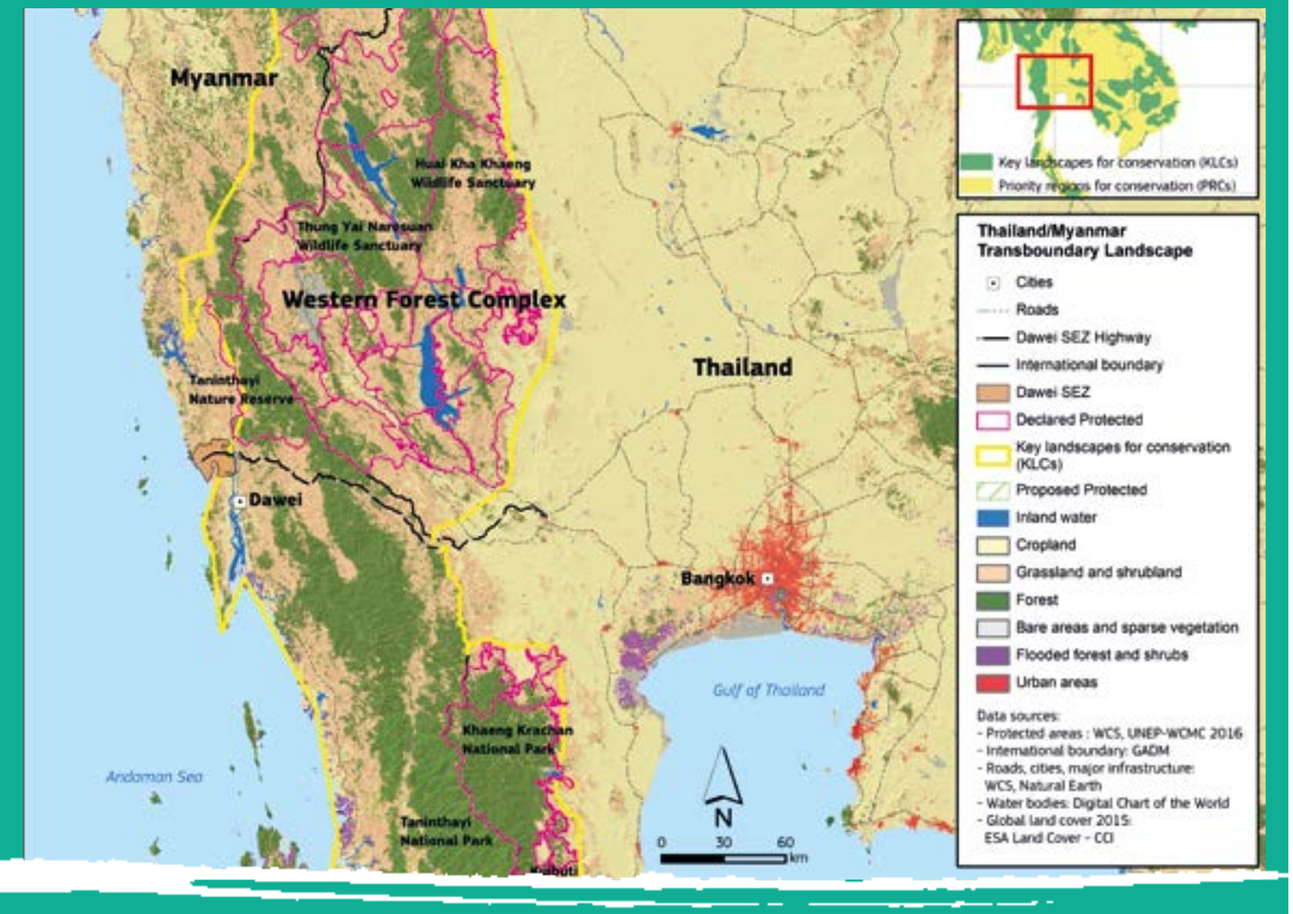
Inle lake, Myanmar, is a shallow, isolated lake where unique fish and snail species have evolved, including the endangered Inle carp. It is a key biodiversity area because of this endemic, threatened fauna. It is also an important cultural site and a tourist attraction, but land-use change and over-exploitation are threatening its unique character.



Box 1 _ Western Forest Complex (WEFCOM) of Thailand and adjacent forested areas in Myanmar (KLCs 6 and 8)

Straddling two countries – Thailand and Myanmar – and including more than 20 national parks and wildlife sanctuaries, the Western Forest Complex region is the largest protected complex in the Greater Mekong, covering over 18 730 km². Three large protected areas, Huai Khakhaeng (2 780 km²), Thungyai Naresuan West (2 118 km²) and Thungyai Naresuan East (1 572 km²) make up the core area, the most important stronghold for wildlife in the region. The core area was recognised as a UNESCO World Heritage Site in 1991.

The WEFCOM supports the largest and most viable populations of tiger in the Greater Mekong region at 100 individuals. It also supports major populations of other big mammals (e.g. elephant, primates, ungulates), 153 species of mammals, 490 species of birds, 90 species of reptiles, 40 species of amphibians and 108 species of fish. It is an important watershed area for 6 of the 25 major river basins in Thailand.

Priority interventions include: ensuring effective management of the landscape and network of protected areas, to maintain connectivity and to conserve all the key components of biodiversity, as well as to support local sustainable development; trans-boundary conservation activities between Thailand and Myanmar; improving protected area management, law enforcement and monitoring, including using SMART and monitoring tiger populations; working with the private sector to mitigate and offset impacts of development (e.g. the Yadana pipeline in Taninthayi, Dawei Special Economic Zone development in Myanmar).

