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# ASIA REGIONAL BIODIVERSITY AND TROPICAL FOREST ASSESSMENT (FAA 118/119)

**FOR EFFECTIVE USAID DEVELOPMENT PROGRAMMING**

**May 2012**

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## **Disclaimer**

Data in this assessment was sourced primarily from publicly available global datasets and therefore has inherent limitations in terms of accuracy, location, and time period. Data illustrated in tables and charts does not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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## ACRONYMS

ACB	ASEAN Center for Biodiversity
ADB	Asian Development Bank
AIPP	Asia Indigenous Peoples Pact
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASEAN-WEN	ASEAN Wildlife Enforcement Network
ASFN	ASEAN Social Forestry Network
BOBLME	Bay of Bengal Large Marine Ecosystem project
BSAP	Biodiversity strategy and action plan
CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CI	Conservation International
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CSR	Corporate social responsibility
CTI	Coral Triangle Initiative
FAO	Food and Agriculture Organization of the United Nations
FFI	Fauna & Flora International
FPIC	Free, prior, and informed consent
GDP	Gross domestic product
GEF	Global Environment Facility
GMS	Greater Mekong Subregion
GTI	Global Tiger Initiative
IBA	Important bird areas
ICIMOD	International Center for Integrated Mountain Development
ICRAF	International Center for Research in Agroforestry (World Agroforestry Center)
IUCN	International Union for the Conservation of Nature
IUU	Illegal, unreported, and unregulated fishing
KESAN	Karen Environmental and Social Action Network
MPA	Marine protected area
MRC	Mekong River Commission
NP	National park
PA	Protected area
PES	Payment for ecosystem (environmental) services
RAFT	Responsible Asia Forestry and Trade
RDCS	Regional development cooperation strategy
RDMA	USAID Regional Development Mission for Asia
RECOFTC	The Center for People and Forests
REDD	Reducing Emissions from Deforestation and Forest Degradation
SAARC	South Asian Association for Regional Cooperation

SAWEN	South Asia Wildlife Enforcement Network
SEAFDEC	Southeast Asian Fisheries Development Center
TNC	The Nature Conservancy
TRAFFIC	The Wildlife Trade Monitoring Network
TRC	Tiger range countries
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USFS	United States Forest Service
WOCAN	Woman Organizing for Change in Agriculture & NRM (Natural Resource Management)
WWF	World Wildlife Fund



## EXECUTIVE SUMMARY

Occupying only 8.6 percent of the Earth's surface, Asia contains about 60 percent of the world's population and much of its rich biological heritage, with some of the highest diversities in mammals, corals, and fish species (UNEP 2010). Southeast Asia alone contains 20 percent of known terrestrial species, including 27,000 endemic species. Asia has the most extensive and diverse coral reefs in the world and more than 50 of the 70 known mangrove species (ASEAN 2006). Species such as tigers, Asian elephants, and orangutan inhabit Asia's forests; giant catfish and river dolphins travel its biologically rich rivers; storks, cranes, spoonbills and eagles soar above its wetlands; and dugong, dolphins and blue whales inhabit its seas. However, these and other species and their habitats are under the increasing threat generated by the region's rapid economic development and its demand for energy, new infrastructure, industrial agricultural products, and natural resources. Tigers, orangutans, river dolphins, and dugong are now rare and endangered species, a status shared by many other species in the region.

Currently, one-third of entire world's threatened species are found in Asia, a trend that shows little sign of abating (IUCN 2009). Biodiversity hotspots — areas of high terrestrial biodiversity that are under significant threat from human activity — cover much of the region. To have so much of Asia designated as hotspots is an indicator of the overall biodiversity crisis in the region. The ongoing trend of converting natural forests to plantations, expanding hydropower dams into river basins, and converting coastal areas to farms, ports, and resorts is transforming the natural ecosystems of the region.

The importance of biodiversity and forests goes beyond aesthetics. Natural resources are the foundation of sustainable economic growth and provide a wide range of environmental goods and services. Natural ecosystems provide ecosystem services such as climate regulation, flood and drought control, consistent water supply, carbon sequestration, and other services that are estimated to be worth trillions of dollars annually (Costanza et al. 1997). Providing food, medicine, building materials, and other products, Asia's biological resources are estimated to account for at least 40 percent of the region's economy and to provide up to 80 percent of the needs of the poor (ASEAN 2010). Asia has the most productive freshwater fisheries in the world. The fishery sector improves food security by providing a source of protein and livelihoods for millions of people, especially the rural poor, as well as making a significant contribution to the national economies of the region. Nonetheless, a key finding of this report is that the contribution of natural ecosystems, including its critical freshwater ecosystems, is frequently undervalued or not considered in the development of economic policies and planning. In striving for increased economic development, the environmental and social costs are too often not considered. As a result, ecosystems continue to be degraded, habitats lost, and more species threatened with extinction. Meanwhile, long-term sustainable development is also undermined.

The findings of this report suggest that conservation of Asia's biodiversity and forests will require actions involving governments, the private sector, civil society, and the individual. While these actions are ambitious and wide-ranging, there are new

opportunities and potential alliances. The rising middle class, for example, has expectations and values that can provide an opportunity to build an active constituency that calls for inclusion in decision making, access to information, environmental safeguards, biodiversity conservation, and changes in consumption patterns.

This Asia Regional Biodiversity and Tropical Forest Assessment was conducted for USAID's Regional Development Mission for Asia (RDMA) to (i) summarize the status and threats to species and natural ecosystems in Asia, (ii) identify the actions necessary to conserve biodiversity and tropical forestry in Asia, (iii) analyze the extent to which RDMA is addressing the actions necessary, and (iv) identify regional trends, gaps, and opportunities and better ways to mainstream these considerations into RDMA development programming. This assessment fulfills the requirements of Sections 118 and 119 of the U.S. Foreign Assistance Act, which requires USAID to analyze and address threats to tropical forests and biodiversity. It also aims to inform the development of RDMA's new five-year regional development cooperation strategy.

The *geographic scope* of the Asia region, as defined for this assessment, includes 18 countries in four subregions: Insular Southeast Asia (Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste); Mekong (Burma<sup>1</sup>, Cambodia, Laos, Thailand, and Vietnam); South Asia (Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka); and China. This vast and diverse region contains some of the most important areas in the world for biodiversity conservation, including the world's third-largest block of tropical rainforest, some of the world's most diverse and productive river systems, and the global center of coral reef diversity.

Stakeholder meetings with more than 150 individuals and 61 organizations were held in Rangoon, Manila, Jakarta, and Delhi, as well as in Bangkok. A midterm stakeholder meeting was held in Bangkok to further refine the findings in this report. The assessment identified the status, trends, and threats to biodiversity for three major ecosystem types — terrestrial, freshwater, and marine — to ensure that their unique considerations were taken into account. For the purposes of this analysis, regional threats were defined as those that (i) affect multiple countries, (ii) impact transboundary ecosystems, (iii) have drivers outside the affected countries and region (e.g., trade-related issues), or (iv) are most effectively and efficiently addressed through a regional approach. Habitats and species richness, important species, globally recognized high-conservation-value areas, and values of key resources are described for each major ecosystem type. Exhibit 1 summarizes the analytical process and depicts the flow of this report.

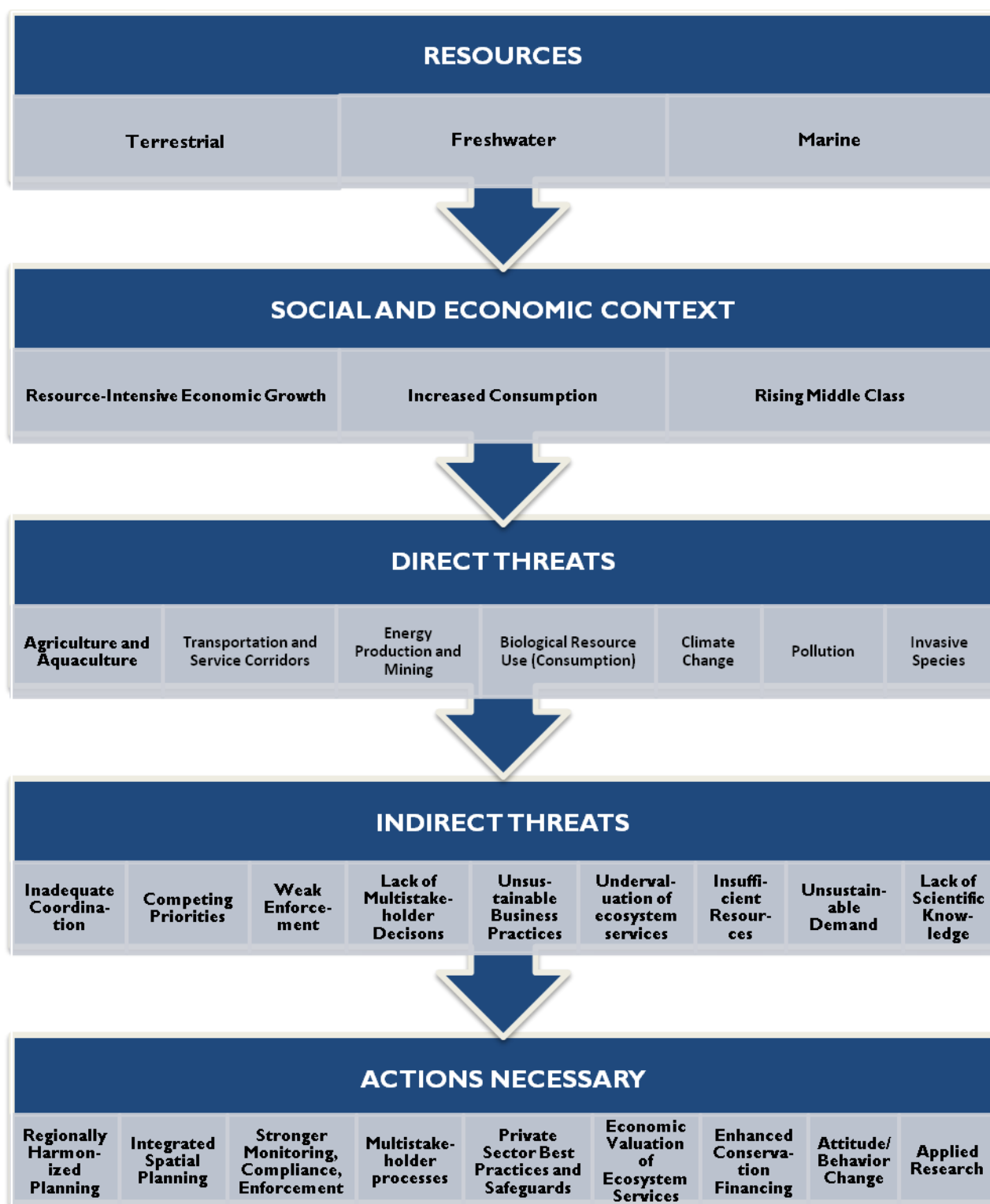
## **A. Status of Biodiversity and Forests in Asia**

Asia is one of the richest biological regions in the world, but its biodiversity is being lost at unprecedented rates. The threats from Asia's rapid economic growth are on a scale that current environmental policies and mechanisms are ill equipped to deal with. Biodiversity

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<sup>1</sup> In 1989, the official name of the country was changed from the Union of Burma to the Union of Myanmar, and in 2010 to the Republic of the Union of Myanmar. This report uses the country's historical name, Burma, except in direct quotations or the names of organizations, titles of publications, and the like.

## EXHIBIT I. OVERVIEW FRAMEWORK FOR THE ASSESSMENT



is undervalued in development policies and planning. While the rate of deforestation has declined, natural forests continue to be converted to plantations, and afforestation efforts are often with few species and of limited biodiversity. The expansion of protected areas has not been matched with adequate resources to manage them effectively, and many areas of high biodiversity value are not under protection.

At the highest level, Asia's *socioeconomic trends* are influencing the magnitude and intensity of threats to biodiversity and forests. Asia is the most densely populated region in the world, and its rapid economic growth has created a strong and growing demand for natural resources, energy, new infrastructure, and expanded industrial agriculture. Together, these factors have led to significant losses of biodiversity and degradation of habitats. Other notable socioeconomic trends include (i) the consumption patterns of Asia's sizable and expanding middle class, (ii) an expanding elite with a taste for rare products, and (iii) the increasing regional integration of economies, trade, infrastructure, and energy without sound regulatory frameworks in place.

## B. Direct Threats

*Direct threats* to biodiversity were analyzed and presented using a modified version of the standardized threats taxonomy framework created by the Conservation Measures Partnership (2012). Significant direct threats for each major ecosystem type are listed in Exhibit 2. The most significant direct threats to biodiversity and tropical forests are the conversion of natural ecosystems for commercial agriculture and aquaculture and the unsustainable harvesting of forest, freshwater, and marine resources. Climate change is also a direct threat since it will not only be a multiplier of existing environmental pressures, but will also give rise to new pressures for all ecosystems in the region.

**EXHIBIT 2. DIRECT THREATS TO BIODIVERSITY AND TROPICAL FORESTS IN ASIA**

Natural Ecosystems		
Terrestrial	Freshwater	Marine
<b>Conversion</b> of forests into agriculture (e.g., oil palm, rubber, timber plantations)	<b>Development of hydropower dams</b>	<b>Overharvesting</b> , including illegal, unreported, and unregulated (IUU) fishing
<b>Overharvesting</b> of non-timber forest products (NTFPs), especially the illegal wildlife trade	<b>Overharvesting</b> , including illegal, unreported, and unregulated (IUU) fishing	<b>Destructive fishing practices</b> (e.g., blast fishing, cyanide fishing, trawling in coral areas)
<b>Unsustainable logging</b> , especially industrial-scale	<b>Destructive fishing practices</b> , (e.g. blast fishing, cyanide fishing, use of unsustainable net mesh sizes)	<b>Conversion</b> of mangroves and other coastal habitats (e.g., shrimp farms, resort development)
<b>Infrastructure development</b> (e.g., roads, dams, pipelines)	<b>Conversion</b> of freshwater wetlands to agriculture or aquaculture (e.g. rice paddies, fish ponds)	<b>Pollution</b> (e.g. municipal and ship ballast waste, oil spills, chemical and thermal pollution from industry, agricultural runoff)
<b>Climate change</b> (e.g., habitat modification, alteration of rainfall patterns and temperatures, forest fires, outbreaks of pests)	<b>Pollution</b> (e.g., mine tailings, runoff from agriculture, municipal waste)	<b>Climate change</b> (e.g., sea level rise, tropical storms, increasing sea surface temperatures, ocean acidification)
<b>Exotic and invasive species</b>	<b>Exotic and invasive species</b> (e.g., water hyacinths and tilapia)	<b>Exotic and invasive species</b>
	<b>Climate change</b> , (e.g. alteration of rainfall patterns and hydrologic cycles, salt water intrusion)	

Level of Threat

### C. Indirect Threats and Actions Necessary

Direct threats to biodiversity and forests are caused primarily by critical weaknesses in environmental governance, termed *indirect threats*, at the local, national, regional, and global levels. Addressing these underlying governance concerns is key to protecting biodiversity, curbing forest loss, and achieving sustainable development. Linking these with the direct threats identified in Exhibit 2, a total of nine *actions necessary* to protect biodiversity and promote forest conservation were determined. The overall framework for actions necessary, based on direct and indirect threats, is depicted in Exhibit 3.

**EXHIBIT 3. INDIRECT THREATS, DIRECT THREATS, AND ACTIONS NECESSARY**

	<b>Indirect Threat</b>	<b>Links to Direct Threats</b>	<b>Action Necessary</b>
1	<b>Inadequate regional coordination</b> to protect high-conservation-value habitats	<ul style="list-style-type: none"> <li>• Conversion (agriculture and aquaculture)</li> </ul>	Establish regionally harmonized planning processes, policies, and environmental safeguards
2	<b>Fragmented and competing development priorities</b>	<ul style="list-style-type: none"> <li>• Conversion</li> <li>• Infrastructure development (natural system modification/ transportation and service corridors)</li> <li>• Development of hydropower (natural system modification/ transportation and service corridors)</li> </ul>	Promote integrated spatial planning, which includes food security, economic growth, energy, climate change, and conservation
3	<b>Weak enforcement</b> of laws, policies, and agreements related to natural resources	<ul style="list-style-type: none"> <li>• Overharvesting (biological resource use)</li> <li>• Unsustainable logging (biological resource use)</li> <li>• Conversion</li> </ul>	Strengthen regional monitoring, compliance, and enforcement of natural resource laws and policies
4	<b>Lack of multi-stakeholder involvement</b> , especially of marginalized groups, in development decision-making	<ul style="list-style-type: none"> <li>• Overharvesting</li> <li>• Unsustainable logging</li> <li>• Conversion</li> </ul>	Promote multi-stakeholder processes involving government, civil society, and the private sector, leading to ownership and commitment
5	<b>Business practices do not adequately consider the full range of social and environmental impacts</b>	<ul style="list-style-type: none"> <li>• Pollution</li> <li>• Destructive fishing practices (biological resource use)</li> <li>• Unsustainable logging</li> </ul>	Encourage the private sector to adopt best practices and employ strong social and environmental safeguards
6	<b>Undervaluation</b> of goods and services provided by healthy ecosystems	<ul style="list-style-type: none"> <li>• Development of hydropower</li> <li>• Conversion</li> <li>• Pollution</li> </ul>	Place economic value on ecosystem services and incorporate into development planning and business practices
7	<b>Insufficient resources</b> for natural resource and biodiversity conservation	<ul style="list-style-type: none"> <li>• Exotic and invasive species</li> <li>• Overharvesting</li> <li>• Pollution</li> </ul>	Enhance sustainable financing for conservation from public and private sectors

	<b>Indirect Threat</b>	<b>Links to Direct Threats</b>	<b>Action Necessary</b>
<b>8</b>	<b>Demand for unsustainably-sourced</b> food, natural resources, energy, and consumer products	<ul style="list-style-type: none"> <li>• Overharvesting</li> <li>• Development of hydropower</li> <li>• Conversion</li> <li>• Unsustainable logging</li> </ul>	Transform consumer attitudes and behaviors to support sustainable products and processes
<b>9</b>	<b>Lack of scientific knowledge</b> to sustainably manage biodiversity	<ul style="list-style-type: none"> <li>• Climate change</li> <li>• Exotic and invasive species</li> </ul>	Promote applied research to inform policy and management practices and to support decision-making

#### **D. Extent to which RDMA is Addressing the Actions Necessary**

This report summarizes RDMA programs and the extent to which the efforts being undertaken by RDMA meet the actions necessary, looking across RDMA’s entire programming portfolio and at each of the four RDMA technical offices: the Office of Public Health (OPH), the Office of Governance and Vulnerable Populations (GVP), the General Development Office (GDO), and the Regional Environment Office (REO). The Office of U.S. Foreign Disaster Assistance (OFDA), based at RDMA but not included in RDMA’s strategic planning, was also included in this assessment. In brief, the assessment found that RDMA is currently addressing all nine of the actions necessary to some degree through its current and recent biodiversity and environment programs. Some key gaps in RDMA’s current biodiversity programming do exist, however, and include weak engagement with the private sector, weak engagement in India and South Asia, and weak engagement on freshwater biodiversity.

#### **E. Recommendations**

Based on the findings of this assessment, the following recommendations are provided for how RDMA can more strategically and effectively address the actions necessary to conserve biodiversity and tropical forests in Asia. These are meant to be illustrative and are by no means exhaustive.

*1. Strengthen synergies, collaboration, and integration through existing RDMA programs.* Strategic areas of focus based on existing programming include the following:

- Integration of conservation and sustainable management into economic development (e.g., by including environmental safeguards, standards, and biodiversity considerations in regional trade and agriculture policy activities). A regional assessment of markets, trends, and impacts of specific agricultural crops on forests (e.g., oil palm, rubber, cassava, corn, prawn) could help inform more integrated conservation and agriculture/food security programming.
- Strengthen synergies between conservation, health, and food security (e.g., malaria and forest conservation; wildlife trade and emerging pandemic threats; and food security, nutrition, and fisheries).

- Expand linkages between rule-of-law efforts and natural resource management and governance (e.g., by addressing China’s regional environmental footprint through more explicit inclusion of natural resource governance issues, such as illegal wildlife and timber trade, into broader rule-of-law efforts).

2. *Strengthen strategic partnerships with key countries and regional organizations.*

Strategic priorities for RDMA would include the following:

- *ASEAN.* RDMA should develop a comprehensive strategy with this key regional partner to address “green” economic growth, biodiversity and natural resources, and climate change, among other issues, and also to promote regional environmental standards, environmental compliance, and enforcement.
- *Greater Mekong/Lower Mekong subregion* is a high political priority and a key regional focus of RDMA. The mission should proactively support the Lower Mekong Initiative’s environment pillar, as well as the other pillars of health, education, and infrastructure. The mission should also engage with key regional partners such as the Asian Development Bank, the Mekong River Commission, and others to consider opportunities to strengthen regional safeguards for infrastructure development, promote sustainable trade in natural resources, and address other related issues.
- *Coral Triangle region* is a key focus of RDMA to address critical biodiversity, climate change, and food security issues in Southeast Asia and the Pacific. The mission should continue to strategically support emerging regional governance systems and develop broader connections with marine and fisheries conservation priorities across the region.
- *China.* Due to China’s central role in many of the region’s environmental challenges (e.g., logging, mining, hydropower development, fisheries, wildlife trade, infrastructure development, etc.), RDMA should develop a clear strategy for constructive engagement and collaboration in solving regional challenges, building on current efforts related to rule of law, environmental governance, and Tibet.
- *India.* As the world’s largest democracy, India’s trajectory affects the entire South Asian continent (e.g., through hydropower development, timber and palm oil imports), as well as more broadly across the region. India also offers innovative solutions to regional challenges. RDMA should strengthen collaborative engagement with India to better capitalize on these opportunities.
- *Smaller, more vulnerable countries* in the region, such as Bangladesh, Burma, Cambodia, Laos, Nepal, and Papua New Guinea, face significant capacity constraints, as well as challenges in their regional relationships with larger neighbors. These countries should be targeted as prime focal countries for RDMA support and investments.

- *USAID bilateral missions.* As the bilateral missions are key clients of RDMA, the mission should facilitate more coordinated planning and programming across sectors. Nearly all bilateral missions are relevant for biodiversity and forestry; Cambodia, India, Indonesia, Nepal, the Philippines, and Vietnam are key.
- *U.S. Government agencies.* RDMA can achieve greater impact through more strategic partnerships with U.S. embassies and other U.S. Government agencies (e.g., U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Department of Justice, and others) to leverage resources and expertise and to strengthen political outreach and diplomacy related to mutual environmental and development priorities.

3. *Thematic recommendations.* These recommendations are illustrative opportunities for RDMA to consider and are not meant to promote specific programming priorities or decisions.

- *Stimulate public-private partnerships for conservation.* Greater strategic engagement with the private sector is needed to mobilize private resources and investments for conservation. This could include voluntary private sector certification initiatives (e.g., for timber, oil palm, fisheries), supporting and stimulating pro-conservation business ventures (e.g., ecotourism, payments for ecosystem services), and other forms of partnerships for conservation — for example, partnerships with protected areas. Such efforts would be complemented more broadly through multi-stakeholder approaches that engage civil society and government, as well as through a combination of voluntary efforts and strengthening of regulatory compliance measures.
- *Strengthen environmental economics for sustainable economic development.* Building understanding of (and capacity in) environmental economics and mainstreaming this discipline into decision making would enable more accurate accounting of the true costs and benefits of development and ensure more equitable distribution of these costs and benefits. There is a significant need to change the paradigm focused solely on growth to ensure that economic activities are environmentally sustainable, and to minimize and/or mitigate negative impacts on the region's remaining high-conservation-value areas. RDMA could help catalyze and elucidate a long-term vision for sustainable development in the region, explore scenarios for what this could look like, and help develop plans for achieving true sustainability.
- *Engage in sustainable hydropower development.* Hydropower is a natural integrator of energy, water, forests, fisheries, watersheds, and development issues. Many countries in Asia are looking to hydropower as a “green” energy alternative, but its role and future in a changing climate are inadequately understood. This is a transboundary issue involving connections across the region, such as between the Mekong and South Asia, as well as the roles of China and India.
- *Mainstream climate change across RDMA's portfolio.* Climate change is already having wide-ranging impacts, and development programming needs to consider future scenarios to enhance the sustainability of investments. RDMA can build on



current efforts, such as the Mekong climate change study, to assess potential climate impacts across the entire Asia region and integrate these considerations into all sectors — for example, health and malaria programming. This would be supported by clear identification and targeting of the most vulnerable communities and groups, including women and ethnic minorities.

- *Support regional marine and fisheries conservation.* An estimated 500 million people in Asia rely on fisheries as their main source of protein. Recognizing the critical connections among biodiversity, climate change adaptation, food security, governance, and health, a regional approach is needed to conserve fisheries and endangered aquatic species that migrate across international waters and transboundary rivers. There is also a need to share best practices and harmonize policies among regional policymakers and practitioners.
- *Invest in systematic geospatial monitoring of regional indicators.* RDMA's planned GeoCenter should build on the geospatial analysis and data initiated in this assessment to strengthen regional strategic planning and programming. This would improve understanding and monitoring of biodiversity threats and regional development trends and should be expanded to include regional geospatial data and indicators related to health (e.g., malaria distribution, emerging pandemic threats), economic growth (e.g., poverty, income), governance, food security, social indicators, environment, climate change, disasters, and other relevant information.
- *Raise awareness and improve communication about the global biodiversity crisis to stimulate greater local and regional ownership and political will.* Economic growth remains the top priority of regional governments and the private sector, but continued degradation of natural ecosystems threatens to undermine the prospects for sustained future growth. Awareness of the importance of healthy ecosystems and biodiversity for economic development needs to be raised and political will mobilized to stimulate proactive action and ownership. RDMA can help catalyze and facilitate this through broad-based strategic partnerships with other efforts and organizations, such as UNEP's World Conservation Monitoring Center, IUCN, the ASEAN Center for Biodiversity, the ASEAN and South Asia Wildlife Enforcement Networks, the Asian Development Bank, civil society organizations, journalists, and others. These efforts could lead to more systematic monitoring of regional biodiversity status and trends and more effective communication of these concerns to inform and stimulate proactive responses.



## I. INTRODUCTION

The species richness of mammals and birds in Asia is among the highest in the world and includes well-known and threatened species such as Asian elephants (*Elephas maximus*), tigers (*Panthera tigris*), and giant pandas (*Ailuropoda melanoleuca*) and a great diversity of plants. Other taxonomic groups such as insects, mollusks, and other invertebrates contain many species, with more being discovered through ongoing research. The biodiversity of the region is increasingly threatened by the demand — generated by rapid economic development — for energy, new infrastructure, and industrial, agricultural, and natural resources. With these pressures on biodiversity, it is not surprising that one-third of all the threatened species are found in Asia (IUCN 2009).

This Asia Regional Biodiversity and Tropical Forest Assessment describes the region’s biodiversity and the threats it faces, with the aim of helping to inform RDMA’s new regional development cooperation strategy. This report also serves to fulfill the legal requirements of U. S. Foreign Assistance Act (FAA) Sections 118 (tropical forests) and 119 (biodiversity). The FAA requires that “each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (i) the actions necessary in that country to achieve conservation and sustainable management of tropical forests/biodiversity and (ii) the extent to which the actions proposed for support by the agency meet the needs thus identified.” The specific *objectives* of the assessment were:

- To conduct a regional assessment identifying the actions necessary to conserve biodiversity and tropical forests and assessing the extent to which RDMA is addressing those actions.
- To identify regional trends, gaps, and opportunities and better ways to mainstream those considerations into RDMA’s development programming.

For the purposes of this assessment, biodiversity was defined to include the varieties of species, communities, and ecosystems that are found in Asia, with a focus on wild species. Genetic crop varieties and other biodiversity aspects are not covered in this report. Although Sections 118 and 119 refer specifically to tropical forests, the region contains temperate forests as well. These are included in relevant summaries.

This assessment was lead by Chemonics International, with extensive participation by USAID staff and engagement by the U.S. Forest Service. Geospatial mapping was provided by the Regional Integrated Multi-Hazard Early Warning System (RIMES) at the Asian Institute of Technology, based on publicly available global datasets. Although this report includes only a portion of these maps, the full datasets have been provided to RDMA for future analytical and mapping work.

The scope of this assessment was to examine regional trends in biodiversity and forest conservation. For the purposes of this analysis, “regional” activities were defined as those that: (i) affect multiple countries in the region, (ii) impact transboundary ecosystems, (iii)

have drivers outside the affected countries and region (e.g., trade-related issues), or (iv) are most effectively and efficiently addressed by regional approaches

The *geographic scope* of the assessment included 18 countries in four subregions: Mekong (Burma, Cambodia, Laos, Thailand, and Vietnam); Insular Southeast Asia-Pacific (Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste); South Asia (Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka); and China. This assessment builds on a previous effort (*RDMA Asia Regional Biodiversity Conservation Program Planning Assessment 2009*) and takes a closer look at the biodiversity and forestry concerns in three ecosystem types: terrestrial, freshwater, and marine. These were addressed specifically to ensure inclusion of threats that may be more relevant in some ecosystems than in others.

To carry out the assessment, the team leader met with USAID staff and representatives of various international conservation nongovernmental organizations (NGOs) operating in Asia to gather background information. A literature review included 118/119 reports from bilateral USAID missions, *Asia's Future* (USAID 2010), other key USAID documents, published academic literature, and NGO documents and studies. From January to early April 2012, the team leader and a senior technical advisor carried out activities from their base in Bangkok, where they were supported by an extended team of RDMA staff for regional consultations with stakeholders in Bangkok, New Delhi, Jakarta, Manila, and Rangoon (see Exhibit 4). Annex A provides a full list of stakeholders met during this process. In addition, the team consulted with staff from each RDMA technical office to gain a better understanding of their programs and how each relates to biodiversity and forests in the region to inform the assessment.

**EXHIBIT 4. REGIONAL STAKEHOLDER MEETINGS**

<b>LOCATION</b>	<b>NO. OF INDIVIDUALS</b>	<b>NO. OF ORGANIZATIONS</b>
Bangkok, Thailand	21	10
New Delhi, India	22	16
Jakarta, Indonesia	34	15
Manila, Philippines	20	9
Rangoon, Burma	21	11
<b>Total</b>	<b>118</b>	<b>61</b>

Preliminary results of this assessment were discussed with regional stakeholders at a roundtable discussion in Bangkok that was attended by 13 individuals from 10 organizations working within the sector (see Annex A for a list of participants). Preliminary results were also presented to RDMA for feedback and discussion. The final assessment reflects this feedback, as well as input gathered from a review of the draft document by USAID staff in Washington, bilateral missions, and RDMA.

## II. BIODIVERSITY AND TROPICAL FORESTS IN ASIA

### A. Introduction

Occupying only 8.6 percent of the world's total land area, Asia contains about 60 percent of the world's human population and one-third of all the threatened species listed in the IUCN Red List<sup>3</sup> (UNEP 2010). Six Asian countries — China, India, Indonesia, Malaysia, Papua New Guinea, and the Philippines — are among the 17 “mega-diverse” countries in the world that together contain 70 percent of the world's biodiversity (Conservation International 1998). Southeast Asia alone, with only 3 percent of the world's land area, contains 20 percent of the known terrestrial species, including 27,000 endemic species (ASEAN 2006; cited in USAID 2009). Globally recognized species, such as Asian elephants, tigers, and orangutans, are found only in Asia. The region also contains some of the world's most diverse coral reefs systems (the Coral Triangle), the world's third-largest tract of tropical rainforest (New Guinea), and biologically rich river systems inhabited by distinctive species such as giant catfish and river dolphins.

Biodiversity in Asia has more than aesthetic value. Biological resources provide food, medicine, building materials, and other products that are said to account for at least 40 per cent of the economy and to provide up to 80 percent of the needs of the poor (ASEAN 2010). Moreover, natural ecosystems provide environmental services such as water and soil resources, climate control and sequestration of greenhouse gas emissions, pollination of crops, and other factors that are estimated to be worth trillions of dollars each year (Costanza et al. 1997).

### B. Biodiversity Hotspots

The vast Asia region, with its diversity of habitats and biodiverse flora and fauna, contains some of the most important areas in the world for biodiversity conservation. Biodiversity “hotspots” cover much of the Asia region (Exhibit 5). A biodiversity hotspot is defined as an area with high levels of biodiversity, as well as high levels of threat (CI 2012). Specifically, to be considered a biodiversity hotspot an area must (i) contain at least 1,500 species of vascular plants<sup>4</sup> as endemics (species found nowhere else on earth) and (ii) have lost at least 70 percent of its original habitat.

The hotspots in Asia are the East Melanesian Islands, the Philippines, Wallacea, Sundaland, Himalayas, Indo-Burma, Western Ghats and Sri Lanka, and the mountains of southwest China. Descriptions of each of these hotspots are provided below, with key statistics summarized in Exhibit 5. Estimates of the number of these species vary widely from source to source, and new species are still being discovered with more taxonomic

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<sup>3</sup> The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List), founded in 1963, is the world's most comprehensive inventory of the global conservation status of biological species. The International Union for Conservation of Nature (IUCN) is the world's main authority on the conservation status of species.

<sup>4</sup> Vascular plant are higher plants, excluding mosses, liverworts and hornworts, and are referred to in this report as “plants.” The number 1,500 plants represents more than 0.5 percent of the world's total.

surveys. While individual species form an important part of biodiversity, they are not summarized for each hotspot by Conservation International or in this assessment due to data limitations. Although a focus on biodiversity hotspots does not capture all the habitats and biodiversity in Asia, a hotspot focus does highlight some of the more critical areas needing conservation attention.

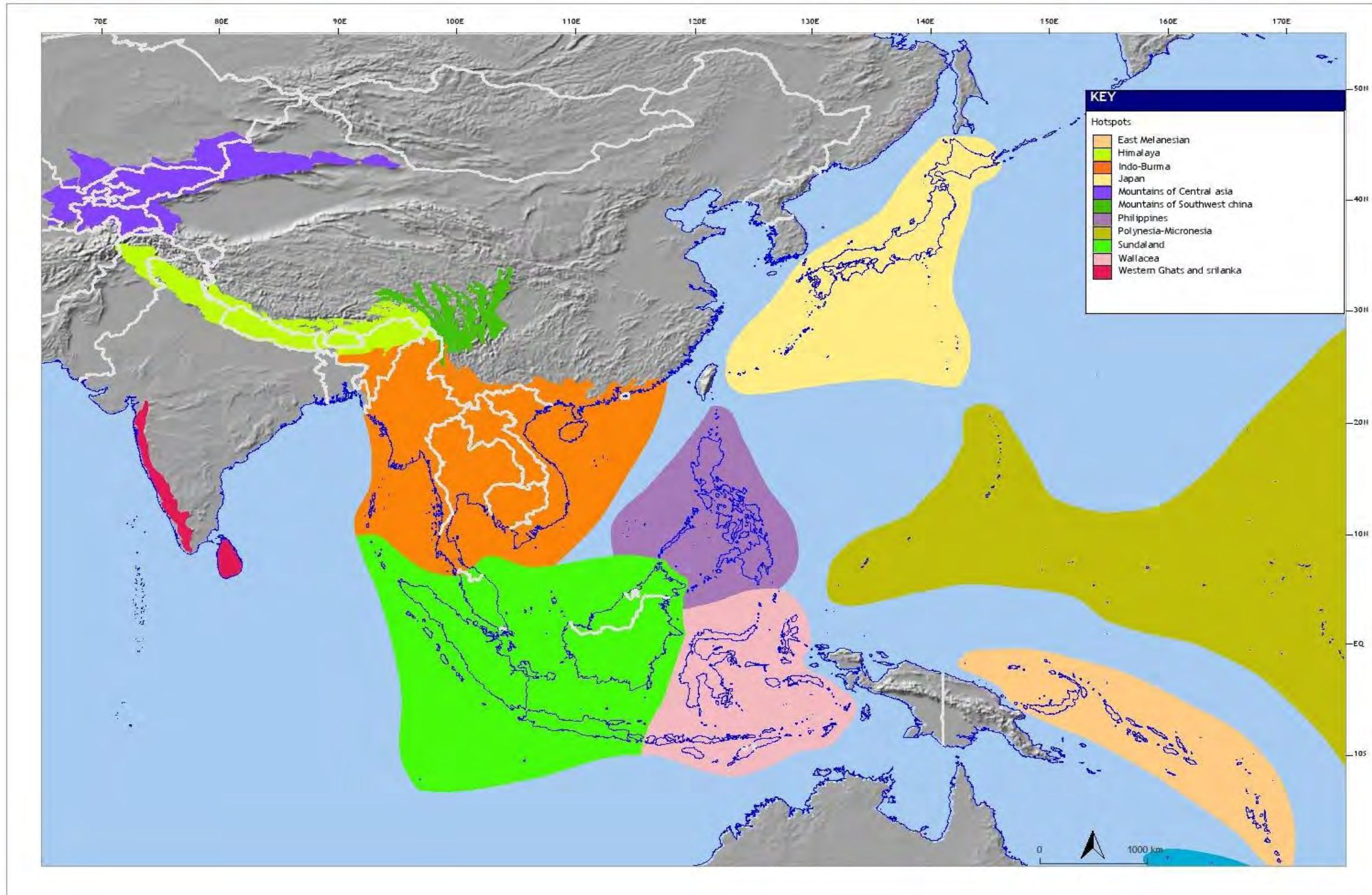
*East Melanesian Islands.* The East Melanesian Islands hotspot includes the Solomon Islands and adjacent islands, 1,600 islands in total, some with active volcanoes. The islands contain a number of different habitats, including mangroves, lowland and montane rainforests, freshwater swamp forests, seasonally dry forests, grasslands, and coastal vegetation. This hotspot contains more than 8,000 plant species and some unique animals — for example, giant prehensile-tailed skinks (*Corucia zebrata*), black-faced pitta birds (*Pitta anerythra*), and flying fox bats (*Pteropodidae*). Due to their long isolation from the closest large land mass of New Guinea and their diversity of habitats, many of the plant and animal species found here are endemic.

*Philippines.* The Philippines has more than 7,000 islands and is considered a biodiversity hotspot. Forest fragments cover only 7 percent of the original once-covered area (CI 2012), but there are still more than 9,000 vascular plant species, 167 mammal species, 535 bird species, 237 reptile species, and 89 amphibian species. Many of these species, including 85 percent of the amphibians, 68 percent of the reptiles, and 61 percent of the mammals, are endemic. Unusual species found only in the Philippines include an endemic freshwater crocodile (*Crocodylus mindorensis*), the Philippine eagle (*Pithecophaga jeffery*), and a dwarf water buffalo, the tamaraw (*Bubalus mindorensis*).

*Wallacea.* The Wallacea hotspot includes the Indonesian islands of Sulawesi, the Moluccas (Indonesia), and the Lesser Sundas, which encompass Timor-Leste, and the Indonesian region of Nusa Tenggara. These islands are divided from another hotspot — Sundaland — which lies to the west of the “Wallace Line.” As Alfred Wallace first determined in the 19th century, the species on either side of this “line” in the sea are distinctly different due to the movement of the earth’s tectonic plates and changing sea levels over the course of species evolution. Wallacea has tropical rainforests and savannah woodlands and more than 10,000 plant species. Nearly half of the reptiles, birds, and mammal species in this area are endemic, such as the well-known Komodo dragon (*Varanus komodoensis*).

*Sundaland.* The Sundaland hotspot includes Borneo, Sumatra, Java, Bali, Singapore, parts of peninsular Malaysia, a bit of southern Thailand, and some adjacent small islands. This area is west of the Wallace line, with a different species composition and a geographic diversity that ranges from high tropical mountains with no vegetation through lowland rainforests, peat swamp forests, and coastlines that include sandy beaches, rocky shores, and mangrove forests. This area is one of the richest on earth in plant species, with more than 25,000 species of vascular plants, at least 60 percent of which are endemic. The fauna are equally diverse, with at least 380 mammals, 769 birds, and 452 reptiles. This is the only region where orangutans (*Pongo spp*) are found; it is also home to the Javan rhinoceros (*Rhinoceros sondaicus*).