Table 5.1 List of KLCs in the Greater Mekong

Map #	KLC group	KLC name	Country (ISO Code)	Area (km²)	Special features
1	Upper Chindwin-Ayeyarwady	Lower Chindwin forest	MM	40 087	Evergreen and semi-evergreen hill forest, with alpine Himalayan habitats in the far north. Large number of threatened species, including birds, primates, banteng, Asian elephant, Eld's deer, freshwater turtles.
		Upper Ayeyarwady catchment	MM	101 394	
		Upper Chindwin catchment	MM	50 156	
2	Chin Hills - Rakhine Yoma	Chin hills complex	MM	36 272	Evergreen and semi-evergreen hill forest, threatened vultures, primates, reptiles, Asian elephant, shorebird migration, fish recruitment.
		Rakhine Yoma Range	MM	47 914	
3	Bago-Yoma-Sittaung	Bago Yoma Range	MM	16 143	Evergreen and semi-evergreen hill forest, Asian elephant, banteng, threatened primates, threatened tortoise, freshwater turtle. Large river, floodplain, wetlands, fish and shorebird migration, spoon-billed sandpiper.
		Sittaung river	MM	3 048	
		Western Shan Yoma Range	MM	27 742	
4	Ayeyarwady-Chindwin	Ayeyarwady river	MM	19 798	Large river, floodplain, wetland, white-winged wood duck, threatened freshwater turtles, tortoises, primates.
		Chindwin river	MM	5 299	
5	Thanlwin	Thanlwin river	MM	7 692	Large free-flowing river, floodplain, wetland, fish migration.
6	Taninthayi	Taninthayi Range	MM	42 880	Deciduous, dipterocarp and evergreen forest, tiger, Asian elephant, threatened freshwater turtles, birds.
7	North-West Thailand	Lum Nam Pai-Salaw-in	TH	24 333	Mixed, deciduous and semi-evergreen forest, threatened freshwater turtle, Asian elephant, banteng.
		Mae Ping-Om Koi	TH	8 666	
		Sri Lanna-Khun Tan	TH	20 164	
8	Greater Western Forest Complex	Chumphon	TH	1 740	Semi-evergreen forest, raptor migration.
		Kaeng Krachan	TH	5 479	Semi-evergreen forest, tiger, Malay tapir, Asian elephant.
		Western Forest Complex	TH	24 112	Deciduous, dipterocarp, semi-evergreen and evergreen forest, Asian elephant, hornbill, banteng, tiger, Malay tapir.
9	Inner Gulf	Inner Gulf of Thailand	TH	1 408	Tidal mudflats, shorebird migration including threatened spoon-billed sandpiper.
10	Southern Thailand	Hala-Bala	TH	7 423	Lowland evergreen and semi-evergreen forest, tiger, threatened primates, Asian elephant, freshwater turtles, tortoises, Malay tapir, hornbills.
		Khao Banthad	TH	4 064	
		Khao Luang	TH	2 439	
		Khlong Saeng-Khao Sok	TH	8 132	
		Mu Ko Similan-Phi Phi-Andaman	TH	26 317	
11	North-East Thailand	Doi Phuka-Mae Yom	LA, TH	17 053	Mixed, deciduous and semi-evergreen forest, tiger, Asian wild dog, Asian elephant, threatened primates.
		Phu Khieo-Nam Nao	TH	13 395	
		Phu Miang-Phu Thong	TH	9 944	

Table 5.1 (continued)

Map #	KLC group	KLC name	Country (ISO Code)	Area (km²)	Special features
12	Eastern forests	Lower Eastern Forest Complex	TH	4 139	Sub-tropical moist, dry, deciduous and semi-evergreen forest, banteng, Asian elephant, tiger, threatened primates.
		Phanom Dongrak-Pha Tam	TH	3 510	
		Upper Eastern Forest Complex	TH	9 685	
13	Mekong river	Mekong river and major tributaries	KH, LA, TH	16 475	Large river, floodplain, wetlands, Irrawady dolphin, migration of freshwater fish, threatened fish, birds, Siamese crocodile.
14	Mekong delta	North-western Mekong delta wetlands	KH, VN	7 854	Large river, floodplain, wetland, migration of large waterbirds, marine mammals, primates, marine turtles.
		Mekong delta coastal zone	VN	3 933	
15	Cardamom Mountains	Cardamom and Elephant Mountains	KH	17 660	Tropical moist broadleaf forest, mangrove, Siamese crocodile, Asian elephant, threatened primates, endangered freshwater fish.
16	Tonle Sap	Tonle Sap Lake and inundation zone	KH	17 547	Large river, floodplain, wetland, very important fishery, fish migration, migration of large waterbirds.
17	Central plain forests and grasslands	Sekong plains	KH	3 845	Semi-evergreen and deciduous dipterocarp forest, large river, floodplain, wetland, banteng, Asian elephant, Asian wild dog, threatened primates, threatened vultures, giant ibis, white-shouldered ibis, Eld's deer, Siamese crocodile.
		Northern plains dry forests	KH, LA	19 322	
		Eastern plains dry forests	KH, VN	21 160	
		Cambodia-Lao PDR-Vietnam tri-border forests	KH, LA, VN	10 617	
		Bolaven plateau	LA	4 411	
		Xe Khampho-Xe Pian	LA	4 723	
18	Southern Annamites	Southern Annamites western slopes	KH, VN	3 945	Semi-evergreen forest, threatened primates, saola, threatened birds, tortoises, freshwater fish.
		Di Linh	VN	5 166	
		Lowland Dong Nai watershed	VN	8 293	
		Southern Annamites main montane block	VN	11 976	
19	Central Annamites	Central Annamites	LA, VN	32 873	Semi-evergreen forest, large-antlered muntjac, endangered reptiles, birds, primates.
20	Northern Annamites	Central Indochina limestone	LA, VN	7 990	Evergreen and semi-evergreen forest, saola, large-antlered muntjac, Asian elephant, threatened turtles, Laotian rock-rat, Edward's pheasant, threatened primates.
		Northern Annamites	LA, VN	21 112	
		Quang Binh-Quang Tri-Xe Bangfai lowlands	LA, VN	3 819	
		Ke Go and Khe Net lowlands	VN	1 011	
21	Red river coast	Red river delta coastal zone	VN	2 255	Large river, floodplain, wetland, shorebird migration, including spoon-billed sandpiper, black-faced spoonbill.
22	Chu river	Upper Chu river watershed	VN	4 505	Threatened primates.
23	Northern Indochina limestone	Northern Indochina limestone	VN	6 793	Semi-evergreen forest, Delacour's langur, Cat Ba langur.
24	Sino-Vietnamese limestone	Ailao/Hoang Lien Mountains	VN, CH	28 076	Semi-evergreen forest, black-crested gibbon, Cao-vit gibbon, threatened amphibians.
		Sino-Vietnamese limestone	VN, CH	58 502	Semi-evergreen forest, Cao-vit gibbon and other threatened primates.
25	Nam Et-Phou Louey	Nam Et-Phou Louey	LA	4 391	Semi-evergreen forest, tiger, Asian golden cat, clouded leopard, Asiatic wild dog, northern white-cheeked gibbon, sambar deer, muntjac, serow, gaur.
26	Nam Ha	Nam Ha-Xishuangbanna-Phou Dendin	VN, CH	21 523	Semi-evergreen forest, Asian elephant, threatened freshwater turtle.