EXHIBIT 5. ASIA'S BIODIVERSITY HOTSPOTS







*Himalaya.* The Himalaya hotspot includes the highest mountains in the world, and due to the extreme elevation gradients, contains a diversity of ecosystems ranging from subtropical broadleaf forests and grasslands to conifer forests and alpine meadows above the tree line, with some vascular plants recorded as high as 6,000 meters. More than 10,000 plant species are found here, including at least 750 orchids (*Orchidaceae*). Some of the world's largest birds, including a number of vultures (*Gyps spp*) and storks (*Leptoptilos spp*), are found here, along with unique mammals such as the golden langur (*Trachypithecus gee*). The alluvial grasslands of the Ganges and Brahmaputra plains contain some of the highest densities of tigers (*Panthera tigris*) in the world.

*Indo-Burma.* The Indo-Burma hotspot stretches from eastern Bangladesh to northern peninsular Malaysia and includes Laos, Cambodia, Vietnam, most of Thailand, Burma, parts of southern China, and some offshore islands. The Lower Mekong catchment is entirely encompassed by this hotspot. Many ecosystems occur in this region, including evergreen, deciduous, and montane forests, shrublands, karst outcrops, lowland swamps, mangroves, and more. This diversity in habitats results in a great variety of plant and animal species, including 53 species of freshwater turtles — one-fifth of all the freshwater turtle species in the world (CI 2012). Many new species, including six mammals, have been found here in recent years.

*Western Ghats and Sri Lanka.* The Western Ghats in southwestern India share a similar climate, geology and evolutionary history with the island of Sri Lanka, 400 kilometers away. Together, these areas contain more than 6,000 vascular plant species, with 80 genera that are endemic. Of the 175 amphibian species found here, about 130 are endemic, as are about two-thirds of the 260 reptile species. Although the mammal and bird fauna do not have a high proportion of endemic species, this hotspot holds important populations of Asian elephants (*Elephas maximus*) and lion-tailed macaques (*Macaca silenus*).

*Mountains of Southwest China.* This hotspot includes a series of mountain ranges and valleys that stretch from the eastern edge of the Tibetan Plateau to the central Chinese plain and includes the headwaters of the Mekong, Yangtze, and other major rivers in the region. More than 12,000 species of plants have been found, creating one of the world's most diverse temperate areas. Giant pandas (*Ailuropoda melanoleuca*), red pandas (*Ailurus fulgens*), and golden monkeys (*Rhinopithecus roxellana*) are found here, along with the largest diversity of pheasants in the world.

Exhibit 6 depicts the status of plant and animal species in Asia's hotspots.

### **C. Status of Biodiversity in Asia**

Natural resources provide the foundation for sustainable economic growth, as well as a wide range of environmental goods and services society depends upon. Despite these important values, ecosystems continue to be degraded and lost, and with this loss in habitats come high rates of extinction. Global rates of extinction are currently 1,000 times higher than historical background rates, prompting scientists to refer to our current period as —the sixth great extinction” (Soule 1996). At least five previous periods of mass

**EXHIBIT 6. SPECIES STATUS IN ASIA'S HOTSPOTS**

LAND AREA AND SPECIES	HOTSPOTS								
	Indo-Burma	East Melanesian Islands	Himalaya	Southwest China Mountains	Philippines	Sundaland	Western Ghats & Sri Lanka	Wallacea	TOTAL
<b>Area (Km<sup>2</sup>)</b>	2,373,057	99,384	741,706	262,446	297,179	1,501,063	189,611	338,494	5,802,940
<b>Plants</b>									
Species (#)	13,500	8,000	10,000	12,000	9,253	25,000	5,916	10,000	93,669
Endemic (#)	7,000	3,000	3,160	3,500	6,091	15,000	3,049	1,500	42,300
Endemism (%)	52	38	32	29	66	60	52	15	45
<b>Birds</b>									
Species (#)	1,266	360	977	611	535	769	458	647	5,623
Endemic (#)	64	149	15	2	186	142	35	262	855
Endemism (%)	5	41	2	—	35	18	8	41	15
<b>Mammals</b>									
Species (#)	433	86	300	237	167	380	140	222	1,965
Endemic (#)	73	39	12	5	102	172	18	127	548
Endemism (%)	17	45	4	2	61	45	13	57	28
<b>Amphibians</b>									
Species (#)	286	42	105	90	89	244	178	48	1,082
Endemic (#)	154	38	42	8	76	196	130	33	677
Endemism (%)	54	91	40	9	85	80	73	69	63
<b>Reptiles</b>									
Species (#)	522	117	176	92	237	452	267	222	2,085
Endemic (#)	204	54	48	15	160	243	174	99	997
Endemism (%)	39	46	27	16	68	54	65	45	48
<b>Freshwater Fish</b>									
Species (#)	1,262	52	269	92	281	950	191	250	3,347
Endemic (#)	553	3	33	23	67	350	139	50	1,218
Endemism (%)	44	6	12	25	24	37	73	20	36
<b>Extinct species</b>	1	6	0	0	2	4	20	3	36

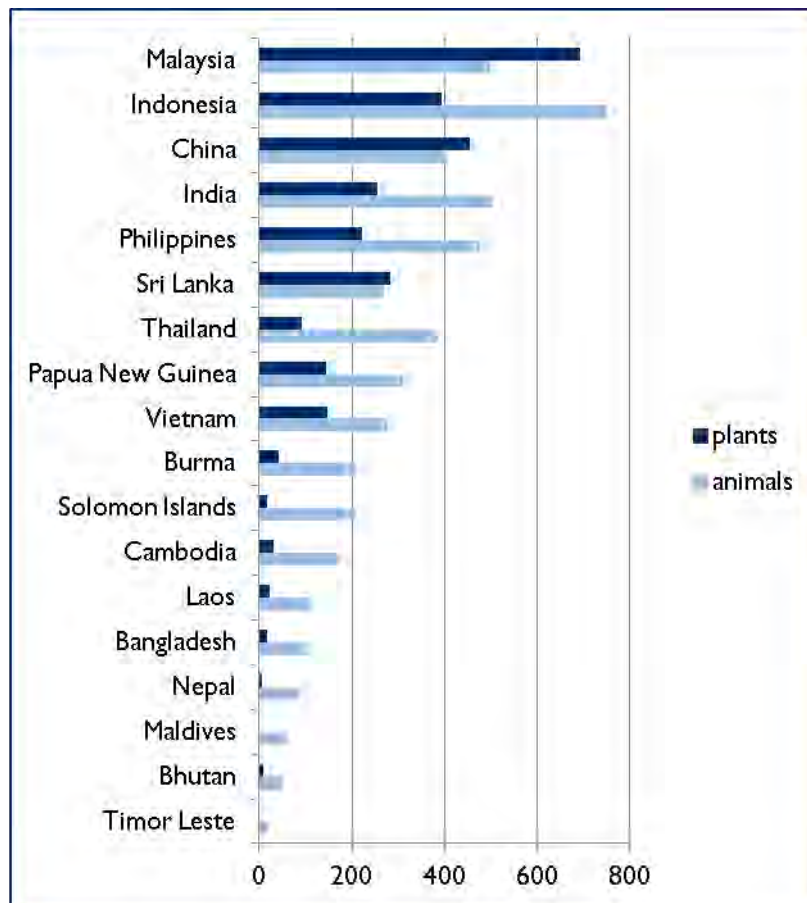
Source: Conservation International 2012

extinction of similar magnitude have occurred throughout geologic time (including the extinction of the dinosaurs), but the current period is different in that it is primarily caused by humans.

In 2010, the International Year of Biodiversity, the United Nations Environment Program summarized *The State of Biodiversity in Asia and the Pacific*. Exhibit 7 depicts the number of threatened plant and animal species of the 18 countries in the Asia region. According to the *United Nations Statistical Yearbook* (2009, revised 2011), the trend of extinction is increasing as the number of threatened species in these countries has increased between 2006 and 2010.

What these numbers alone do not convey is the urgency of the overall biodiversity crisis in Asia. To have so much of Asia designated as “hotspots” is an indicator of this crisis, for it reflects the fact that 70 percent of the original habitats have been lost, and this trend is continuing without abatement. Asia, particularly Southeast Asia, has among the highest levels of bird and mammal biodiversity in the world, but it shares with tropical Africa and South America the distinction of having the highest concentration of bird and animal species that are threatened (IUCN 2009).

**EXHIBIT 7. THREATENED PLANT AND ANIMAL SPECIES IN ASIA/PACIFIC, 2008**



Source: *The State of Biodiversity in Asia and the Pacific* (UNEP 2010)

## D. Terrestrial Biodiversity

### D1. Habitats and Species Richness

Terrestrial biodiversity in Asia includes all the plants, animals, fungal species, microorganisms, and other living things that inhabit all land-based habitats, from the high Himalayas and the Asian steppes, through the forested slopes and plateaus, to the lowlands and the coasts. This vast geography contains specialized habitats such as limestone caves, river shorelines, deserts, and rainforests. Exhibit 8 depicts Asia's major terrestrial biomes — large areas of similar climate-vegetation types. However, due to the large scale of the region, smaller local ecosystems are not displayed.

*Forests.* Asia's many forest types together total more than 530 million hectares — about 30 percent of the total land area of the 18 countries included in this report (FAO 2011) (see Annex B, Table 1). It is in forests that the largest numbers of amphibians, birds, and mammals are found (IUCN 2009). Forests provide the habitats for much of the biodiversity in the region, including flagship species like elephants, tigers, and orangutans.

Exhibit 9 shows the percentage of forest cover for Asia. It can be seen that the large islands of Borneo and New Guinea contain the densest and largest blocks of forest, with other dense forests remaining in other parts of Southeast Asia as well. Many of these forest ecosystems are transboundary in nature, including the forests of New Guinea and Borneo, as well as the Mekong subregion, the Himalayas subregion, and the Sundarbans mangroves. The extent of forests in Asia and the Pacific has changed dramatically over the past two decades. In the 1990s, the region experienced a net forest loss of 0.7 million hectares per year, while from 2000 to 2010, forest area increased by an average of 1.4 million hectares per year, primarily through afforestation programs in China, India, and Vietnam (FAO 2011).

However, the increase in forest area does not necessarily mean that forest biodiversity is being preserved. While FAO defines a forest as “land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent or trees able to reach these thresholds in situ” (FAO 2010), other definitions of forests are used in the region. Some of these include areas with very little canopy cover, while others include as forests areas that have much canopy cover, but were planted for commercial agriculture, such as oil palm and rubber plantations. Efforts to plant rubber, oil palm, and other tree crops are escalating throughout the region. If these are planted in areas previously used for agriculture, this may result in more “forest area,” but as monocultures, these plantations contain far less biodiversity than a natural forest.

*Grasslands.* At the biome scale, a few areas of montane grasslands and shrublands are visible in Southeast Asia. These grasslands are isolated areas with unique biodiversity, especially of plants. Other grassland areas of smaller scale are found in Nepal, in the Chitwan area, where Indian rhinos and tigers still are found.

EXHIBIT 8. CLIMATE-VEGETATION BIOMES IN ASIA

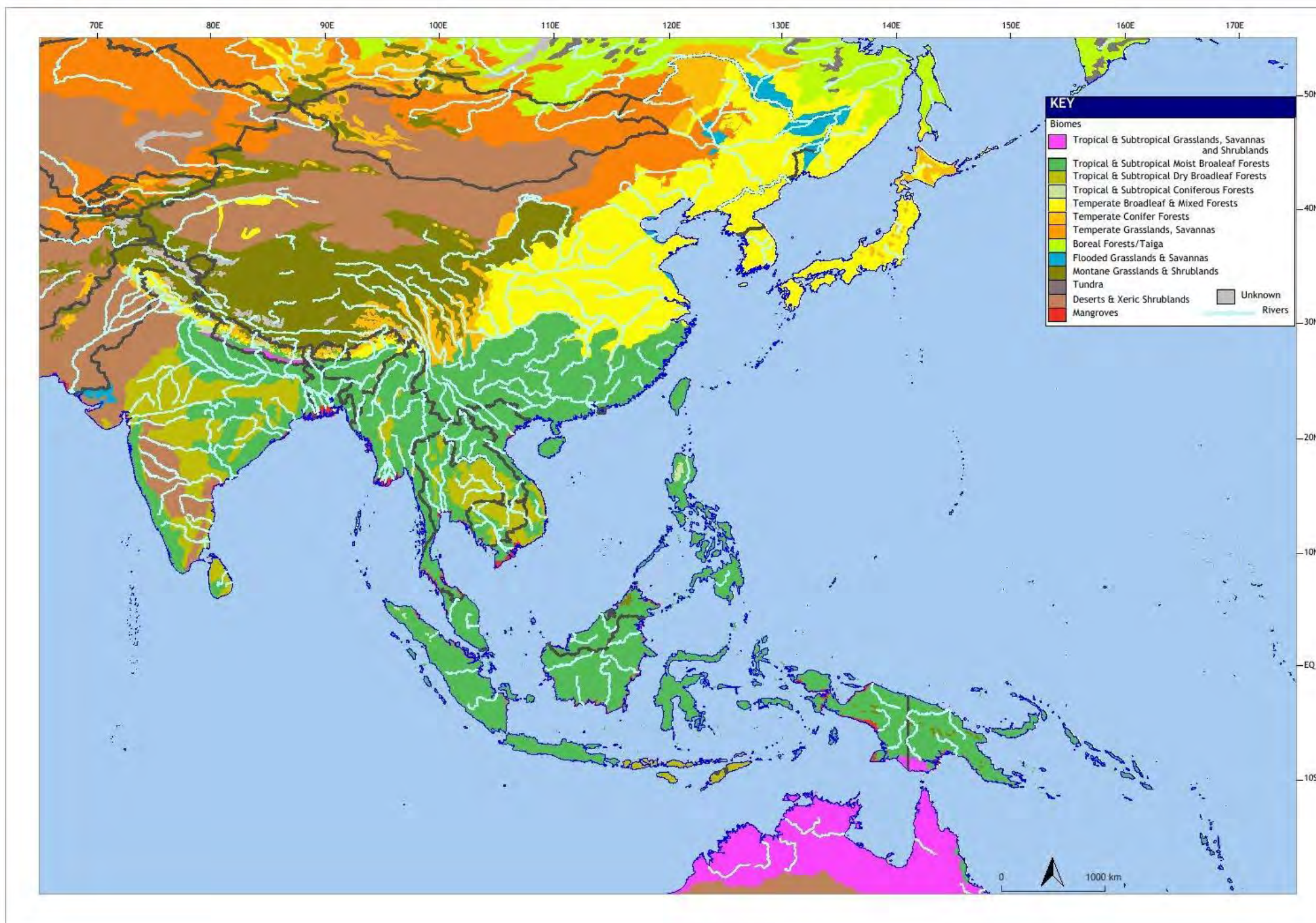
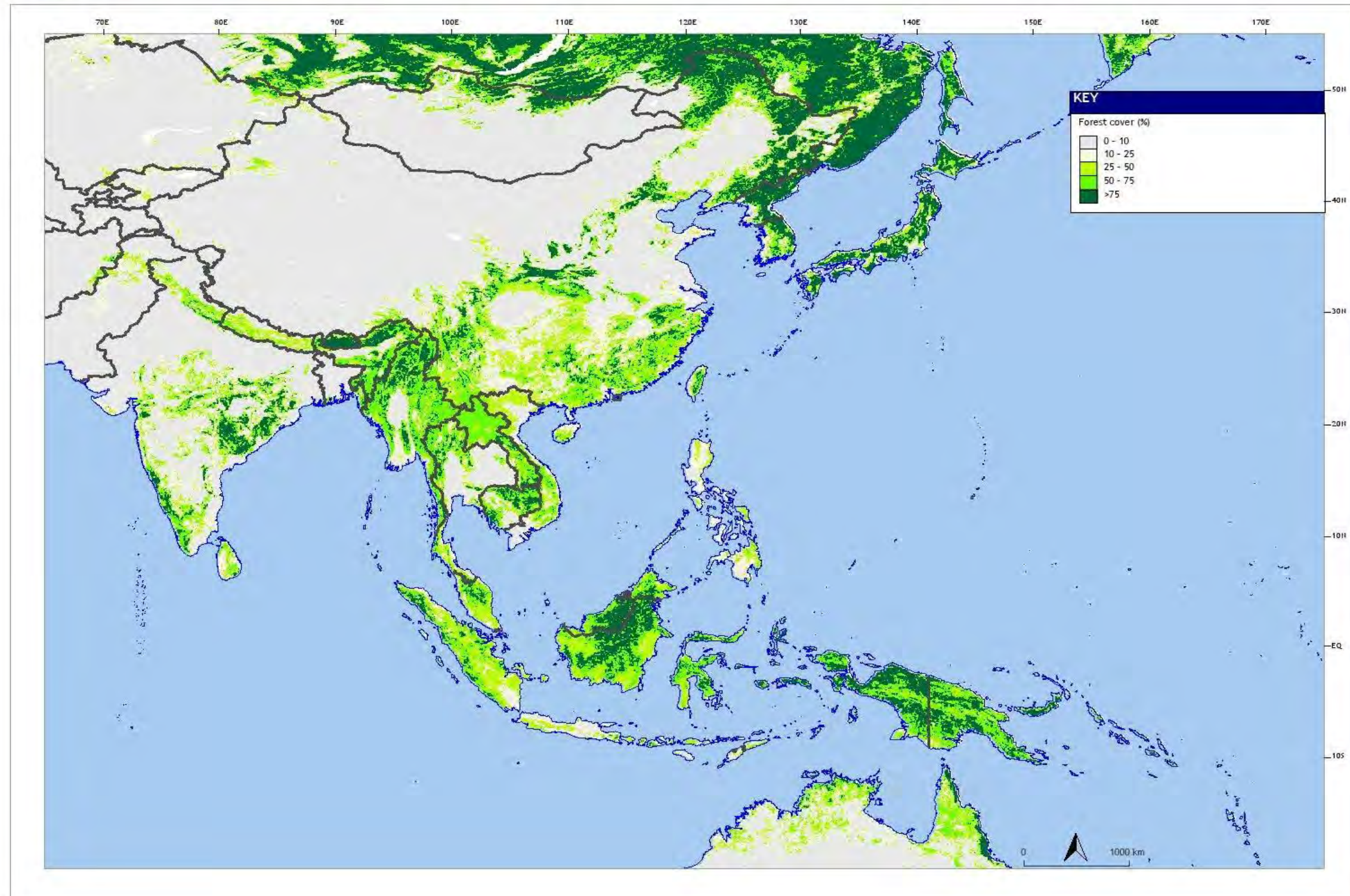




EXHIBIT 9. FOREST COVER IN ASIA







*Deserts.* Large areas of desert are found in China and India. In India, desert accounts for much of the middle of the country. These areas coincide with large human populations and agriculture that is primarily dependent on extraction of water from the river systems. These are generally not considered hotspots for biodiversity, although they may contain locally important species.

*Karst areas and caves.* Limestone formations (karst) and caves throughout Southeast Asia and China also provide specialized habitats for a diversity of species. Although the most obvious cave-dwelling species are bats, these areas also support many endemic and localized species of invertebrates, especially snails and arthropods.

## D2. Species of Special Concern

The terrestrial biodiversity of Asia includes many species listed in the IUCN's Red List as "threatened." In the 18 countries covered in this assessment, 3,725 species are listed as threatened,<sup>5</sup> including 740 critically endangered, 1,021 endangered, and 1,919 vulnerable terrestrial species based on detailed criteria of population levels, species ranges, and other scientific data that undergoes a rigid assessment process. Exhibit 6 provides more detail on the threatened species in Asia in all habitat types by taxonomic category

*Flagship species.* As a whole, the Asia region is known for a number of flagship species — species that are emblematic of a particular habitat or environmental cause, often occupying large ranges. Flagship species such as elephants and tigers are associated with particular ecosystems, including biodiversity-important forests. Worldwide interest in preserving these species in the wild also preserves the large remaining tracts of forest and the inherent biodiversity of other taxa as well. Giant pandas (*Ailuropoda melanoleuca*) are another charismatic species in Asia (although found only in parts of China). In Indonesia, orangutans (*Pongo spp*) also hold flagship species status, drawing many ecotourists and building support for conserving their habitats. Birdwatchers are concerned about the conservation of such unique species as, for example, black-necked cranes (*Grus nigricollis*) on the Tibetan plateau; Philippine eagles (*Pithecophaga jeffery*); and the many hornbills (*Bucerotidae*) that survive in still undisturbed forests throughout the region. Threatened migratory birds include the spoonbill sandpiper (*Eurynorhynchus pygmeus*) and the Bengal florican (*Houbaropsis bengalensis*).

## D3. Globally Recognized Areas

Efforts to protect the world's unique biological heritage have been undertaken primarily through the establishment of protected areas (PAs). Established and managed for long-term conservation of nature, PAs range from government-designated PAs to community-managed reserves. More than 150,000 protected areas have been designated to date, covering nearly 13 percent of the earth's land surface (outside Antarctica), with the world's governments committed to expand this area to 17 percent. Exhibit 10 illustrates protected areas in Asia. Recent analyses of PA coverage and trends in species extinction

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<sup>5</sup> Species are termed "critically endangered" if facing an *extremely* high risk of extinction in the wild; "endangered" if facing *very high* risk; and "vulnerable" if facing *high* risk.

risk at globally significant sites have shown that species in sites with greater PA coverage have experienced smaller increases in extinction risk over recent decades, indicating that PAs are having a beneficial effect in reducing extinction rates (Butchart et al. 2012). However, since globally half of the important sites for biodiversity conservation remain unprotected, much of the world's biodiversity exists outside of formal PAs. While PAs may slow the rate at which species are driven toward extinction, recent PA network expansion appears to have under-represented important sites. In addition to designating a comprehensive network of PAs, governments must ensure that conservation areas are adequately managed. It is estimated that this would cost roughly \$23 billion per year — more than four times current expenditures (Butchart et al. 2012)

Annex B (Table 6) provides information on the PAs in each of the countries covered in this report (UNEP 2012). Countries with the greatest percentage of area under protection include Cambodia (24 percent), Sri Lanka (20.8 percent) and Thailand (19.6 percent). Although China has a smaller percentage (16.6 percent) under protection, because of its total land area, it has the largest area under protection (1.5 million square kilometers). Lowest on the scale for percentage of land under protection are the Solomon Islands (0.1 percent) and Bangladesh (1.6 percent). While the amount of land under formal protection means that these areas have official conservation status, management effectiveness of PAs across the region varies widely, with a general lack of adequate measures in place and insufficient financial resources to protect the biodiversity within them.

In addition to country-specific efforts to create PAs, a number of other approaches have been used to gain recognition for the conservation of particular sites throughout the world. One approach is the selection of important bird areas (IBAs) by Birdlife International, a process that recognizes the importance of areas to migratory, globally threatened, and restricted-range birds. There are 2,293 IBAs in 28 Asian countries (see Exhibit 11), equivalent to 7.6 percent of the region's land area. Unfortunately, about 43 percent of these IBAs have no formal protection, and in many other cases, protection is inadequate. Although birds are the focus of this effort, the IBAs also include many other species of animals and plants that need protection as well.

The ASEAN Heritage Parks (AHPs) initiative is an effort to bring attention to some of the PAs in ASEAN member countries that are seen to be regionally important for biodiversity and cultural aspects. The ASEAN Center for Biodiversity (ACB) is the secretariat for the AHPs. The ACB is working to strengthen regional networks of PAs, especially in transboundary landscapes, and to strengthen national systems of PA management, including best practices and minimum standards. They also monitor the effectiveness of PA management. Currently, there are 37 declared AHPs, distributed as follows: Brunei Darussalam (1), Cambodia (2), Indonesia (7), Laos (1), Malaysia (3), Myanmar (6), Philippines (4), Singapore (1), Thailand (6), and Vietnam (6). Unfortunately, the amount of protection these AHPs receive varies widely depending on the management practices of each country.

EXHIBIT 10. PROTECTED AREAS IN ASIA





EXHIBIT II. IMPORTANT BIRD AREA SITES





## **D4. Economic Value**

Terrestrial biodiversity has great value to the people in the region and also contributes substantially to the economy. One area where data is available concerns the value of the timber trade. In 2009, roundwood production in the targeted 18 countries was 922 million cubic meters (UN 2009; see Table 5 in Annex B). In the same year, Asia provided wood products valued at \$28.4 billion, representing 27.4 percent of the world's total, and non-timber forest products (NTFPs), such as rattan and bamboo, valued at \$7 billion, representing 37.8 percent of the world's total (FAO 2010).

Terrestrial ecosystems and their biodiversity provide food, building materials, medicine, and other products used locally and for processed products. The diversity of plants in Asian habitats provides a wide range of useful products. In 1995, FAO estimated the region had 1,206 food plants, 1,182 medicinal plants, 539 ornamental plants, 252 fiber plants, 58 bamboos, 328 timber trees, 170 rattans, and 1,442 other crops, for a total of 4,997 plant species of domestic and commercial value.

Asian forests also provide storm protection, water supply and regulation, water purification, air cleansing, carbon sequestration, and other ecosystem services. Costanza, et al. (1997) estimated the ecosystem services of tropical forests, including primarily nutrient cycling, raw materials, and climate regulation, to be \$3,083 (2012 US dollars) per hectare per year. Using this estimate, Asia's 500 million hectares of forests provide \$1.5 trillion yearly in ecosystem services. Other estimates of ecosystem services, for example, include the value of bee pollination for coffee production, estimated at \$361 per hectare per year for coffee fields within forested areas (Kumar 2010).

## **E. Freshwater Biodiversity**

### **E1. Habitats and Species Richness**

Freshwater ecosystems in Asia range from large transboundary rivers to smaller streams, lakes and ponds, swamps, seasonal wetlands, and floodplains. Rivers and wetlands are discussed in more detail below. All of these habitats have important levels of biodiversity and many endemic species. Major watersheds, rivers, wetlands, and freshwater features are depicted in Exhibit 12.

### **Major Asian River Systems**

Asia's major river systems are the Ganges-Brahmaputra, the Salween-Nu, the Mekong-Lanxang, and the Yangtze. All originate in the Himalayas and the Tibetan plateau, the "water tower of Asia." These river systems are among the top ten in the world at risk for "massive degradation unless action is taken to conserve them" (Wong et al. 2007).

*Ganges-Brahmaputra.* The Ganges and Brahmaputra river basins cover parts of Nepal, India, China and Bangladesh and are estimated to contain about 8 percent of the world's human population (Wong, et al. 2007). These watersheds include 10 distinct biomes with diverse habitats ranging from small mountain streams, main river segments and

associated floodplains, and coastal mangroves. The Ganges River basin contains more than 140 species of freshwater fish, including unique species such as freshwater sharks (*Glyphis gangeticus*), 90 amphibian species, and the Ganges river dolphin (*Platanista gangetica*). The Sundarbans delta, the largest tract of mangrove forests in the world, contains 42 mammal species (including tigers), 315 bird species, 35 reptile species, 176 fish species, and 31 crustacean species that have been identified, although more are certainly present.

*Salween-Nu.* The Salween river basin encompasses parts of China, Burma, and Thailand and flows adjacent to the Mekong and Yangtze Rivers in the Tibetan plateau. The biodiversity of this river is not well known, although it is said to contain 143 fish species (47 of which are endemic), 92 amphibian species, and a high diversity of turtles; it is also an important bird habitat (Wong et al. 2007). One localized survey at Khoe Kay in a forested section of the river in Burma (KESAN 2008) found 39 mammal species, 66 bird species, 20 reptile species, and 32 fish species (including 8 endemics), which hints at the level of diversity to be expected when more studies are conducted.

*Mekong-Lanxang.* The Mekong river basin is the 10th largest in the world in volume and includes parts of China, the border between Laos and Burma, most of the border between Laos and Thailand, and much of Cambodia and southern Vietnam. It has a flooding regime that includes a seasonal reverse flow of water to and from Tonle Sap Lake in Cambodia. This water regime, along with many different habitats, results in an exceptionally high degree of biodiversity (Coates et al. 2003). At least 1,200 to 1,700 fish species are found here, the third-highest level of fish diversity in a river basin after the Amazon and the Congo (Wong et al. 2007). These waters contain more than 160 amphibian species and many crustaceans and mollusk species that have not been fully surveyed.

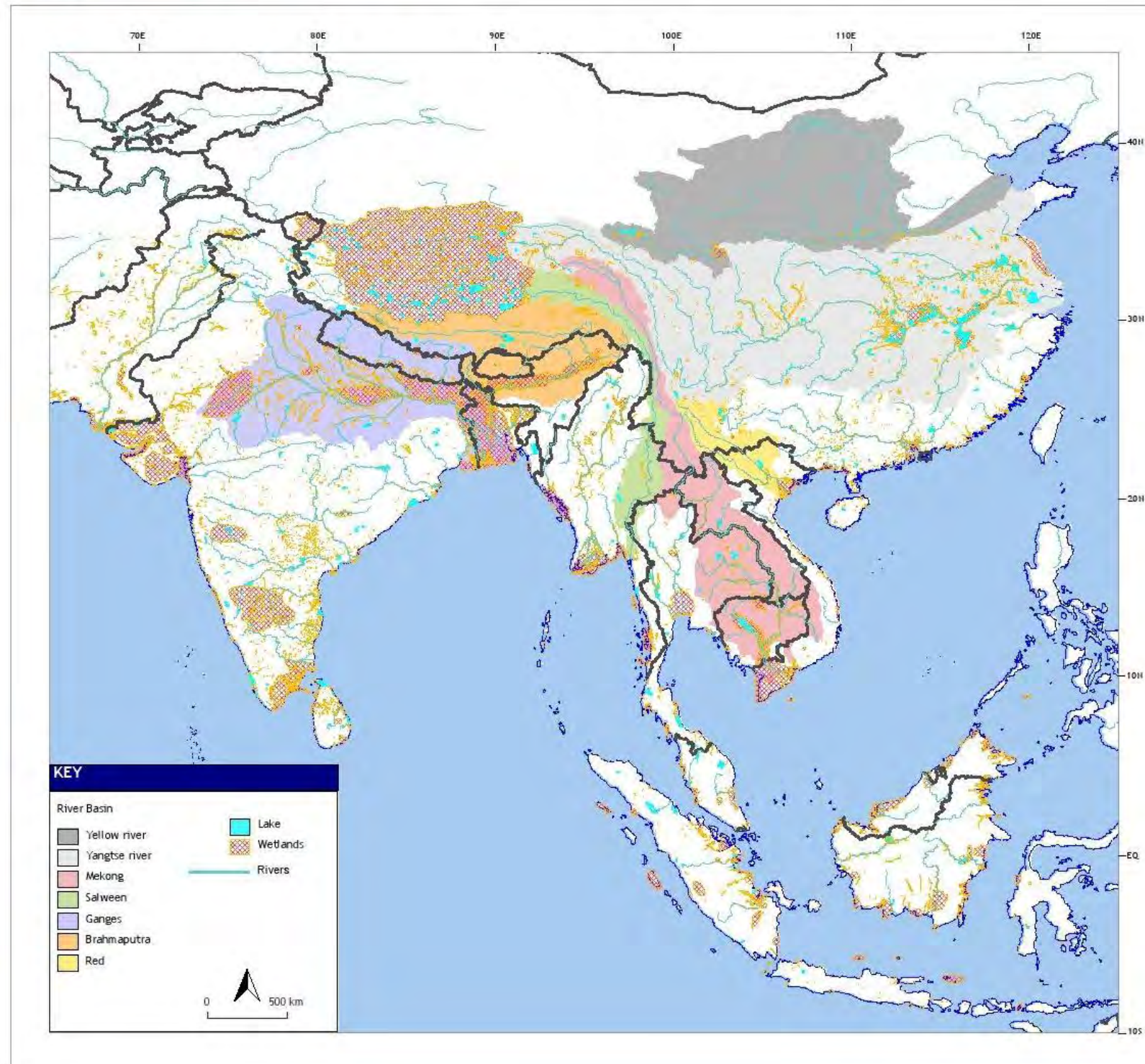
*Yangtze.* The 6,300-kilometer Yangtze River basin covers one-fifth of the area of China (Wong, et al. 2007); contains 350 fish species, including 112 endemics, and more than 160 amphibian species; and is an epicenter for crab diversity. A number of critically endangered species are found in the Yangtze, including the Yangtze sturgeon (*Acipenser dabryanus*), the Chinese paddlefish (*Psephurus gladius*), the Chinese alligator (*Alligator sinensis*), the Chinese giant salamander (*Audrias davidianus*) and the Yangtze giant soft-shell turtle (*Rafetus swinhoei*) (IUCN Red Data Book 2009).

## **Wetlands**

In addition to river systems, freshwater biodiversity in Asia also inhabits lakes, sinkholes, marshes, flooded forests, and a variety of other wetland types that are beyond the scope of this assessment. Some particularly notable Asian wetlands are freshwater swamp forests, including peat swamp forests that cover large low-lying areas in Borneo, Sumatra, peninsular Malaysia, and Papua, Indonesia. Not only does this unique vegetation type produce a variety of endemic plants, fish and other species — it also serves to sequester large amounts of carbon. Other wetlands of significance to biodiversity include those along river valleys, lake shores, isolated seasonal ponds, and many others, each with different species assemblages.



EXHIBIT 12. FRESHWATER RESOURCES IN ASIA





## E2. Species of Special Concern

IUCN's Red List identifies a total of 1,118 freshwater animal and plant species that are considered to be threatened (567 species), endangered (358 species), critically endangered (227), or extinct (8 species) in Asia (IUCN 2009). The largest groups of critically endangered freshwater species include turtles, large fish such as sturgeon and freshwater sharks, amphibians, and smaller fish species.

In freshwater conservation programs, a few species serve as flagships for the habitats they occupy and the other species contained therein. Irrawaddy dolphins (*Orcaella brevirostris*) and Ganges river dolphins (*Platanista gangetica*) are widely known and recognized, and their long travels up the major transboundary rivers in the region are a symbol of the need for connectivity of ecosystems not divided by dams. Similarly, the giant Mekong catfish (*Pangasianodon gigas*) migrates up the Mekong River and also serves as a flagship species.

River otters thrive only in areas where the food chain is not contaminated by heavy metals and other toxicants, thus serving a role as ambassadors for clean waterways. Five species of otters are found in Asia (Foster-Turley 1990). One of these, the hairy-nosed otter (*Lutra sumatrana*), was thought to be near-endangered but in the past five years has been found in significant numbers in Vietnam and Cambodia.

## E3. Globally Recognized Areas: Ramsar Sites

The Convention on Wetlands — known as the “Ramsar Convention” — is an intergovernmental treaty in which member countries agree to maintain the ecological character of their “wetlands of international importance” and to plan for the “wise use” of all of the wetlands in their territories. Of the 18 targeted countries in the Asia region, 14 are members, with a total of 120 Ramsar sites covering nearly 13.5 million hectares (see Exhibit 13).<sup>6</sup>

## E4. Value of Freshwater Biodiversity

Asia has the most productive freshwater fisheries in the world. The fishery sector not only makes a significant contribution to the national economies of the region but also improves food security by providing a source of protein and a livelihood for millions of people, especially the rural poor (Baran et al. 2008)

According to the FAO (2010), Asia contributes about two-thirds (66.4 percent) of global inland fisheries production. Total inland water fish production Asia in 2008 was 6.7 million tons, with China contributing 2.2 million tons of the total. Inland fisheries data include more than fish: crustaceans, mollusks and many other species are also commercially harvested and included in these figures.

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<sup>6</sup> Information about the specific habitats, biodiversity and threats to each of these sites can be accessed at the Ramsar Convention database ([www.ramsar.org](http://www.ramsar.org)).

**EXHIBIT 13. RAMSAR SITES WITHIN TARGETED COUNTRIES IN ASIA**

<b>NO.</b>	<b>COUNTRY</b>	<b>NO. OF SITES</b>	<b>AREA (HECTARES)</b>
1	China	41	3,709,853
2	Indonesia	6	964,690
3	India	25	677,131
4	Bangladesh	2	601,700
5	Papua New Guinea	2	594,924
6	Thailand	11	372,800
7	Malaysia	6	134,158
8	Philippines	4	132,032
9	Cambodia	3	54,600
10	Vietnam	3	35,807
11	Nepal	9	34,455
12	Sri Lanka	5	32,372
13	Laos	2	14,760
14	Burma	1	256
	<b>Total</b>	<b>120</b>	<b>7,359,538</b>

Source: Ramsar Sites database

The Mekong River contributes about one-quarter of the world's freshwater fish catch (Baran et al. 2008). Studies in the Lower Mekong demonstrate the importance of freshwater fish. At least 120 fish species in the Mekong are commercially important to the world's largest inland fisheries, with approximately 1.9 million tons from capture and 2 million tons from aquaculture. The total economic value of the Mekong fisheries has been estimated by the MRC at between \$3.9 billion and \$7.0 billion per year. Fishing is an important source of income for households. In Laos, for example, where more than half the population fishes, fishing provides 20 per cent of household income (MRC 2010).

Moreover, fish and other aquatic species provide a primary source of protein for most people in the region and elsewhere in the Mekong River basin (Peterson and Middleton 2010). Small fish and fish products provide necessary calcium to the diet of the people in the Mekong region that would otherwise be lacking since rice does not contain calcium and milk is not part of the traditional diet (Baran et al. 2008, citing Jensen 2001).

Added to the value of fisheries is the economic value of environmental services provided by freshwater ecosystems. Freshwater wetlands provide the most ecosystem services, for an estimated average value of \$30,079 per hectare per year, mostly in the form of water regulation, waste treatment, and water supply. Rivers and lakes provide primarily water regulation and water supply, for an estimated total value of \$13,055 per hectare per year (Costanza et al. 1997, updated to 2012 U.S. dollars).

## F. Marine Biodiversity

### F1. Habitats and Species Richness

The Asia region includes a variety of habitats that support the world's highest levels of biodiversity of marine and coastal fauna and flora, including the center of global coral diversity (Exhibit 14).

*Coral reefs* are shallow-water marine ecosystems that are among the most biologically rich and productive ecosystems on earth. They house approximately 25 percent of all known marine species, including fish, sponges, urchins, crustaceans, mollusks, reef-building corals, and others (WRI 2011). Southeast Asia has the most extensive and diverse coral reefs worldwide, comprising 28 percent of the total global area (almost 70,000 square kilometers), including fringing and barrier reefs, such as the extensive Palawan Barrier Reef, in the Philippines. East Rennell, the southernmost island in the Solomons group, is the largest raised coral atoll in the world. Small but significant oceanic atoll and platform formations also exist, notably in the South China Sea. The Indian Ocean also houses extensive reefs (31,500 square kilometers), including vast tracts along the Chagos-Laccadives Ridge, including the Maldives, and reefs encircling the Andaman Sea, including India's Andaman and Nicobar Islands and the islands and coasts of Burma and Thailand. Reefs are far less abundant around the Indian subcontinent, although there are important areas in the Gulf of Myanmar and southern Sri Lanka.

*Mangroves* are salt-tolerant plant communities that thrive in tropical intertidal zones around estuaries and lagoons. Of the world's 70 known mangrove species, more than 50 are found in Southeast Asia alone (ASEAN 2010). Mangrove forests have massive root systems that provide critical fish habitats, including spawning and nursery areas protected from predators, while crustaceans and mollusks benefit from rich soils, silt, and detritus deposits. Mangrove ecosystems also support salt water crocodiles, sea turtles, water lizards, and various other valued species. In recent decades, mangroves regionwide have suffered significant deforestation due to conversion to shrimp ponds, other aquaculture, or rice farming; human settlement; coastal development; and overexploitation for fuelwood and timber production. Mangrove ecosystems are also damaged by eutrophication from nutrient-rich waters, overfishing, accumulation of toxins from aquaculture facilities, shoreline erosion, and climate change-induced sea level rise.