Within the KLCs are 251 144 km² of protected areas, or about 30 % of the KLC area (Figure 5.2, Tables 5.2 and 5.3).

Figure 5.2 Priority regions for conservation, key landscape for conservation and protected areas (IUCN categories I to IV) in Greater Mekong

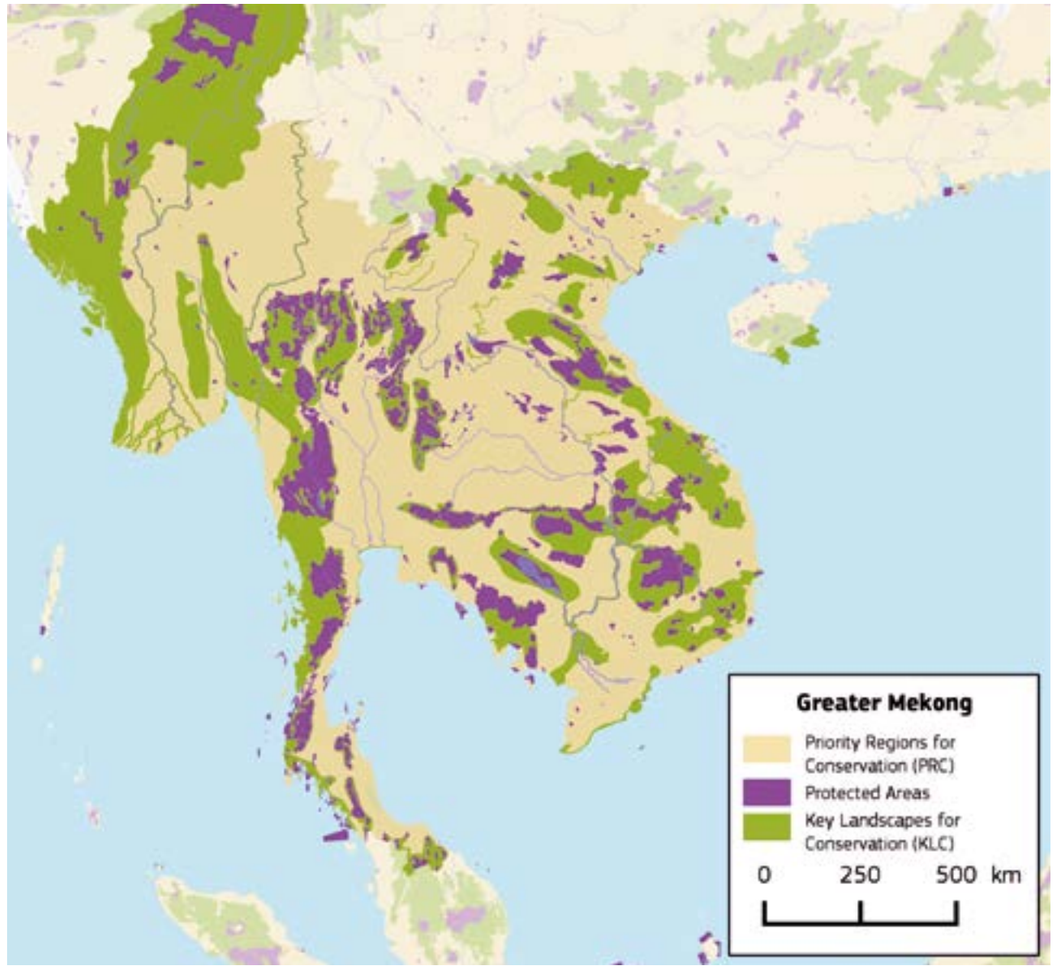


Table 5.2 Protected area coverage of KLCs in Greater Mekong

KLC name	Total area defined as KLC (km²)	Area of KLC covered by protected areas (km²)
Cambodia	91 833	38 732
Lao PDR	73 244	28 988
Myanmar	384 417	60 697
Thailand	170 480	89 589
Vietnam	120 603	33 138
Total	840 577	251 144

Table 5.3 Examples of important protected areas in the KLC groups identified in Greater Mekong

Map #	KLC group	Important Protected Areas
1	Upper Chindwin-Ayeyarwady	Hkakaborazi National Park, Htamanthi Wildlife Sanctuary, Indawgyi Wetland Wildlife Sanctuary, Alaungdaw Kathapa National Park
2	Chin Hills - Rakhine Yoma	Khaw Nu M'Zung (formerly Natmataung) National Park, Rakhine Yoma elephant range
3	Bago-Yoma-Sittaung	North Zamari Wildlife Sanctuary, Moeyungyi Wetland Wildlife Sanctuary
4	Ayeyarwady - Chindwin	Ayeyarwady Dolphin Protected Area, Meinmahla Kyun Wildlife Sanctuary
5	Thanlwin	No data
6	Taninthayi	Taninthayi Nature Reserve, Taninthayi National Park (proposed), Lenya National Park (proposed)
7	North-West Thailand	Omkoi Wildlife Sanctuary
8	Greater Western Forest Complex	Kaeng Krachan National Park, Huai Kha Khaeng Wildlife Sanctuary, Thung Yai Wildlife Sanctuary
9	Inner Gulf	No data
10	Southern Thailand	Hala Bala Wildlife Sanctuary, Bang Lang National Park, Klong Saeng Wildlife Sanctuary, Similan Islands National Park, Tarutao National Park
11	North-East Thailand	Phu Kheio Wildlife Sanctuary
12	Eastern forests	Khao Yai National Park, Thap Lan National Park, Pang Srida National Park
13	Mekong river	No data
14	Mekong delta	Phu Quoc National Park, Con Dao National Park, U Minh Ha & U Minh Thuong National Park, Ca Mau National Park, Tram Chim National Park, Can Gio Mangrove Biosphere Reserve
15	Cardamom Mountains	Sre Ambel proposed protected area, Peam Krasop Wildlife Sanctuary, Central Cardamoms National Park, Phnom Aural Wildlife Sanctuary, Phnom Samkos Wildlife Sanctuary, Southern Cardamoms National Park
16	Tonle Sap	Prek Toal core area, Northern Tonle Sap protected landscape, Ang Trapeang Thmor protected landscape
17	Central plains forests and grasslands	Cambodia: Keo Seima Wildlife Sanctuary, Chhep Wildlife Sanctuary, Kulen Promtep Wildlife Sanctuary, Prey Preah Rokha Wildlife Sanctuary, Phnom Prich Wildlife Sanctuary, Srepok Wildlife Sanctuary, Lomphat Wildlife Sanctuary, Mondulkiri Wildlife Sanctuary, Virachey National Park, Phnom Tbeng National Heritage Park, Prey Lang Wildlife Sanctuary, Veunsai Siem Pang Wildlife Sanctuary, Western Siem Pang Wildlife Sanctuary, Vietnam: Chu Mom Ray National Park
18	Southern Annamites	Cat Tien National Park, Bu Gia Map National Park, Yok Don National Park, Lo Go Xa Mat National Park, Bidoup - Nui Ba Mountain National Park, Chu Yang Sin National Park
19	Central Annamites	Lao PDR: Hin Nam No National Protected Area, Laving Lavern protected area, Xe Sap National Protected Area Vietnam: Kon Ka Kinh National Park, Chu Mon Ray National Park, Son Tra Nature Reserve, Sao La protected area, Bach Ma National Park, Song Thanh National Park
20	Northern Annamites	Lao PDR: Nam Kading National Protected Area, Naki Nam Theun National Protected Area, Phou Sithone protected area Vietnam: Ke Go Nature Reserve, Khe Net Nature Reserve, Giang Man Nature Reserve, Phong Nha Ke Bang National Park, Pu Mat National Park, Vu Quang National Park
21	Red river coast	Ba Vi National Park, Xuan Thuy National Park
22	Chu river	Pu Huong Nature Reserve, Xuan Lien Nature Reserve
23	Northern Indochina limestone	Van Long Nature Reserve, Cuc Phuong National Park, Cat Ba National Park, Pu Luong Nature Reserve
24	Sino-Vietnamese limestone	Hoang Lien National Park, Trung Khanh species and habitat conservation area, Ba Be National Park
25	Nam Et-Phou Louey	Nam Et-Phou Louey National Protected Area
26	Nam Ha	Nam Ha National Protected Area

5.2 Strategic approaches to addressing the main pressures on biodiversity and ecosystems

5.2.1 Enhance international cooperation to reduce wildlife trafficking and demand

Wildlife crime has become a multi-billion-dollar global business supplying millions of products, from thousands of species, to markets that are growing as disposable income grows in the region. It poses an increasing threat to biodiversity as infrastructure and communications link the most remote regions with international markets. With China and Vietnam as two of the largest markets for wildlife products, the Greater Mekong countries are a source, a transit route and in some cases also a market. Wildlife crime is a trade governance issue as well as a conservation problem, and threatens economies and human health through the spread of disease and invasive organisms.

Wildlife crime is now addressed at the level of international conventions, in commitments by national leaders, through cooperation between law enforcement and wildlife agencies, and through dedicated projects and NGOs working on investigations, data gathering and consumer campaigns. Considerable donor support is available for action, and the EU has released a strategy on wildlife trafficking and funds a number of projects on the issue globally.

Despite significant efforts, the growth in wildlife crime exceeds the impact of measures to counter it, and species continue to be driven closer to extinction. The obstacles to effective control include lack of sustained political commitment, problems with enforcement (e.g. inadequate capacity, difficult cross-border collaboration, weak legal frameworks), the complex, long-term nature of demand reduction campaigns, and the complications caused by the growth of wildlife farming.

Immediate short-term needs to address the current threat from wildlife crime include the following.

- Strengthen enforcement in key locations and at key points in the wildlife-crime trade chain. Encourage collaborative operations that bring together the agencies and NGOs that have the necessary skills and legal authority to act. Provide support to address training and incentives for field

*Illegal sawmilling of rosewood (*Dalbergia *species) in the Cardamom Mountains, Cambodia. International action against the growing illegal trade in this luxury timber led to the listing of all 300 species under CITES in 2017.*