*Seagrass* beds of flowering marine plants skirt the coasts of South and Southeast Asia, forming complex ecosystems that provide habitat and nursery areas for fish and shellfish and critical food resources for sea birds, marine mammals, sea turtles, and human communities. Seagrass beds are threatened by eutrophication, other land and marine-based pollution, bottom trawling and other destructive fishing practices, coastal development, and climate change-related sea temperature rise (ASEAN 2010).

*Mudflats* in intertidal zones are found in estuarine areas, along bays, and on deltaic islands with low river velocities and tidal currents. The Sundarbans in India and Bangladesh, for example, include a complex network of tidal waterways, mudflats, and small mangrove islands. Mudflats provide critical substrate for invertebrates and other

fauna and substratum for mangrove seeds. They also have important ecosystem functions related to food security and climate change adaptation as sea levels rise.

*Rocky shorelines* occur on many islands in Southeast Asia, including the southwest coast of Sumatra and the Pacific coast of the Philippines and Sulawesi. Small areas of rocky coastline are also found in Sri Lanka and more extensively on India's west coast and in the Andaman and Nicobar Islands. Extreme variations in moisture, salinity and surface temperature limit the range of species that exist in rocky shorelines zones, which typically includes snails, barnacles, and algae, with greater diversity at the lowest tidal level and in crevices. Submerged rocky outcrops provide habitat for diverse sessile organisms to attach, including large algae that provide food and physical structure for the congregation of other species (UNEP 2009).

*Sandy beaches* occur extensively throughout Asia, with habitat types ranging from steep beaches of coarse sand on open-facing coasts exposed to strong surf to intertidal flats of mixed sediments with narrow, sandy fringes on more protected shores. Only certain species can tolerate the dynamic, unstable environment of exposed sandy beaches with temperature, moisture, and salinity extremes. On sand flats containing some silt, burrowing invertebrates compose the species mix. Sea turtles nest on sandy beaches throughout the region, which also provide important resting, nesting, and feeding grounds for seabirds (UNEP 2009). The white, sandy beaches that support large tourism industries in the region are mostly dependent on healthy coral reefs for the primary source of their calcium carbonate-based sand.

## **F2. Species of Special Concern**

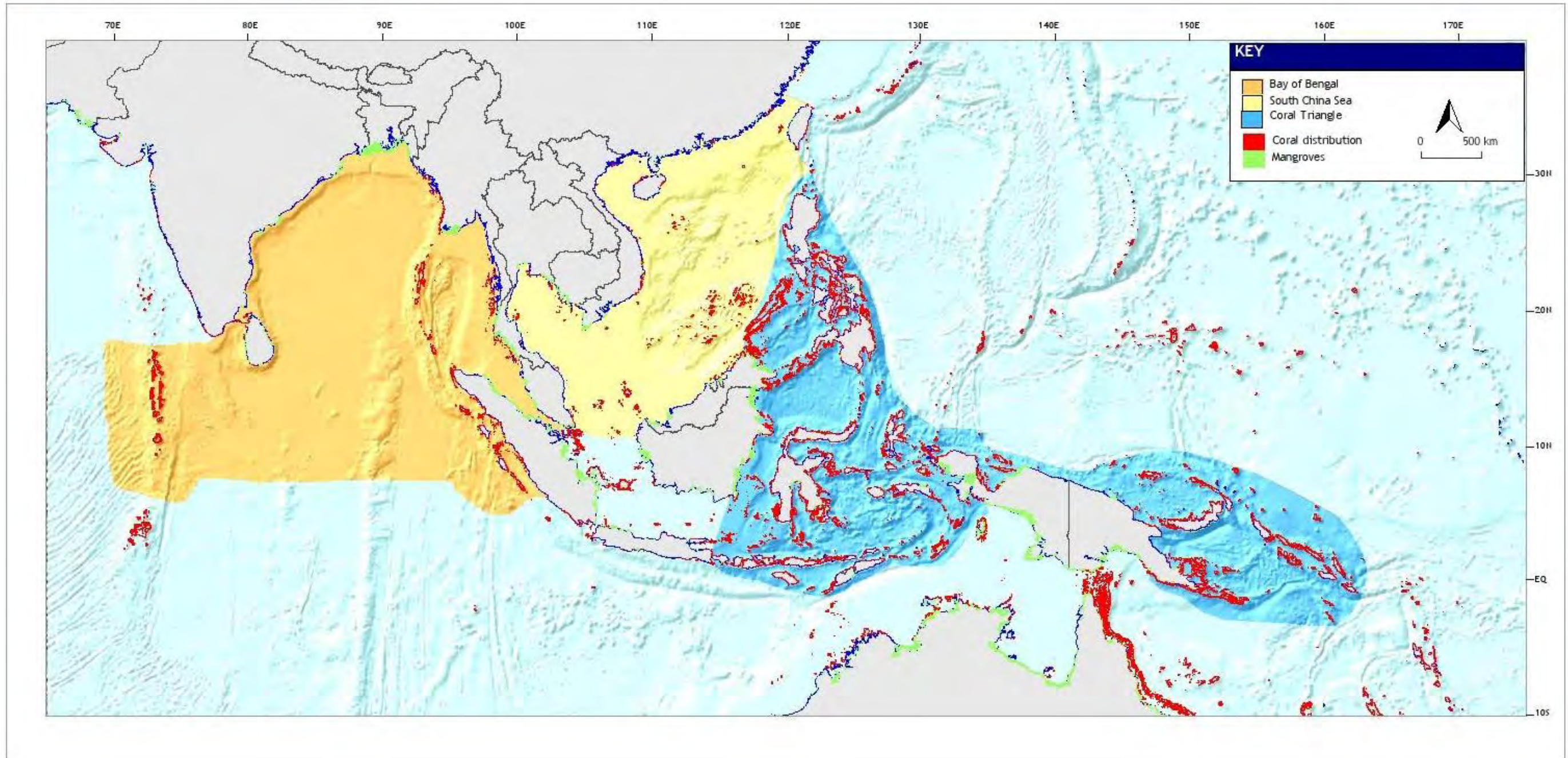
There are more than 2,800 marine species in the Asia region listed under some degree of threat in the IUCN Red List (2009). A number of species of sharks, sawfish, tuna, and sea turtles are critically endangered. Many other smaller species of marine life are also listed as threatened, vulnerable, or endangered. Other species of conservation significance include many coral species — especially black corals — giant clams, and other organisms on the sea floor that are unsustainably harvested.

Migratory species in these critical transboundary areas include whale sharks, dugongs, dolphins, sharks, tuna, sea turtles, and a number of smaller species. These species carry significant commercial, economic, and cultural value, and a number of them are highly threatened or endangered. Many are targets of illegal trade, and those that are migratory are vulnerable to weak regulatory and enforcement measures that fail to protect them in national and international waters.

## **F3. Globally Recognized Areas**

Within Asia, three major transboundary marine areas have been globally recognized for their high levels of biodiversity and the ongoing, escalating and emerging threats they face: the Coral Triangle, the Bay of Bengal, and the South China Sea.

EXHIBIT 14. MARINE RESOURCES IN ASIA







## **Coral Triangle**

The Coral Triangle encompasses nearly 4 million square miles of ocean and coastal waters in Southeast Asia and the Pacific surrounding Indonesia, Malaysia, Papua New Guinea, the Philippines, Timor-Leste, and the Solomon Islands. The area is home to more than 500 species of reef-building corals and more than 3,000 fish species, providing valuable spawning habitat for more than one-third of the world's tuna (CTI 2012). This area includes nesting sites for sea turtles, repositories for fish eggs and larvae, passageways for plankton, fishes, sea turtles and whales, and source areas for valued fish and shellfish, including prawns, crabs, and groupers, as well as extensive mangrove forests, seagrass beds, and coral reefs.

The Sulu-Sulawesi Seascape is within the Coral Triangle subregion and extends nearly 900,000 square kilometers between Indonesia, Malaysia, and the Philippines. It is recognized as the epicenter of world marine biodiversity and home to many threatened species, including hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), green sea turtles (*Chelonia mydas*), various groupers, and giant clams (*Tridacna giga*) (CI 2008). This area includes extensive mangrove forests, seagrass beds, coral reefs, and nursery grounds for fish and other economically important species, as well as dispersal and/or migratory routes for plankton, fish, sea turtles, and cetaceans.

The Bismarck Solomon Seas ecoregion of the Coral Triangle stretches from the Birdshead Peninsula of West Papua across the Admiralty and Bismarck archipelagos of Papua New Guinea to Makira Island in the Solomons. It includes mangrove and swamp forests, tidal estuaries, deltas, lagoons, coral reefs, atolls, fringing reefs, and barrier islands supporting rich marine biodiversity and high endemism (WWF 2012). The Bismarck Solomon Seas ecoregion supports hawksbill, leatherback, green, olive ridley, and loggerhead sea turtles; a variety of beaked whales; dolphins and porpoises; dugongs (*Dugong dugon*); giant clams; giant tritons; and many seabird species. Fish families include butterfly fish, sea bass, pipefish, and sea horses.

## **Bay of Bengal**

The Bay of Bengal, the largest bay in the world, is located in the northern Indian Ocean and includes the Andaman and Nicobar Islands. Within the bay are coral reefs and a variety of highly valued and threatened species groups such as dolphins, sharks, sea turtles, marlin, and tuna (WCS 2012). The Sundarbans of Bangladesh and India is the world's largest mangrove forest area and includes tidal waterways, mudflats, and islands housing threatened and endangered species such as the rare Irrawaddy dolphin (*Orcaella brevirostris*). A submarine canyon in adjacent coastal waters supports deep-water cetaceans (whales).

## **South China Sea**

The South China Sea houses rich marine biodiversity and globally important marine species including, among many others, several species of lobster, sea cucumbers, and

grouper that have been extirpated along the coast, while other species, such as the Chinese white dolphin (*Sousa chinensis chinensis*), are seriously threatened.

#### **F4. Value of Marine Biodiversity**

The marine ecosystems in Asia provide significant economic goods and services that contribute to the livelihoods, food security, and safety of millions of people. The conservation and health of these ecosystems are critical to human and economic well-being (CI 2008).

Coral reefs support economically valuable fisheries, are a main tourism resource, and provide critical protection for coastal shorelines and infrastructure. In the Philippines and Indonesia, for example, coral reef-related goods and services were estimated in 2010 at \$258 million for tourism, \$2.2 billion for fisheries, and \$782 million for shoreline protection (WRI 2011). The economic implications of reef destruction and loss are equally significant, with a predicted \$1.9 billion loss to Indonesia alone over the next 20 years from reef overfishing. In addition to their direct economic value, coral reefs remove carbon dioxide from the atmosphere to help mitigate global warming and reduce associated adverse economic impacts (CI 2008).

Mangrove forests protect coastal communities and infrastructure from storms, waves, and wind, and their extensive root systems reduce coastal erosion and help mitigate the negative economic impacts of climate change-related sea level rise. Mangroves also support economically valuable fisheries and are used as sources of fuelwood and timber both domestically and for export.

Seagrasses support commercial and artisanal near-shore fisheries for finfish, mollusks, and crustaceans, provide nursery habitats for offshore fisheries, and are a source of plant-based food and fiber for local communities. Seagrass beds also buffer wave energy and trap sediments to create rich, highly productive ecosystems. They also purify coastal waters by removing toxic compounds, thereby reducing eutrophication and phytoplankton blooms (UNEP 2009). As perennial structures, seagrass beds also store carbon for long periods of time.

Sandy beaches and rocky shorelines provide important bases for tourism and coastal infrastructure development. They serve as buffer zones, protecting uplands from storms and waves; they support food and other natural resources used by coastal communities; and they help filter upland runoff to maintain healthy intertidal and marine ecosystems.

Also critically important as places of natural beauty and great diversity, each of these ecosystems has intrinsic, aesthetic, cultural, recreational, educational and scientific values that make important contributions to local, regional, and global communities and economies.

### III. THE REGIONAL SOCIAL AND ECONOMIC CONTEXT

#### A. Overview

The Asia region's robust economic development has lifted millions out of poverty in the last decade (USAID 2009). Of the 18 countries of the region, all but two (Papua New Guinea and Timor-Leste) are expected to meet or exceed the Millennium Development Goal of halving poverty by 2015 (UN 2011). The region's rapid economic development has been the result of many factors, including macroeconomic policy changes that support economic growth, increased exports of manufactured goods and natural resources, foreign direct investment, rising commodity prices, new investment in infrastructure, "frugal innovation" (development of low-cost products and services), and investment in education (ADB 2010). However, rapid economic growth has not been accompanied by similar achievements in political stability or environmental policy and safeguards, resulting in significant impacts to biodiversity and forests.

#### B. Social and Economic Factors

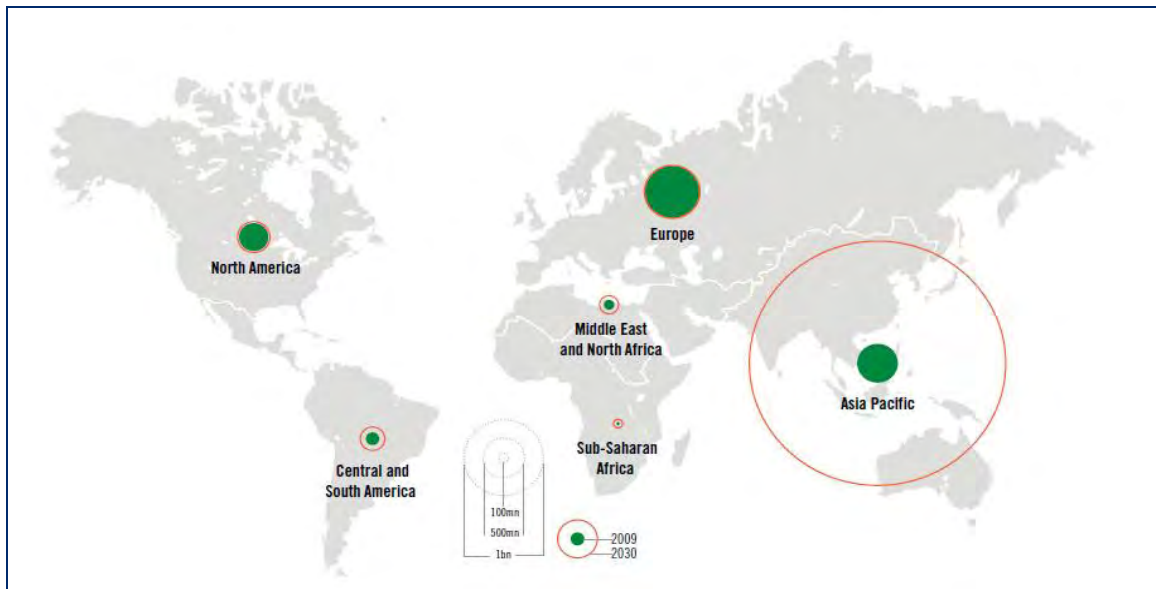
In 2011, the global population reached 7 billion, of which almost 4 billion (around 57 percent) are in Asia (see Exhibit 16); two countries, India and China, account for more than 2.5 billion (around 36 percent). The population growth rate in Asia overall has slowed to below 1.1 percent, a significant decline from the growth rate of 1.7 percent of 20 years ago (ADB 2011a). It is a population that in less than a generation has become more prosperous, healthier, better educated, and better connected through mobile phones and, increasingly, the Internet. It is more urban and has greater access to (and higher expectations of) electricity and water. Mobile phones provide not only basic phone services also innovative applications in business, health, and education that contribute to human development (UN 2010).

Asia's rapid economic growth is the *primary* root cause for the loss of biodiversity and deforestation through growing *demand* for natural resources, energy, and infrastructure, along with the expansion of industrial agriculture. In a period of global economic downturn, the growth forecast for Asia is an estimated 7.7 percent in 2012 (ADB 2011a). Asia has a uniquely resource-intensive economy, accounting for well over half of global material use (UN and ADB 2012). In 2005, the economies of the Asian and Pacific regions required three times more resources per unit of GDP than the rest of the world (UN and ADB 2012). As the largest importer within the region, China is the regional hub and the "engine" of growth. Commodities and intermediate goods are sourced within the region for assembly in China, which exports the final goods (ADB 2011b).

Asia's "economic miracle" was enabled by urbanization and associated development of a strong industrial base, and Asia's cities are growing rapidly (ADB 2010). By 2030, more than 55 percent of the population will be urban — meaning an additional 1.1 billion people will live in the region's cities in the next 20 years (ADB 2008, 2011b, and 2012). Of the 14 of the world's largest cities located along coasts, 11 are in Asia, including Bangkok, Dhaka, Jakarta, Manila, Mumbai, and Shanghai (Exhibit 16). The urbanization of coasts brings with it coastal development, including demands for fresh water and sewage treatment — and damage to coastal ecosystems (Creel 2003).

The strong economic growth and urbanization in Asia has been accompanied by the emergence of a sizable middle class and a significant reduction in poverty. By 2008, the middle class had risen to 56 percent of the population in Asia — or nearly 1.9 billion people — up from 21 percent in 1990, with its expenditures increasing almost threefold during this period. It is in Asia that the greatest growth of the middle class is projected; by 2030, much of developing Asia will have attained middle and upper class majorities (see Exhibit 15), with China and India expected to provide the largest numbers of the new middle class (ADB 2010; RRI 2012; Standard Chartered Global Research 2010).

#### EXHIBIT 15. GLOBAL MIDDLE CLASS PREDICTION FOR 2030



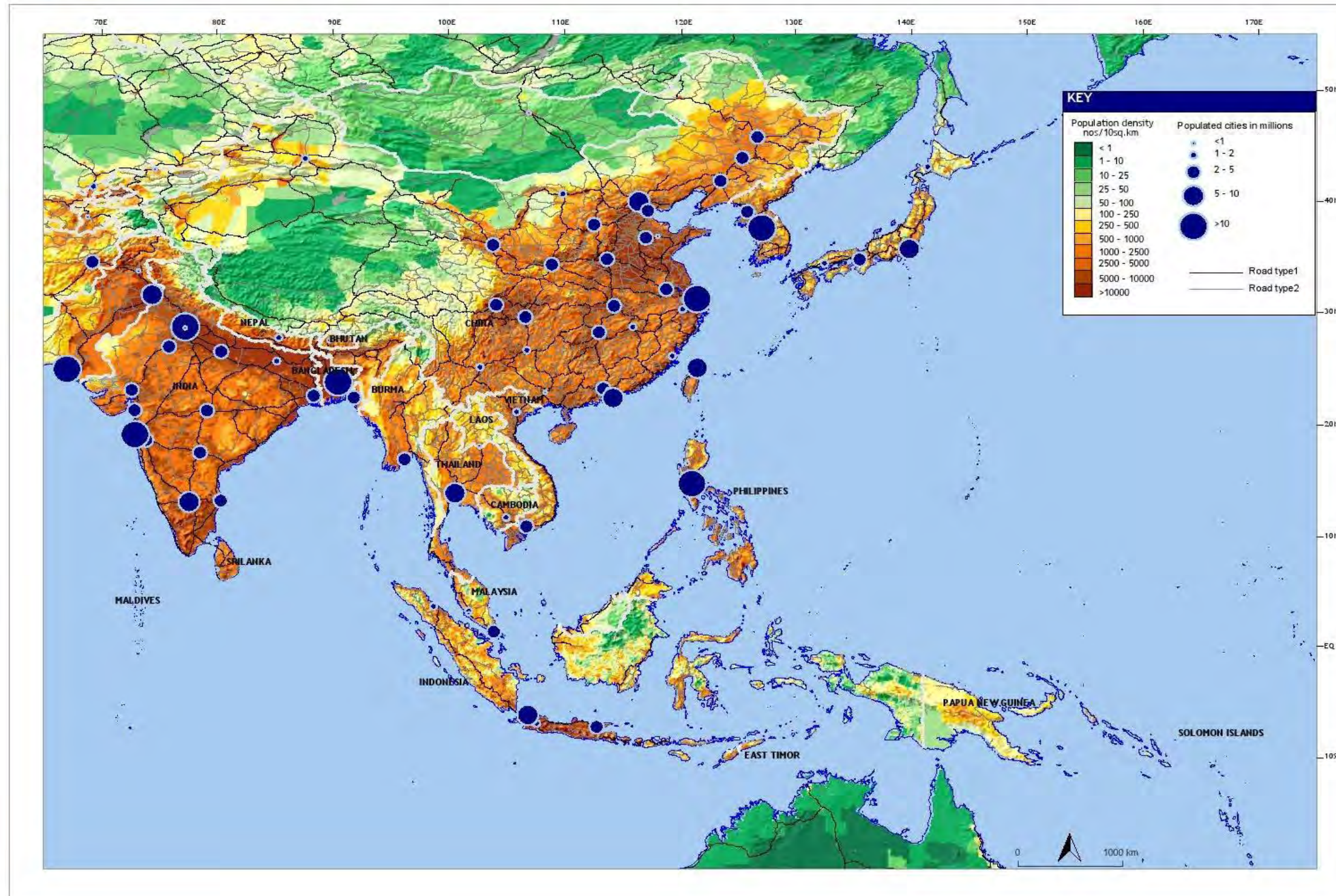
Source: *The Super-Cycle Report*, Standard Chartered Global Research 2010

The rising middle class is exerting a major impact on biodiversity and forests in the region, for it is not just the number of people but the resources they consume that deepen the human footprint. A middle class standard of living in the region includes changes in consumption patterns related to diet (e.g., increased consumption of meat and fish); energy consumption (electricity and transport); consumer durables (mobile phones,<sup>11</sup> refrigerators, TVs, motorcycles, and cars); and location (urban and coastal areas). Urbanization has enabled many of these changes in consumption by allowing people to more readily access a wide range of resources (ADB 2011; RRI 2012).

The difficulty of obtaining rare wildlife (e.g., tigers) and wood products (e.g., rosewood) associates these products with prestige and increased social status and has fueled the development of illegal wildlife markets and trade. While the very wealthy are commonly perceived as having a disproportionate impact on biodiversity and forests, traders are increasingly engaging the middle class in illegal wildlife trade by offering smaller, affordable quantities of these products. In Southeast Asia alone, the illegal wildlife trade is estimated to be worth between \$8 billion and \$10 billion yearly (Felbab-Brown 2011).

<sup>11</sup> China and India are the world's largest and second-largest markets for mobile phones.

EXHIBIT 16. POPULATION DENSITY OF ASIA





Accompanying and supporting the region's rapid development is the increasing regional integration of economies, trade, infrastructure, and energy. Transport infrastructure is increasingly regionally planned (e.g., the Greater Mekong subregion) and executed, energy-related investments and services go beyond borders, and trade barriers are being dismantled.<sup>12</sup> Far less attention is paid to transboundary environmental management, including of biodiversity and forests, than is warranted. While government policies provide incentives for rapid growth, regulatory frameworks, even if in place, are not adequately enforced. Regional harmonization of environmental policies and enforcement are weak.

Internal migration, voluntary or through displacement, has intensified unrest in many countries of the region. Friction between residents and newcomers erupts over long-standing issues such as insecurity of land tenure, local access (especially of indigenous peoples) to forests and marine resources, pollution of rivers and water tables, and deforestation and the lack compensation by agriculture, forest, and mining concessions. As access to fresh water, marine resources, and forest areas dwindles, competition over natural resources intensifies, exacerbating transboundary conflicts, both local and international. Ethnic and religious conflicts influence the movement of people and can lead to them to resettle in relatively undisturbed natural habitats, including protected areas and areas of high conservation value, placing additional stress on these habitats and the biodiversity contained therein.

There are wide disparities among the countries in the region. According to the Human Development Index (HDI), which includes health, education, and living standards in its analysis (see Exhibit 17), of the 18 countries included in this analysis, only one (Malaysia) has a development ranking of “high,” while 11 are classified as “medium” and 6 as “low.” The six ranked low include the three countries of the Pacific; Nepal and Bangladesh (two of the poorest countries in Asia); and Burma, a country that appears to be just beginning to come out from under the rule of a repressive military junta. Even so, all six countries are projected to have positive economic growth (see Annex B, Table 3). For four of the six, growth will result from fossil fuel and commodities exports (Burma, Papua New Guinea, the Solomon Islands, and Timor-Leste), which has implications for both sustainable economic growth and impact on biodiversity and forest conservation.

Women have benefited from the rise in prosperity in the region, although the poorest of the poor continue to be female-headed households (ADB 2010). Women in many countries, while still lagging behind men in access to formal sector jobs, have closed or are on track to closing the gap in primary and secondary education, although girls in rural areas are at a disadvantage. Within Asia there are marked subregional differences — for example, women in southern Asia and the Pacific countries have lower formal sector employment rates (UN 2010). Even when employed in the formal sector, women are likely to be paid less and have less job security than men (UN 2011). As seen elsewhere in the world, the higher the level of education of women, the lower the fertility rate.

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<sup>12</sup> A recent report by ADB (ADB 2011a) noted that the tariff levels and other barriers to trade in the South have tumbled in the past two decades, but are still higher than with the North.

**EXHIBIT 17. COUNTRY RANKINGS ON HUMAN DEVELOPMENT INDEX**

<b>COUNTRY</b>	<b>HDI RANKING (2011)</b>	<b>HDI CLASSIFICATION</b>
Malaysia	61	High
Sri Lanka	97	Medium
China	101	Medium
Thailand	103	Medium
Maldives	109	Medium
Philippines	112	Medium
Indonesia	124	Medium
Vietnam	128	Medium
India	134	Medium
Laos	138	Medium
Cambodia	139	Medium
Bhutan	141	Medium
Solomon Islands	142	Low
Bangladesh	146	Low
Timor-Leste	147	Low
Burma (Myanmar)	149	Low
Papua New Guinea	153	Low
Nepal	154	Low

Source: UN 2011

example, women in southern Asia and the Pacific countries have lower formal sector employment rates (UN 2010). Even when employed in the formal sector, women are likely to be paid less and have less job security than men (UN 2011). As seen elsewhere in the world, the higher the level of education of women, the lower the fertility rate.

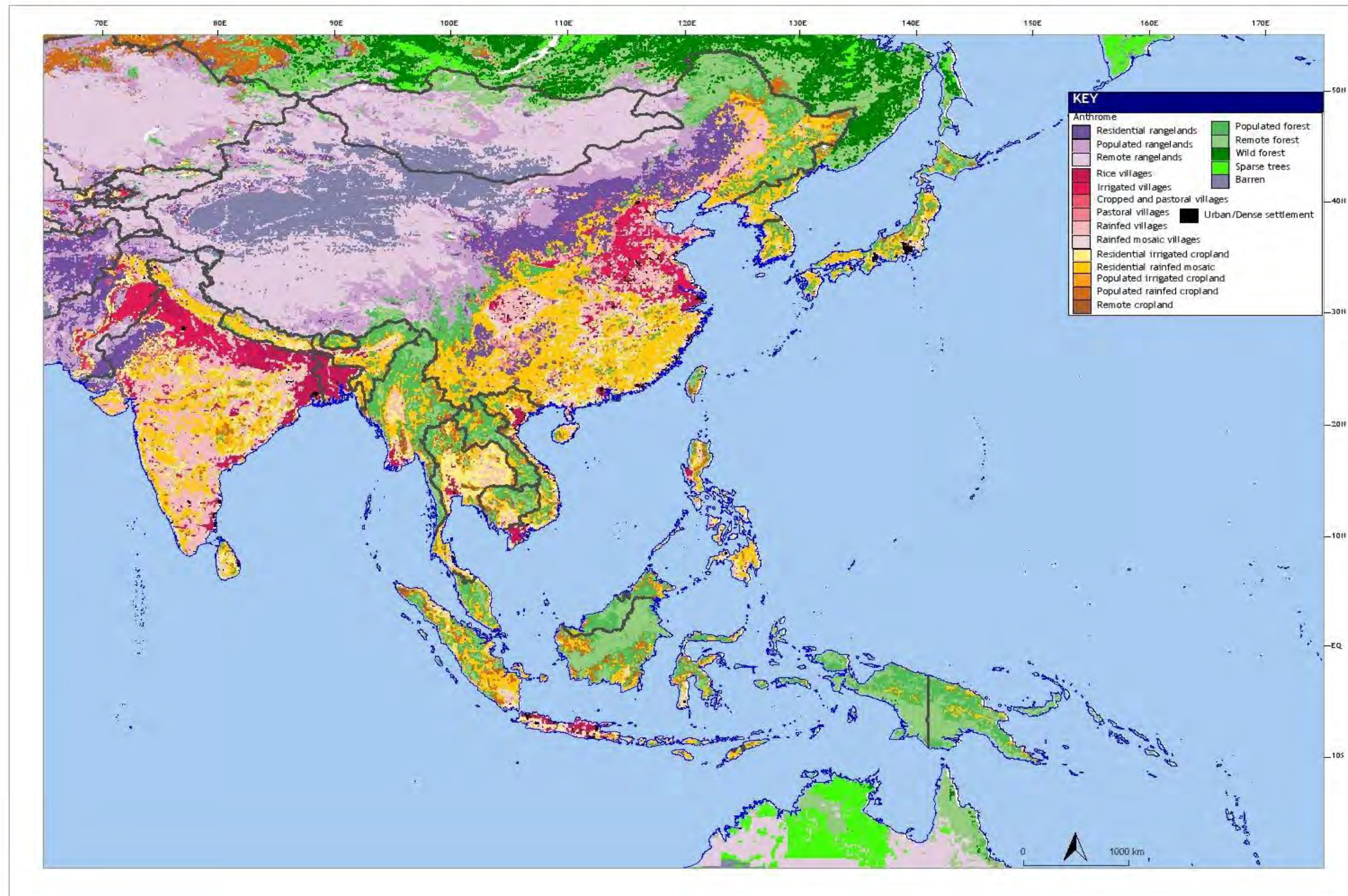
Distinct ethnic groups are found throughout region, although they vary in number and size from country to country. By choice or displacement, ethnic groups are often in the hills and mountains, while the larger, more dominant groups are in the lowlands. Differences in language, farming systems (e.g., swidden in the forested hills, paddy rice in the valleys), religion, and cultural practices reinforce the distinction. Socially, economically, and politically marginalized ethnic or tribal groups are especially vulnerable to displacement and exploitation.

However, conditions vary. Tribal groups make up about 8 percent of the population in India and are legally referred to as “scheduled tribes,” with quotas for education and government positions. In Burma, ethnic groups represent 40 percent of the population and live on 60 percent of the land, yet they are underrepresented in government. “Indigenous” is a term used in some countries such as Papua New Guinea and the Solomons where, except for recent migrants, all groups are considered indigenous, but with tribal and clan distinctions and authority.

Livelihood strategies are reflected in the transformation of natural landscapes across the region (see Exhibit 18). Agriculture has been a major force in changing Asia’s terrestrial and freshwater ecosystems. Rice cultivation began in Asia and is fundamental to its history and civilizations, and rice remains one of the most important crops in the region today, particularly in lowland irrigated and rain-fed areas. Rice cultivation in the hillsides



EXHIBIT 18. ANTHROMES (ANTHROPOGENIC BIOMES) OF ASIA





and irrigation systems in the river basins have altered natural ecosystems throughout Asia. Similar processes with different crops and animals transformed the drier regions and high plateaus. Vegetation changed, new plants and animals species were introduced, and water systems were diverted (Ellis 2011; Ellis et al. 2010)

The hills and mountains where ethnic groups reside are often the areas with the greatest terrestrial biodiversity and the largest forest remnants, due to a combination relative isolation, poor infrastructure, and local natural resource management.

### **C. Political Systems and Governance**

Political systems of countries in the region include multiparty democracies with varying degrees of efficacy, constitutional monarchies, a transitioning military junta (Burma), and socialist states under the leadership of the communist party. The political system of a country does not determine its rate of economic growth; for example, communist China is projected to have the highest rate of economic growth in the region in 2012, with democratic India not far behind (ADB 2011a). Even Burma, which appears to be emerging from almost 50 years of rule by a military junta and is under economic sanctions, is expected to have an economic growth rate of more than 5 percent.

Economic growth has outpaced the capacity of governments to support, regulate, and monitor it. The consequences include pollution, degraded natural resources, and corruption. With a few exceptions, Asia is perceived as having some of the most corrupt economies in the world. According to Transparency International's 2011 Corruption Perception Index of 183 countries (see Exhibit 19), 9 of the 18 countries in this analysis ranked in the bottom third (most corrupt), with only one country, Malaysia, ranking in the top third (least corrupt). Pervasive corruption results in part from weak or contradictory policies, laws and regulatory frameworks and in part from a lack of accountability and transparency. However, the emerging middle class is becoming a force against corruption. The demands of the middle class for better services are helping to improve accountability in public services (ADB 2010).

Yet for some countries emerging from conflict or undergoing political transition, the middle class remains nascent. Political stability is a significant concern for many of these countries. In the Failed States Index (see Exhibit 19), the higher the rank, the lower the stability), which ranks countries using 12 factors that include security threats, economic implosion, human rights violations, and refugee flows, 5 of the 18 countries under study ranked in the upper 30 (Timor-Leste, Bangladesh, Nepal, Sri Lanka, and Burma), and another 6 countries ranked in the up 60 Cambodia, Laos, the Solomon Islands, Bhutan, the Philippines, and Papua New Guinea). Political instability and corruption are a volatile combination, working against biodiversity and forest conservation.

A recent assessment of environmental governance in nine Asian countries (Bangladesh, India, Indonesia, Nepal, the Philippines, Sri Lanka, Thailand, Vietnam and Yunnan province of China) showed that decentralization of political and administrative authority is a policy priority in many countries, creating greater opportunities for the public to engage at the local level (Nicro et al. 2011). Community-based forest management has

**EXHIBIT 19. COUNTRY RANKINGS ON GOVERNANCE**

<b>COUNTRY</b>	<b>CORRUPTION PERCEPTION INDEX* (2011)</b>	<b>FAILED STATE INDEX* (2011)</b>
Bangladesh	120	25
Bhutan	38	50
Burma (Myanmar)	180	18
Cambodia	164	38
China	75	72
India	95	76
Indonesia	100	64
Laos	154	46
Malaysia	60	112
Maldives	134	91
Nepal	154	27
Papua New Guinea	154	54
Philippines	129	50
Solomon Islands	120	48
Sri Lanka	86	29
Thailand	80	79
Timor-Leste	143	23
Vietnam	112	88

\* Index of 183 countries ranked by perception of corruption (lower ranking indicates lower perception of corruption), Transparency International 2011. \*\* Index of 177 countries ranked by governance (lower ranking denotes greater instability) Foreign Policy and The Fund for Peace 2012.

been adopted by the Philippines and Nepal as an approach to enhance local control of, and benefits from, forest resources. However, the referenced assessment also found a correlation between poverty and marginalization and an inability to ensure access rights. For all countries, poor and marginalized people, including women, ethnic minorities, and migrants, are the least able to exercise access rights.

In Asia, forests generally belong to the state, with an estimated 68 percent of Asian forests administered by government and about 24 percent owned by communities and indigenous people (Rights and Resources 2010). Forest area under nongovernmental ownership varies widely across the region, led by Papua New Guinea (99 percent), China (58 percent), and India (27 percent). The share of total forest area under nongovernmental ownership is less than 10 percent for other countries (Burma, Cambodia, Indonesia, and Thailand). Some countries have been allocating forest lands to local people through community forestry policies and initiatives, most notably Cambodia and Nepal.

## IV. THREATS TO BIODIVERSITY AND TROPICAL FORESTS

### A. Overview

Direct threats are “activities or processes that have caused, are causing, or may cause the destruction, degradation, and/or impairment of biodiversity” (Salafsky et al. 2008). The primary focus of this assessment is the threats caused by human activities, on the assumption that these threats can be countered with appropriate human actions.

Natural ecosystems face numerous simultaneous threats of differing scales and intensities. It is the combination of these threats — the “human footprint” — that determines how human-influenced (and degraded) a natural ecosystem has become. A graphic representation of the human footprint in Asia (Exhibit 20) comes from a study by WWF and the Center for International Earth Science Information Network at Columbia University (SEDAC 2012). The human footprint was compiled from data on human population distribution, urban areas, roads, navigable rivers, and various agricultural land uses that together give an indication of human impact. As seen on the map, the human footprint in Asia is most heavily concentrated in lowland areas and floodplains, with uplands areas less impacted (particularly New Guinea, Borneo, parts of Cambodia and Burma, and the Himalayas/Tibetan plateau).

RDMA’s previous regional biodiversity program planning report (RDMA 2009) also looked at threats to biodiversity in the region and identified the following major regional direct threats: wildlife trade (especially illegal and unregulated), unsustainable wild fisheries and inappropriate aquaculture, mining, logging, infrastructure development (especially dams and roads), industrial agricultural plantations, ecosystem fragmentation, and climate change.

This current assessment utilizes the threats taxonomy of the Conservation Measures Partnership (2012), which provides a systematic framework for classifying direct threats (see Annex C) to fine-tune these results. While all 11 threat categories described in this framework have an impact on Asian biodiversity, the most significant direct threats to biodiversity and forests were identified during regional consultations and incorporated into the 7 main threat categories considered here. The implications of these direct threats on terrestrial, freshwater, and marine ecosystems were considered separately since these habitats are impacted in different ways.

In addition, recent USAID 118/119 assessment reports were reviewed to determine the direct threats to biodiversity and forests in each country. While these assessments identified country-specific threats, many of these threats have regional dynamics, and where relevant, they are mentioned in the threat descriptions below. Bilateral reports included are from Bangladesh (2005), Cambodia (2010), Indonesia (2008), the Philippines (2008), Nepal (2006), and Timor-Leste (2004).

## **B. Direct Threats to Biodiversity and Tropical Forests**

### **B1. Agriculture and Aquaculture**

Growing global and regional demand for food and agricultural products produced in Asia continues to fuel high levels of conversion of natural ecosystems to agriculture and aquaculture. In 2000 more than 55 percent of the world has been converted to agricultural uses (Ellis et al. 2010). This includes terrestrial land conversion for agriculture, both small-scale and widespread, and large-scale commercial crops such as rice, sugar, corn, cassava, timber, and rubber and oil palm plantations; expansion of livestock farming/grazing; and marine and freshwater aquaculture. The extent of cropland in Asia and other potential threats to terrestrial biodiversity are illustrated in Exhibit 21.

#### **Terrestrial**

In much of the region, expansion of large commercial agriculture through the conversion of forest land to oil palm, rubber, other crops, and timber enterprises is the leading driver of deforestation. Southeast Asia is experiencing rapid conversion of forest and swidden land to oil palm plantations. Indonesia and Malaysia are the world's largest palm oil producers, accounting for 87 percent of the 40 million tons of global crude palm oil production (USDA 2011). Some studies estimate recent expansion in Asia at 400,000 hectares per year (Corley 2005). The bilateral 118/119 assessment for Indonesia (2008) mentioned this threat, and many of the Indonesian stakeholders interviewed by our assessment team cited the threat of forest conversion to oil palm plantations as the most important issue impacting forests in the country. Commercial oil palm plantations were also mentioned as a threat in the 118/119 assessments for Vietnam and Timor-Leste.

Total oil palm plantation area is currently more than 15 million hectares, and nearly half of these plantations have been created on primary or secondary forest land (Colchester et al. 2011). Much of the lowland rainforest on the Indonesian island of Sumatra has already been lost, largely because of clearances for oil palm plantations and pulp and paper plantations. The new plantations are a direct threat to globally endangered species such as elephants, tigers, and orangutans that require biodiverse forests for survival (WWF 2012). India is currently the world's largest importer of palm oil, primarily from Indonesia (80 percent), illustrating the regional dynamics of this threat. In some countries (e.g., Thailand) the government's push to plant more biofuel crops has led to lower production of rice, resulting in other countries, such as Laos, clearing forests to plant more rice and hastening the loss of forest biodiversity (Cutter and Blate 2012).

In addition to oil palm in Southeast Asia, rubber plantations were cited as a threat during consultations with stakeholders in Burma and Thailand, and also by the bilateral 118/119 report from Vietnam (2009). Our team's consultations in India pinpointed overgrazing as another agricultural threat to biodiversity there.