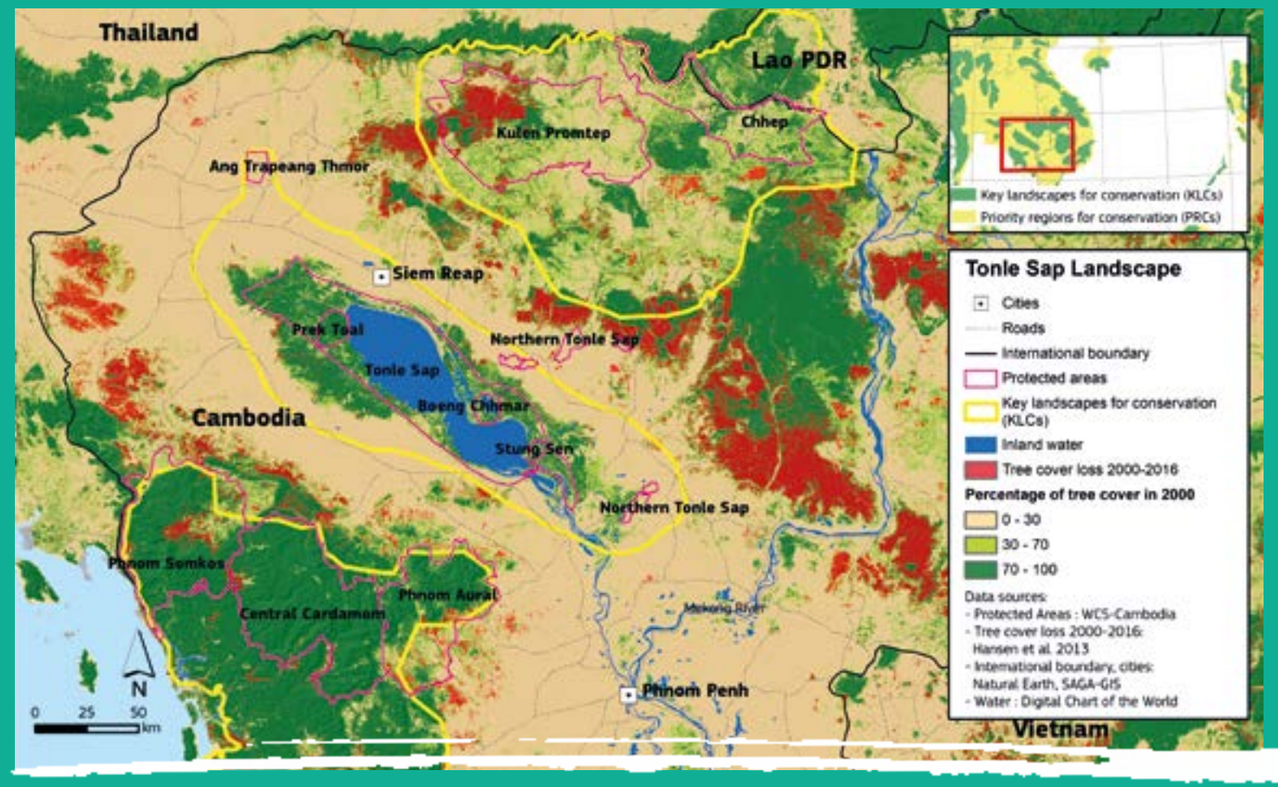
operators, communications and intelligence sharing across borders and between jurisdictions along the trade chain. In the longer term, collaborative enforcement efforts should become part of the standard approach of the relevant agencies, independent of donor support.

Medium-term needs that will take longer to have an impact but are essential for long-term sustainability of efforts to tackle wildlife crime are the following.

- Support national lawmakers to address weaknesses in the formulation and implementation of legislation and policy. International agreements, especially the CBD and CITES, provide an entry point, as do relevant ASEAN agreements, and agreements on trafficking, transnational crime and safeguards. Important areas for policy development include (i) making importers responsible for proving the legality and traceability of products; (ii) restricting the growth and operations of 'farms' that supply wild animal products; and (iii) banning trade in products from farms where it undermines conservation of wild populations. Weaknesses in implementation include light sentencing and low prosecution rates.
- Emphasise the links between wildlife crime and corruption, money-laundering and trans-national crime, and make use of existing national and international efforts to address these problems.
- Develop new, dedicated funding sources for work on wildlife crime. These might include a 'restitution fund' to receive compensation payments from prosecuted traffickers and funds recovered from prosecution of money laundering, as well as taxes and fees from issuing permits for legal trade.
- Engage the parts of the private sector that are used by traffickers, to limit opportunities for wildlife crime. Encourage, for example, 'wildlife trafficking free' certification of airlines and shipping companies, airport and port operators, infrastructure companies, social media platforms and markets.

Long-term needs that are vital to the goal of eliminating trade that threatens wild species include the following.

- Support demand-reduction campaigns and education in priority consumer countries. Effective demand-reduction campaigns and education require adaptive management based on joint planning, measuring results and shared learning. They also require long-term, sustainable funding, especially for in-country actors. Campaigns can be



Box 2 _ The Tonle Sap Lake, Cambodia (KLC 16)

The Tonle Sap is the largest permanent freshwater lake in South-East Asia and one of the most productive freshwater ecosystems in the world. It is sustained by the annual wet-season flood of the Mekong river, which increases the lake's depth from 1 m to 9.5 m, and the lake's area from 2 500 km² to 15 000 km², flooding adjacent forests and grassland and creating breeding habitats for fish. These fish are central to the Cambodian rural economy, resulting in one of the most intensive fisheries and highest catches per inhabitant of any country. It has been estimated that, directly or indirectly, the Tonle Sap benefits up to 50 % of Cambodia's population, and more than 1.2 million people depend on the lake for their livelihoods.

The Tonle Sap also supports the biggest colonies of large waterbirds in South-East Asia, including numerous globally threatened species. This includes the only colony of spot-billed pelican in South-East Asia, with a population of over 2 000 pairs, and more than 20 000 pairs of storks. The birds are dependent upon the annual flood of the Tonle Sap, and breed when the fish productivity of the ecosystem is at its greatest.

The Tonle Sap is heavily threatened by hydropower developments upstream in the Mekong and its tributaries. The dams impact the lake by changing the flow of water down the Mekong, so that the seasonal flood-pulse is reduced. They also increase the dry season water-level and trap nutrient-rich sediment from the mountains, which is responsible for the lake's high productivity. Land-use change in the Tonle Sap floodplain is beginning to impact the productivity of the lake and its biodiversity. Deforestation of the watershed surrounding the lake - the Northern and Eastern plains of Cambodia and the Cardamom Mountains - causes increased run-off and erosion, which also impacts the lake.

Historically, the lake's fisheries were managed through private concessionaires, who strictly protected habitats and limited access. Over the last 10 to 15 years those concessionaires have been abolished in favour of community management. Although this represents a significant step forward, effective models of community fisheries management are rare and in practice this means the resource is open-access. Destructive fishing practices (dams, poisons, etc.) are common and fisheries habitats are being cleared. A small number of protected areas act as fish refuges and protect vital habitat.

Priority interventions: understanding the impacts of the dams on fish productivity and the lake ecosystem; working with upstream countries and the private sector to mitigate dam impacts; improving management of the protected areas within the lake ecosystem; supporting local communities and authorities with community fisheries management models; sustainable tourism development; improved protected area management in forested regions surrounding the lake.

A patrol team member in Nakai-Nam Theun National Protected Area, Lao PDR, with wire snares collected from the forest. Nakai-Nam Theun is habitat for the unique and endangered forest mammals including saola, large muntjac and Indochina warty pig.

Using rice husks to generate energy for the rice mill has reduced waste and fuel consumption, and saves money for rice growers. An EU project funds NGOs, government and rice growers' associations to work together to introduce the technology in rice-growing areas around Cambodia's Tonle Sap Lake.

strengthened by the collection of data on the economic, cultural and social costs of wildlife crime, as part of the efforts to convince policy-makers of the need to act.

5.2.2 Support more effective management of protected areas

Land-use change is causing the rapid degradation, fragmentation and destruction of natural ecosystems. It reduces wildlife populations, disrupts ecological communities and undermines the supply of wild products and ecosystem services for local livelihoods. The drivers are complex, and include insecurity of land tenure and land conflict; poverty; expansion of industrial agriculture, aquaculture and livestock; urbanisation; and an increasing pressure of population on resources, globally and locally.

All countries have put in place wildlife protection legislation and developed PAs, which aim to ensure that representative areas of natural ecosystems are protected. On paper these cover between 26 % (Cambodia) and 7 % (Myanmar) of the land surface of the countries. However, only the PAs in Thailand have significant operational funding for protection and management, with the protection of PAs in other countries in the region highly dependent on donor-funded projects and international NGO support. These projects have resulted in the development of improved capacity for PA management and some important successes, such as the increase in tiger numbers in Thailand's Western forest complex, but the long-term sustainability of such interventions is unclear. Where there is no project or donor support, illegal land-use change and hunting is common within PAs. In some cases, legal land concession licences, which are overlapping with the PA, are being issued. The challenges of establishing effective PA networks include a lack of appreciation of the economic and social values of PAs, competition for land and resources from other sectors, and failure to adequately accommodate local interests in PA designation, which is leading to conflicts with local communities and authorities.

Short-term actions to address the immediate pressure on PAs and on those ecosystems not adequately covered by PAs include the following.

- Support field-level protection and management of high-priority protected areas. Emphasise optimal use of available resources for enforcement, reducing pressure on the PA through engagement with local stakeholders, capacity building of staff and institutions, and monitoring for adaptive management.
- Strengthen national PA networks, identifying gaps on the basis of updated assessments of biodiversity coverage and conservation needs. Take into account the likely impacts of climate change. Consider alternative approaches to site protection (e.g. community based, private) as part of the overall review of protection.

Medium-term actions to improve the policy and political environment for PAs are below.

- Address legal constraints to effective PA management, including the need for adequate legal protection from degazettement for economic concessions. Support amendment of regulations that are obstacles to negotiation and compromise with local stakeholders. Pursue commitments from industry, financiers and consumer-oriented companies to respect PA designations.
- Encourage enhanced, government-financed support for national protected area networks alongside continued donor support and diversified sources of revenue from ecosystem services, ecotourism, fees and corporate sponsorship. Support funding mechanisms that prioritise and reward field activities, including monitoring and applied research for adaptive management.
- Address issues driving illegal and unsustainable exploitation of PAs by local communities, including poverty, insecurity of access to land and lack of access to technology and markets. Promote sustainable, alternative livelihoods for communities that are neighbouring PAs.

Longer-term actions aiming to establish PAs as an asset, which has public and government commitment and funding, are as follows.

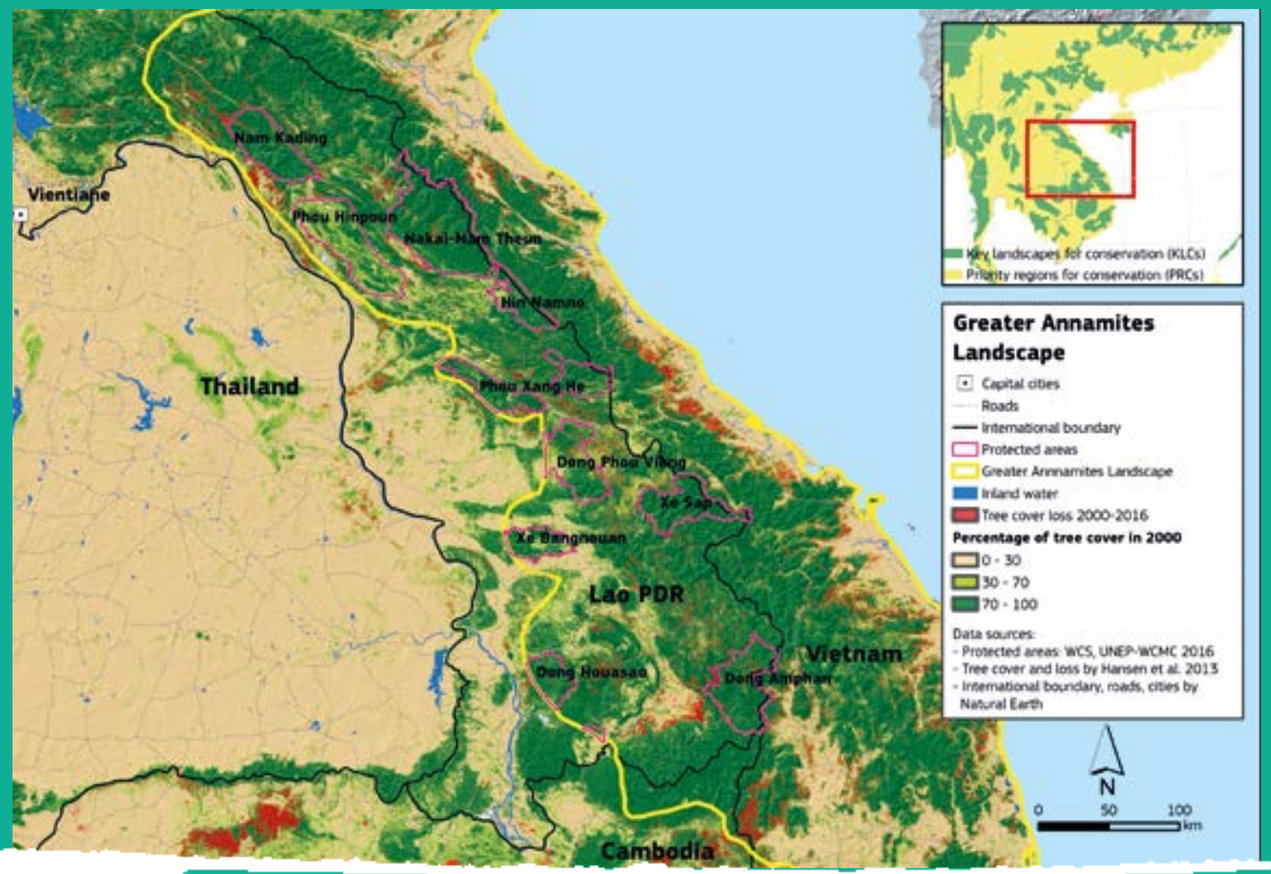
- Increase awareness and support for PAs as a national asset with a role in national identity and development. Advocate the economic, scientific, aesthetic and cultural arguments for PAs to wider civil society, government (beyond the conservation agencies) and thought-leaders. Increase the use of international mechanisms for the recognition of PAs, and promote links with the achievement of SDGs.