EXHIBIT 20. HUMAN FOOTPRINT IN ASIA

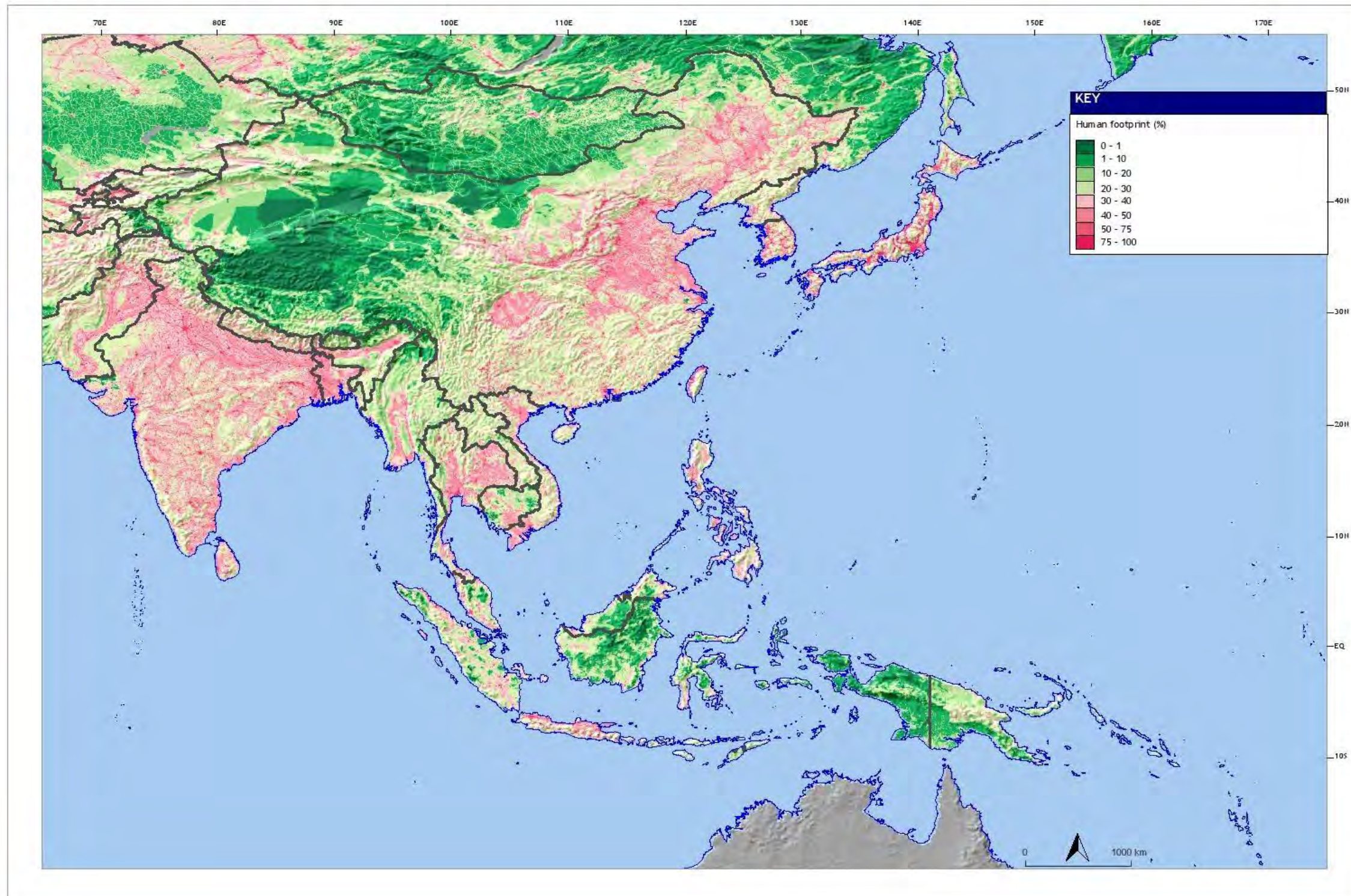
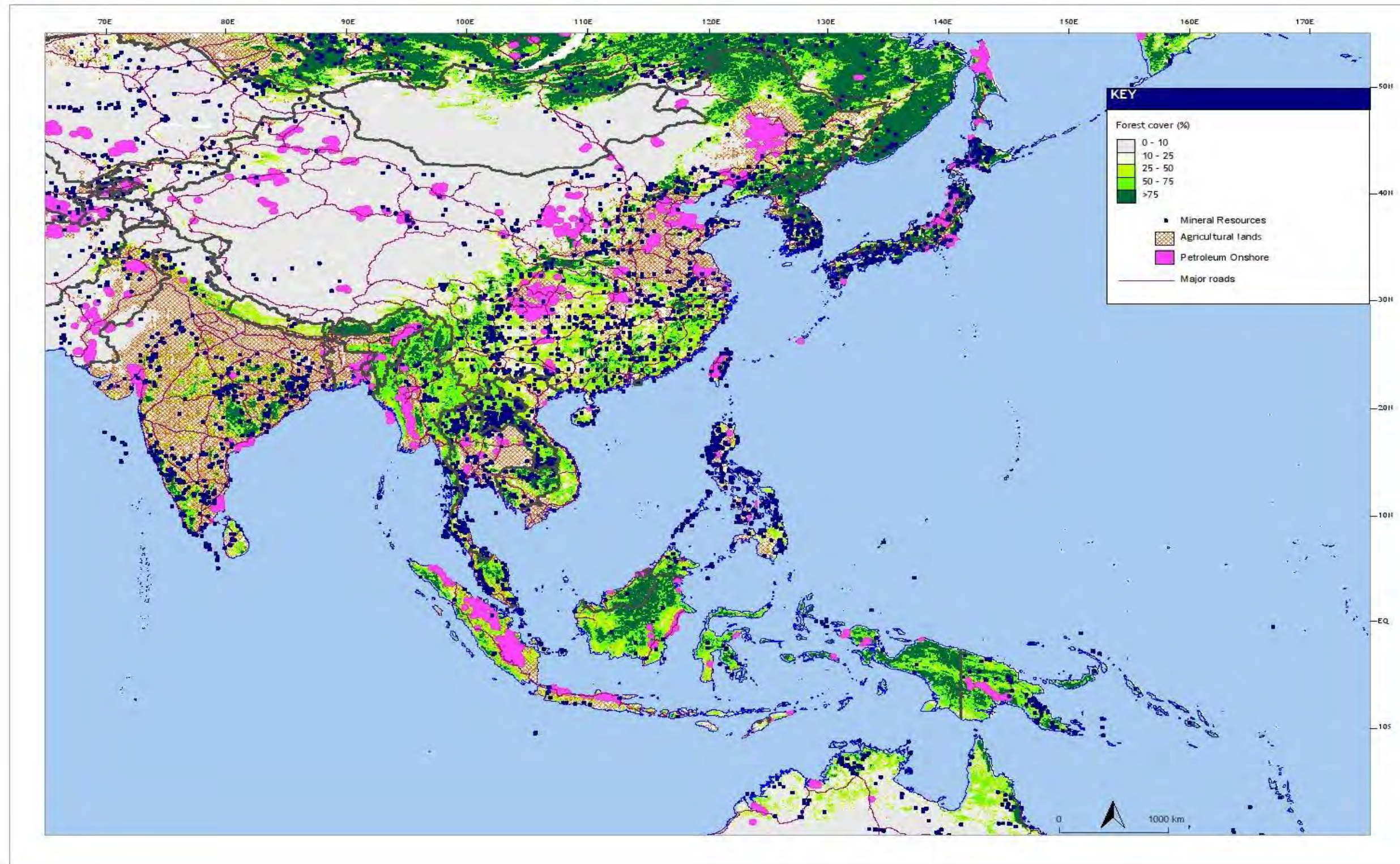






EXHIBIT 21. THREATS TO TERRESTRIAL RESOURCES IN ASIA





## **Freshwater**

Conversion of biologically important freshwater wetlands to fish farms, rice fields, and other agricultural enterprises threatens freshwater biodiversity. Natural wetlands serve as breeding and migratory stopover points for many bird species, and most cannot fulfill their needs within cropland. As natural wetlands are drained for agriculture and swamps are impounded into fish ponds, biodiversity decreases. Increased areas under cultivation also require intensive water use, with resulting losses of freshwater to natural ecosystems.

The agricultural sector in Asia is water-intensive. Globally, 70 percent of withdrawn water is used in the agricultural sector, whereas in Southeast Asia the share is 85 percent and in South Asia it is nearly 95 percent (UNEP 2008 and 2009). Water productivity — measured in terms of GDP per cubic meter of water use — is only \$1.4 for South Asia and \$2.4 for the Mekong River Basin, far less efficient than the average of \$23.8 generated by the major food-producing countries: China, Brazil, France, Mexico, and the United States (UNEP 2008 and 2009). Exhibit 23 depicts potential threats to freshwater resources in Asia.

## **Marine**

Conversion of mangroves and other coastal habitats to shrimp farms and other uses is a major threat to marine biodiversity in the region. This was also mentioned as a threat in bilateral assessments for Bangladesh, Cambodia, Indonesia, and Vietnam. Southeast Asia has the highest rate of mangrove loss worldwide, with more than 600 square kilometers destroyed each year (ASEAN 2010) and an overall 9.7 percent decrease from 1980 to 2005; the rest of Asia saw a 6.7 percent decrease during this period (FAO 2007). Indonesia has the largest extent of mangrove forests in the region (about 3 million hectares), as well as the highest rates of annual loss (about 50,000 hectares).

The loss of mangroves for countries addressed in this assessment is summarized in Annex B, Table 2. Shrimp farms are only one of the factors involved in mangrove loss — conversion of land for coastal development and firewood cutting are other factors — but the shrimp ponds present a recurring threat. These ponds are viable for only a few years before disease sets in, the ponds are abandoned, and new land converted into new ponds. Coastal shrimp farms replace natural estuaries that are the nursery ground for many of the fish and shellfish consumed by local people and that also form the basis of commercial fisheries. As a result of land conversion to shrimp farms, not only do the habitats become a monoculture, but the productivity of marine life also declines. Exhibit 24 depicts potential threats to marine resources in Asia.

## **B2. Natural System Modification and Transportation and Service Corridors**

For purposes of this analysis, the two threats of natural system modification and transportation corridors were combined into a single category due to the similar nature of these threats on ecosystems. Natural system modification refers to threats from actions that convert or degrade habitat in service of “managing” natural or semi-natural systems, often to improve human welfare, and include activities such as hydropower dam

construction and fire management (Conservation Measures Partnership 2012). To service and meet increasing trade demand, more transboundary infrastructure is being built in the region. This includes the development of economic corridors with transboundary roads and railway lines, ports, and the expansion and increased use of shipping lanes. In addition, the heightened need for energy is leading to the development of dams and hydropower facilities on major rivers, as well as transboundary service and utility lines and pipelines throughout the region.

### Terrestrial

The expansion of energy and transport infrastructure (roads, pipelines, power lines, etc.) results in degradation and fragmentation of wildlife habitats, which often impedes the movement of animals over long distances to find mates and seasonal sources of food. Not only do roads transect important habitats — they can destroy local high-conservation-value sites and as a result harm small localized species (often endemic) that are found only in that specific area. This was mentioned as a direct threat in the bilateral 118/119 assessments for Bangladesh, Cambodia, and Indonesia. Major roads in the region include the Greater Mekong Subregion economic corridors that are being facilitated and supported by the Asian Development Bank and other investors to increase regional connectivity. As more and more roads are built and existing roads are made larger and wider, mammals, reptiles, and other species that attempt to cross them are put in danger.

Natural system modification also includes fire and fire management. Fire is one of the main methods used to clear land in Asia and is responsible for the annual problems of transboundary haze pollution. Use of fire can lead to wildfires, and frequent burning degrades forests, particularly moist forests that are not adapted to fires. This was mentioned as a threat in the bilateral 118/119 reports for Indonesia and Nepal.

### Freshwater

Rapid development of hydropower dams to meet the increasing need for more electrical power is the primary threat to rivers and freshwater biodiversity throughout Asia. Exhibit 22 summarizes the number of dams already present in major rivers of the region.

**EXHIBIT 22. DAMS IN ASIA BY MAJOR RIVER BASIN**

BASIN NAME	NO. OF DAMS	RESERVOIR CAPACITY (M <sup>3</sup> )
Yangtse	398	189,485
Ganges	72	35,730
Yellow	50	65,520
Mekong	19	19,137
Brahmaputra	6	2,328
Salween	3	973

Source: Global Reservoir and Dam (GRanD) database 2011

Cambodia’s Tonle Sap Lake (the nursery for fisheries in the Lower Mekong) and Vietnam’s Mekong delta are thought to be particularly at risk from hydropower

EXHIBIT 23. THREATS TO FRESHWATER RESOURCES IN ASIA

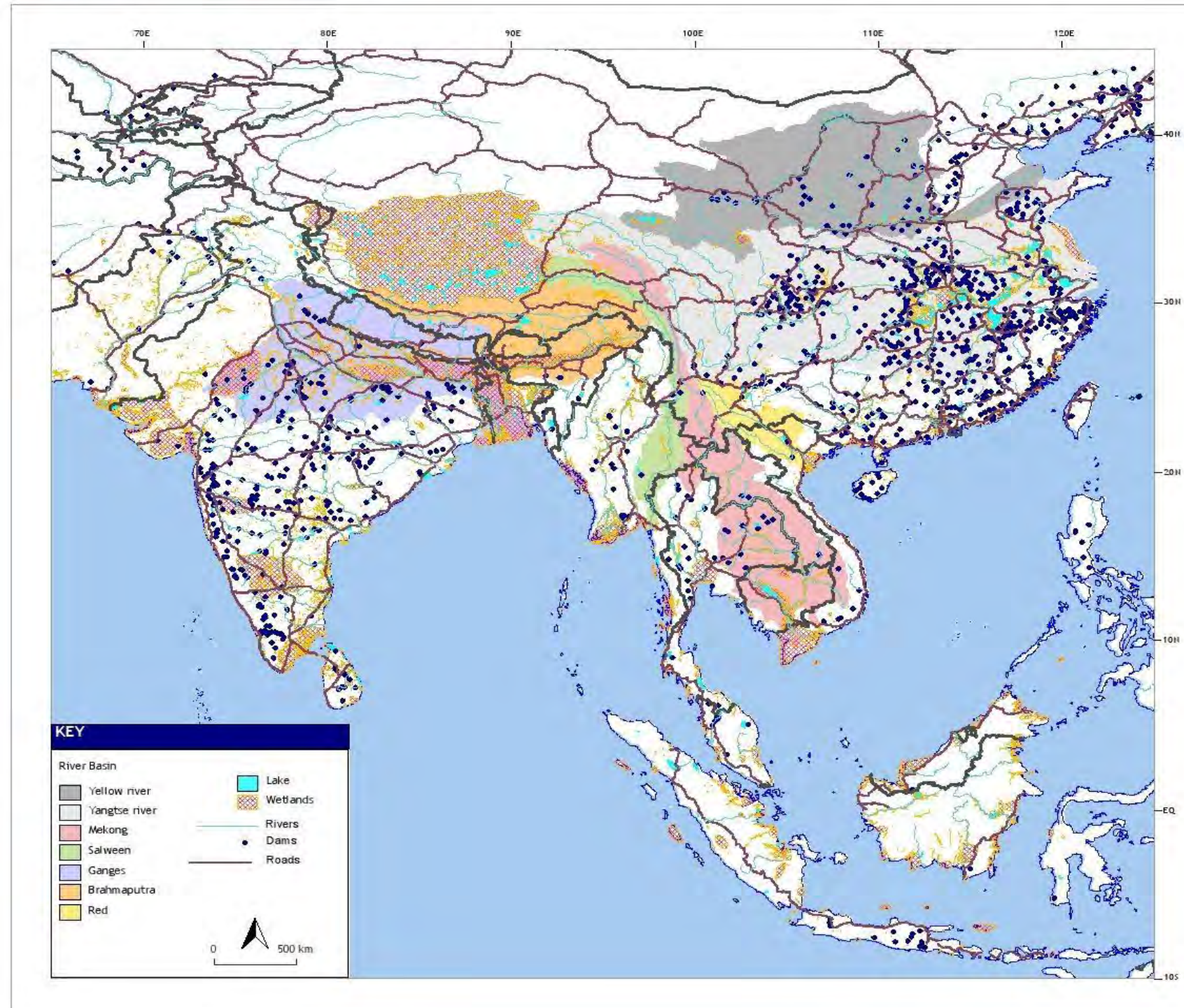
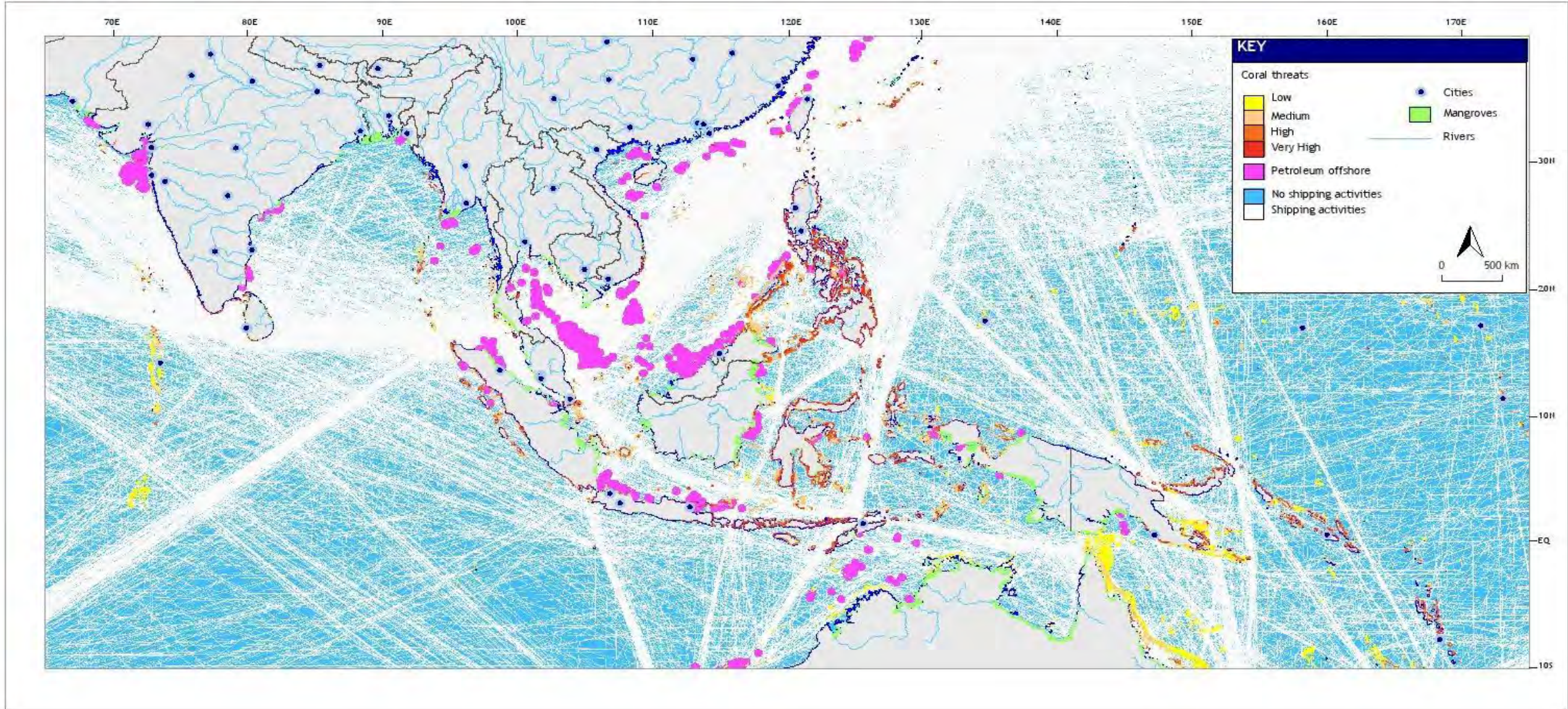




EXHIBIT 24. THREATS TO MARINE RESOURCES IN ASIA







development that alters the Mekong's natural water flow (UNEP 2009). More dams continue to be planned. In the Mekong River system, between 16 and 78 tributary dams and up to 11 mainstem dams are being considered for development between 2015 and 2030 (Ziva et al. 2012).

Hydropower dams have significant environmental impact as they change the river's flow, convert flowing rivers into reservoirs, inundate biodiverse areas near the riverbank, alter downstream riverbeds, prevent sediment from flowing downstream, and block migratory routes. All of these factors have significant impact on aquatic freshwater biodiversity, with fish and mammal migratory routes impeded, spawning ground substrates altered for fish, and microhabitats destroyed for invertebrates and plants that are important food sources for aquatic birds and other species. Often, the power resulting from these projects is exported to neighboring countries and does not provide energy or economic benefits to the residents of the countries facing huge disturbances to their natural resources.

Although much of the attention to the impact of dams on biodiversity has concerned dams on the mainstem of rivers, a recent study for the U.S. National Academy of Science (Ziva et al. 2012), models the impact of damming smaller tributaries as well. The study found that 103 of the 877 fish species in the Mekong would be prevented from making their migrations if all 78 planned tributary dams are built, and that one dam alone, the Lower Se San 2 in Cambodia, would cause a 9.3 percent drop in fish biomass basin-wide. In regional consultations, hydropower dam development was mentioned as a significant threat in Burma, as well as in the Himalayan region (Bhutan, China, Nepal, and India).

Although transportation corridors are of lesser importance to freshwater biodiversity, there is still some negative effect from increased river traffic and urban expansion along rivers, which leads to a displacement of species and direct impact such as physical harm to species such as freshwater dolphins that are injured by boats.

## **Marine**

Natural system modifications and transportation corridors also threaten marine biodiversity and habitats. Increased demands of trade in the region have led to rapid development of new ports and expansion of existing ones, often in sensitive coastal area, including mangroves and estuaries where appropriate protection is not in place. These ports also provide point sources of pollutants that negatively impact fragile marine species in the area. Exhibit 24 shows the location of major ports and shipping lanes. The heavy boat traffic in these shipping lanes provides hazards to marine mammals and sea turtles that swim on the surface in these waters. Bilateral assessments for Timor-Leste and Indonesia specifically mentioned shipping lanes as a biodiversity threat in their countries.

Unplanned and unmanaged coastal development also destroys and degrades coastal and marine ecosystems such as mangroves and offshore coral reefs that are lost due to siltation from onshore construction. The bilateral 118/119 assessment for Cambodia specifically mentions the unregulated construction of seaside resorts as a threat to marine biodiversity there. In addition to threats from construction, overbuilt areas of the coast

also threaten other species. Sea turtles, for example, require undisturbed, unlighted beaches to successfully crawl from their nests to the sea and fail when they become disoriented by lights and human activities.

### **B3. Energy Production and Mining**

According to the *UNEP Statistical Yearbook 2011* (UNEP 2012), electricity production in Asia and the Pacific grew by an average of 6.1 percent per year from 2000 to 2008, and in 2008 the region accounted for 44 percent of global energy supply. The rising extraction rate of fossil fuels in the region — petroleum, natural gas, and coal — leads to a variety of threats to impacted ecosystems and biodiversity, described below.<sup>8</sup>

A number of Asian countries have significant deposits of other valuable minerals. Both China and India have sizeable deposits of lead, uranium, zinc, manganese, nickel, and tin. Indonesia is known for its copper and gold resources, and Malaysia for its tin (Bendi 2012). Extracting these resources has costs to biodiversity and ecosystems.

#### **Terrestrial**

Large-scale mining operations threaten some forests and areas of high conservation value in the region and was mentioned as a threat in the bilateral 118/119 assessments for Cambodia, Indonesia, and Vietnam. Examples include areas of high conservation value cleared for coal mining in Kalimantan, Indonesia, and protected areas in Cambodia awarded to mining concessions (USAID 2010).

Access roads to mining operations also facilitate access for illegal wildlife hunting and harvesting of natural resources, resulting in further loss of rare species and easing the illegal transport of timber and other forest products from once inaccessible areas. Stakeholder consultations in Indonesia and the Philippines noted the impact of mining operations on biodiversity as a significant issue.

#### **Freshwater**

Gravel mining along river courses and streambeds to provide construction materials is also a threat to biodiversity and human fishing activities and is mentioned in the 2010 bilateral 118/119 assessment for Cambodia. This work destroys the stream bed and removes spawning habitats for fish, thus endangering these populations and the humans who fish for them.

Contamination from mines that seep into freshwater systems are also a threat to biodiversity. Gold mining, for instance, leads to the introduction of mercury into ecosystems, which accumulates in living organisms and can cause death or reproductive failure.

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<sup>8</sup> Only non-biological resources are considered in this section. The increasing demand for biofuels is described under the threat from agriculture and aquaculture, and the expanding network of hydropower facilities is described under the threat from natural system modifications.

## Marine

The extraction of oil and gas from offshore and coastal areas entails occasional spills that threaten sensitive marine and coastal ecosystems and many species living there, as well as contaminating food chains. Seabirds, sea turtles, and many encrusting invertebrate species are all highly threatened by oil spills. The food chain is also contaminated, resulting in increased mortality and impaired fertility of many marine and coastal species.

## B4. Biological Resource Use

Biological resource use includes such things as unsustainable — and often illegal — harvest and trade of natural resources, including forest products, fish, and wildlife. Although the greatest impact is from large-scale industrial extraction and use — which results in overharvesting, overfishing, and unsustainable extraction — impact in some areas arises from local use as well. All the bilateral 118/119 assessments reviewed for this regional assessment mentioned various aspects of unsustainable natural resources use as a major threat to biodiversity in these countries.

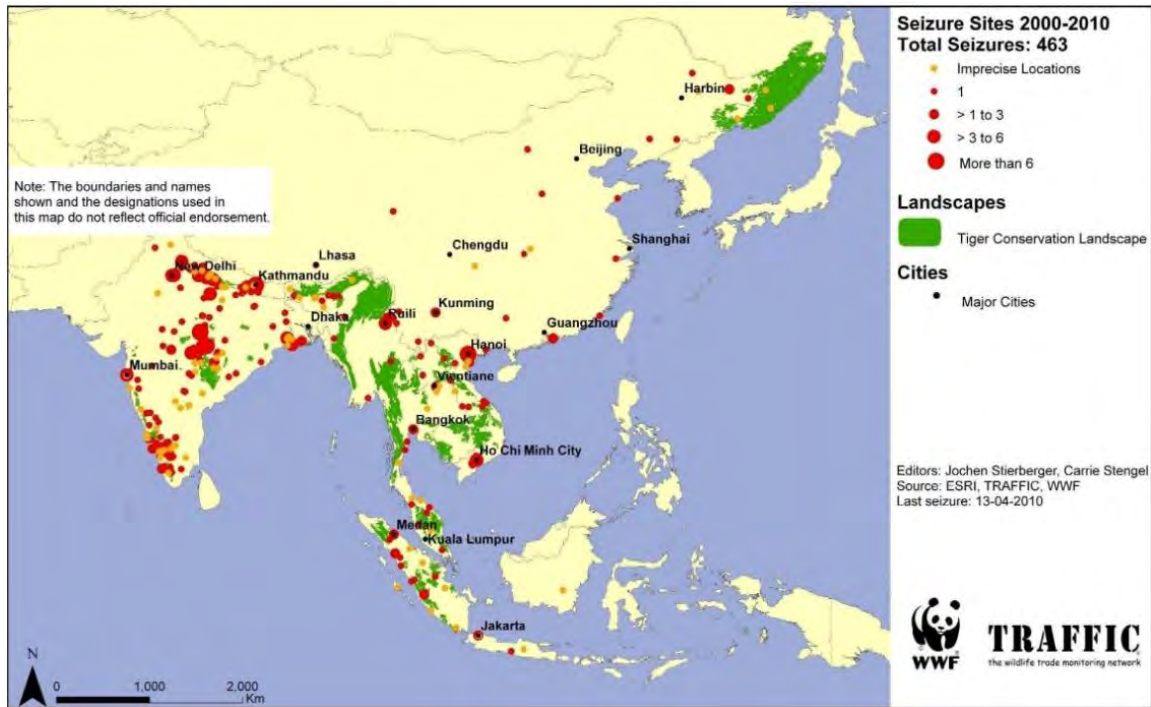
## Terrestrial

Wildlife trafficking continues to be major threat to biodiversity in Asia, as well as globally. There is a significant illegal trade in threatened and endangered species, estimated to be the third-largest black market behind drugs and weapons, with an estimated value, excluding illegal timber and fisheries, of between \$8 billion \$10 billion per year (Haken 2011). The new prosperity in Asia, combined with traditional cultural beliefs and values, has led to an increased demand for illegal animal and plant products with purported medicinal value, and for rare prestige products. Wildlife poachers use increasingly sophisticated equipment to ply their trade, resulting in greater difficulty in apprehending them (Cutter and Blate 2012). Asian demand for rare products has a global effect, also driving elephant and rhino poaching in Africa.

In Southeast Asia, pangolins (scaly anteaters) are one of the most widely traded species, leading to their rarity in many places where they once were commonly found. Despite international protection for one of Asia's most iconic species, wild tigers are still being caught and trafficked, and captive "tiger farms" may be facilitating the illegal trade (FREELAND 2012). An estimated 3,200 tigers are thought to exist in the wild, but an analysis of tiger seizures from 2000 to 2010 reported a total of 463 seizures across Asia (see Exhibit 25).

Overharvesting — legal and illegal — of wood and other forest products is also a major threat, leading to the decline in natural forest coverage and a resultant loss of biodiversity. Industrial-scale logging occurs in Burma, Indonesia, Laos, Malaysia, and Papua New Guinea and is widely believed to be unsustainable (ITTO 2012). Other countries (such as Cambodia, China, and Thailand) have enacted logging bans, to varying degrees of effectiveness. While logging bans may help protect a country's domestic forest resources, deforestation is typically displaced to other countries with weaker controls. China, known as the wood factory of the world, is the world's largest processor

**EXHIBIT 25. LOCATION OF SEIZURES OF TIGER PARTS  
FROM 2000-2010 IN RELATION TO TIGER CONSERVATION LANDSCAPES**



Source: Verheij et al. 2010

of wood products, importing timber from nations across the globe (see Exhibit 26). Other countries in the region, such as Thailand and Vietnam, also have active wood processing industries.

**Freshwater**

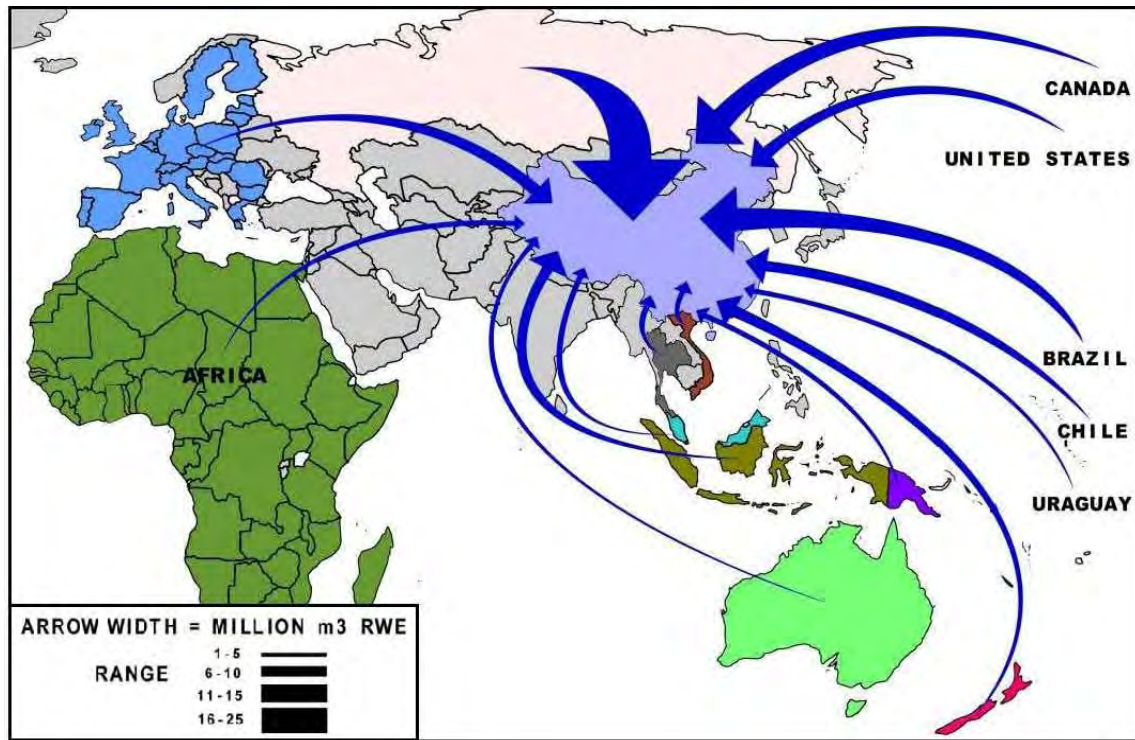
Overharvesting and unsustainable use of freshwater species is leading to a decline in abundance, size, and distribution of many species. IUU fishing for commercially used taxa, along with damaging fishing practices such as blast fishing and the use of unsustainable net mesh sizes, also threaten freshwater fish and other species and the habitats they live in.

**Marine**

Overharvesting and unsustainable use of many marine species, such as tuna, grouper, and snapper, is leading to declines in abundance, size, and distribution of many commercial species. The live reef food fish and aquarium fish trade is also driving some species, such as grouper for consumption and anemone fish for aquariums, into threatened status. Some species, such as various tuna, have already been overfished to endangered status.

Poaching and trafficking of rare and endangered marine species, including sharks, manta rays, sea turtles, napoleon wrasse, and many others, continues to threaten these vulnerable species. IUU fishing for commercially used taxa, along with high by-catch

**EXHIBIT 26. CHINA FOREST PRODUCT IMPORTS BY VOLUME  
IN MILLION CUBIC METERS OF ROUNDWOOD EQUIVALENT, 2009**



Source: Chinese customs data 2009, cited in Woods et al. 2011

rate and destructive fishing practices like blast fishing, cyanide fishing, trawling fishing, longliners, and the use of unsustainable net mesh sizes, threaten many marine species and ecosystems.

**B5. Climate Change and Severe Weather**

Climate impacts on ecosystems are many and variable in intensity, timing, and scale. Long-term climatic changes and other severe climatic/weather events can significantly change the habitats and increase the vulnerability of species. Changes in rainfall patterns, temperatures, and sea level are already affecting biodiversity and ecosystems in the region and will continue to exacerbate current environmental problems, such as water pollution and water shortages for agriculture and domestic use. Climate change was mentioned in all the bilateral 118/119 assessments as a significant threat to biodiversity.

**Terrestrial**

Habitat modifications due to changing rainfall patterns and temperature threaten the range, distribution, and diversity of terrestrial species. Rising temperatures affect flowering and seasonality and have particularly significant impact on high latitudes and altitudes. High temperature and prolonged drought may increase the risk of forest fire, which will also threaten species and habitats. As there is progressively more warming with elevation, areas higher than 4,000 meters will experience the greatest warming rates.

Climate change will therefore have a disproportionate impact on alpine and high-elevation areas, including significant impact in the Himalayas and the Tibetan plateau, the sources of much of Asia's freshwater supply.

## **Freshwater**

Climate change is expected to become a significant threat in the medium term, potentially exceeding other threats. *“By 2050 it is expected that climate change will have had a larger impact on river flows than dams and water withdrawals have up to now”* (Doll and Zhang 2010, cited in IUCN 2010). These changes to freshwater ecosystems will change the habitat characteristics and alter the distribution and abundance of species now found in these areas. This threat exacerbates the ongoing threat to river systems in Asia due to existing dams and plans for more dams in the future.

Sea level rise is another consequence of global warming that will influence freshwater ecosystems and species as saltwater intrudes upon freshwater areas and only salt-tolerant species will be able to adapt to these changes.

## **Marine**

Climate change effects of warming sea temperatures, ocean acidification, and sea level rise will have altering effects on many marine species and ecosystems. Many corals, for instance, suffer bleaching and death with water warming to only a few degrees higher than the accustomed temperatures. Ocean acidification caused by high concentrations of carbon dioxide in the atmosphere also severely reduces the ability of corals and other organisms to form their calcium carbonate skeletons and leads to their death.

Increasing coastal storms will also impact coastal environments and cause the loss of mangroves, the erosion of beaches (e.g., loss of sea turtle nesting beaches), and degradation of other coastal habitats in affected areas, leading to further threats to biodiversity.

## **B6. Pollution**

Rapid industrial growth without adequate enforcement of environmental regulations, expanding urban areas, inadequate solid waste management, and pollution of rivers by agricultural chemicals and fertilizers have resulted in a loss of biodiversity and degradation of ecosystems throughout the region. Some 80 per cent of the region's rivers are polluted and/or otherwise compromised by unsustainable development (ADB 2011d). In regional consultations in Indonesia and the Philippines, stakeholders reported that the impact of pollution from terrestrial mining, oil palm plantations, and other activities has led to declines in freshwater biodiversity, contamination of the food chain, and ultimately deterioration in the health of people who depend on aquatic resources for their sustenance.

## **Terrestrial**

Land-based pollution, including the improper management of solid waste, mining tailings, and municipal waste, threaten terrestrial biodiversity in localized areas. Although this threat is not as great for terrestrial biodiversity as it is for aquatic systems, it does greatly impact animals that consume contaminants. Certain pollutants, such as mercury, also bioaccumulate in tissue and can cause reproductive problems and premature mortality.

## **Freshwater**

Contamination of the food chain from mining operations and runoff from agriculture, municipal waste, and other pollutants negatively impact the food chain and result in impaired reproductive capacity, poor health, and other factors that influence species survival. Greater impacts from pollution are evident in aquatic systems (marine and freshwater) due to the ability of water to disperse the pollutants. The paper and pulp industries in particular are considered to be a major threat to freshwater biodiversity. In transboundary river systems, pollutants from far upstream often make their way downstream into other countries, far removed from the original sources.

## **Marine**

Marine pollution, including from ships, oil spills, and land-based industrial, municipal, and agricultural sources, contaminate the food chain and injure or kill marine life. Other wastes, such as plastic bags, remain in the sea and are fatally consumed by sea turtles, impacting marine biodiversity.

Land-based pollution of coastal areas, including untreated sewage from dense urban areas, toxic pollution from mining and other industries, fertilizer and sediment runoff from agriculture, and toxic runoff from city surfaces, add further threats.

## **B7. Invasive and Other Problematic Species**

Invasive species that compete with, consume, or parasitize native biodiversity and impact ecosystems are a regional threat in all ecosystems, but this problem is only now receiving significant attention. Many of these species are exotics introduced from other regions, with no natural controls, diseases, insect pests, or predators in their new environment to slow their spread. While ecosystem degradation is also a factor, of special concern is the human introduction, both intentional and accidental, of problematic species that often results from the movement of people and their activities throughout the region, often as a result of increased global trade. All bilateral 118/119 assessments reviewed for this report mentioned invasive species as a threat to biodiversity. In consultations, stakeholders noted that while invasive species are an emerging threat, there is currently little awareness of the issue or understanding of the magnitude or costs of its potential impact.

## **Terrestrial**

Human agriculture and horticultural practices often promote the introduction of non-native species that outcompete native species. The very characteristics that make a plant hardy and easy to grow in a garden also gives it a competitive advantage over native species. In cleared forest areas near human settlements, these exotic plants are often the first to colonize, leading to a loss in biodiversity. Other terrestrial non-native species, such as tree sparrows, house crows, and Norway rats, are abundant in the region and are serious crop and urban pests (MacKinnon 2002).

## **Freshwater**

Exotic and invasive plant species, such as water hyacinths, modify and negatively impact freshwater habitats, leading to a loss of native biodiversity. Not only do these species often outcompete native species, but often, they provide different environmental conditions — for instance, more shade — that affects many species in the ecosystem.

Non-native fish species such as tilapia, used in aquaculture, often escape and proliferate in natural environments and outcompete native species, leading to species loss. In the Philippines, exotic fish species have caused the extinction of most endemic lake fish (MacKinnon 2002).