5.2.3 Promote landscape approaches to secure biodiversity values and improve livelihoods

Semi-natural landscapes, where productive activities such as agriculture and forestry have altered the natural habitat, may still have considerable biodiversity and continue to provide important ecosystem services. However, the biodiversity and ecosystem functions of landscapes are eroded by the over-exploitation of resources, intensification of land use, pollution, and land-use change such as dams, mining, industrial agricultural concessions and urban development. Linear infrastructure (roads, pipelines, power lines, fences) has a smaller 'footprint' on the landscape but may form a barrier to wildlife movements and a conduit for access by hunters or farmers.

When landscapes form corridors or buffers connecting and surrounding PAs, they allow larger wildlife populations to move and inter-breed, providing an important buffer against local extinctions. When the biodiversity value of landscapes is eroded, this connectivity is broken and the PAs become isolated, and the biodiversity within them vulnerable to over-exploitation, disease and disasters such as fires, without the possibility of re-colonisation from elsewhere.

Landscapes hold multiple stakeholders with multiple agendas, and so landscape approaches are necessarily multi-stakeholder, and involve negotiation with trade-offs between conservation priorities, local resource management and private sector interests. While they offer an opportunity to integrate conservation management and economic development, in practice weak



Box 3 _ Annamite Mountains (KLCs 19, 20 and 25)

The Annamite Mountains represent the southernmost extensions of the mountain ranges that originate in the Himalayas. They form the backbone of Vietnam, much of the border between that country and Lao PDR, and extend to the south as far as Cambodia. They came to the attention of the conservation community in the early 1990s, with the discovery of the 'Asian Unicorn' or saola, a critically endangered large bovid endemic to the Annamite range, which resembles an antelope with two parallel pointed horns. The fact that a 100 kg animal, standing 85 cm tall and 1.5 m long, had remained unknown to science for so long led to considerable scientific interest in the 1990s and 2000s. During this period several other endemic mammals were discovered, including the giant muntjac, the largest species of muntjac; the Laotian rock rat or kha-nyou, whose nearest relatives are potentially 11 million-year-old fossils; and the Annamite striped rabbit.

The Annamite Mountains' distinctive biodiversity is attributed to the continuation of warm, wet conditions during the last ice age. Across most of South-East Asia, habitat fluctuated between moist evergreen rainforest and more open dry forest, but the unusual conditions in the Annamites allowed rainforest to persist, giving the forest and its animals thousands of additional years to evolve.

This biodiversity is highly threatened by over-hunting, illegal wildlife trade and land-use change, including expanding hydropower development. Of these two threats, hunting and wildlife trade is severe with many species now having populations in the tens or hundreds of individuals, which are threatened with extinction. For example, up to 5 of the 25 most endangered primates in the world are found in the Annamites. Expanding hydropower development is increasingly fragmenting the landscape, resulting in direct loss of critical habitats. The majority of protected areas are 'paper parks' with little or no funding for management or enforcement activities, very limited staffing or infrastructure, and extremely weak political support. Land clearance and hunting within protected areas is common.

Priority interventions include: ensuring effective management of the landscape and network of protected areas to conserve all the key components of biodiversity, and to support local development, e.g. through community-based tourism; improving protected area management, law enforcement and monitoring, including using SMART; working with the private sector to mitigate impacts of mines and hydropower developments; community-based conservation; and stopping hunting and the unsustainable wildlife trade.

Chin State, Myanmar. Although the region has seen rapid economic growth and a sharp reduction in poverty, the remaining pockets of extreme rural poverty are often the areas where wildlife persist and protected areas are created, meaning that conservation efforts must still take into account livelihoods and welfare.

governance, lack of institutional capacity, conflicts, sectoral agendas and difficulty of enforcing planning and licensing conditions all pose significant obstacles to successful implementation.

Landscape approaches should be seen as part of the medium-term solution to addressing the challenges for PAs and wildlife crime noted above.