## **Marine**

Dumping of ballast waters from cargo and cruise ships often leads to the introduction of exotic species into non-native seas where they proliferate, causing risk to native species. Exotic and non-native species spread beyond their natural ranges, where they compete with native species. With ships moving around the world from region to region, species are being spread as well. There is little published data on the extent of specific introductions and spread of non-native marine species from elsewhere to Asia.

## **C. Summary of Direct Threats**

The major direct threats to terrestrial, freshwater, and marine biodiversity are summarized in Exhibit 27.



## EXHIBIT 27. DIRECT THREATS TO BIODIVERSITY AND TROPICAL FORESTS IN ASIA

Natural Ecosystems		
Terrestrial	Freshwater	Marine
<b>Conversion</b> of forests into agriculture (e.g., oil palm, rubber, timber plantations)	<b>Development of hydropower dams</b>	<b>Overharvesting</b> , including illegal, unreported, and unregulated (IUU) fishing
<b>Overharvesting</b> of non-timber forest products (NTFPs), especially the illegal wildlife trade	<b>Overharvesting</b> , including illegal, unreported, and unregulated (IUU) fishing	<b>Destructive fishing practices</b> (e.g., blast fishing, cyanide fishing, trawling in coral areas)
<b>Unsustainable logging</b> , especially industrial-scale	<b>Destructive fishing practices</b> , (e.g. blast fishing, cyanide fishing, use of unsustainable net mesh sizes)	<b>Conversion</b> of mangroves and other coastal habitats (e.g., shrimp farms, resort development)
<b>Infrastructure development</b> (e.g., roads, dams, pipelines)	<b>Conversion</b> of freshwater wetlands to agriculture or aquaculture (e.g. rice paddies, fish ponds)	<b>Pollution</b> (e.g. municipal and ship ballast waste, oil spills, chemical and thermal pollution from industry, agricultural runoff)
<b>Climate change</b> (e.g., habitat modification, alteration of rainfall patterns and temperatures, forest fires, outbreaks of pests)	<b>Pollution</b> (e.g., mine tailings, runoff from agriculture, municipal waste)	<b>Climate change</b> (e.g., sea level rise, tropical storms, increasing sea surface temperatures, ocean acidification)
<b>Exotic and invasive species</b>	<b>Exotic and invasive species</b> (e.g., water hyacinths and tilapia)	<b>Exotic and invasive species</b>
	<b>Climate change</b> , (e.g. alteration of rainfall patterns and hydrologic cycles, salt water intrusion)	

Level of Threat

### D. Indirect Threats to Biodiversity and Tropical Forests

While direct threats focus on changes to ecosystem processes (e.g., habitat change, fragmentation, or loss; overexploitation; and introduction of non-native species), indirect threats focus on the underlying factors — usually social, economic, political, institutional, or cultural — that enable or add to the occurrence or persistence of direct threats (Salafsky et al. 2008) and have a negative effect on biodiversity and forest conservation. An indirect threat can magnify one or more direct threats (MEA 2005). However, social, political, and institutional factors can also provide opportunities for having a positive effect, such as land-use planning that favors conservation (Salafsky et al. 2008). In the process of preparing this assessment and in stakeholder consultations, nine indirect threats were identified, as summarized in Exhibit 28, with linkages to the direct threats. Following the summary table, descriptions of each individual indirect threat are provided.

**EXHIBIT 28. INDIRECT THREATS AND LINKS TO DIRECT THREATS**

	<b>Indirect Threat</b>	<b>Links to Direct Threats</b>
<b>1</b>	<b>Inadequate regional coordination</b> to protect high-conservation-value habitats	<ul style="list-style-type: none"> <li>• Conversion (agriculture and aquaculture)</li> </ul>
<b>2</b>	<b>Fragmented and competing development priorities</b>	<ul style="list-style-type: none"> <li>• Conversion</li> <li>• Infrastructure development (natural system modification/ transportation and service corridors)</li> <li>• Development of hydropower (natural system modification/ transportation and service corridors)</li> </ul>
<b>3</b>	<b>Weak enforcement</b> of laws, policies, and agreements related to natural resources	<ul style="list-style-type: none"> <li>• Overharvesting (biological resource use)</li> <li>• Unsustainable logging (biological resource use)</li> <li>• Conversion</li> </ul>
<b>4</b>	<b>Lack of multi-stakeholder involvement</b> , especially of marginalized groups, in development decision-making	<ul style="list-style-type: none"> <li>• Overharvesting</li> <li>• Unsustainable logging</li> <li>• Conversion</li> </ul>
<b>5</b>	<b>Business practices do not adequately consider the full range of social and environmental impacts</b>	<ul style="list-style-type: none"> <li>• Pollution</li> <li>• Destructive fishing practices (biological resource use)</li> <li>• Unsustainable logging</li> </ul>
<b>6</b>	<b>Undervaluation</b> of goods and services provided by healthy ecosystems	<ul style="list-style-type: none"> <li>• Development of hydropower Conversion</li> <li>• Pollution</li> </ul>
<b>7</b>	<b>Insufficient resources</b> for natural resource and biodiversity conservation	<ul style="list-style-type: none"> <li>• Exotic and invasive species</li> <li>• Overharvesting</li> <li>• Pollution</li> </ul>
<b>8</b>	<b>Demand for unsustainably-sourced</b> food, natural resources, energy, and consumer products	<ul style="list-style-type: none"> <li>• Overharvesting</li> <li>• Development of hydropower</li> <li>• Conversion</li> <li>• Unsustainable logging</li> </ul>
<b>9</b>	<b>Lack of scientific knowledge</b> to sustainably manage biodiversity	<ul style="list-style-type: none"> <li>• Climate change</li> <li>• Exotic and invasive species</li> </ul>

*1. Inadequate regional coordination for the protection of high conservation value habitats.* While regional organizations, such as ASEAN, are playing an increasingly significant regional coordination role and multilateral institutions, such as ADB, have established subregional programs (e.g., the Greater Mekong Subregion), coordination is still insufficient. Inadequate coordination among countries, and between ministries within countries, inhibits the development of national and regional policy frameworks and limits commitment to these frameworks when developed. To manage transboundary ecosystems effectively, a common vision for management is needed across countries. The goal is to mitigate threats and avoid displacement of impacts to countries with weaker protections in place. Transboundary ecosystems could include the Coral Triangle (marine), the Heart of Borneo (forests), the Mekong River (freshwater and forests), the Himalayas (freshwater and forests), and the Sundarbans (marine, freshwater, and mangroves).

*2. Fragmented and competing development priorities.* Competing development priorities for different sectors, with different goals and strategies to reach them, impact biodiversity

conservation. For instance, food security programs aim to increase agricultural crops, often leading to conversion of natural land and forests to agriculture. Economic growth goals may involve extraction of natural resources, with the inherent threats described above. Energy goals and the development of new hydropower schemes also conflict with biodiversity conservation goals. Integrated development planning that considers all of these demands and can optimize the most sustainable solutions is currently lacking.

*3. Weak enforcement of laws, policies, and agreements related to natural resources.* Most of the countries in the Asia region have signed international biodiversity agreements such as CITES, the Convention on Biological Diversity, and the Convention on Wetlands of International Importance (Annex D). These conventions and agreements clearly outline the legal and policy framework for addressing issues such as wildlife trade, biodiversity conservation, and sustainable use of wetlands. However, enforcement across the region is weak and is hindered by low prioritization, corruption, and lack of resources.

*4. Lack of multi-stakeholder involvement in development decision-making, especially of marginalized groups.* Currently, decision-making is insufficiently transparent, and public participation is limited. While countries of the region vary, civil society is demanding greater transparency and an expanding role in decision-making. This is a positive trend, since there is evidence that public participation in environmental decision-making at the local and regional levels generally leads to more sustainable approaches to managing resources (MEA 2005). However, there are few mechanisms to bring civil society — especially marginalized groups — together with government and the private sector to develop a shared understanding and commitment to sustainably manage natural resources.

*5. Business practices do not adequately consider the full range of social and environmental impacts.* Businesses in Asia, striving for increased economic development, do not always consider the environmental and social costs of their policies and plans, and they often externalize the cost of production, to the detriment of society, especially the poor. For instance, new hydropower projects are being planned to meet growing energy needs, but these projects often lead to the loss of biodiversity and fisheries for both community and commercial use, at a great cost to society. The unregulated establishment and expansion of ports, mining concessions, and other development projects similarly harms biodiversity and natural resources and impacts local people, who may lose livelihoods based on natural resources or who may even be forced to relocate. Although some private sector stakeholders try to minimize their impact on the environment and people, this sensitivity is not yet widespread, with most companies still focusing on the bottom line without considering the full range of costs, especially the additional burdens that may be placed on the poor and vulnerable.

*6. Undervaluation of goods and services provided by healthy ecosystems.* Although ecosystems provide a range of services that can have significant ramifications for economic growth, these services are typically not formally valued, and the economic benefits of maintaining these services are rarely considered in the development of economic policies. Some of the high-value benefits of ecosystems include carbon storage;

protection from storms, flooding, and erosion; provisioning of clean water; and pollination. Currently, there is a significant knowledge gap around the value of these services. If these services were formally valued and considered in long-term economic planning, this would likely lead to increased protection of natural resources and could fundamentally shift related development decisions.

*7. Insufficient resources for natural resource and biodiversity conservation.* Ministries and agencies responsible for environmental protection and monitoring are underfinanced and often lack the authority and resources to effectively enforce environmental regulatory frameworks. Many protected areas, for instance, are “paper parks” with little real protection. While this may be seen as primarily a national issue, it has regional implications for transboundary ecosystems and resources. In addition to public sector investments in conservation, there is a need for greater private sector investments in the natural capital that sustains the resource base needed for sustainable development.

*8. Demand for unsustainably sourced food, natural resources, energy, and consumer products.* Consumption patterns in the region are changing. With rising incomes, diets are becoming more diverse (consuming more animal and fish-based protein), and the demand for culturally important wildlife-derived medicines and prestige items is increasing. The energy needs for a growing middle class and expanding industries pose a significant challenge. Consumers and markets often fail to distinguish between products that are sustainably produced and those that negatively impact the environment and local populations. Even with this knowledge, most consumers would not pay a higher price to ensure they are using sustainable products that have fewer negative consequences.

*9. Lack of scientific knowledge to sustainably manage biodiversity.* A frequently cited challenge in stakeholder discussions was the lack of information available, both within a country and regionally, about a variety of key factors needed to improve planning and management. This is due in part to fundamental knowledge gaps (e.g., information about the distribution, abundance, and population dynamics of particular species, sustainable harvest rates for fish and tree species, etc.) that need to be addressed by research and new data collection. Another factor is the lack of transparency, limited information-sharing, and sectoral stovepiping that limits the dissemination of existing information.

## V. ACTIONS NECESSARY TO CONSERVE BIODIVERSITY AND TROPICAL FORESTS IN ASIA

### A. Overview

In the previous section, direct and indirect threats to biodiversity and forests were detailed for Asia. In total, nine major indirect threats were identified. Based on these nine indirect threats, nine actions necessary were determined to address them, as summarized in Exhibit 29 and further described below.

**EXHIBIT 29. INDIRECT THREATS, DIRECT THREATS, AND ACTIONS NECESSARY**

	<b>Indirect Threat</b>	<b>Links to Direct Threats</b>	<b>Actions Necessary</b>
1	<b>Inadequate regional coordination</b> to protect high-conservation-value habitats	<ul style="list-style-type: none"> <li>• Conversion (agriculture and aquaculture)</li> </ul>	Establish regionally harmonized planning processes, policies, and environmental safeguards
2	<b>Fragmented and competing development priorities</b>	<ul style="list-style-type: none"> <li>• Conversion (agriculture and aquaculture)</li> <li>• Infrastructure development (natural system modification/ transportation and service corridors)</li> <li>• Development of hydropower (natural system modification/ transportation and service corridors)</li> </ul>	Promote integrated spatial planning, which includes food security, economic growth, energy, climate change, and conservation
3	<b>Weak enforcement</b> of laws, policies, and agreements related to natural resources	<ul style="list-style-type: none"> <li>• Overharvesting (biological resource use)</li> <li>• Unsustainable logging (biological resource use)</li> <li>• Conversion (agriculture and aquaculture)</li> </ul>	Strengthen regional monitoring, compliance, and enforcement of natural resource laws and policies
4	<b>Lack of multi-stakeholder involvement</b> , especially of marginalized groups, in development decision-making	<ul style="list-style-type: none"> <li>• Overharvesting (biological resource use)</li> <li>• Unsustainable logging (biological resource use)</li> <li>• Conversion (agriculture and aquaculture)</li> </ul>	Promote multi-stakeholder processes involving government, civil society, and the private sector, leading to ownership and commitment
5	<b>Business practices</b> do not adequately consider the full range of social and environmental impacts	<ul style="list-style-type: none"> <li>• Pollution</li> <li>• Destructive fishing practices (biological resource use)</li> <li>• Unsustainable logging (biological resource use)</li> </ul>	Encourage the private sector to adopt best practices and employ strong social and environmental safeguards
6	<b>Undervaluation</b> of goods and services provided by healthy ecosystems	<ul style="list-style-type: none"> <li>• Development of hydropower (natural system modification/ transportation and service corridors)</li> <li>• Conversion (agriculture and aquaculture)</li> <li>• Pollution</li> </ul>	Place economic value on ecosystem services and incorporate into development planning and business practices

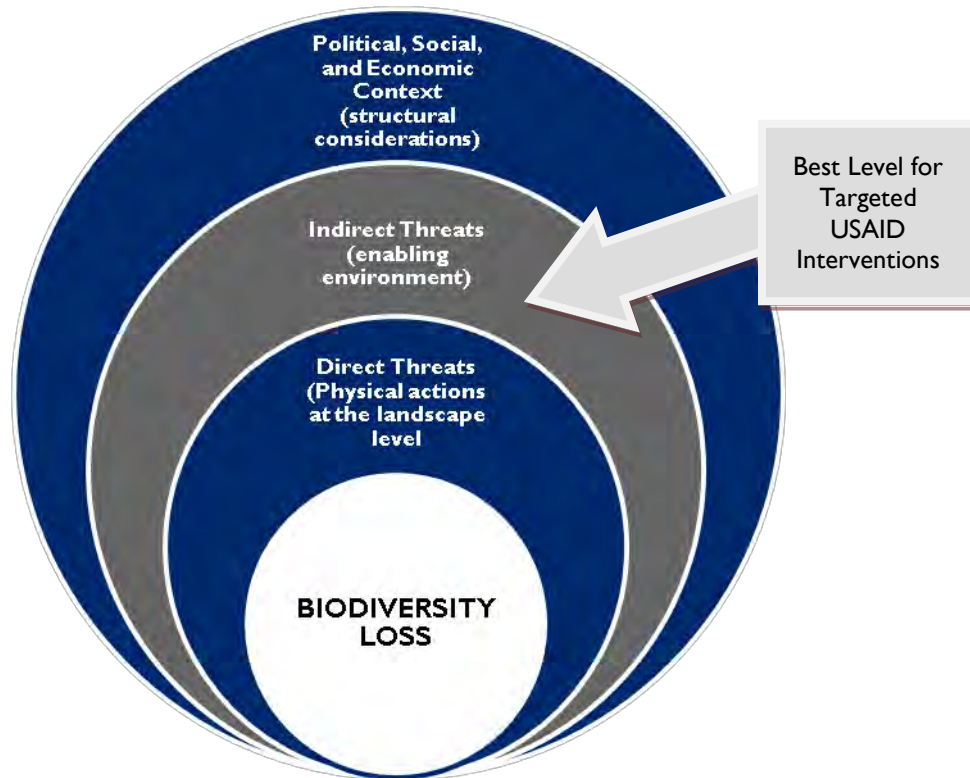
	<b>Indirect Threat</b>	<b>Links to Direct Threats</b>	<b>Actions Necessary</b>
<b>7</b>	<b>Insufficient resources</b> for natural resource and biodiversity conservation	<ul style="list-style-type: none"> <li>• Exotic and invasive species</li> <li>• Overharvesting (biological resource use)</li> <li>• Pollution</li> </ul>	Enhance sustainable financing for conservation from public and private sectors
<b>8</b>	<b>Demand for unsustainably sourced</b> food, natural resources, energy, and consumer products	<ul style="list-style-type: none"> <li>• Overharvesting (biological resource use)</li> <li>• Development of hydropower (natural system modification/ transportation and service corridors)</li> <li>• Conversion (agriculture and aquaculture)</li> <li>• Unsustainable logging (biological resource use)</li> </ul>	Transform consumer attitudes and behaviors to support sustainable products and processes
<b>9</b>	<b>Lack of scientific knowledge</b> to sustainably manage biodiversity	<ul style="list-style-type: none"> <li>• Climate change</li> <li>• Exotic and invasive species</li> </ul>	Promote applied research to inform policy and management practices and to support decision-making

Focusing on indirect threats is an effective approach for addressing the long-term need to sustainably manage and conserve biodiversity and forests. Many direct threats need to be addressed locally or nationally rather than at the regional level, with some exceptions — for instance, unsustainable and illegal trade in natural resources is a direct threat more effectively addressed by regional intervention. However, efforts to address direct threats will be unsustainable if the underlying social, economic, and political factors that facilitate and enable them (in other words, the indirect threats) are not also effectively addressed. Addressing indirect threats can therefore have a positive impact on mitigating direct threats and helping to conserve biodiversity in Asia. For this reason, this assessment focuses on actions that address the indirect threats (see Exhibit 30).

The changing face of Asia presents new opportunities for alliances for conservation and sustainable development. The expectation and values of the rising middle class provide an opportunity to build an active constituency who will support actions to safeguard the environment. The private sector is strengthening its corporate social responsibility (CSR) commitments, and industries involved in commercial crops, such as oil palm, are developing certification schemes for sustainable production. These emerging opportunities for new alliances were considered when determining the actions necessary to address threats to biodiversity.

The recommended actions were discussed and revised based on feedback from the regional stakeholder meeting held in Bangkok and are summarized in the discussion that follows. It should be noted that these actions are general suggestions for a wide range of stakeholders across the region rather than actions specifically recommended for RDMA. Recommendations for RDMA are presented in Section VII.

**EXHIBIT 30. RECOMMENDED LEVEL FOR USAID INTERVENTIONS IN BIODIVERSITY AND TROPICAL FORESTS**



**B. Actions Necessary**

1. *Establish regionally harmonized planning processes, policies, and environmental standards.* Countries in Asia (as elsewhere) are reluctant to enter into formal agreements that might be perceived to undermine their laws, regulations, policies, and priorities. Nonetheless, there is growing recognition of the importance of improving effective and coordinated management of valuable ecosystems and natural resources, particularly those that are transboundary in nature, since illegal and unsustainable activities tend to be displaced to areas with weaker protection. Recent progress provides examples of how to move forward in building regional coordination. For example, the Coral Triangle Initiative (CTI) is working to strengthen regional coordination of an area of high biodiversity value (see Annex E). Its approach is to affirm national sovereignty while setting out areas of cooperation based on sustainable development principles in the management, conservation, and development, taking into consideration existing multilateral, regional, and bilateral environmental agreements. The initiative has visible support at the highest political level (the presidents of each country signed the CTI agreement). This approach, which combines political support, acknowledgement of national sovereignty, and agreement on shared areas of interest, can be applied to other transboundary ecosystems in the region, such as the Heart of Borneo, Mekong, the Himalayas, and the Sunderbans. Illustrative actions include the following:

- Develop and implement a common vision and commitment among neighboring countries for the management and conservation of transboundary ecosystems (similar to Coral Triangle), including attention to the social and environmental impacts of development activities.
- Improve coordination among regional organizations (e.g., Mekong River Commission) and platforms (e.g., ASEAN-WEN, SAWEN, and the SEAFDEC IUU network) and civil society organizations to enhance strategic collaboration.
- Develop and harmonize strong social and environmental laws and policies throughout the region, including the adoption of international standards for environmental impact assessments (EIAs) and strategic environment assessments (SEAs), creating a consistent regulatory environment for public and private sector engagement in national and transboundary trade, energy, transport, and infrastructure activities.

*2. Promote integrated spatial planning that includes food security, economic growth, energy, climate change, and conservation.* Different sectors with different priorities and strategies competing for resources are an all-too-familiar scenario. In Asia, economic growth goals often take priority over social and environmental goals and safeguards. Integrated planning for sustainable, long-term development would provide guidance at the regional, national, and ecosystem levels on how to best meet the demand for economic growth, food, and energy while building climate change resilience and conserving biodiversity and natural resources. An example of where integration is critically needed is the development of hydropower. Planners should consider not just energy production, but also the hydropower facility's 'footprint' on biodiversity, agriculture, fisheries, livelihoods, health, watersheds, and forests. Illustrative actions include the following:

- Ensure that sectoral government agencies such as finance, agriculture, energy, mining, and transportation, integrate conservation into planning processes.
- Ensure that development initiatives take into consideration conservation of biodiversity; infrastructure development does not fragment protected areas; migration corridors are maintained; national protected area systems are not opened to mining and resource exploitation; and protected areas and rehabilitation of habitats, e.g., mangroves, are recognized and included in climate change resilience strategies.
- Plan and implement climate change mitigation and adaptation efforts such as REDD+ in ways that strengthen biodiversity conservation, gender equity, and resilience.
- Integrate gender considerations into all aspects of development planning, recognizing women as key managers of natural resources.

*3. Strengthen regional monitoring, compliance, and enforcement of natural resource laws and policies.* Most of the countries in the region have signed a number of international agreements related to biodiversity (see Annex D), almost half have met the



new global target for protected areas (17 percent), and to a greater or lesser degree, most have EIA requirements. The challenge is to take these agreements and requirements off the shelf and put them into practice. This will require a renewed commitment to international biodiversity agreements such as CITES; higher prioritization of environment and biodiversity protection, as reflected not only in increased allocation of human and financial resources, but also in effective enforcement; and a commitment to reducing corruption. Illustrative actions include the following:

- Ensure that major importing nations (China and India in particular) reinforce sustainable production through appropriate procurement policies and trade standards for natural resources such as timber, fish, oil palm, and wildlife.
- Strengthen coordinated law enforcement efforts by networking existing regional platforms and civil society organizations and improving cross-regional sharing of information among ASEAN, SAARC, Interpol, and other relevant agencies.

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- Increase the authority of regional coordination bodies such as ASEAN, SEAFDEC, SAARC, and MRC not only to monitor activities but also to enforce biodiversity, fisheries, and forest-related laws and regulations.
- Strengthen civil society, academia, and the media to play leading roles as watchdogs monitoring compliance with and enforcement of biodiversity conservation policies, laws, and regulations.

*4. Promote multi-stakeholder processes involving government, civil society, and the private sector, leading to ownership and commitment.* The expectations of the middle class and the increasing availability of information through mass media, especially the Internet and mobile phones, are changing the relationships among civil society, government, and the private sector. Multi-stakeholder processes mobilize societies and enable the exchange of information, alliance building, and improved oversight of environment conservation. Illustrative actions include the following:

- Ensure that information used in budget allocations — including land use planning and zonation laws; forest, agriculture, and mining concession agreements; and plans for infrastructure projects — is publicly available and readily accessible.
- Promote adherence to the principle of free, prior, and informed consent (FPIC) by communities when planning and implementing development and conservation projects.
- Encourage active public participation in government and private sector planning processes via town hall or other culturally appropriate events, by providing comment periods, and at the project level through EIAs.

- Encourage effective collaboration between international and regional journalists and community service organizations to monitor and report on biodiversity conservation and environmental issues.

*5. Encourage the private sector to adopt best practices and employ strong social and environmental safeguards.* Social and environmental safeguards are put in place to protect vulnerable communities and the environment, but compliance is not always enforced or even expected. However, the increased availability of information is leading to a change in public opinion. Large international and some regional companies are strengthening their CSR commitments, and industries involved in commercial crops, such as oil palm, are developing certification schemes for sustainable production that include social and environmental safeguards. Illustrative actions include the following:

- Increase adoption of and compliance with environmental regulations by the private sector — for example, through fines that are high enough to act as a deterrent for noncompliance, or through public reporting of noncompliance.
- Promote private sector adoption of sustainable sourcing, procurement, and greening of supply chains, including independent certification systems for major natural resource products such as timber, palm oil, rubber, shrimp, fisheries, and other commercial crops and products. These systems should include social and environmental safeguards.
- Encourage the private sector to move beyond CSR to deliver greater and more equitable social, environmental, and economic benefits by assessing the corporate ecological footprint, analyzing the full range of the costs and benefits of doing business, internalizing ecosystem costs, and investing in natural capital.
- Provide incentives to increase investment in sustainable production systems and to transition away from unsustainable natural resource extraction.

*6. Place economic values on ecosystem services and incorporate these services into development planning and business practices.* Ecosystems services such as clean water, animal and plant habitats, and regulation of water cycles are often not considered or are undervalued when development initiatives are being planned. Ecosystem valuation can establish an understanding of the services provided, their value, the cost consequences of losing them if these services are degraded, and the cost of the actions to reduce environmental impact. A major way to successfully incorporate ecosystem services into decision-making is to develop markets that value and trade in these services. This is what is being attempted with forest carbon sequestration under the proposed REDD+ initiative of the UNFCCC. Illustrative actions include the following:

- Strengthen capacities of governments, the private sector, and civil society to conduct environmental valuation and cost/benefit analyses.

- Develop payment of ecosystem services (PES) mechanisms for national and transboundary services such as water in which users pay for the services provided.

*7. Enhance sustainable financing for conservation from the public and private sectors.*

The under-resourcing of environmental conservation has resulted in “paper parks” throughout the region. Even with the rising prosperity in the region, environmental agencies must compete with other sectors for additional funding. Valuation of the contribution of healthy ecosystems to the economy (see above) can assist in creating a constituency for conservation, as well as a potential market for payment for ecosystem services (PES). Illustrative actions include the following:

- Increase national investment (budget allocation) in conservation.
- Implement sustainable conservation financing initiatives (e.g., PES, REDD+, biodiversity offsets/banking) to generate investments from service buyers to support protected area systems, conservation, and enforcement.
- Institutionalize incentives for private companies, such as tax and regulatory relief, to establish, maintain, and invest in conservation areas and sustainable management.
- Encourage private companies with high social and environmental standards to contribute financially to environmental enforcement.

*8. Transform consumer attitudes and behaviors to support sustainable products.* The consumption patterns of the growing middle class and the industries that service them are having a major environmental impact on the region. The consumer is often unaware of the impact, and even if aware, is usually more interested in low prices than the environmental costs. Illustrative actions include the following:

- Promote consumer awareness and adoption of products that are sustainably sourced, including certification systems for major natural resource products such as timber, palm oil, rubber, shrimp, fisheries, and other commercial crops and products.
- Change cultural attitudes and overall consumption patterns to reduce consumer demand for threatened and endangered species and other illegal products.
- Strengthen efforts to build public awareness of the value of biodiversity and sustainable use of natural resources by regional organizations such as ASEAN, SAARC, SEAFDEC, ACB, ICIMOD and others.
- Promote adoption of standards by governments and the private sector for procurement of products that are sustainably sourced and independently certified, such as timber, palm oil, rubber, etc.

*9. Promote applied research to inform policy and management practices and to support decision-making.* The lack of available science-based information hinders regional and

national planning, monitoring, and implementation of sustainable natural resource management. More information is needed on the population dynamics of key species to set sustainable harvest rates and to create appropriate management systems. Illustrative actions include the following:

- Strengthen regional biodiversity monitoring systems to track species and ecosystem status, trends, and threats and to inform more proactive responses.
- Carry out research on sustainable harvest rates, linked to appropriate policies and enforcement.
- Provide information and capacity building on biodiversity monitoring, mapping, and GIS; DNA testing for animal, tree, and plant products; environmental journalism; conservation biology; and other aspects of natural resources conservation.

## VI. EXTENT TO WHICH RDMA IS ADDRESSING THE NECESSARY ACTIONS

### A. Overview

At the time of this writing, RDMA continues to operate under a strategy statement adopted in 2005 that aims to “create an effective regional platform that facilitates regional cooperation by leveraging partnerships, resources, and knowledge and that fully supports other bilateral Mission programs.” This assessment considers the current programs and activities across RDMA’s portfolio to evaluate the extent to which they address the identified actions necessary for effective biodiversity conservation.

RDMA’s mandate includes implementing regional programs, as well as bilateral programs in non-presence countries (Burma, China, Laos, and Thailand). Annexes to this regional report include abbreviated assessments for bilateral program activities in China (Annex G), Laos (Annex H) and Thailand (Annex I), while this report is focused primarily on regional programming. Due to the extent of bilateral programming in Burma, a separate 118/119 report has been prepared for that country.

RDMA’s current strategy includes four strategic objectives (SOs), which are managed by the mission’s four technical offices: Governance and Vulnerable Populations (GVP); the General Development Office (GDO); the Office of Public Health (OPH); and the Regional Environment Office (REO). RDMA’s current SOs are:

- SO 1: Vulnerable populations in the region assisted and other special foreign policy interests (GVP)
- SO 2: Improved regional governance and economic reform (GDO)
- SO 3: Increased effective regional response to HIV/AIDS and infectious diseases (OPH)
- SO 4: Improved regional environmental conditions (REO)

In addition, the Office of Foreign Disaster Assistance (OFDA) is also based at RDMA but has generally not been explicitly included in the mission’s strategy. OFDA programs have some relevance to biodiversity and natural resources and so are also considered in this assessment.

This section summarizes programs under these SOs and addresses *the extent to which* these programs meet the actions necessary to conserve biodiversity and tropical forests, as presented in the previous section. A full list of current RDMA programs is provided in Annex F.

## **B. Assessment of RDMA Programs by Strategic Objective**

### **SO 1. Vulnerable populations in the region assisted and other special foreign policy interests (GVP)**

Programming under SO 1 is primarily through GVP's bilateral programs in Burma, China, Laos, and Thailand, which are considered in more detail in the annexes and in the separate 118/119 report for Burma. Briefly, however, these include support for civil society in Burma, cultural preservation programs in Tibet (China), post-conflict assistance for Laos, and democratic strengthening in Thailand. Programs in Burma, Laos, and Thailand currently do not have biodiversity-related activities; however, activities in Tibet do have some focus on environmental conservation, including protected area management, rangeland management, and water and sanitation.

In addition to the bilateral programs, SO 1 also includes a regional program addressing human trafficking (MTV EXIT). This regional program does not explicitly address any of the actions necessary to conserve biodiversity (and was not designed to do so). However, experience in building awareness and political will to combat human trafficking may potentially inform similar efforts related to combating illegal wildlife trafficking.

### **SO 2. Improved regional governance and economic reform (GDO)**

SO 2 is implemented by GDO, which has technical experts in engineering, economics, rule of law, and food security. SO 2 includes bilateral programs (i) to help Laos integrate into the World Trade Organization and implement legal reforms, and (ii) to strengthen China's criminal justice procedures in areas concerning torture, use of the death penalty, and related areas. These programs are discussed in more detail in the bilateral reports in the appendices.

Under SO 2, regional programs in trade and food security have particular relevance to the threats to biodiversity and actions necessary for conservation. SO 2 programs provide support to ASEAN to help streamline export procedures into a "single-window" approach that simplifies bureaucratic trade barriers. Another regional trade program, to be completed soon, worked to develop a "seamless virtual factory" for the garment industry to enable better coordination. A new food security program aims to improve food trade policies and the enabling environment for increased intra-regional trade in food and food products. Efforts will primarily focus on supporting multi-stakeholder processes to bring the private sector and civil society organizations into dialogue with government decision makers.

While this and other programs are not expected to focus on specific commodities, efforts to facilitate increased trade, and reduction of trade barriers generally, could inadvertently have negative consequences on biodiversity and natural resources if effective safeguards for protecting them are not in place. As described in chapters above, the illegal and poorly regulated trade in natural resources (primarily timber, endangered wildlife, and marine fisheries) is a significant regional threat to biodiversity. Therefore, efforts to ease trade regulations under SO 2 may inadvertently result in greater threats to natural

resources if those efforts do not also consider strengthening enforcement of common trade standards and protections.

### **SO 3. Increased effective regional response to HIV/AIDS and infectious diseases (OPH)**

Under SO 3, OPH's regional health programs focus on malaria, tuberculosis, HIV/AIDS, and emerging pandemic threats. Malaria and forests are intimately interconnected. Communities living near intact forests reportedly have significantly fewer cases of malaria and dysentery than communities without intact forests nearby (Pattanayak 2003). Deforestation has also been linked to an increased abundance or range of mosquito populations or species and/or life-cycle changes that improve their capacity as malaria vectors (Afrane et al. 2012). Some recent reports of illegal logging activities in Laos have also been linked to cases of malaria outbreaks (Barrett 2012). Drug-resistant strains of malaria are commonly found in the forested border areas between Burma-Thailand and Thailand-Cambodia. The spread of drug-resistant malaria has regional dimensions: as infected people migrate across borders, and drug-resistant strains appear to be linked to counterfeit drugs originating from China. While OPH's malaria programming does not directly address any of the threats to biodiversity and tropical forests (and were not designed to do so), the fact that the target populations of these activities typically inhabit transboundary forest areas creates opportunities for more integrated programming.

OPH is also implementing an Asia regional component of a global program addressing a range of emerging pandemic threats (e.g., bird flu, SARS, etc.). Many of these emerging diseases have strong links to the trade in wildlife, which provides disease transmission mechanisms that not only cause human disease outbreaks but also threaten livestock, international trade, rural livelihoods, native wildlife populations, and the health of ecosystems (Karesh et al. 2005). Disease outbreaks linked to the wildlife trade have been estimated to cause hundreds of billions of dollars of economic damage globally. One practical approach to addressing these threats to human health is to decrease the contact rate among species, including humans, at the interface created by wildlife trade rather than attempting to eradicate pathogens or the wild species that may harbor them. This program clearly has direct links to the wildlife trade, and although it does not explicitly address threats to biodiversity, some obvious potential synergies exist. Indeed, OPH and REO staff have already discussed potential areas of collaboration (such as demand reduction campaigns and awareness raising about the potential impacts on human health from illegal wildlife trade and consumption), and additional ideas are presented in the recommendations section below.

### **SO 4. Improved regional environmental conditions (REO)**

Under SO 4, REO aims to improve the response to environmental challenges in Asia. REO's portfolio consists primarily of regional programs in climate change and clean energy, water and adaptation, and biodiversity and sustainable landscapes, as well as a few bilateral environment activities in China. REO's biodiversity and forestry-related programs directly address many of the identified actions necessary to a significant extent, while other programs are also making important contributions.

REO currently has two biodiversity programs that directly address threats to natural resources. The regional Coral Triangle Initiative (involving Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste) is improving the management of marine protected areas, promoting an ecosystem approach to fisheries management, and strengthening the capacity of coastal-marine communities to adapt to climate change. Another regional program (ARREST) is working in ASEAN countries and China to strengthen regional collaboration to combat illegal wildlife trafficking, improve enforcement of existing policies, laws, and regulations, and reduce consumer demand for illegal, threatened, and endangered species. In addition to these current biodiversity programs, REO had also recently been implementing activities related to responsible forestry and trade (RAFT), as well as a program piloting payments for environmental services in Vietnam (ARBCP), both of which ended in 2011.

Current regional climate change programs, while not explicitly addressing biodiversity conservation, are also making contributions to reducing threats to biodiversity and natural ecosystems by reducing carbon emissions and building resilience to climate change. The Mekong adaptation (Mekong ARCC) program is conducting a scientific study to understand the impact of future climate change on communities, crops, and ecosystems so as to implement effective adaptation strategies. Activities will include policy advocacy to encourage ecosystem-based adaptation efforts and to correctly value the services provided by natural ecosystems. A forest mitigation program (LEAF) is working to implement policies and practices that protect standing forests and reduce emissions from deforestation and forest degradation (REDD+) in Malaysia, Mekong countries, and Papua New Guinea. In addition, a regional low emission development program (LEAD) is focusing on promoting low carbon economic growth strategies that increase economic efficiency and reduce environmental impact.

Regional water programs do not explicitly address biodiversity conservation but make contributions through efforts to address threats to riparian freshwater ecosystems from infrastructure development (particularly hydropower dams), climate change, and altered sedimentation. These programs focus primarily on water resources, but by mitigating the potential impacts of dams, they may have co-benefits for freshwater biodiversity conservation. Activities are designed to improve regional cooperation and promote consideration of the full range of environmental and social costs and benefits of dam development. A related initiative, the Asian Environmental Compliance and Enforcement Network (AECEN), also strengthens environmental compliance more broadly, with efforts primarily focused on pollution issues.

In addition to regional programs, REO also implements bilateral programs in China with a focus on climate change (greenhouse gas accounting), environmental law (strengthening environmental governance), and environmental compliance (pollution, brown issues). Due to China's important role in the region and globally, strengthened environmental policies, laws, and regulations in China will have an impact far beyond its borders. Because China is central to many of the region's environmental challenges (e.g., logging, mining, hydropower development, fisheries, wildlife trade, infrastructure



development, etc.), lasting solutions cannot be sustained without strategic engagement of and collaboration with China.

### **C. Office of Foreign Disaster Assistance (OFDA)**

OFDA priorities include assisting with disaster response, and supporting and promoting activities to help reduce the vulnerability of populations at risk of climate- and human-induced disasters, as well as to increase resiliency to future shocks. Disaster risk reduction (DRR) programs include flood preparedness in Bangladesh and the Hindu Kush-Himalayan mountain region, drought readiness in India, earthquake risk management in Nepal and Pakistan, and private sector partnerships for disaster management in India. Disasters such as earthquakes, tsunamis, volcanic activity, floods, and droughts can also have direct impacts on biodiversity and forest resources. The response to disasters can also have an indirect impact when, for example, people take shelter in forest areas, gather wood for fuel, housing, and harvest forest products, including wildlife, for food. Exacerbating the effects of natural disasters in the region, local communities have gradually abandoned traditional coping mechanisms, which increases their vulnerability. OFDA is also working to mitigate local level flooding hazards caused by the siltation of rivers and canals from lack of effective watershed management and volcanic activity in affected areas in the Philippines. More sustainable agroforestry systems that include vetiver grass planted along terraces at lower elevations and cocoa and coffee at higher elevations are being promoted in partnership with local NGOs. There are also climate change field schools for farmers to create awareness on climate change issues and adaptation and mitigation measures. Another OFDA project in Bangladesh works in conjunction with the Ministry of Forestry to build the capacity of at-risk coastal communities to reduce their vulnerability to and protect their livelihoods from natural hazards, including the reestablishment of mangrove areas by communities. Although OFDA's programming does not explicitly intend to support biodiversity conservation, sustainable management of natural resources is one of the key approaches to ensure enhanced resilience to disasters and climatic fluctuations.

### **D. Conclusions**

Overall, RDMA is currently addressing many of the identified actions necessary to a significant extent, although each to different degrees. Exhibit 31 summarizes how RDMA is addressing each of the nine necessary actions identified. A number of gaps are noted, particularly related to engagement with the private sector and freshwater fisheries, and recommendations are provided in the following chapter for how RDMA can enhance its conservation impact.