- Identify locations where the need and potential for landscape approaches is greatest. Starting points include biodiversity values (as indicated by KLCs in section 5.1 and KBAs, for example), important ecosystem services, communities with strong traditions of management of resources and agricultural biodiversity, local government interest and the willingness of industry stakeholders to engage.
- Establish institutions and mechanisms for coordination at landscape level that are integrated with existing governance arrangements, including land use and development planning and strategic environmental assessment, to facilitate the negotiation and integration of landscape-level objectives into sectoral plans and budgets.
- Support the valuation of biodiversity and ecosystem services (for example using total economic value/natural capital approaches) to establish links between landscapes and development planning. Where landscapes are transboundary, put in place mechanisms for international coordination.
- Establish mechanisms for donor coordination across the landscape, aiming to ensure efficient use and long-term security of funding, stakeholder-driven evaluation and lessons learned, and a needs-driven prioritisation of donor support.
- Support local communities to transition away from environmentally damaging activities and towards more sustainable livelihoods.

In the long-term, the sustainability of landscape approaches requires appropriate policies, supportive private sector agendas and international support.

- Where necessary, strengthen legal and policy frameworks that recognise and support resource use and management by indigenous and local communities.
- Make connections to private-sector commitments and green economic development, for example through the protection of high conservation-value forests, green infrastructure approaches, certification, and social and environmental sustainability.

- Make connections to national and international processes and commitments, for example FLEGT VPA implementation, CBD/Aichi targets, and UNFCCC/INDC. Mainstream biodiversity and ecosystem indicators within development planning and monitoring. Encourage consistent use of this data in the evaluation of national progress towards CBD/Aichi targets, SDGs and other multilateral environmental agreements.

5.2.4 Enhance knowledge and learning for biodiversity conservation

Adequate data on biodiversity, ecosystem services, the threats to them and the impacts of conservation measures are fundamental requirements for policy development and conservation management. Presently, data on all of these aspects of conservation is patchy, project-specific and inadequate. Where data does exist, it is often difficult to access and may not be updated or well maintained. Furthermore, government agencies, businesses and civil society organisations, which need this information in the planning and evaluation of their activities, do not necessarily have the expertise to use it effectively.

There are many initiatives to collate information on biodiversity, often at site or local level, sometimes national and international. However, these are rarely updated, and so quickly become obsolete and unreliable.

Short-term actions to improve existing knowledge generation are as follows.

- Convene species action-planning groups to address research and conservation action, giving priority to species that are not adequately conserved within protected area networks, critically endangered and little-known species, and those with particular economic or cultural values.
- Up-date and complete key biodiversity area identification for the region, including information needed to prioritise site actions. Put in place a mechanism to maintain and update data (linked to existing international mechanisms), and make it available to decision-makers in government and the private sector.
- Undertake targeted research on strategic issues to inform critical policy issues. These might include biodiversity and ecosystem values, biodiversity in agricultural landscapes, impacts of trade and farming on wild populations, and assessments of species considered for CITES listings.

In the medium term, efforts to put in place mechanisms to integrate and maintain datasets, and to ensure that they are used effectively for conservation planning, include the following.

- Strengthen the mechanisms to make data and analysis on biodiversity available to decision-makers in government, industry, civil society and donor organisations. Enhance regional mechanisms, including the clearing-house function of the ASEAN centre for biodiversity, as well as national data banks.
- Build capacity in the region for biodiversity and ecosystem-related research and analysis, including biological, economic and social issues.

5.2.5 Strengthen the role of civil society and the corporate sector in biodiversity conservation

The opportunities for civil society development and engagement are generally increasing. At the same time, national governments are encouraging land and resource-based investment, including from abroad. Hence the differing agendas of CSOs and foreign companies and investors can be expected to play an increasingly important role in determining the shape of ecosystems in the region. Sustained support is needed to enhance the capacity of CSOs, with the long-term aim of reducing dependence on international NGOs. Donors have a role to play in providing targeted capacity building support, and enabling local CSOs to engage in national and international processes. A combination of incentives for positive initiatives and pressure on laggards in the private sector is needed to support current moves towards more sustainable business practices.

In the medium term the following strategic approaches are relevant.

- Support the strengthening of CSO capacity, and CSO engagement in high-priority landscapes and sites. Encourage, where feasible, independent CSO monitoring of government programmes and private sector actions and commitments. Integrate programme components concerned with CSO support into larger programmes of support to protected area and landscape conservation.
- Engage and support leading private sector initiatives on the environment, particularly companies and industry associations that are attempting to mitigate environmental impacts and make a positive contribution to conservation. Encourage the private sector to increase its capacity to deliver on social and environmental commitments.

In the longer term, sustaining and broadening the efforts by individual companies and CSOs should include the following.

- Work with governments to encourage policy support for the higher environmental standards set by leading companies, and move towards greater openness and recognition for the role of CSOs on environmental issues.

Staff in the observation tower at the Minzontaung Wildlife Reserve, Myanmar. The reserve protects a wild population of the critically endangered Burmese starred tortoise, and has a breeding and reintroduction programme.

5.3. Conclusion

The region covered by this chapter is experiencing rapid change. Industrialisation and urbanisation are well established in Thailand and Vietnam, and progressing rapidly in Cambodia, Lao PDR and, most recently, Myanmar. Located on the border of the world's second largest economy, the region is a target for investment, as well as a major trade route. These influences are having an increasing impact on ecosystems and biodiversity, both in terms of direct exploitation of species, and pressure on land and water. Governments have taken some action to mitigate these pressures, but in many cases the resources available to conservation are tiny compared to the task. In several of the countries in the region, the involvement and influence of local civil society and industry remains minor, although growing.

Working with governments and local civil society, donors and international NGOs is already making an important contribution to efforts to protect and sustainably manage the region's resources. In several of the countries, protected areas already rely heavily on donors and international NGOs for operational management, and this critical support needs to be continued while seeking sustainable alternatives. Many projects have supported landscape approaches, integrating local livelihoods and sustainable resource management, and there are lessons and experiences which can be shared and scaled-up. Action against the illegal wildlife trade, both enforcement and education, is also being supported. Broadening and deepening this work, to ensure that ecosystems and biodiversity are integrated into plans for economic development, will be key to the survival of the region's biodiversity and the maintenance of its ecosystem services.