**EXHIBIT 31. SUMMARY OF THE EXTENT TO WHICH RDMA IS ADDRESSING THE ACTIONS NECESSARY TO CONSERVE BIODIVERSITY AND TROPICAL FORESTS**

No.	ACTION NECESSARY	EXTENT TO WHICH RDMA IS ADDRESSING THE ACTION
1	Establish regionally harmonized planning processes, policies, and environmental standards.	<ul style="list-style-type: none"> <li>• <i>Coastal-marine</i>: Coral Triangle regionwide marine protected area network and management effectiveness assessment tool; Coral Triangle Atlas (CTI)</li> <li>• <i>Forest</i>: Transboundary forest management Laos-Vietnam (LEAF); ASEAN timber chain of custody guidelines (RAFT)</li> <li>• <i>Wildlife</i>: ASEAN standards for rangers and protected area managers (ARREST)</li> <li>• <i>Water</i>: Mekong Basin Development Plan evaluation (PSU), RSAT tool, MRC conflict mitigation (ECO-Asia); sediment flows and hydropower (NHI)</li> </ul>
2	Promote integrated spatial planning, which includes food security, economic growth, energy, climate change, and conservation	<ul style="list-style-type: none"> <li>• <i>Mekong</i>: adaptation (Mekong ARCC), forest mitigation with co-benefits (LEAF, LEAD)</li> <li>• <i>Coral Triangle</i>: regional/local action plans for coastal community adaptation (CTI)</li> </ul>
3	Strengthen regional monitoring, compliance, and enforcement of natural resource laws and policies.	<ul style="list-style-type: none"> <li>• <i>Wildlife trade</i>: ARREST, Emerging Pandemic Threats</li> <li>• <i>Coastal-marine</i>: IUU fishing and monitoring compliance systems, community-based fisheries law enforcement (CTI)</li> <li>• Environmental compliance generally: AECEN</li> </ul>
4	Promote multi-stakeholder processes involving government, civil society, and the private sector, leading to ownership and commitment	<ul style="list-style-type: none"> <li>• <i>Coastal-marine</i>: Local governance alliance, PPP with fishing communities, community stakeholder consultation/participation in planning/management of MPAs (CTI)</li> <li>• <i>Forests</i>: Community consultation, joint management (LEAF, LEAD)</li> <li>• <i>Watersheds, cities</i>: M-BRACE (ISET)</li> <li>• <i>Adaptation</i>: Mekong ARCC, ADAPT (UNDP, ADB, etc.)</li> </ul>
5	Encourage the private sector to adopt best practices and employ strong social and environmental safeguards.	<ul style="list-style-type: none"> <li>• <i>Forests</i>: Best management practices and certification of forest concessions (RAFT); promote PES with hydropower in Vietnam (ARBCP)</li> <li>• <i>Coastal-marine</i>: Regional business forum and private sector engagement in adoption of ecologically friendly, sustainable fishing practices (fish catch monitoring) (CTI)</li> <li>• <i>Water</i>: Sediment flows and hydropower (NHI)</li> <li>• <i>Adaptation</i>: M-BRACE, Mekong ARCC</li> </ul>
6	Place economic values on ecosystem services and incorporate into development planning and business practices.	<ul style="list-style-type: none"> <li>• <i>Adaptation</i>: Mekong ARCC</li> <li>• <i>Forests</i>: Carbon storage (LEAF), watershed services and PES (ARBCP)</li> <li>• <i>Water</i>: PSU Mekong study</li> <li>• <i>Coastal-marine</i>: MPA-level valuation studies incorporated in management plans for zoned areas such as tourism, capture and aquaculture fisheries (CTI)</li> </ul>

No.	ACTION NECESSARY	EXTENT TO WHICH RDMA IS ADDRESSING THE ACTION
7	Enhance sustainable financing for conservation from the public and private sectors.	<ul style="list-style-type: none"> <li>• <i>Forests</i>: Carbon finance (LEAF), watershed services and PES (ARBCP)</li> <li>• <i>Adaptation (ecosystem-based approaches)</i>: ADAPT, Mekong ARCC</li> <li>• <i>Coastal-marine</i>: PES (entrance fees) for tourism in recreational zones of MPA areas (CTI)</li> <li>•</li> </ul>
8	Transform consumer attitudes and behaviors to support sustainable products.	<ul style="list-style-type: none"> <li>• <i>Wildlife</i>: Awareness campaigns (ARREST), Emerging Pandemic Threats</li> <li>• <i>Forests</i>: Responsible timber trade (RAFT)</li> <li>• <i>Adaptation</i>: Market linkages (Mekong ARCC)</li> <li>• <i>Coastal-marine</i>: Consumer awareness on sustainable seafood, such as live fish trade in Hong Kong and Sabah (CTI)</li> </ul>
9	Promote applied research to inform policy and management practices and to support decision-making.	<ul style="list-style-type: none"> <li>• <i>Adaptation</i>: Climate study and policy advocacy (Mekong ARCC)</li> <li>• <i>Coastal-marine</i>: Stock assessment of grouper populations to regulate collection and trade; resource profiling of marine habitats, e.g., corals, mangroves, seagrasses etc.; fisheries population assessments and agreement on appropriate regulatory measures</li> </ul>



## VII. RECOMMENDATIONS

### A. Overview

The development of RDMA's new five-year (2013-2018) regional development cooperation strategy presents an opportunity to evaluate the mission's current investments and strategic objectives to better incorporate biodiversity and forest conservation into the planning process, and also to consider USAID Forward reforms related to building local capacity, innovation, science and technology, and private sector engagement. While to some extent, RDMA's current environmental activities address all nine actions identified as necessary to conserve biodiversity and tropical forests, some gaps are noted below, as well as opportunities to enhance programmatic impact across the region.

It is also important to recognize the cross-sectoral linkages between biodiversity and other sectors, including health, economic growth and trade, governance, vulnerable populations, and disaster assistance. The following recommendations are presented for RDMA to consider ways in which current and future investments across its portfolio can better address biodiversity conservation and result in greater impact and more sustainable outcomes.

### B. Recommendations by Strategic Objective

#### **SO 1. Vulnerable populations in the region assisted and other special foreign policy interests (GVP)**

Trafficking in drugs, arms, illegal wildlife, and people are major transnational black markets run by extensive global and regional criminal networks and enabled by rampant corruption and weak governance throughout the region. There are reportedly connections between these black markets in terms of the players and networks involved and the transit and transportation routes. Efforts to address trafficking could be strengthened through better linkages to anticorruption initiatives more broadly, collaboration across law enforcement sectors (e.g., with UNODC and WCO), and more strategic partnerships with U.S. Government enforcement agencies operating in the region. Experience in awareness-raising and demand reduction campaigns should be shared between programs (e.g. MTV-EXIT and ARREST) to enhance impact and build political will. Trade-related programs should consider opportunities to strengthen enforcement against cross-border illegal trade, such as through customs cooperation.

The pristine and remote region of Tibet is important for biodiversity, and even more so as the source of most of Asia's major river systems. Current RDMA activities in Tibet already include some degree of environmental focus, and this could be strengthened. For instance, activities could include awareness-raising about illegal wildlife trade and campaigns to reduce demand for furs and luxury items derived from wildlife, as well as better cross-border enforcement. Rangeland management activities could include identification of high-conservation-value areas and explicit actions to preserve and

sustainably manage them. Efforts to reduce environmental impacts from dams, mining, logging, and waste disposal in Tibet would have local as well as transboundary benefits.

Challenges related to biodiversity conservation and natural resource management are primarily and fundamentally governance issues. Ineffective governance arrangements fuel environmental degradation, marginalize local communities, and lead to conflicts over resources. As most forests in Asia belong to the state, there is a real need to support local rights to resources and promote more community-based approaches to natural resource management. It is no coincidence that the region's remaining forests overlap with ethnic minorities and other marginalized communities. Ensuring that vulnerable populations in biodiversity-rich areas have access to the benefits of these resources, supported by rights and tools to sustainably use them, is a key strategy required. Conserving the region's remaining natural ecosystems therefore, is inexorably tied to the well-being of these vulnerable peoples.

## **SO 2. Improved regional governance and economic reform (GDO)**

Of all of RDMA's SOs, this one has the greatest potential to result in unintended consequences that may increase threats to biodiversity and forest conservation if this possibility is not taken into consideration. As highlighted in this report, the poorly regulated and often illegal trade in natural resources, particularly timber, wildlife, and fisheries, is a major threat to Asia's biodiversity. Therefore, efforts to facilitate intraregional trade and to remove regional trade barriers without establishing appropriate standards to protect critical natural resources may exacerbate these threats. RDMA's trade-related programs should ensure that environmental safeguards are considered, such as through the inclusion of regionally harmonized standards for the harvest and trade in natural products, independent certification systems, and other means. RDMA can work to find an appropriate balance between increasing trade generally and ensuring that critical safeguards are in place for the species and ecosystems where these products originate. Without widespread adoption of harmonized policies and practices to ensure protection, biodiversity risks further erosion through the easing of regional trade.

In addition to trade in natural resources, agricultural expansion is another major threat to Asia's biodiversity and forests. In particular, conversion of natural ecosystems to commercial monoculture plantations of oil palm, rubber, pulp trees, shrimp farms, and other crops is having significant impact on the region's biodiversity and forests, particularly in high-conservation-value landscapes. In addition to threatening forested ecosystems, agriculture also impacts freshwater wetlands, mangroves, and coral reefs. Programs under this SO need to be mindful of the biodiversity conservation implications during project design so as to avoid the type of activity that would, for example, promote increased food security by establishing large-scale commercial monocultures in forested landscapes. With such cautions in mind, this SO can ensure that efforts to promote regional food security include appropriate biodiversity considerations in policies and decision-making. RDMA can help bring together and reconcile competing agriculture and conservation priorities through interministerial collaboration, by involving agricultural experts in conservation planning, and by encouraging greater private sector participation in regional natural resources planning and conservation. Activities can

include addressing biodiversity safeguards in trade policy discussions and developing regionally harmonized policies for protecting natural habitats and areas of high conservation value.

GDO efforts involve substantial engagement with ASEAN related to economic growth and trade. Some RDMA environmental activities also engage with ASEAN to varying degrees. This offers RDMA an opportunity to increase strategic collaboration and coordination with ASEAN in areas related to economic growth, biodiversity and natural resources, and climate change.

### **SO 3. Increased effective regional response to HIV/AIDS and infectious diseases (OPH)**

The direct links between malaria and forests demonstrate some obvious connections between health and environmental conservation. Many of the communities where OPH is targeting efforts to address drug-resistant malaria are located in and around forested areas along the borders between Thailand-Cambodia and Thailand-Burma. In particular, the transboundary forest area between Thailand and southern Burma is of great conservation interest due to presence of the region's last remaining extensive lowland primary rainforest. RDMA has an opportunity to consider integrated programming approaches that address a range of health, conservation, and other development priorities simultaneously in important areas such as these. Awareness campaigns targeted at malaria prevention, for example, could include linkages to the importance of forest protection. Programs working with forest-dependent communities in the health sector could include activities such as alternative livelihood development, land use planning, and other strategies that help protect natural resources as well as human health.

Another opportunity to strengthen the connections between human health and environmental conservation involves the wildlife trade. As a key enabler of emerging new diseases, the wildlife trade is also a significant driver of biodiversity loss in Asia. RDMA has been heavily engaged in this area for several years and is already identifying opportunities for greater synergy between these efforts. This includes incorporating human health concerns in demand reduction campaigns and efforts to strengthen enforcement and regulation of illegal wildlife markets and trade.

### **SO 4. Improved regional environmental conditions (REO)**

To a significant extent, REO's current programs already address many of the threats to biodiversity and forest conservation in Asia, as summarized in Section VI. Nonetheless, a number of significant gaps exist, particularly related to freshwater fisheries, private sector engagement, environmental economics, and connections with South Asia. Recommendations for how REO can enhance its biodiversity impact are presented below in the context of overall recommendations for RDMA.

### **C. Office of Foreign Disaster Assistance (OFDA)**

OFDA programs, through disaster risk reduction (DRR) activities, address the underlying causes of recurrent disasters, including environmental degradation, rapid urban growth, and climate change, with aim of reducing vulnerability to disasters that might otherwise deplete local resources. OFDA programs already include some biodiversity-related components as they take an ecosystem-based approach to adaptation. Greater integration and cross-fertilization with other RDMA climate change adaptation programs can strengthen impact across the region and help scale up and replicate effective approaches. OFDA's community-based climate change programs in the Hindu Kush-Himalayan region, in partnership with ICIMOD, would be a useful platform to reach into South Asia and the region's mountain ecosystems.

In addition, in response to specific disaster events, where feasible and practical, OFDA should consider sustainable procurement in sourcing materials for response and recovery, such as legal timber for reconstruction, appropriate fuel sources, etc.

### **D. Mind the Gaps (Current Gaps in RDMA programming)**

*1. Engagement with the private sector.* The private sector is playing a major role in the transformation of the natural landscape of Asia. Responding to national, regional, and international demand, private sector investments are converting forest lands to industrial agricultural uses, constructing dams that impact major river systems, and expanding infrastructure, trade, and connectivity across the region. Adoption of sustainability standards by the private sector will have significant positive impact on conservation of biodiversity and forest resources, but current RDMA programming is not engaging sufficiently with this major stakeholder group.

*2. India and South Asia.* While much attention has been on China, India is undergoing a significant economic transformation and is a major regional importer of timber, hydropower, palm oil, and agricultural commodities. To date, there has been relatively little RDMA engagement with India, and with South Asia more broadly. Promoting sustainable business practices and compliance with environmental and social safeguards would have a positive impact not only within India but also across the region.

*3. Freshwater biodiversity.* Although vitally important, freshwater resources have not received as much attention as forest and marine resources from RDMA and other development partners. With the rapid expansion of dams for energy and infrastructure for transport, significant and growing threats are expected throughout the Asia region, not just to biodiversity, but also to food security (agriculture, fisheries, diet) and livelihoods, especially of the rural poor.

### **E. Overall Recommendations for RDMA**

Based on the findings of this assessment, the following recommendations are provided for how RDMA can more strategically and effectively address the actions necessary to



conserve biodiversity and tropical forests in Asia. These recommendations are meant to be illustrative and are by no means exhaustive.

*1. Strengthen synergies, collaboration, and integration through existing RDMA programs.* Strategic areas of focus based on existing programming include the following:

- Integration of conservation and sustainable management into economic development (e.g., by including environmental safeguards, standards, and biodiversity considerations in regional trade and agriculture policy activities). A regional assessment of markets, trends, and impacts of specific agricultural crops on forests (e.g., oil palm, rubber, cassava, corn, shrimp) could help inform more integrated conservation and agriculture/food security programming.
- Strengthen synergies between conservation, health, and food security (e.g., malaria and forest conservation; wildlife trade and emerging pandemic threats; and food security, nutrition, and fisheries).
- Expand linkages between rule-of-law efforts and natural resource management and governance (e.g., by addressing China's regional environmental footprint through more explicit inclusion of natural resource governance issues, such as illegal wildlife and timber trade, into broader rule-of-law efforts).

*2. Strengthen strategic partnerships with key countries and regional organizations.* Strategic priorities for RDMA would include the following:

- *ASEAN.* RDMA should develop a comprehensive strategy with this key regional to address “green” economic growth, biodiversity and natural resources, and climate change, among other issues, and also to promote regional environmental standards, environmental compliance, and enforcement.
- *Greater Mekong/Lower Mekong subregion* is a high political priority and a key regional focus of RDMA. The mission should proactively support the Lower Mekong Initiative's environment pillar, as well as the other pillars of health, education, and infrastructure. The mission should also engage with key regional partners such as the Asian Development Bank, the Mekong River Commission, and others, to consider opportunities to strengthen regional safeguards for infrastructure development, promote sustainable trade in natural resources, and address other related issues.
- *Coral Triangle region* is a key focus of RDMA to address critical biodiversity, climate change and food security issues in Southeast Asia and the Pacific. The mission should continue to strategically support emerging regional governance systems and develop broader connections with marine and fisheries conservation priorities across the region.
- *China.* Due to China's central role in many of the region's environmental challenges (e.g., logging, mining, hydropower development, fisheries, wildlife trade,

infrastructure development, etc.), RDMA should develop a clear strategy for constructive engagement and collaboration in solving regional challenges, building on current efforts related to rule of law, environmental governance, and Tibet.

- *India.* As the world's largest democracy, India's trajectory affects the entire South Asian continent (e.g., through hydropower development, timber and palm oil imports), as well as more broadly across the region. India also offers innovative solutions to regional challenges. RDMA should strengthen collaborative engagement with India to better capitalize on these opportunities.
- *Smaller, more vulnerable countries* in the region, such as Bangladesh, Burma, Cambodia, Laos, Nepal, and Papua New Guinea, for example, face significant capacity constraints, as well as challenges in their regional relationships with larger neighbors. These countries should therefore be targeted as prime focal countries for RDMA support and investments.
- *USAID bilateral missions.* As the bilateral missions are key clients of RDMA, the mission should facilitate more coordinated planning and programming across sectors. Nearly all bilateral missions are relevant for biodiversity and forestry; Cambodia, India, Indonesia, Nepal, the Philippines, and Vietnam are key.
- *U.S. Government agencies.* RDMA can achieve greater through more strategic partnerships with U.S. embassies and other U.S. Government agencies (e.g., U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Department of Justice, and others) to leverage resources and expertise and to strengthen political outreach and diplomacy related to mutual environmental and development priorities.

3. *Thematic recommendations.* These recommendations are illustrative opportunities for RDMA to consider and are not meant to promote specific programming priorities or decisions.

- *Stimulate public-private partnerships for conservation.* Greater strategic engagement with the private sector is needed to mobilize private resources and investments for conservation. This could include voluntary private sector certification initiatives (e.g., for timber, oil palm, fisheries), supporting and stimulating pro-conservation business ventures (e.g., ecotourism, payments for ecosystem services), and other forms of partnerships for conservation — for example, partnerships with protected areas. Such efforts would be complemented more broadly through multi-stakeholder approaches that engage civil society and government, as well as through a combination of voluntary efforts and strengthening of regulatory compliance measures.
- *Strengthen environmental economics for sustainable economic development.* Building understanding of (and capacity in) environmental economics and mainstreaming this discipline into decision-making would enable more accurate accounting of the true costs and benefits of development and ensure more equitable distribution of these costs and benefits. There is a significant need to change the paradigm focused solely

on growth to ensure that economic activities are environmentally sustainable and to minimize and/or mitigate negative impacts on the region's remaining high-conservation-value areas. RDMA could help catalyze and elucidate a long-term vision for sustainable development in the region, explore scenarios for what this could look like, and help develop plans for achieving true sustainability.

- *Engage in sustainable hydropower development.* Hydropower is a natural integrator of energy, water, forests, fisheries, watersheds, and development issues. Many countries in Asia are looking to hydropower as a “green” energy alternative, but its role and future in a changing climate are inadequately understood. This is a transboundary issue involving connections across the region, such as between the Mekong and South Asia, as well as the roles of China and India.
- *Mainstream climate change across RDMA's portfolio.* Climate change is already having wide-ranging impacts, and development programming needs to consider future scenarios to enhance the sustainability of investments. RDMA can build on current efforts, such as the Mekong climate change study, to assess potential climate impacts across the entire Asia region and integrate these considerations into all sectors — for example, health and malaria programming. This would be supported by clear identification and targeting of the most vulnerable communities and groups, including women and ethnic minorities.
- *Support regional marine and fisheries conservation.* An estimated 500 million people in Asia rely on fisheries as their main source of protein. Recognizing the critical connections among biodiversity, climate change adaptation, food security, governance, and health, a regional approach is needed to conserve fisheries and endangered aquatic species that migrate across international waters and transboundary rivers. There is also a need to share best practices and harmonize policies among regional policy makers and practitioners.
- *Invest in systematic geospatial monitoring of regional indicators.* RDMA's planned GeoCenter should build on the geospatial analysis and data initiated in this assessment to strengthen regional strategic planning and programming. This would improve understanding and monitoring of biodiversity threats and regional development trends and should be expanded to include regional geospatial data and indicators related to health (e.g., malaria distribution, emerging pandemic threats), economic growth (e.g., poverty, income), governance, food security, social indicators, environment, climate change, disasters, and other relevant information.
- *Raise awareness and improve communication about the global biodiversity crisis to stimulate greater local and regional ownership and political will.* Economic growth remains the top priority of regional governments and the private sector, but continued degradation of natural ecosystems threatens to undermine the prospects for sustained future growth. Awareness of the importance of healthy ecosystems and biodiversity for economic development needs to be raised and political will mobilized to stimulate proactive action and ownership. RDMA can help catalyze and facilitate this through

broad-based strategic partnerships with other efforts and organizations, such as UNEP's World Conservation Monitoring Center, IUCN, the ASEAN Center for Biodiversity, the ASEAN and South Asia Wildlife Enforcement Networks, the Asian Development Bank, civil society organizations, journalists, and others. These efforts could lead to more systematic monitoring of regional biodiversity status and trends and more effective communication of these concerns to inform and stimulate proactive responses.

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## Bibliography of GIS Exhibits

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<b>5. ASIA'S BIO-DIVERSITY HOTSPOTS</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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<b>9. FOREST COVER IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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<b>11. IMPORTANT BIRD AREA SITES</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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<b>12. FRESH-WATER RESOURCES IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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	River basin. Major Rivers of the World. 2000. Environmental System Research Institute (ESRI) & Digital Chart of the World (DCW). Available at IWMI water data portal. <a href="http://waterdata.iwmi.org/GisRs_Data.php">http://waterdata.iwmi.org/GisRs_Data.php</a>
	Rivers. Rivers and Lakes Centerlines. 2009. Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip</a>
	Wetlands. Global Lakes and Wetlands Database (GLWD). 2004. World Wild Fund and Center for Environmental Systems Research. University of Kassel. Germany <a href="https://secure.worldwildlife.org/science/data/item1877.html">https://secure.worldwildlife.org/science/data/item1877.html</a>
	Lakes. Global Lakes and Wetlands Database (GLWD). 2004. World Wild Fund and Center for Environmental Systems Research. University of Kassel. Germany. <a href="https://secure.worldwildlife.org/science/data/item1877.html">https://secure.worldwildlife.org/science/data/item1877.html</a>
<b>14. MARINE RESOURCES IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
	Coastline. Ocean Coastline. 2009. Scale 1:10Million, Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip</a>
	Mangroves. Global Distribution of Mangroves. 1997. UNEP WCMC <a href="http://data.unep-wcmc.org/datasets/6">http://data.unep-wcmc.org/datasets/6</a>
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	Coral Triangle boundary. Coral Triangle Atlas, ReefBase <a href="http://ctatlas.reefbase.org/ctdataset.aspx">http://ctatlas.reefbase.org/ctdataset.aspx</a>
<b>15. POPULATION DENSITY OF ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
	Coastline. Ocean Coastline. 2009. Scale 1:10Million, Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip</a>
	Population. Gridded Population of the World (GPW) v1. 2.5' Resolution. 2010. SEDAC. Columbia University. USA. <a href="http://sedac.ciesin.columbia.edu/gpw/global.jsp">http://sedac.ciesin.columbia.edu/gpw/global.jsp</a>
	Cities. Populated Places. Version 0.9.0 on 2009.12.3. Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/cultural/10m-populated-places.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/cultural/10m-populated-places.zip</a>

Exhibit No.	Data Source
<b>15. POPULATION DENSITY (CONT'D)</b>	Roads. RWDB2 Roads. 2005. FAO - Aquaculture Management and Conservation Service (FIMA) <a href="http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private">http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private</a>
	Elevation. ETOPOI Global Relief Model, 1' Resolution. 2009. National Geophysical Data Center. NOAA. USA <a href="http://www.ngdc.noaa.gov/mgg/global/global.html">http://www.ngdc.noaa.gov/mgg/global/global.html</a>
<b>18. ANTHROMES (ANTHROPOGENIC BIOMES) OF ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
	Coastline. Ocean Coastline. 2009. Scale 1:10Million, Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip</a>
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<b>20. HUMAN FOOTPRINT IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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	Human footprint. Global Human Footprint Data Set (HF). 2005. 30" Resolution. WCS and Center for International Earth Science Information Network (CIESIN). Socioeconomic Data and Applications Center (SEDAC). Columbia University. USA <a href="http://www.ciesin.columbia.edu/repository/wildareas/data/hfp_global_geo_grid.zip">http://www.ciesin.columbia.edu/repository/wildareas/data/hfp_global_geo_grid.zip</a>
	Elevation. ETOPOI Global Relief Model, 1' Resolution. 2009. National Geophysical Data Center. NOAA. USA. <a href="http://www.ngdc.noaa.gov/mgg/global/global.html">http://www.ngdc.noaa.gov/mgg/global/global.html</a>
<b>21. THREATS TO TERRESTRIAL RESOURCES IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
	Coastline. Ocean Coastline. 2009. Scale 1:10Million, Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip</a>
	Forest cover. Occurrence of Forest (FGGD). 2009. FAO - Food Insecurity, Poverty and Environment Global GIS Database (FGGD) <a href="http://www.fao.org:80/geonetwork/srv/en/resources.get?id=14066&amp;fname=Map5_1.zip&amp;access=private">http://www.fao.org:80/geonetwork/srv/en/resources.get?id=14066&amp;fname=Map5_1.zip&amp;access=private</a>
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	Agricultural Lands. Dominant Land Cover and Land Use. 2009. FAO <a href="http://www.fao.org/geonetwork/srv/en/resources.get?id=38215&amp;fname=DomLU.zip&amp;access=private">http://www.fao.org/geonetwork/srv/en/resources.get?id=38215&amp;fname=DomLU.zip&amp;access=private</a>
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	Roads. RWDB2 Roads. 2005. FAO - Aquaculture Management and Conservation Service (FIMA) <a href="http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private">http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private</a>

EXHIBIT NO.	Data Source
<b>22. THREATS TO FRESH-WATER RESOURCES IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
	Coastline. Ocean Coastline. 2009. Scale 1:10Million, Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-coastline.zip</a>
	River basin. Major Rivers of the World. 2000. Environmental System Research Institute (ESRI) & Digital Chart of the World (DCW). Available at IWMI water data portal. <a href="http://waterdata.iwmi.org/GisRs_Data.php">http://waterdata.iwmi.org/GisRs_Data.php</a>
	Rivers. Rivers and Lakes Centerlines. 2009. Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip</a>
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	Lakes. Global Lakes and Wetlands Database (GLWD). 2004. World Wild Fund and Center for Environmental Systems Research. University of Kassel. Germany. <a href="https://secure.worldwildlife.org/science/data/item1877.html">https://secure.worldwildlife.org/science/data/item1877.html</a>
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	Roads. RWDB2 Roads. 2005. FAO - Aquaculture Management and Conservation Service (FIMA) <a href="http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private">http://www.fao.org/geonetwork/srv/en/resources.get?id=29044&amp;fname=rwdb_rd.zip&amp;access=private</a>
<b>23. THREATS TO MARINE RESOURCES IN ASIA</b>	Country boundaries. Small Scale International Boundaries (SSIB). 2011. Department of State International Boundaries. USA <a href="https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip">https://hiu.state.gov/data/Global_SSIB_2011December_HIU_USDoS.zip</a>
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	Coral threats. Local Threats. World Resources Institute. Reefs at Risk Revisited. 2011. <a href="http://c438765.r65.cf2.rackcdn.com/reefs_at_risk_revisited_local_threats_vector_only.zip">http://c438765.r65.cf2.rackcdn.com/reefs_at_risk_revisited_local_threats_vector_only.zip</a>
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	Mangroves. Global Distribution of Mangroves. 1997. UNEP WCMC <a href="http://data.unep-wcmc.org/datasets/6">http://data.unep-wcmc.org/datasets/6</a>
	Rivers. Rivers and Lakes Centerlines. 2009. Natural Earth Data. USA <a href="http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip">http://www.naturalearthdata.com/http://www.naturalearthdata.com/download/10m/physical/10m-rivers-lake-centerlines.zip</a>
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	Shipping activities. Commercial Activity (Shipping). National Center for Ecological Analysis and Synthesis <a href="http://ebm.nceas.ucsb.edu/GlobalMarine/impacts/transformed/asc/shipping.7z">http://ebm.nceas.ucsb.edu/GlobalMarine/impacts/transformed/asc/shipping.7z</a>



## ANNEX A. EXPERTS CONSULTED

NAME	TITLE	ORGANIZATION	DATE
<b>WASHINGTON, D.C.</b>			
Andrew Clements	Health Officer	USAID/Health	October 31, 2011
Gary Cook	Health Officer	USAID/Health	October 31, 2011
Hannah Fairbank	Biodiversity Specialist	USAID/EGAT	October 31, 2011
Barbara Best	Marine Specialist	USAID/EGAT	October 31, 2011
Alicia Grimes	Forestry Specialist	USAID/EGAT	October 31, 2011
Cynthia Mackie	Director	USFS/Asia Pacific	November 1, 2011
Sharon Gulick	Asia Climate Change Officer	USFS/Asia Pacific	November 1, 2011
Kate Newman	Managing Director, Coral Triangle Initiative	WWF/US	November 2, 2011
James Compton	Senior Program Director, Asia	TRAFFIC/WWF	November 2, 2011
Jon Micelor	E. Himalayas/Burma	WWF/US	November 2, 2011
Fred Bagley	Program Officer	USFWS International Programs	November 3, 2011
Neil Cox	Program Officer	Conservation International	November 4, 2011
Aaron Bruner	Economist	Conservation International	November 4, 2011
<b>NEW DELHI, INDIA</b>			
Dr. Promode Kant	Director	Institute of Green Economy	January 30, 2012
Prabhjot Sodhi	Regional Director, East	Center for Environment Education (Delhi)	January 30, 2012
Anil Arora	Project Officer	Center for Environment Education (Delhi)	January 30, 2012
Samir Sinha	Director	Traffic India	January 30, 2012
M. K. S. Pasha	Coordinator	Traffic India	January 30, 2012
Dilpreet B. Chhabra	Communications Officer	Traffic India	January 30, 2012
Jeremy Gustafson	Office Director	Clean Energy and Environment Office, USAID/India	January 30, 2012
Varghese Paul	Senior Forestry Advisor	Clean Energy and Environment Office, USAID/India	January 30, 2012 February 3, 2012
N. M. Prusty	Chief Mentor and Director	Center for Development and Disaster Management Support Services (CDDMASS)	January 31, 2012
C. Balaji Singh	Executive Director	Center for Development and Disaster Management Support Services (CDDMASS)	January 31, 2012
Dr. Sejal Worah	Program Director	WWF India	January 31, 2012
Dr. K. S. Murali	Country Representative	RARE Conservation	January 31, 2012
Ajanta Dey	Project Coordinator	Nature Environment and Wildlife Society (NEWS)	January 31, 2012
Dr. Anupam Joshi	Environmental Specialist	World Bank	February 1, 2012
Dr. J. S. Rawat	In-Charge	IUCN	February 1, 2012
Kazimuddin Ahmed	Dialogue Coordinator	IUCN	February 1, 2012
Dr. Ghazala Shahabuddin	Professor	Ambedkar University	February 1, 2012 (phone)

<b>NAME</b>	<b>TITLE</b>	<b>ORGANIZATION</b>	<b>DATE</b>
<b>NEW DELHI, INDIA (cont'd)</b>			
Tito Joseph	Program Manager	Wildlife Protection Society of India (WPSI)	February 2, 2012
Sudipto Chatterjee	Coordinator	Wildlife Trust of India (WTI)	February 2, 2012
Dr. Kinsuk Mitra	President	Winrock International	February 2, 2012
Rohan Arthur	Marine Biologist	National Conservation Foundation-India	February 2, 2012 (phone)
Dr. K. Vijaya Lakshmi	Vice President/Head, Innovation Systems	Development Alternatives	February 2, 2012
Aditi Jha		Development Alternatives	February 2, 2012
<b>INDONESIA</b>			
Tony Whitten	Director	Flora and Fauna International (FFI)	February 5, 2012 Jakarta
Trigeany Linggoatmodjo	Program Specialist	USAID/Indonesia	February 6, 2012 Jakarta
Celly Catharina	Marine Program Specialist	USAID/Indonesia	February 6, 2012 Jakarta
Nassat Idris	Climate Change and Forestry Specialist	USAID/Indonesia	February 6 and 10 2012, Jakarta
Edward Routh	Deputy Director	USDOJ ICITAP	February 6, 2012 Jakarta
Ade Soekadis	Acting Director Forest Program	TNC Indonesia	February 6, 2012 Jakarta
Veda Santiaji	Program Leader	WWF Indonesia	February 6, 2012 Jakarta
Abdullah Habibi	Coordinator	WWF Indonesia	February 6, 2012 Jakarta
Maurice Knight	Chief of Party	U.S. Coral Triangle Support Partnership (CTSP)	February 7, 2012 Jakarta
Peyton Deeks	Deputy Chief of Party	U.S. Coral Triangle Support Partnership (CTSP)	February 7, 2012 Jakarta
Pahala Nainggolan	Chief of Party	USAID/Indonesia MPAG	February 7, 2012 Jakarta
Timothy Brown	Environment Sector Coordinator	World Bank	February 7, 2012 Jakarta
Juha Seppala	Environment and Carbon Finance Specialist	World Bank	February 7, 2012 Jakarta
Ina Binari Pranoto	Environmental Specialist	World Bank	February 7, 2012 Jakarta
Kim J. DeRidder	Chief of Party	USAID IFACS	February 8, 2012 Jakarta
Darrell Kitchener	Chief Technical Advisor	USAID IFACS	February 8, 2012 Jakarta
Steve Dennison	Technical Coordinator	USAID IFACS	February 8, 2012 Jakarta
Rizal Bukharii	Office Director	The Borneo Initiative	February 8, 2012, Jakarta
Dr. Ir. Haryadi Himawan	Chair/Director of Social Forestry	ASEAN-ASFN	February 9, 2012 Jakarta

<b>NAME</b>	<b>TITLE</b>	<b>ORGANIZATION</b>	<b>DATE</b>
<b>INDONESIA (cont'd)</b>			
Adam Tomasek	Director	WWF-Heart of Borneo Initiative	February 9, 2012 Jakarta
Darmawan Liswanto	Program Director	Flora and Fauna International (FFI)	February 9, 2012 Jakarta
Stacey Tighe	Policy Advisor	Consultant	February 9, 2012 Jakarta
Dr. Darmawan	Coordinator	Coral Triangle Initiative (CTI)	February 9, 2012 Jakarta
Dr. Suseno Sukoyono	Executive Chair	Coral Triangle Initiative (CTI)	February 9, 2012 Jakarta
Frances Seymour	Director General	CIFOR	February 10, 2012 Bogor
Manuel Boissiere	Ethnobotanist	CIFOR	February 10, 2012 Bogor
Terry Sunderland	Senior Scientist	CIFOR	February 10, 2012 Bogor
Meine Noordwijk	Principle Scientist and Chief Science Advisor	ICRAF	February 10, 2012 Bogor
Claude Garcia	Senior Scientist	CIRAD	February 10, 2012 Bogor
James Roshetko	Leader	ICRAF	February 10, 2012 Bogor
Alfred Nakatsuma	Director, Office of Environment	USAID/Indonesia	February 10, 2012 Jakarta
Aurelia Micko	Deputy Director, Office of Environment	USAID/Indonesia	February 10, 2012 Jakarta
Antonius P.Y. Djogo	Program Management Specialist	USAID/Indonesia	February 10, 2012 Jakarta
Ben Stoner	Senior Environment Advisor	USAID/Indonesia	February 10, 2012 Jakarta
Bill Rush	Senior Forest Advisor to Indonesia	USDA Forest Service	February 10, 2012 Jakarta
Alan White	Program Manager, Coral Triangle	TNC Indonesia	February 10, 2012 Jakarta
<b>PHILIPPINES</b>			
Joesph Foltz	Deputy Chief	Office of Energy & Environment, USAID/Philippines	February 6, 2012 Manila
Dr. Kerry Reeves	Environment Officer	Office of Energy & Environment, USAID/Philippines	February 6, 2012 Manila
Rebecca Guieb	Development Assistance Specialist	Office of Energy & Environment, USAID/Philippines	February 6, 2012 Manila
Rolf Anderson	Office Chief	Office of Energy & Environment, USAID/Philippines	February 6, 2012 Manila
Oliver O. Agonillo	Natural Resource Policy Advisor	Office of Energy & Environment, USAID/Philippines	February 6, 2012 Manila
Joan Castro	Executive Vice President	PATH Foundation	February 6, 2012 Manila
Ronald Quintana	Program Manager	PATH Foundation	February 6, 2012, Manila
Godofredo T. Villapando	Acting Director	Foundation for the Philippine Environment	February 7, 2012 Manila

<b>NAME</b>	<b>TITLE</b>	<b>ORGANIZATION</b>	<b>DATE</b>
<b>PHILIPPINES (cont'd)</b>			
Nessim Ahmad	Director, Environment & Safeguard Division	ADB	February 7,2012 Manila
Bruce Dunn	Environment Specialist	ADB	February 7,2012 Manila
Dr. Monina Uriarte	Capacity Development Specialist	ASEAN-ACB	February 8,2012 Manila
Jose Andres A. Canivel	Executive Director	Philippine Tropical Forest Conservation Foundation Inc.	February 8,2012 Manila
James Kho	Senior Research Associate	Ateneo School of Government	February 8,2012 Manila
Maria Cathrina Margarita R. Roxas	Technical Assistant	Ateneo School of Government	February 8,2012 Manila y
Alaya M. De Leon	Legal Specialist	Ateneo School of Government	February 8,2012 Manila
Nelson P. Devenadera	Assistant Director	Protected Areas and Wildlife Bureau	February 9,2012 Manila
Nancy R. Corpuz		Protected Areas and Wildlife Bureau	February 9,2012 Manila
Norma Molinyawe		Protected Areas and Wildlife Bureau	February 9,2012 Manila
Romeo Trono	Country Executive Director	Conservation International Philippines	February 10, 2012 Manila
Evangeline Florence	Senior Manager, Policy and Development	Conservation International Philippines	February 10, 2012 Manila
Moonyeen Nida R. Alava	Development Specialist	Conservation International Philippines	February 10, 2012 Manila
Marion Antonette A. Daclan	Executive Technical Coordinator	Conservation International Philippines	February 10, 2012 Manila
Niquole Esters	Regional Coordinator, Coral Triangle Initiative	Conservation International	February 10, 2012 Manila
<b>BANGKOK, THAILAND</b>			
Kirk Herbertson	Campaigner	International Rivers	February 13, 2012
Jeannette Gurung	Executive Director	WOCAN	February 16, 2012
Dr. Robert Mather	Head, Southeast Asia Group	IUCN	February 17, 2012
Patrick Durst	Senior Officer	FAO	February 19, 2012
Dr. S. Appanah	Program Advisor	FAO	February 19, 2012
Jeremy Broadhead	Policy Advisor	FAO	February 19, 2012
Manop Lauprasert	Senior Officer	ASEAN-WEN	February 20, 2012
Chrisgel Ryan Ang Cruz	Assistant Senior Officer	ASEAN-WEN	February 20, 2012
Allison Bleaney	Communications/ Partnership Manager	IUCN-RAFT	February 23, 2012
Dr. Pete Cutter	Program Manager	WWF Greater Mekong	February 24, 2012
Dr. Geoffry Blate	Senior Advisor	WWF Greater Mekong	February 24, 2012
Suriyan Vichitlekarn	Head, Agriculture Industries/ Natural Resources Division	ASEAN Secretariat	February 25, 2012

<b>NAME</b>	<b>TITLE</b>	<b>ORGANIZATION</b>	<b>DATE</b>
<b>BANGKOK, THAILAND (cont'd)</b>			
Max Zieren	GEF Coordinator	UNEP	January 25, 2012
Sameer Karki	Regional Technical Advisor	UNDP	January 25, 2012
Joseph D'Cruz	Regional Technical Advisor	UNDP	January 25, 2012
Akihito Kono	Regional Technical Advisor	UNDP	January 25, 2012
Christopher Barrett	Health Development Officer/Deputy Director	USAID/RDMA/OPH	February 22, 2012
Sylvie Doutriaux	Senior Advisor, Regional Food Security	USAID/RDMA/GDO	February 22, 2012 March 23, 2012
Lauren Russell	Deputy Office Chief	USAID/RDMA/GDO	February 22, 2012 March 23, 2012
Sam Nassif	Engineer	USAID/RDMA/GDO	February 22, 2012
Alefia Merchant	Agriculture Officer	USAID/RDMA/GDO	January 18, 2012 March 23, 2012
Chris Schaeffer	Democracy and Governance Officer	USAID/RDMA/GVP	February 23, 2012
Michael Bak	Senior Governance Advisor	USAID/RDMA/GVP	February 23, 2012
Mike Eddy	Office Director	USAID/RDMA/GVP	February 23, 2012
Rob Friedman	Regional Advisor	USAID/RDMA/OFDA	February 27, 2012
Ben Hemingway	Regional Advisor	USAID/RDMA/OFDA	February 27, 2012
Dr. Tint Thuang	Executive Director	RECOFTC	February 25, 2012
James Bampton	Program Coordinator	RECOFTC	February 25, 2012
<b>REGIONAL WORKSHOP, BANGKOK, THAILAND</b>			
Kirk Herbertson	Campaigner	International Rivers	March 5, 2012
Patrick Durst	Senior Officer	FAO	March 5, 2012
Chrisgel Ryan Ang Cruz	Assistant Senior Officer	ASEAN-WEN	March 5, 2012
Dr. Pete Cutter	Program Manager	WWF Greater Mekong	March 5, 2012
Dr. Geoffry Blate	Senior Advisor	WWF Greater Mekong	March 5, 2012
Sameer Karki	Regional Technical Advisor	UNDP	March 5, 2012
Paul Hartman	Chief of Party, Mekong ARCC	DAI	March 5, 2012
Peter Stephen	Forest Management and Climate Change Advisor	Winrock-LEAF	March 5, 2012
Jeremy Broadhead	Policy Advisor	FAO	March 5, 2012
Timothy Boyle	Regional Coordinator, UNREDD	UNDP	March 5, 2012
Akihito Kono	Regional Technical Advisor	UNDP	March 5, 2012
Colin Poole	Director	WCS India	March 5, 2012
Mark Bowman	Director of Field Operations	FREELAND	March 5, 2012
Steve Galster	Executive Director	FREELAND	March 5, 2012
Allison Bleaney	Communications/Partnership manager	IUCN	March 5, 2012



## **ANNEX B. SOCIOECONOMIC AND BIODIVERSITY DATA FOR ASSESSMENT COUNTRIES**

Table 1.	Forest Cover and Change in 18 Targeted Countries (1990-2010)
Table 2.	Estimates of Mangrove Area and Deforestation Rates of Mangroves by Country (1980-2005)
Table 3.	Socioeconomic Profile of 18 Target Countries
Table 4.	Number of Threatened Species by Taxonomic Group
Table 5.	Roundwood Production (Solid Volume of Roundwood without Bark in Millions of Cubic Meters)
Table 6.	Protected Areas

**Table 1. Forest Cover and Change in 18 Targeted Countries (1990-2010)**

Source: *State of the World's Forests 2011* (FAO)

Country	Total Land Area (in thousands of hectares)	Population (in thousands, 2011 data)	Forest Area (2010)			Annual Change Rate			
			Area (in thousands of hectares)	%	Area (in hectares per 1,000 people)	1990-2000		2000-2010	
						Area (in thousands of hectares)	%	Area (in thousands of hectares)	%
Bangladesh	13,017	155,990	1,442	11	9	-3	-0.2	-3	-0.2
Bhutan	4,700	648	3,249	69	4,729	11	0.3	11	0.3
Burma	65,755	48,379	31,773	48.0	641	-435	-1.2	-310	-0.9
Cambodia	17,652	14,196	10,094	57	693	-14	-1.1	-145	-1.3
China	932,749	1,328,474	206,861	22	154	1,986	1.2	2,986	1.6
India	297,319	1,151,751	68,434	23	58	145	0.2	304	0.5
Indonesia	181,157	228,864	94,432	52	415	-1,914	-1.7	-498	-0.5
Laos	23,080	5,759	15,751	68	2,538	-78	-0.5	-78	-0.5
Malaysia	32,855	26,113	20,454	62	757	-79	-0.5	-114	-0.5
Maldives	30	300	1	3.0	3	0	0	0	0
Nepal	14,300	27,641	3,636	25	126	-92	-2.1	-26	-0.7
Papua New Guinea	45,286	6,201	28,726	63	4,368	-139	-0.5	-141	-0.5
Philippines	29,817	86,263	7,665	26	85	55	0.8	55	0.7
Solomon Islands	2,799	484	2,213	79	4,331	-6	-0.2	-6	-0.2
Sri Lanka	6,463	19,207	1,860	29	93	-27	-1.2	-22	-1.1
Thailand	51,089	63,443	18,972	37	282	-55	-0.3	-3	0
Timor-Leste	1,487	1,113	742	50	676	-11	-1.2	-11	-1.4
Vietnam	31,007	86,205	13,797	44	158	236	2.3	207	1.6
<b>TOTAL</b>	<b>1,750,562</b>	<b>3,251,031</b>	<b>530,102</b>	<b>30.28</b>	<b>163</b>	<b>-420</b>	<b>-0.08</b>	<b>2,206</b>	<b>0.42</b>



**Table 2. Estimates of Mangrove Area and Deforestation Rates of Mangroves by Country (1980-2005)**

Source: *The World's Mangroves 1980-2005* (FAO, 2007)

Country	Most Reliable Estimate		1990	2000	Annual Change 1990-2000		2005	Annual Change 2000-2005	
	Area (hectares)	Reference Year	Area (hectares)	Area (hectares)	Area (hectares)	%	Area (hectares)	Area (hectares)	%
Bangladesh	476,215	1995	460,000	476,000	1,600	0.3	476,000	0	0
Burma	518,646	1999	536,100	516,700	-1,940	-0.4	507,000	-1,940	-0.4
Cambodia	72,835	1997	82,400	73,600	-880	-1.1	69,200	-880	-1.2
China	22,480	2001	28,344	22,955	-539	-2.1	22,480	-95	-0.4
India	446,100	2003	467,000	448,200	-1,880	-0.4	448,000	-40	0
Indonesia	3,062,300	2003	3,500,000	3,150,000	-35,000	-1.0	2,900,000	-50,000	-1.6
Malaysia	564,971	2005	642,000	589,500	-5,250	-0.8	565,000	-4,900	-0.8
Papua New Guinea	410,000	2000	472,000	410,000	-6,200	-1.6	380,000	-6,000	-1.5
Philippines	247,362	2003	273,000	250,000	-2,300	-0.9	240,000	-2,000	-0.8
Solomon Islands	50,573	1993	53,000	45,300	-770	-1.6	41,500	-760	-1.7
Sri Lanka	9,530	1996	9,300	9,000	-30	-0.3	8,800	-40	-0.4
Timor-Leste	1,802	2000	3,000	1,800	-120	-5.0	1,800	0	0
Thailand	244,085	2000	250,200	244,100	-610	-0.2	240,000	-820	-0.3
Vietnam	157,500	2000	213,500	157,500	-5,600	-3.0	157,000	-100	-0.1
<b>TOTAL</b>	<b>6,284,399</b>		<b>6,989,844</b>	<b>6,394,655</b>	<b>-59,519</b>	<b>-1.29</b>	<b>6,056,780</b>	<b>-67,575</b>	<b>-0.66</b>

**Table 3. Socioeconomic Profile of 18 Target Countries**Source: *ADB Statistical Report, Statistical Database System (SDBS)*. Per Capita GDP from *ADB 2012 Outlook*.

Country	Population (millions)	Population Annual Change (%)	Urban Population (% of total)	GDP Growth (%)	Per Capita GDP (U.S. Dollars)
Bangladesh	146.2	1.3	25.4	5.8	700
Bhutan	0.7	1.8	31.0	6.7	1,870
Burma	59.8	1.1	33.2	10.4	N/A
Cambodia	14.3	1.5	19.5	5.9	750
China	1,339.7	0.4	49.7	10.3	4,270
India	1,182	1.4	29.8	8.5	1,330
Indonesia	234.2	1.2	42.1	6.1	2,500
Laos	6.2	1.7	32.0	7.9	1,050
Malaysia	28.3	1.3	63.4	7.2	7,760
Maldives	0.3	1.7	35.0	9.9	5,750
Nepal	28.3	2.2	14.2	4.6	440
Papua New Guinea	6.5	2.2	n/a	7.1	1,300
Philippines	94	1.9	65.7	7.6	2,060
Solomon Islands	0.5	2.3	n/a	7.1	1,030
Sri Lanka	20.7	1.0	15.1	8.0	2,240
Thailand	67.3	0.6	34.6	7.6	4,150
Timor-Leste	1.1	2.6	28.1	6.1	2,220
Vietnam	86.5	1.1	30.2	6.8	1,160
<b>TOTAL</b>	<b>3,316.5</b>	<b>1.5</b>	<b>34.3</b>	<b>10.8</b>	<b>2,387</b>

**Table 4. Number of Threatened Species by Taxonomic Group**Source: *U.N. Statistical Yearbook 2009* (revised 2011)

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Molluscs	Invertebrates	Plants	Total
Bangladesh									
2006	31	32	21	2	13	0	0	12	111
2008	34	28	20	1	12	0	2	12	109
2010	34	29	21	1	19	0	2	16	122
Bhutan									
2006	25	18	1	2	0	0	1	7	54
2008	28	17	1	1	0	0	1	7	55
2010	27	17	2	1	3	0	1	8	59
Burma									
2006	40	49	26	7	15	1	1	38	177
2008	45	41	22	0	17	1	63	38	227
2010	45	41	24	0	33	1	63	42	249
Cambodia									
2006	29	25	15	6	15	0	0	32	122
2008	37	25	12	3	18	0	67	31	193
2010	37	24	15	3	28	0	67	30	204
China									
2006	84	88	34	91	59	1	5	442	804
2008	74	85	30	90	70	1	20	446	816
2010	74	85	31	87	97	8	24	453	859
India									
2006	89	82	26	68	35	2	20	247	569
2008	96	76	25	65	40	2	109	246	659
2010	94	78	30	66	122	2	111	255	758
Indonesia									
2006	146	121	28	39	105	3	26	387	857
2008	183	115	27	33	111	3	229	386	1,087
2010	183	119	31	32	138	3	243	393	1,142
Laos									
2006	35	24	12	9	6	0	0	20	106
2008	46	23	11	5	6	0	3	21	115
2010	45	22	12	5	23	0	3	22	132
Malaysia									
2006	51	43	22	47	45	19	2	688	917
2008	70	42	21	47	49	19	207	686	1,141
2010	70	45	24	47	60	31	221	692	1,180

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Molluscs	Invertebrates	Plants	Total
Maldives									
2006	1	2	2	0	10	0	0	0	15
2008	2	0	3	0	12	0	38	0	55
2010	2	0	3	0	15	0	39	0	59
Nepal									
2006	32	34	9	3	0	0	0	7	85
2008	32	32	7	3	0	0	0	7	81
2010	31	33	8	3	8	1	2	7	93
Papua New Guinea									
2006	58	32	10	10	37	2	10	142	301
2008	41	36	9	11	38	2	167	142	446
2010	39	37	11	11	41	2	169	143	453
Philippines									
2006	51	74	9	48	58	3	17	215	475
2008	39	67	9	48	60	3	199	216	641
2010	39	72	38	48	65	3	210	222	697
Solomon Islands									
2006	20	20	44	2	7	2	4	16	75
2008	17	20	44	2	12	2	138	16	211
2010	20	20	6	2	15	2	139	16	220
Sri Lanka									
2006	21	17	8	52	29	0	52	280	459
2008	30	13	8	53	31	0	119	280	534
2010	30	14	11	53	41	0	120	283	552
Timor-Leste									
2006	–	–	–	–	–	–	–	–	–
2008	4	5	1	0	5	0	0	0	15
2010	4	7	2	0	5	0	0	0	18
Thailand									
2006	36	49	22	3	49	1	0	88	250
2008	57	44	22	4	50	1	179	86	443
2010	57	45	23	4	72	1	184	91	447
Vietnam									
2006	45	42	27	18	30	0	0	148	310
2008	54	39	27	17	33	0	91	147	408
2010	54	40	30	16	46	0	92	146	424
<b>TOTAL</b>									
<b>2006</b>	<b>794</b>	<b>752</b>	<b>316</b>	<b>407</b>	<b>513</b>	<b>34</b>	<b>138</b>	<b>2,769</b>	<b>5,687</b>
<b>2008</b>	<b>889</b>	<b>708</b>	<b>299</b>	<b>383</b>	<b>564</b>	<b>34</b>	<b>1,632</b>	<b>2,767</b>	<b>7,236</b>
<b>2010</b>	<b>885</b>	<b>728</b>	<b>322</b>	<b>379</b>	<b>831</b>	<b>54</b>	<b>1,690</b>	<b>2,819</b>	<b>7,668</b>

**Table 5. Roundwood Production (Solid Volume of Roundwood without Bark in Millions of Cubic Meters)**Source: *U.N. Statistical Yearbook 2009* (revised 2011)

<b>Country</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Bangladesh	28.5	28.4	28.0	28.0	28.0	27.9	27.9	27.8	27.7	27.7
Bhutan	4.4	4.4	4.5	4.5	4.6	4.7	4.7	5.0	5.0	5.0
Burma	38.1	39.4	38.9	42.2	41.8	42.5	42.5	42.5	21.1	21.1
Cambodia	10.3	10.0	9.9	9.7	9.5	9.3	9.3	9.0	8.9	8.9
China	323.6	316.9	312.0	309.9	305.9	302.0	298.2	290.7	291.9	291.9
India	296.1	296.7	319.4	321.0	326.6	328.7	329.4	330.2	331.0	331.0
Indonesia	122.5	112.2	115.6	112.0	112.7	111.3	106.8	102.2	100.6	100.6
Laos	6.4	6.5	6.3	6.3	6.2	6.1	6.1	6.1	6.1	6.1
Malaysia	27.7	23.5	22.7	26.5	28.5	28.3	26.2	28.0	25.7	25.7
Nepal	14.0	14.0	14.0	14.0	14.0	14.0	13.9	13.9	13.8	13.8
Papua New Guinea	7.8	7.3	7.8	8.0	7.9	8.1	8.5	8.6	10.8	10.8
Philippines	44.0	44.4	16.0	16.0	16.1	16.1	16.1	15.9	15.6	15.6
Solomon Islands	0.9	0.7	0.7	0.9	1.2	1.3	1.2	1.6	1.6	1.6
Sri Lanka	6.6	6.5	6.5	6.4	6.3	6.3	6.3	6.1	6.1	6.1
Thailand	26.8	27.5	28.1	28.8	28.7	28.6	28.4	28.3	28.2	28.2
Timor-Leste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vietnam	30.9	30.8	30.7	26.4	26.5	31.1	31.0	27.5	27.9	27.9
<b>TOTAL</b>	<b>988.6</b>	<b>969.2</b>	<b>961.1</b>	<b>960.6</b>	<b>964.5</b>	<b>966.3</b>	<b>956.5</b>	<b>943.4</b>	<b>922.0</b>	<b>922.0</b>

**Table 6. Protected Areas**Source: *Statistical Yearbook for Asia and the Pacific 2011*

Protected Areas	Marine Areas Protected						Terrestrial Areas Protected					
	Square Kilometers			% of Territorial Waters			Square Kilometers			% of Surface Area		
	1990	2005	2009	1990	2005	2009	1990	2005	2009	1990	2005	2009
<b>Northeast Asia</b>	<b>1,410</b>	<b>4,828</b>	<b>4,828</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1,267,421</b>	<b>1,553,953</b>	<b>1,553,953</b>	<b>14</b>	<b>17</b>	<b>17</b>
China	1,410	4,828	4,828	0.4	1.4	1.4	1,267,421	1,553,953	1,553,953	13.5	16.6	16.6
<b>Mekong Southeast Asia</b>	<b>5,294</b>	<b>8,594</b>	<b>8,594</b>	<b>5</b>	<b>8</b>	<b>8</b>	<b>111,260</b>	<b>245,710</b>	<b>245,710</b>	<b>23</b>	<b>72</b>	<b>72</b>
Burma	432	477	477	0.3	0.3	0.3	20,897	42,429	42,429	3.1	6.3	6.3
Cambodia	–	141	141	–	0.9	0.9	–	43,765	43,765	–	24.0	24.0
Laos	–	–	–	–	–	–	1,950	37,737	37,737	0.8	16.3	16.3
Thailand	4,392	4,769	4,769	4.0	4.3	4.3	73,742	101,436	101,436	14.2	19.6	19.6
Vietnam	470	3,207	3,207	0.3	2.1	2.1	14,671	20,343	20,343	4.4	6.2	6.2
<b>Insular Southeast Asia</b>	<b>22,344</b>	<b>87,499</b>	<b>88,345</b>	<b>2</b>	<b>7</b>	<b>12</b>	<b>281,610</b>	<b>375,928</b>	<b>376,069</b>	<b>38</b>	<b>51</b>	<b>52</b>
Indonesia	15,979	64,315	64,325	0.5	1.9	1.9	190,622	269,034	269,034	10.0	14.1	14.1
Malaysia	919	1,436	1,436	1.1	1.6	1.6	55,920	59,317	59,317	16.9	17.9	17.9
Papua New Guinea	2,389	2,391	2,391	0.3	0.3	0.3	9,001	14,366	14,366	1.9	3.1	3.1
Philippines	3,057	18,922	18,922	0.2	1.5	1.5	26,051	32,417	32,417	8.7	10.9	10.9
Solomon Islands	–	264	264	–	0.1	0.1	16	27	27	0.1	0.1	0.1
Timor-Leste	–	171	1,007	–	1.1	6.7	–	767	908	–	5.1	6.0
<b>South Asia</b>	<b>3,235</b>	<b>3,955</b>	<b>3,955</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>190,307</b>	<b>221,560</b>	<b>221,560</b>	<b>48</b>	<b>73</b>	<b>73</b>
Bangladesh	156	324	324	0.4	0.8	0.8	2,155	2,300	2,300	1.5	1.6	1.6
Bhutan	–	–	–	–	–	–	5,689	11,320	11,320	14.2	28.3	28.3
India	3,050	3,299	3,299	1.5	1.7	1.7	158,072	168,995	168,995	5.0	5.3	5.3
Nepal	–	–	–	–	–	–	11,360	25,106	25,106	7.7	17.0	17.0
Sri Lanka	29	332	332	0.1	1.1	1.1	13,031	13,839	13,839	19.6	20.8	20.8
<b>TOTAL</b>	<b>32,283</b>	<b>104,876</b>	<b>105,722</b>	<b>9</b>	<b>19</b>	<b>25</b>	<b>1,850,598</b>	<b>2,397,151</b>	<b>2,397,292</b>	<b>122</b>	<b>213</b>	<b>214</b>

## **ANNEX C. THREATS TAXONOMY**

- 1 Residential & Commercial Development**
  - 1.1 Housing & Urban Areas
  - 1.2 Commercial & Industrial Areas
  - 1.3 Tourism & Recreation Areas
- 2 Agriculture & Aquaculture**
  - 2.1 Annual & Perennial Non-Timber Crops
  - 2.2 Wood & Pulp Plantations
  - 2.3 Livestock Farming & Ranching
  - 2.4 Marine & Freshwater Aquaculture
- 3 Energy Production & Mining**
  - 3.1 Oil & Gas Drilling
  - 3.2 Mining & Quarrying
  - 3.3 Renewable Energy
- 4 Transportation & Service Corridors**
  - 4.1 Roads & Railroads
  - 4.2 Utility & Service Lines
  - 4.3 Shipping Lanes
  - 4.4 Flight Paths
- 5 Biological Resource Use**
  - 5.1 Hunting & Collection of Terrestrial Animals
  - 5.2 Gathering Terrestrial Plants
  - 5.3 Logging & Wood Harvesting
  - 5.4 Fishing & Harvesting of Aquatic Resources
- 6 Human Intrusions & Disturbance**
  - 6.1 Recreational Activities
  - 6.2 War, Civil Unrest, & Military Exercises
  - 6.3 Work & Other Activities
- 7 Natural System Modification**
  - 7.1 Fire & Fire Suppression
  - 7.2 Dams & Water Management/Use
  - 7.3 Other Ecosystem Modifications
- 8 Invasive & Other Problematic Species & Genes**
  - 8.1 Invasive Non-Native/Alien Species
  - 8.2 Problematic Native Species
  - 8.3 Introduced Genetic Material
- 9 Pollution**
  - 9.1 Household Sewage & Urban Wastewater
  - 9.2 Industrial & Military Effluents
  - 9.3 Agricultural & Forestry Effluents
  - 9.4 Garbage & Solid Waste
  - 9.5 Airborne Pollutants
  - 9.6 Excess Energy

**10 Geological Events**

- 10.1 Volcanoes
- 10.2 Earthquakes/Tsunamis
- 10.3 Avalanches/Landslides

**11 Climate Change & Severe Weather**

- 11.1 Habitat Shifting & Alteration
- 11.2 Droughts
- 11.3 Temperature Extremes
- 11.4 Storms & Flooding



## ANNEX D. PARTICIPATION IN INTERNATIONAL BIODIVERSITY CONVENTIONS BY 18 ASSESSMENT COUNTRIES

Country	The Cartagena Protocol on Biosafety	The Convention on Biological Diversity	Convention on International Trade in Endangered Species	Convention on the Conservation of Migratory Species of Wild Animals	International Treaty on Plant Genetic Resources	The Ramsar Convention on Wetlands	Convention Concerning the Protection of the World Cultural and Natural Heritage
Bangladesh	2004	1994	1982	2005	2004	1992	1983
Bhutan	2003	1995	2002	–	2003	–	2002
Burma	2008	1994	1997	–	2003	2005	1994
Cambodia	2003	1995	1997	–	2002	1999	1992
China	2005	1993	1981	–	–	1992	1986
India	2003	1994	1976	1983	2002	1982	1978
Indonesia	2004	1994	1979	–	2006	1992	1989
Laos	2004	1996	2004	–	–	2010	1987
Maldives	2003	1994	–	–	2006	–	1986
Malaysia	2003	1994	1978	–	2003	1995	1989
Nepal	–	1993	1975	–	2010	1988	1978
Papua New Guinea	2006	1993	1976	–	–	1993	1997
Philippines	2007	1993	1981	–	2006	1994	1985
Solomon Islands	2004	1995	2007	–	–	–	1992
Sri Lanka	2004	1994	1979	1990	–	1990	1980
Thailand	2006	2004	1983	–	–	1998	1987
Timor-Leste	–	2007	–	–	–	–	–
Vietnam	2004	1994	1994	–	2006	1989	1988

Source: InforMEA



## ANNEX E. REGIONAL INITIATIVES, ORGANIZATIONS, AND APPROACHES

### A. Overview

A number of regional initiatives and organizations are already addressing some of the identified actions necessary. Numerous organizations and other players have regional biodiversity conservation within their mandates, and several successful approaches are already being used in Asia.

### B. Biodiversity-Related International Agreements

The major biodiversity-related international agreements are summarized here. Annex D provides a list showing which countries included in this assessment ratified each.

#### B1. Convention on Biological Diversity

The Convention on Biological Diversity (CBD) ([www.cbd.int](http://www.cbd.int)) is a comprehensive international treaty framework that works to sustain the rich diversity of life on earth. Its three main objectives are to conserve biological diversity, to ensure sustainable use of the components of biodiversity, and to provide a fair and equitable share of the benefits arising from the use of genetic resources. The CBD was entered into force in 1993 and since then has grown to 193 members. Each is required to have a national focal point for the Convention to prepare a National Biodiversity Strategic Action Plan (NBSAP), which is updated regularly. All 18 countries covered in this assessment are parties to the CBD.

Governments have made commitments to address biodiversity loss through the Convention on Biological Diversity. At the conference of the parties in Nagoya, Japan, in October 2010, the 193 parties agreed to a strategic plan with 20 ambitious targets, including the following:

- Target 11: “By 2020, at least 17 percent of terrestrial and inland water areas and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative, and well-connected systems of protected areas and other effective area-based conservation measures and integrated into the wider landscapes and seascapes.”
- Target 12: “By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.”

#### B2. Convention on Wetlands (Ramsar Convention)

The Convention on Wetlands, called the “Ramsar Convention,” ([www.ramsar.org](http://www.ramsar.org)) was signed into force in Ramsar, Iran, in 1971. This intergovernmental treaty promotes the

sustainable use of wetlands by designating “wetlands of international importance” (i.e., Ramsar sites) and working to ensure they are sustainably managed through inclusion in national planning and consultations regarding transboundary resources. Its website lists all Ramsar sites with details on the habitats, species and threats to each one.

### **B3. Convention on International Trade in Endangered Species (CITES)**

The CITES agreement ([www.cites.org](http://www.cites.org)) regulates the international trade in endangered, threatened, and vulnerable species; these are compiled in a database managed by the World Conservation and Management Center, with input from the IUCN Red Data Book listings and procedures. Currently, more than 30,000 species of animals and plants are protected under this convention. There are 175 parties to this convention, including all 18 Asian countries covered in this biodiversity assessment. CITES covers only trade across borders and is not a replacement for national laws. Many nations within CITES maintain separate lists of animals and plants that are threatened within their own borders, but not globally.

### **B4. Convention on the Conservation of Migratory Species of Wild Animals (CMS)**

CMS, also known as the Bonn Convention, is an intergovernmental treaty with 116 members and is managed under the auspices of the United Nations Environment Program. This convention aims to protect and conserve terrestrial, aquatic, and avian migratory species throughout their range and maintains a database of the species it covers. CMS consolidates information on migratory species, migration routes, and habitat requirements and works in association with international NGOs and other partners. Its website ([www.cms.int](http://www.cms.int)) serves as a resource site for publications and species-related information.

### **B5. United Nations Framework Convention on Climate Change (UNFCCC) — Reducing Emissions from Deforestation and Forest Degradation (REDD+)**

UNFCCC is an international treaty that aims to stabilize the amount of greenhouse gases in the atmosphere at a level that prevents dangerous man-made climate changes (UNFCCC, 2012). REDD is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. REDD+ adds conservation and sustainable management of forests. The aim is to provide financial incentives for protecting standing forests and their associated co-benefits (biodiversity, livelihoods, and other environmental services).

Across the region, many countries are preparing national REDD+ strategies, supported by a range of multilateral and bilateral REDD+ “readiness” mechanisms (ADB 2010). The UN-REDD Program in Asia-Pacific supports countries in preparing and implementing national REDD+ strategies and mechanisms for measuring, reporting, and verification (MRV) of REDD+ performance.

## **C. Regional Initiatives**

### **C1. Global Tiger Initiative (GTI)**

The World Bank, Global Environment Facility, Smithsonian Institution, International Tiger Coalition, and other partners launched the Global Tiger Initiative ([www.globaltigerinitiative.org](http://www.globaltigerinitiative.org)) in June 2008, to address the looming biodiversity crisis. The first Global Tiger Summit, held in Russia in November 2010, brought together leaders of 13 partners to adopt the St. Petersburg Declaration on Tiger Conservation and launched the Global Tiger Recovery Program to double the population of wild tigers by 2022, with each country preparing an action plan. There are now 13 tiger range countries: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam. GTI works with civil society, international organizations, and the private sector to stop the extinction of tigers in the wild.

### **C2. Asian Development Bank Greater Mekong Subregion Biodiversity Conservation Corridors Initiative**

Six countries of the Greater Mekong Subregion — Burma, Cambodia, China, Laos, Thailand, and Vietnam — are working in partnership to maintain or improve forest cover and protect biodiversity. They have designated eight biodiversity conservation corridors, with the aim of creating 2 million hectares of forest area to reduce fragmentation and provide linkages for wildlife movement through the region (GMS 2012).

### **C3. Heart of Borneo**

The Heart of Borneo initiative ([www.heartofborneo.org](http://www.heartofborneo.org)) joins three countries — Brunei Darussalam, Indonesia, and Malaysia — in the conservation of biodiversity and forests on the island of Borneo. Initially facilitated by the World Wildlife Fund (WWF), this initiative aims to establish a 22-million hectare mosaic of transboundary reserves, protected areas, and wildlife corridors by 2020 that will preserve endemic species and biodiversity hotspots. It also aims to develop sustainable financing mechanisms that provide equitable benefit-sharing, and to stop the conversion of high-conservation-value forests to other land uses.

### **C4. Coral Triangle Initiative (CTI)**

In 2009, the Coral Triangle Initiative ([www.coraltriangleinitiative.org](http://www.coraltriangleinitiative.org)) was launched by Indonesia, Malaysia, Papua New Guinea, the Philippines, Timor-Leste, and the Solomon Islands to establish high-level political commitment to effectively manage marine protected areas, promote and apply an ecosystem approach to fisheries management, develop and implement climate change adaptation measures, and protect threatened species. USAID, the Government of Australia, Asian Development Bank, World Wildlife Fund, The Nature Conservancy, Conservation International, WorldFish Center, and others are partners supporting this initiative.

### **C5. Bay of Bengal Large Marine Ecosystem Project (BOBLME)**

The Bay of Bengal Large Marine Ecosystem project ([www.boblme.org](http://www.boblme.org)), with technical assistance from UN FAO and the Global Environment Facility, is supporting the governments of Bangladesh, Burma, India, Indonesia, Malaysia, Maldives, Sri Lanka, and Thailand in ecosystem-based management of coastal and marine resources. It aims to establish a strategic action program to protect the health of the ecosystem and manage the living resources of the bay on a sustainable basis to improve the food and livelihood security of the region's coastal population. Key issues addressed by the project include overexploitation of living resources, critical habitat degradation, land-based sources of pollution, and the post-tsunami status of critical habitats and their ability to support livelihoods in the future. The project addresses a key barrier to resolving these issues: the lack of regional arrangements to facilitate a coordinated approach (FAO 2012).

### **C6. Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Toward 2020**

This resolution was adopted by the ministerial session for the ASEAN Southeast Asian Fisheries Development Center (SEAFDEC) in June 2011 to sustain the supply of fish and fishery products from the region to improve food security, facilitate poverty alleviation, and improve the livelihoods in the region. A new regional directive and policy framework will steer ASEAN countries towards more sustainable fisheries development and poverty reduction that considers emerging issues such as climate change, international fish trade requirements, and a projected economic crisis due to population growth. The aim is to build closer collaboration among ASEAN countries toward the realization of a fully integrated ASEAN community (SEAFDEC 2011).

### **C7. ASEAN Wildlife Enforcement Network (ASEAN-WEN)**

ASEAN-WEN ([www.asean-wen.org](http://www.asean-wen.org)) was launched in December 2005 as a regional interagency and intergovernmental initiative to counter the illegal cross-border trade in endangered flora and fauna. As the world's largest wildlife law enforcement network, it comprises law enforcement agencies of the 10 ASEAN countries and is actively supported by RDMA and civil society organizations. The network is a direct and proactive response against poaching and wildlife trafficking that has led to alarming levels of biodiversity loss in Southeast Asia. It helps countries share information on and tackle cross-border wildlife crime and facilitates the exchange of regional best practices in combating those crimes (ASEAN-WEN 2012).

### **C8. ASEAN Social Forestry Network (ASFN)**

ASFN ([www.asfnsec.org](http://www.asfnsec.org)) is the first government-driven social forestry network in Southeast Asia and was established by ASEAN senior forestry officials in August 2005. The main goal of ASFN is to promote policy and practices to strengthen ASEAN cooperation in social forestry through the sharing of social forestry information and knowledge. Membership of ASFN is inclusive, involving research organizations,

academia, NGOs, and experts in related fields. The secretariat is hosted by the Indonesian Ministry of Forestry and serves the network, in coordination with the ASEAN Secretariat.

### **C9. South Asia Wildlife Enforcement Network (SAWEN)**

Building on the ASEAN-WEN model, SAWEN ([www.traffic.org](http://www.traffic.org)) was launched in January 2011 in Bhutan. The secretariat is based in Kathmandu, Nepal. Members comprise SAARC and include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Experts from these countries, the CITES Secretariat, INTERPOL, WWF, and TRAFFIC developed an action-oriented work plan for joint activities and are supported in part by the U.S. Department of State and the World Bank.

### **C10. Mangroves for the Future (MFF)**

Mangroves for the Future ([www.mangrovesforthefuture.org](http://www.mangrovesforthefuture.org)) was initiated after relief efforts for the 2004 Indian Ocean tsunami. It currently includes activities in India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand. Other partners include FAO, UNEP, UNDP, NORAD, CIDA, IUCN, CARE, and Wetlands International. The goal is to foster regional cooperation, support national activities, and engage the private sector and communities in work to enhance the management of coastal ecosystems.

## **D. Key Regional Organizations**

*Multilateral donors.* Most multilateral donors have programs that address environmental concerns in the Asia region and within these programs there are sometimes biodiversity related aspects. UN agencies. A major multilateral in the region, which supports various projects and programs in biodiversity and forest sectors, is the Global Environment Facility (GEF). GEF serves as financial mechanism for the CBD and UNFCCC. Of the 10 GEF agencies, the organizations that implementing GEF in the Asia-Pacific region include UNDP, UNEP, World Bank, FAO, and ADB.

*Regional governmental organizations.* A number of regional organizations include member countries from throughout the region. While focused mostly on regional development, they also address biodiversity conservation to varying degrees. Two regional groups focused on economic activities, but with some environmental programs, include the Association of Southeast Asian Nations (ASEAN), with 10 member states: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Vietnam, and Thailand — and the South Asian Association for Regional Cooperation (SAARC), with member states Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Other regional organizations with links to biodiversity activities include the Mekong River Commission (with headquarters in Laos and Cambodia), the South East Asian Fisheries Development Center (SEAFDEC), and the Asia Environmental Compliance and Enforcement Network (AECEN).

*Research centers.* The Consultative Group on International Agricultural Research (CGIAR) is a partnership of research organizations around the globe that focuses on agriculture, forests, and fisheries. Many of its projects include biodiversity components.

In the Asian region, the most important to biodiversity are the Center for International Forestry Research (CIFOR) and the World Agroforestry Center (ICRAF), both based in Bogor, Indonesia, and the WorldFish Center (formerly ICLARM), based in Kuala Lumpur. Although not affiliated with CGIAR, the International Center for Integrated Mountain Development (ICIMOD) also engages in regional biodiversity activities in South Asia. Various universities, zoos, museums, and other institutions also play a role in biodiversity conservation activities in the region.

*Regional NGOs.* A number of NGO programs in Asia work on regional conservation issues. The major international NGOs include the World Wildlife Fund, Conservation International, the International Union for Conservation of Nature, The Nature Conservancy, Fauna and Flora International, Birdlife International, Wildlife Conservation Society, TRAFFIC, and International Rivers. These organizations have a variety of programs that address biodiversity conservation issues in Asia.

Aside from these large international NGOs, there are also Asia-based organizations working regionally. Key organizations and institutions in this sector include Freeland (a current RDMA partner), the Center for People and Forests (RECOFTC), Woman Organizing for Change in Agriculture and Natural Resource Management (WOCAN), and Asia Indigenous People's Pact (AIPP), all based in Thailand.

## **E. Emerging Approaches**

*Involvement of the private sector.* A number of approaches are being used to engage and mobilize the private sector for better conservation outcomes. One strategy is to certify sustainably harvested and traded products, such as wood. A similar approach is used to encourage oil palm producers to prevent further encroachment on natural forests through the Roundtable on Sustainable Palm Oil (RSPO). Further efforts to involve the private sector include ecotourism ventures and other “green businesses.” The Coral Triangle Initiative conducts regional business forums to recognize and expand the network of green business practitioners in the fishing, tourism, shipping, and other sectors, and to provide a platform for government and private sector dialogue on conservation policies and practices in the region. Finally, even in private companies not directly involved in natural resources, there is a growing trend toward corporate social responsibility programs that support various conservation efforts. Engaging the private sector is a dynamic tool that can change consumer behavior, encourage the sustainable use of natural products, and promote conservation of threatened natural ecosystems.

*Environmental economics/payments for ecosystem services.* Efforts to determine the economic value of ecosystems and biodiversity are in the early stages; however, this approach is gaining momentum. Policy makers often need financial data to build support for conservation-related initiatives. There is also increasing regional interest in market-based conservation strategies, including payments for ecosystem services (PES) and REDD+. A number of small-scale, pilot PES projects have been undertaken in Asia. More national policy support and capacity building are needed to support scale-up of these efforts.



*Integrated approaches.* Biodiversity conservation is often hindered by sectoral stovepiping. Conserving biodiversity demands including not only plant and animal species, but also communities, within the ecosystem to minimize undesirable impacts on health and livelihoods.

*Gender-based approaches.* Women often play a key role in natural resource utilization and management and can be a good entry point for community-based approaches to conserving local biodiversity. Women's empowerment and equity is key factor for achieving sustainable economic growth, social development, and environmental sustainability.

*Using the power of science and technology.* Asia's rapid economic growth, together with advanced science and technology development in the region (e.g., information technology in China and India), has created new opportunities to raise awareness about the importance of biodiversity conservation. The use of computer-based tools (e.g., GIS, remote sensing), the Internet, and mobile phone applications to transfer real-time messages (e.g., in the case of illegal activities or disasters) and to share best practices are being integrated into program planning and activity development.



## ANNEX F. USAID/RDMA PROJECTS IN THE REGION

### Regional Programs

Office/Program/Partner	Dates
<b>Governance and Vulnerable Populations (GVP)</b>	
<i>Peace and Security/Transnational Crime</i>	
Anti-Trafficking in Persons Pan-Asian Campaign (MTV EXIT) — MTV Foundation	2006-2012
<b>General Development Office (GDO)</b>	
<i>Economic Growth/Trade and Investment</i>	
ASEAN Development Vision to Advance National Cooperation and Economic Integration (ADVANCE), ASEAN Single Window, ADVANCE Task Order 3 — Nathan Associates	2008-2013
<i>Economic Growth/Private Sector Capacity</i>	
ASEAN Valuing ASEAN Linkages Under Economic Integration (VALUE) Program, Task Order 4 — Nathan Associates	2008-2013
Advance Task Order #1, ASEAN TATF — Nathan Associates	2007-2013
<i>Economic Growth/Agriculture</i>	
Maximizing Agricultural Revenues through Knowledge, Enterprise Development and Trade Support (MARKET) — Nathan Associates	2011-2014
<b>Regional Environment Office (REO)</b>	
<i>Natural Resources and Biodiversity</i>	
Asia's Regional Response to Endangered Species Trafficking (ARREST) (includes China) — Freeland Foundation	2011-2016
Coral Triangle Support Partnership (CTSP) — WWF	2008-2013
Program Integrator for U.S. Support to the CTI — ARD	2008-2013
NOAA USCTI Participating Agency Program Agreement (PAPA)	2009-2014
Lowering Emissions in Asia's Forests (LEAF) — Winrock	2011-2016
U.S. Forest Service Field Support	2005-Ongoing
<i>Water and Adaptation</i>	
Asia-Pacific Climate Change Adaptation Support Facility (ADAPT) — AECOM	2011-2016
Mekong Adaptation and Resilience to Climate Change — DAI	2011-2016
Climate-Resilient Cities (M-BRACE)— Institute for Social and Environmental Transition (ISET)	2010-2013
Climate-Resilient Mekong — NHI	2010-2013
ECO-Asia Water, Sanitation, and Hygiene Enterprise Development (WaterSHED) — University of North Carolina	2008-2012
Environmental Cooperation-Asia Water, Sanitation, and Governance (ECO-Asia) — AECOM Asian Environmental Compliance and Enforcement Network (AECEN) ECO-Asia Sustainable Water Services (WaterLinks) Promoting Regional Cooperation in the Mekong River Basin (RSAT, PSU study)	2005-2012
<i>Clean Energy and Climate Change</i>	
Low Emissions Asian Development (LEAD) — ICF	2011-2016
Southeast Asia GHG Inventory Capacity Building Program — USEPA	2011-2014
<i>Recently Completed Programs</i>	
ECO-Asia Clean Development and Climate Program (CDCP)	2006-2011
Asia Regional Biodiversity Conservation Program (ARBCP)	2005-2010
Responsible Asia Forestry and Trade (RAFT)	2006-2011
ASEAN-Wildlife Enforcement Network Support Program (ASEAN-WEN)	2005-2010

## Regional Programs (cont'd)

Office/Program/Partner	Dates
<b>Office of Public Health (OPH)</b>	
<i>Investing in People/Health/HIV/AIDS</i>	
Behavior Change Communication for Infectious Disease Prevention (CAP-3D) — Population Services International (PSI)	2011-2016
Population, Health and Nutrition Technical Assistance and Support Contract 3 — Family Health International	2008-2012
Community REACH Asia Program — Pact	2008-2012
Health Policy Initiative: Strengthening HIV/AIDS Policy and Advocacy in the Asia Pacific Region — Research Triangle Institute	2008-2012
<i>Investing in People/Health/Tuberculosis</i>	
Behavior Change Communication for Infectious Disease Prevention — Population Services International (PSI)	2011-2016
Multi Drug/TB Model Center Network & GMS Multi Drug Resistant (CAP-TB)/TB Prevention and Management Program — FHI Development 360	2011-2016
WHO Consolidated Grant — WHO	Annual (Field Support)
USAID CDC Interagency Agreement (IAA) Technical Assistance for Tuberculosis and Malaria in the Greater Mekong Sub region — CDC	Annual (Field Support)
<i>Investing in People/Health/Malaria</i>	
Behavior Change Communication for Infectious Disease Prevention (CAP-3D) — PSI	2011-2016
Greater Mekong Sub-region – Responses to Infectious Diseases (GMS-RID) — Kenan Institute Asia	2009-2012
Behavior Change in Communications for Infectious Disease in Greater Mekong Subregion (MID-BCC) — Family Health International	2009-2012
Molecular Surveillance of Drug Resistant Malaria in the Greater Mekong Sub-region — University of Maryland	2009-2012
Promoting the Quality of Medicines — United States Pharmacopeia (USP)	Annual (Field Support)
GMS Malaria Control Project (CAP-Malaria) — University Research Corporation (URC)	2011-2016
DELIVER Project to Support the Management of Malaria Commodities — John Snow, Johns Hopkins	2011-2013
<b>Office of Foreign Disaster Assistance (OFDA)</b>	
Program for the Enhancement of Emergency Response (PEER) Phase III	2009-2014

## Burma Program

Office/Program/Partner	Dates
<b>Governance and Vulnerable Populations (GVP)</b>	
<i>Governing Justly and Democratically/Civic Participation</i>	
Burma Media Development Program	2010-2013
Strengthening Civil Society by Establishing Community Microfinance Institutions	2009-2013
Strengthening Outreach and Distance Education, Opportunity at the American Center in Rangoon	2007-2012
<i>Investing in People/Basic and Higher Education/Humanitarian Assistance</i>	
Support to Health, Institution Building, Education, and Leadership in Policy Dialogue (SHIELD)	2011-2015
Increasing Access to Quality Nonformal Primary Education through Civil Society Partners	2008-2013
Humanitarian Assistance Central Burma — Pact	2011-2016
Burma Humanitarian Assistance Program: Livelihood Recovery & Food Security	2010-2011
Meeting the Health and Water, Sanitation, and Hygiene (WASH) Needs of the Most Vulnerable Across Laputta Township: An Integrated Approach	Ending December 2012
Building Capacity of the Civil Society on Child's Rights and Nonformal Education in Burma	Ending August 2013
Improve Livelihoods Security and Maternal Health/Child Survival Outcomes among the Most Vulnerable and Marginalized Population in the Delta	2008-2013
Rebuilding Homes, Rebuilding Lives: Coastal Settlements Sustainable Recovery Program	2010-2011
Migrant Rights Capacity Building for Government Officials, Employers, Burmese Migrants, and Host Community Members in Thailand	2002-2011
<b>Office of Public Health (OPH)</b>	
<i>Investing in People/Health/HIV-AIDS</i>	
Behavior Change Communication for Infectious Disease	2011-2016
Rapid and Effective Action Combating HIV/AIDS, Asia (REACH)	2007-2012
<b>Office of Foreign Disaster Assistance (OFDA)</b>	
Regional Office of U.S. Foreign Disaster Assistance (OFDA/ASIA) Programs	Ongoing

## China Program

Office/Program/Partner	Dates
<b>Governance and Vulnerable Populations (GVP)</b>	
<i>Investing in People/Economic Growth/Environment</i>	
Sustainable Development and Livelihoods Program for Urban and Rural Ethnic Tibetans — Bridge Fund	2009-2014
Tibet Sustainable Environment Resources for Increased Economic Growth (TSERING) / Winrock	2009-2014
Promotion of Sustainable Livelihoods Improvement, Environmental Protection, and Cultural Preservation in the Tibetan Autonomous Region (TAR) and Dechen Tibetan Autonomous Prefecture, Yunnan Province — Tibetan Poverty Alleviation Fund	2009-2014
<b>General Development Office (GDO)</b>	
<i>Governing Justly and Democratically/Rule of Law and Human Rights</i>	
China Rule of Law Program: Criminal Justice and Procedure — American Bar Association	2008-2014
China Administrative Law Program — The Asia Foundation	2008-2014
<b>Regional Environment Office (REO)</b>	
U.S.-China Sustainable Buildings Partnership (SBP)	2008-2012
U.S.-China Partnership for Climate Action (PCA) — Institute For Sustainable Communities	2009-2012
U.S.-China Partnership for Environmental Law — Vermont Law School	2006-2012

## Lao PDR Program

Office/Program/Partner	Dates
<b>General Development Office (GDO)</b>	
<i>Economic Growth/Trade and Investment</i>	
Lao-U.S. Bilateral Trade Agreement Compliance and WTO Accession — Nathan Associates	2007-2013

## Thailand Program

Office/Program/Partner	Dates
<b>Governance and Vulnerable Populations (GVP)</b>	
<i>Peace and Security/Conflict Mitigation and Reconciliation</i>	
Sapan Program: Strengthening Thai Democracy — DAI	2010-2013

## **ANNEX G. ABBREVIATED BILATERAL ANALYSIS FOR CHINA**

### **A. Introduction**

RDMA is beginning the process of developing a new strategic plan. This Biodiversity and Tropical Forestry Assessment is conducted to address U. S. Foreign Assistant Act (FAA) Section 118 (tropical forests) and 119 (biodiversity) requirements. The FAA require ~~that~~ each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests/biodiversity and (2) the extent to which the actions proposed for support by the agency meet the needs thus identified.”

This abbreviated analysis for China was primarily a desk study, not a standard 118/119 assessment. No trips to the country were made and no consultations held with stakeholders, aside from brief interviews with relevant RDMA staff. Information in this study relies heavily on a few reports. Within the resources allotted for this abbreviated assessment, it was not possible to validate the data.

### **B. Overview of Socioeconomic Context**

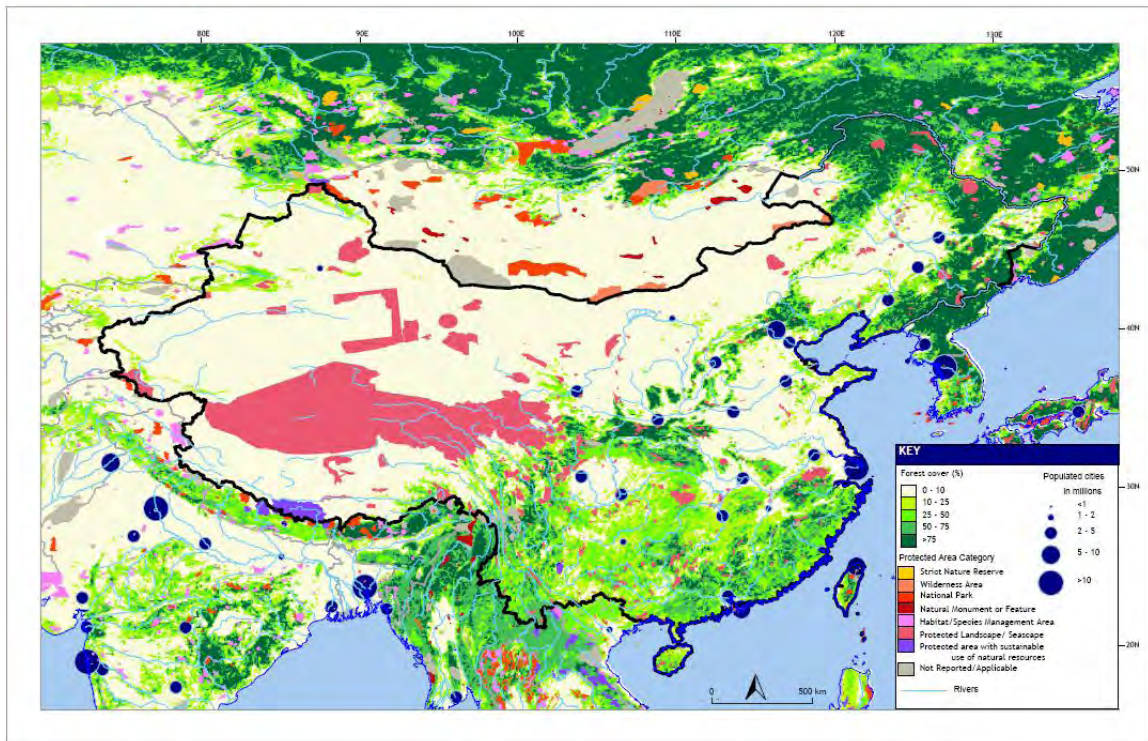
With more than 1.3 billion people, China is the most populous country in the world. The population growth rate is decreasing (0.4 percent) and life expectancy is increasing and currently stands at 74.68 years. However, China is now one of the most rapidly aging countries in the world due to the population control policy. About half of the population resides in urban areas (ADB 2011).

China has moved from a closed, centrally planned system to a more market-oriented system in the late 1970s and now plays a major role in the global economy. GDP has increased substantially since 1978. The annual GDP growth rate is 10.3 percent, with per capita GDP of \$4,713 (ADB 2011). In 2010, China became the second-largest economy in the world after that of the United States, measured on the basis of purchasing power parity (CIA 2012). With economic development and rising incomes, domestic demand for high-value resources and energy is growing, and many of these resources are being drawn from China’s neighbors, often at unsustainable rates and employing unsustainable means. However, consumption patterns in China are still less unsustainable than those of the developed world (USAID 2009).

### **C. Overview of Biodiversity and Threats**

China is the fourth-largest country in the world, with an area of nearly 9.6 million square kilometers. China is one of the world’s 17 “mega-diverse” countries, which together house more than 70 percent of all species. China’s rich biodiversity includes more than 35,000 species of higher plants and 6,347 species of vertebrates. Many of these species — 1,700 higher plants and 667 species of vertebrates — are endemic. There are 1,118 species of fishes and 271 species of wetland birds. A total of 20,278 marine species have

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been recorded from China's seas, which is more than 10 percent of the world's total marine species (GOC 2008).

According to the FAO (2011), China's forest cover is more than 206 million hectares and accounts for some 22 percent of the total geographical area of the country. Annual forest grew by 1.39 percent annually (more than 2.7 million hectares) from 2005 to 2010. The main forest types are coniferous, mixed coniferous and broadleaf, deciduous broadleaf, evergreen broadleaf, tropical, subtropical, and temperate.

China has more than 400 million hectares of grasslands (41.7 percent of its total area), including alpine meadows, temperate deserts, and alpine grasslands. China contains parts of all of four distinct biodiversity hotspots — the mountains of southwest China, Himalaya, Indo-Burma, and the mountains of Central Asia — identified both by the number of higher plants and the amount of habitat loss (Conservation International, 2005). Biodiversity in these habitats is facing several threats due to rapid industrialization and urbanization, infrastructure development, unsustainable harvesting of natural resources, invasion of alien species, and climate change.

About 1,500 rivers flowing into sea bring large amounts of freshwater and silt to China. The most important rivers are Yangtze, Yellow, Zhujiang (Pearl River), Heilongjiang, Songhuajiang, Brahmaputra (Yaluzangbujiang), Lancang (Mekong), Nujiang, Hanjiang,



and Liaohe (Mother) (UNEP 2006). China has 13,700,300 hectares of marsh wetlands, 8,351,500 hectares of lake wetlands, and 8,207,000 hectares of river wetlands (GOC 2008). However, these wetlands are under critical threat of destruction due to conversion for agricultural purposes, such as fish and shrimp ponds and farmlands (no official estimates are available). Moreover, China's wetlands are deteriorating due to severe pollution. This impacts the use of wetlands by migratory birds and contaminates the food chain, reducing species richness and threatening human health (USAID 2010).

China's coastline, on the western side of the Pacific Ocean, has four seas adjacent to the mainland: the Bohai, Yellow, East China, and South China Seas. China has more than 18,000 kilometers of continental coastline and more than 14,000 kilometers of island coastline. More than 6,500 islands have an area greater than 500 square meters, and the total island area is about 80,000 square kilometers (UNEP 2006). The depletion of regional and global fisheries by Chinese fishing operations poses a significant threat to food security in Asia and the Pacific region. Chinese vessels are active in all seven oceans, and legal and illegal fishing practices in these waters are contributing to marine resource depletion, with severe transboundary implications.

China's species of global importance include giant pandas, red pandas, Siberian cranes, and others. China's consumption of high-value wildlife products, including threatened species, has risen rapidly as its economy has grown. Consumer demand increasingly places wild animals and plants and their ecosystems — both in China and abroad — at risk due to unsustainable and often illegal wildlife trade (TRAFFIC 2010). Many of the wild populations of species that are consumed have become depleted, and sourcing has shifted to countries in South and Southeast Asia, the Russian Far East, and beyond.

#### **D. Actions Necessary to Conserve Biodiversity in China**

China is working to address the root causes of biodiversity and forest loss by improving legislation and management systems and by integrating biodiversity into national, economic, and social development plans. Major conservation actions identified by China's fourth national report on implementation of the Convention on Biological Diversity include the following (GOC 2008):

1. *Establishment and management of nature reserves.* The establishment and management of nature reserves is a primary approach employed to conserve biodiversity. A national nature reserve system has been created, but more effective management of these nature reserves is needed.
2. *Implementing key forestry projects.* Current projects include the Natural Forest Conservation Project, Returning Farmland to Forest, Wildlife Conservation and Nature Reserve Construction Project, and large-scale afforestation projects.
3. *Strictly controlling pollution and ecological destruction.* China is employing a wide range of economic means, such as finance, taxation, banking, credit, pricing, and trade, to protect the environment and reduce emissions.

4. *Promoting the conservation and sustainable use of biological resources.* China has established a number of systems concerning the use of wildlife under national protection, including hunting permits, pharmaceutical use permits, and animal domestication and breeding permits. Reforms are under way in accreditation and law enforcement, logging quotas, and ecological benefit compensation. Artificial breeding measures have been initiated for endangered species whose populations are hard to restore naturally.
5. *Emphasizing ex-situ conservation of rare and endangered species and genetic resources.* A number of rare plant nurseries, provenance bases, and propagation bases has contributed to the ex-situ conservation of wild plants.
6. *Preventing and controlling invasive alien species.* For the prevention and control of invasive alien species (IAS), a number of departmental regulations have been promulgated and implemented.
7. *Improving scientific research.* To support research on conservation and sustainable use of biodiversity, the government has established related programs and projects in national science development plans.
8. *Enhancing public participation and awareness.* China encourages public participation in biodiversity conservation by organizing activities such as building green communities, holding knowledge competitions, and organizing lectures, exhibitions, ecological summer camps, and celebrations.

#### **E. Extent to Which RDMA is Addressing the Necessary Actions**

RDMA's priorities for cooperation with China have generally focused on programs that address transnational or global challenges through activities that promote regional and U.S.-China cooperation. A number of these programs address to some extent the actions necessary for biodiversity and tropical forest conservation and sustainable management.

Due to the regional or global nature of many environmental issues, such as climate change, air quality, illegal logging, wildlife trafficking, watershed management, and energy security, regional cooperation is crucial for developing effective solutions. RDMA is currently addressing many of these challenges in China through a combination of regional and bilateral programs. RDMA has been successful in working with academic partners, NGOs, and the private sector to achieve results in China. However, the absence of a memorandum of understanding with the central government has resulted in difficulty accessing government personnel through official channels (USAID 2010).

RDMA currently supports the following bilateral and regional programs in China under three environmental focus areas: clean energy and climate change, sustainable management of natural resources, and environmental governance (USAID 2010).

### **Regional Programs Directly Related to Biodiversity Conservation in China**

- The Asian Environmental Compliance and Enforcement Network (AECEN) promotes improved compliance with environmental regulations and legal requirements through regional cooperation.
- Asia's Regional Response to Endangered species Trafficking (ARREST) works to conserve biodiversity by reducing Asia's illegal trade in threatened and endangered species, including in China, where there is the highest demand for wildlife products.
- Until 2011, the Responsible Asia Forestry and Trade (RAFT) promoted sustainable forest management and responsible timber trade.
- The ECO-Asia Clean Development and Climate Program – works to scale up clean energy investments in Asia to mitigate GHG emissions and increase energy security.

### **Bilateral Program Indirectly Related to Biodiversity Conservation in China**

- The U.S.-China Partnership for Climate Action works to achieve significant, meaningful, and lasting reductions in GHG emissions.
- The U.S.-China Sustainable Buildings Partnership works to promote sustained reductions in building energy use and associated GHG emissions.
- The U.S.-China Partnership for Environmental Law works to strengthen the rule of law in environmental protection and to build individual and institutional capacity to solve pollution and energy problems.

### **Other Bilateral Programs**

- Sustainable Development and Livelihoods Program for Urban and Rural Ethnic Tibetans — Bridge Fund
- Tibet Sustainable Environment Resources for Increased Economic Growth (TSERING) — Winrock
- Promotion of Sustainable Livelihoods Improvement, Environmental Protection and Cultural Preservation in the Tibetan Autonomous Region (TAR) and Dechen Tibetan Autonomous Prefecture, Yunnan Province — Tibetan Poverty Alleviation Fund
- China Rule of Law Program: Criminal Justice and Procedure — American Bar Association
- China Administrative Law Program — The Asia Foundation

Since 2003, the Cultural and Biodiversity Conservation Program in Tibet Autonomous Region of China has directly targeted biodiversity issues. Work includes evaluating rangeland for domestic and wild species, promoting conservation awareness, and implementing other activities that directly address the need to conserve biodiversity.

## F. Recommendations

RDMA's China governance assessment report (USAID 2010b) provided key recommendations for future USAID programming in China. These are equally important for biodiversity conservation.

- *Build partnerships.* There are opportunities in sustainable natural resources management, environmental governance, clean energy, and climate change for USAID to support public-private partnerships for energy efficiency in industrial sector; to participate in regional platforms (ASEAN-WEN, AECEN, MRC) to address regional environmental issues; and to support universities in strengthening environmental governance.
- *Enhance USAID's capability.* Given China's size, complexity and dynamism, USAID must have sufficient in-house capacity to ensure high-quality program design, management, and monitoring. USAID also needs to be able to meet regularly, and in a timely fashion, with Chinese and other U.S. Government counterparts, partners, and other donors. To do so, USAID needs a stronger presence in Beijing and a greater capability to track and understand developments in China.
- *Conclude a memorandum of understanding.* Although the absence of a memorandum of understanding with the Chinese Government has given USAID a high degree of program flexibility, USAID's limited engagement with the government has presented problems for USAID and its partners.
- *Ramp up current programs.* Current regional and bilateral programs in China should continue and be strengthened with a stronger focus on the role of private sector, universities, and regional platforms and initiatives for addressing threats to biodiversity and forest conservation.

Other recommendations based on USAID RDMA's China Environment Program Planning Assessment (USAID 2010b) include the following:

- Participation by RDMA in the U.S.-China in Ten-Year Framework (TYF) on Energy and Environment Cooperation of the Strategic Economic Dialogue (SED) to enhance collaboration in the biodiversity sector.
- Continued support for the development and use of legality verification and independent certification programs (such as those of the Forest Stewardship Council and others) for timber and other forest products.

- Incorporation of due diligence mechanisms and environmental safeguards to ensure no net loss of biodiversity occurs due to the development of infrastructure and other projects.
- Environmental governance and institutional and judicial capacity building for legal and regulatory compliance and enforcement.
- Strengthening the roles of civil society, academia, and the private sectors in supporting enforcement of biodiversity conservation policies, laws, and regulations.
- A memorandum of understanding will also provide a framework for engaging the Chinese government at both the national and sub national levels
- Supporting awareness raising and capacity building training, with examples tailored to Chinese issues and audiences.



## **ANNEX H. ABBREVIATED BILATERAL ANALYSIS FOR LAO PEOPLE'S DEMOCRATIC REPUBLIC (LAO PDR)**

### **A. Introduction**

RDMA is beginning the process of developing a new strategic plan. This Biodiversity and Tropical Forestry Assessment is conducted to address U. S. Foreign Assistant Act (FAA) Section 118 (tropical forests) and 119 (biodiversity) requirements. The FAA require ~~that~~ each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests/biodiversity and (2) the extent to which the actions proposed for support by the agency meet the needs thus identified.”

Laos' location, bordering on Burma, Cambodia, China, Thailand, and Vietnam; its membership in ASEAN; and its relationship with the Mekong River give it a regional importance that is reflected in the greater size and scope of RDMA's regional programming in the country.

This abbreviated analysis for Laos was primarily a desk study, not a standard 118/119 assessment. No trips to the country were made and no consultations held with stakeholders, aside from brief interviews with relevant RDMA staff. Information in this study relies heavily on a few reports. Information in this study relies heavily on published reports, including USAID's assessment of recent efforts to help Laos meet WTO requirements (USAID 2011c), the country's fourth report to the Convention on Biological Diversity (GOL 2010), and recent FAO reports (2010 and 2011). Within the resources allotted for this abbreviated assessment, it was not possible to validate the data.

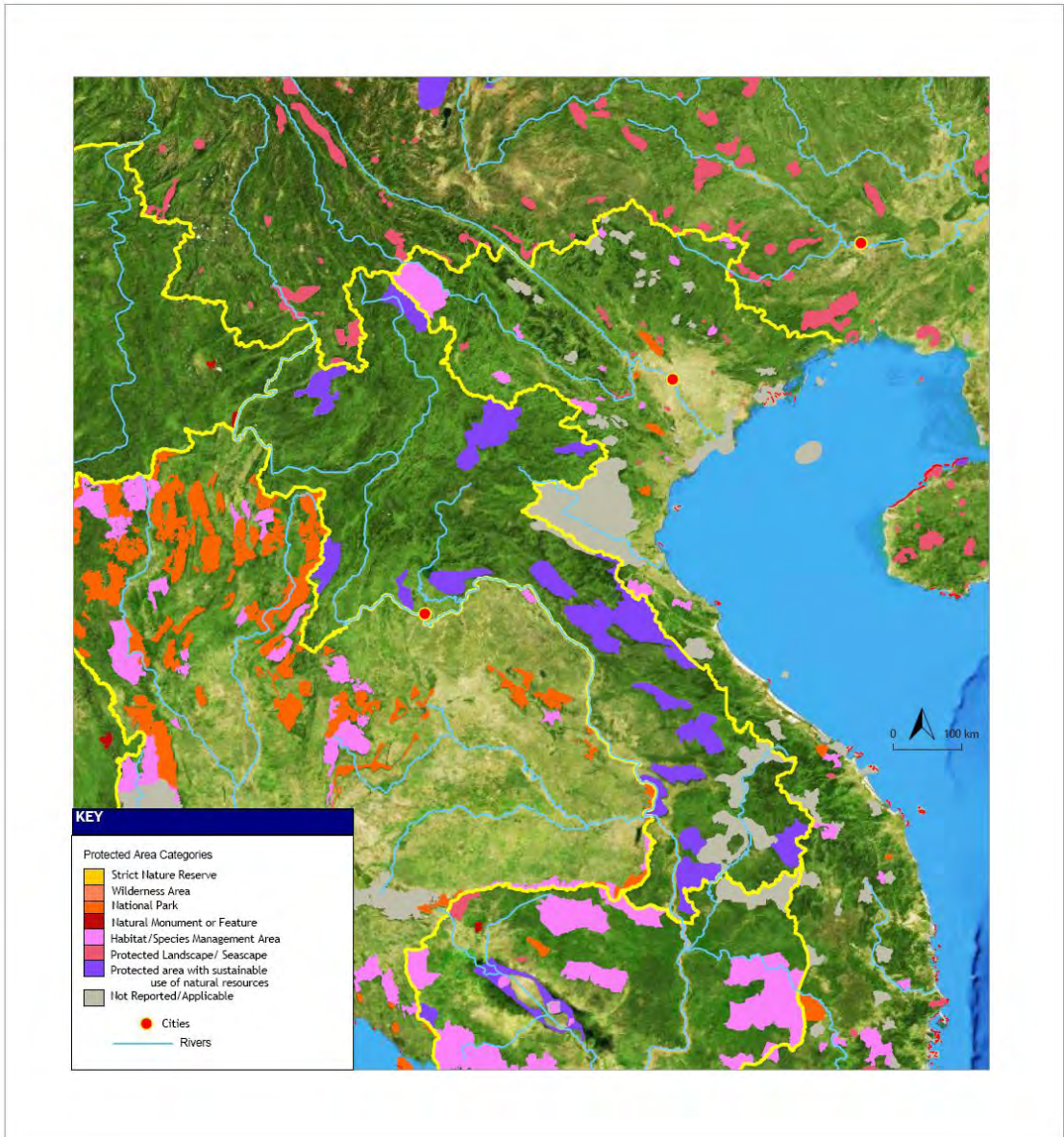
### **B. Overview of Biodiversity and Forests**

Laos is a landlocked state in Southeast Asia with an area of 236,800 square kilometers and a terrain dominated by rugged mountains (76.48 percent) and interspersed with lowland areas (23.52 percent). The climate is tropical monsoon, with a short dry season from November to April.

Lao PDR has significant forest cover — as much as 68 percent (15,751,000 hectares), according to recent estimates (FAO 2011). At low and medium altitudes (100-500 meters), dipterocarp forests (*Dipterocarp spp*) have commercial value as hardwood. At higher elevations, numerous medium-size broadleaf trees are commercial value equal to tropical pines species. Non-timber forest products (NTFPs) typical of the region include bamboos, rattans, cardamom, benzoin resin, latex, bark resin, and gum.

Laos has between 8,000 and 11,000 species of plants, at least 150 species of reptiles and amphibians, at least 700 species of birds, 90 species of bats, and more than 100 species of

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large mammals. The IUCN Red List (IUCN 2009) cites five critically endangered tree species in Lao PDR.

Laos is 13th on the list of countries with the highest number of threatened mammal species (IUCN 2009). The country harbors one of the largest remaining populations of Asian elephants in Indochina, primarily in the Nakai Plateau. The Indochinese tiger is present throughout the forested areas, although populations are small. However, the



combined loss of forest cover and overexploitation of wildlife poses a significant threat to some species, including tiger, gibbon, Asian elephant, and crocodile.

China, Thailand, and Vietnam depend on Lao PDR to feed their timber processing industries because these countries have logging bans. Therefore, logging is a serious threat to the forests of Lao PDR (EIA 2012).

Some 80 percent of the country lies within the Mekong River basin, and resources extracted from the river system remain important to the subsistence of rural communities living in the watersheds. Data documenting freshwater biodiversity in Laos' watersheds is limited. FishBase (2012) documents 590 species of freshwater fish in Laos' river systems. On the mainstream of the Mekong River, more than 1,200 species of fish are reported, 5 of which are listed on IUCN's Red List of Threatened Species (MRC 2010).

Fish stocks in the Mekong watershed, one of the most productive fisheries in the world, are in decline from a combination of factors, including infrastructure development, particularly hydropower facilities, and unsustainable fishing practices. Fisheries contribute up to 8 percent of Laos' GDP. In southern Laos, 80 percent of households participate in the work of fisheries (FAO 2012).

### **C. Overview of the Social and Economic Context**

Lao PDR is a small, sparsely populated, landlocked country with abundant natural resources, including forests, minerals, and freshwater resources (World Bank, 2006). Laos is on the U.N.'s list of least developed countries; however, it is projected to graduate from this status by 2020 (UN-OHRLLS 2012). The country has a population of 6,477,211 (2011 data) and is growing at a rate of 1.68 percent annually — faster than many of its regional neighbors. An estimated 26 percent of the population falls below national poverty line. Per capita GDP is \$2,700, which is low compared to other Southeast Asian countries. Nearly two-thirds of the people live in rural or remote areas, with little or no access to infrastructure and services. They practice small-scale subsistence agriculture and rely on wildlife as a source of animal protein or to meet economic needs (CIA 2012).

Since the government began encouraging the growth of private enterprise in 1986, the economy has grown at an average rate of 6 percent annually; however, the benefits have been concentrated in the lowland areas. Laos still has limited infrastructure, such as roads, water, electricity, and telecommunications, especially in rural areas. Rugged mountains cover more than 75 percent of the country. Upland areas are characterized by poverty, a high proportion of ethnic minorities, and limited access to markets due to a lack of roads and little arable land. Arable land is estimated at around 4 percent of the country's total land area. Lowland areas, especially around the capital, Vientiane, have benefited from improved transportation infrastructure and proximity to markets.

Fifty percent of the GDP is based on subsistence agriculture, which employs 80 percent of the population. Many upland communities rely on rotational agriculture as a primary source of income, but this has become increasingly unsustainable due to population

growth. NTFPs are a widespread and significant income source in rural areas. The country's main exports are hydropower electricity, mined products, and timber (USDOS 2012).

#### **D. Threats to Biodiversity and Tropical Forests**

Threats to biodiversity and forests in Laos are similar to those in the rest of the region. The main driver is rapid and unsustainable regional economic growth due to population growth and rising numbers of wealthy and middle-class consumers with a taste for rare or high-value products. Laos, with relatively poor governance and inadequate safeguards, is easy to exploit to fill the needs of populations elsewhere. Based on the country's fourth national report to the Convention on Biological Diversity (2010), the most significant direct threats to biodiversity are summarized below.

- *Hydropower and road development.* Laos is rapidly becoming the “battery of Southeast Asia,” with proposals for hydropower dams on the mainstream and tributaries of the Mekong River. Much of this development is fueled by foreign investment from neighboring countries, including China, to meet a growing demand for electricity. Hydropower dams impact sediment flows, fisheries, and migration patterns of freshwater species, including the giant Mekong catfish and the Mekong stingray. Reservoirs created by hydropower dams result in deforestation and habitat loss. Road construction also accelerates forest encroachment, overharvesting and trading of wildlife, and overuse of other forestry resources, threatening biodiversity.
- *Agroindustrial plantations.* As elsewhere in the region, agroindustrial plantations are filling up the landscape and replacing natural forests. Rubber and teak plantations are a major threat to the hills and valleys, particularly in the north.
- *Wildlife hunting and trade.* Lao PDR is thought to be the second-largest source country for wildlife in Southeast Asia (after Burma), (i) supplying Thailand with reptiles, wild orchids, wild cattle, pets, food animals, and wildlife; (ii) supplying Vietnam with macaques and other primates, monitor lizards, freshwater turtles, and pangolins; and (iii) used as a trade route for African ivory to China (Felbab-Brown, 2011). Almost all of this trade is illegal, and Vientiane is likely the most important regional smuggling hub (Felbab-Brown 2011). Illegal trade in endangered species is a serious threat to remaining populations of elephant, tiger, pangolin, and other species that are sought by wealthy people in the region. Wildlife harvesting for food, 70 percent by local residents and 30 percent by outsiders, is also a serious threat.
- *Deforestation from logging and agricultural encroachment on forests by smallholders.* In addition to large-scale agriculture, smallholders also are encroaching on the forests in many areas, engaging in rotational agriculture and unsustainably using firewood, which serves to fragment forests and brings people in closer proximity to wildlife.

- *Unsustainable and destructive fishing practices.* As seen elsewhere in the region, unsustainable fishing practices are threatening freshwater fish stocks. The use of small mesh nets and overfishing are problems reduce catch sizes and fish populations.
- *Shifting cultivation (slash and burn agriculture)* is the most serious threat to biodiversity caused by the villagers living in or near protected areas. MOF (2010) estimates that 90 percent of shifting cultivation activities are carried out by people living in near PAs and the remaining 10 percent by people from outside the immediate vicinity.
- *Forest fires* set in the uplands and forests after clearing are a significant threat to biodiversity and a cause of forest loss. Laos needs strict monitoring and enforcement of laws in areas of high biodiversity.
- *Pollution and poisoning activities.* The excessive use of poison and other toxic substances has had an adverse impact on wildlife and fish species, as well as on other natural resources.

#### **E. Actions Necessary to Conserve Biodiversity and Sustainably Manage Forests**

Following are some suggested actions for biodiversity and forest conservation in Lao PDR (GOL 2010):

1. Develop and implement initiatives that ensure benefit-sharing arrangements and increased community participation in natural resource management.
2. Support poor communities in meeting their subsistence and food security needs through sustainable NTFP management.
3. Increase dialogue, consultations, and community involvement in natural resource management.
4. Value watershed protection by applying an integrated ecosystem-based management approach to development activities. Protected area and watershed management costs should be covered by water tariffs.
5. Promote and develop local or traditional practices in land management and policy.
6. Promote a balanced approach to aquaculture development and conservation of natural fish habitats.
7. Facilitate integrated planning for road development, especially in or near protected areas.
8. Support environmental safeguards to assess the direct and indirect impacts of proposed new infrastructure development.

9. Improve intersectoral planning and coordination
  10. Develop the skills and capacity to implement and enforce environmental legislation and policies.
  11. Promote the sustainable use of water resources by working cooperatively with upstream and downstream countries to develop the Mekong River Basin sustainably.
  12. Clarify regulatory mandates among different agencies.
  13. Disseminate information on forest fire prevention.
  14. Strengthen enforcement of laws and regulations, including close monitoring of areas with high biodiversity.
  15. Conduct public awareness programs to help people understand the negative impacts of shifting cultivation and using poison for fishing and hunting.
  16. As a part of integrated rural development, hand over forest lands for agroforestry to provide alternative livelihoods for people dependent on slash-and-burn agriculture.
  17. Promote strict regulations and compliance with existing policies on protected areas. Stop the use of poison for fishing and hunting.

#### **F. Extent to Which RDMA is Addressing the Necessary Actions**

At present, USAID/RDMA's regional strategy and programs only minimally address the actions identified as necessary for conserving biodiversity and tropical forests.

##### **Bilateral Program**

U.S. bilateral assistance to Lao PDR is comparatively small, and most of it is in support of RDMA's Bilateral Trade Agreement/WTO accession program. RDMA's investment in this program is approximately \$2 million. The three-pronged focus of the program is supporting the implementation of the U.S.-Laos Bilateral Trade Agreement; supporting the timely accession of Lao PDR to the WTO; and supporting Lao PDR in fulfilling its commitments under the ASEAN Economic Community.

The greatest benefit of this USAID program is in supporting improvements in the policy and legislative framework to promote transparency and better governance. The logical progression of this project over time would be a shift toward training and capacity building for enforcement, both of which would benefit the environmental management sector.

Lao PDR has a number of competitive disadvantages compared with its neighbors, which include being landlocked with poor infrastructure, few skilled workers, and a dispersed, mostly rural, agrarian population. Trade expansion will likely increase demand for the country's goods and services. As natural resources (water, minerals, and timber) serve as the basis for most of Laos' economy, increased demand may increase stress on these resources. Private investment and enterprise may threaten customary land rights, weakening community stewardship over natural resources. RDMA needs to be aware of these issues and ensure that efforts to increase trade do not put unsustainable demands on the country's biodiversity and forests.

### **Regional Programs**

A number of regional programs operating in Lao PDR indirectly relate to biodiversity and forest conservation. These are listed below.

- Lowering Emissions in Asia's Forests (LEAF). This program works in Laos and five other countries to strengthen forest management by demonstrating approaches to low-carbon development to inform policy and to support national REDD+ strategies.
- Asia's Regional Response to Endangered Species Trafficking (ARREST). This program works to conserve biodiversity by reducing Asia's illegal trade in threatened and endangered species.
- Responsible Asia Forestry and Trade (RAFT). This project worked to improve sustainable forest management, increase regional trade in timber from legal sources, and link forests and climate change.
- Mekong River Basin Climate Change Adaptation Program. This climate change study for agriculture subsectors and ecosystems identifies impact and adaptation options. It also addresses food security, biodiversity, and livelihoods.
- Building Climate Resilience through Improved Management of Mekong Hydropower Infrastructure . This project aims to strengthen resilience against the negative impacts of climate change through improved management of hydropower facilities.

Other RDMA regional programs implemented in Lao PDR are not directly related to biodiversity and forest conservation. However, these programs, listed below, could indirectly help to address biodiversity conservation issues through awareness-raising.

- U.S. Bilateral Trade Agreement Compliance and WTO Accession
- Asia Climate Change Adaptation Project Preparation Facility (ADAPT)
- Reduction of Infectious Diseases, HIV/AIDS, and Avian Influenza Program
- Low-Emissions Asian Development (LEAD) Program

## **G. Recommendations**

The following recommendations are offered as ways for RDMA to enhance biodiversity and forest conservation activities in Lao PDR.

- Supporting Greater Mekong Subregion (GMS) programs, as more than half of the population depends on the resources provided by Mekong River.
- Promote livelihood sources and ecotourism activities and maintain the stability of the ecosystems through the enforcement of rules and regulations.
- Enhance technical capability for biodiversity conservation and management.
- Expand engagement with additional partners, regional initiatives, and regional platforms to address biodiversity and forestry issues.
- Continuing to support the development and use of certification programs for timber and other forest products.
- Support compliance with environmental safeguards to prevent any net loss of biodiversity due to infrastructure development roads.
- Raising awareness of the importance of biodiversity and forest conservation.

# ANNEX I. ABBREVIATED BILATERAL ANALYSIS FOR THAILAND

## A. Introduction

RDMA is beginning the process of developing a new strategic plan. This Biodiversity and Tropical Forestry Assessment is conducted to address U. S. Foreign Assistant Act (FAA) Section 118 (tropical forests) and 119 (biodiversity) requirements. The FAA require ~~that~~ each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests/biodiversity and (2) the extent to which the actions proposed for support by the agency meet the needs thus identified.”

RDMA has only one bilateral program in Thailand (SAPAN), which works to strengthen democratic processes.

This is not a standard 118/119 assessment, as there were no field trips and no consultations with Thai officials or NGOs. Information in this study relies on Thailand’s fourth country report to the Convention on Biological Diversity (2009), other written reports, and information gleaned during the regional biodiversity assessment.

## B. Overview of Biodiversity and Forests

Thailand has a land area of 513,115 square kilometers, slightly smaller than France. It shares land borders with Burma, Cambodia, Laos, and Malaysia. It is bordered by the Andaman Sea and the Gulf of Thailand and has a total marine area of 2,230 square kilometers, which surrounds 936 islands. The entirety of Thailand’s land and marine area lies within the Indo-Burma and Sundaland hotspots (Conservation International 1998). Thailand’s climate is characterized as tropical monsoon.

Thailand supports approximately 15,000 plant species (accounting for 8 percent of the global total), 12,000 species of vascular plants (including 658 fern species and more than 10,000 flowering plants), and 2154 species of non-vascular plants (ONEP 2009). Among Thailand’s 4,591 species of vertebrates are 302 species of mammal, 982 bird species, 350 reptile species, 137 amphibians, and more than 2,820 fish species. Of these, 838 species are freshwater fish, of which 18 species are endemic. Thailand is estimated to have 83,000 species of invertebrates; however, data is limited.

*Forests and wildlife.* Estimated forest cover in Thailand as of 2010 is close to 19 million hectares, accounting for 37 percent of total land area (FAO 2011). Forest types in Thailand are tropical evergreen, pine, mangrove, beach, mixed deciduous, and dry dipterocarp. Primary forest makes up 35 percent of total forest area, and planted forests make up close to 20 percent. Commercial logging has been banned in Thailand since

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1989; however, encroachment into protected areas and forest edges is still widespread. Plantations on private land are expanding, but trends are not tracked in official statistics.

Although most of the country's remaining forests are fragmented, they are largely protected in national parks and wildlife sanctuaries. Thailand's PA network is well established and is one of the strongest systems in Southeast Asia. PAs cover 16 percent of total land area (equivalent to 8.1 million hectares), and more than 65 percent of forests are within existing or proposed PAs (ICEM 2003).



Of particular note is the Western Forest Complex PA network on the Thailand-Burma border. Nineteen contiguous national parks and wildlife sanctuaries in the border region of totaling 18,730 square kilometers comprise this complex. It supports some of the healthiest remaining habitat for tigers, Asian elephants, leopards, and black bears anywhere. Among the notable birds of conservation significance is the threatened plain-pouched hornbill.

*Fisheries and mangroves.* Thailand supports 10 percent of the total estimated fish species worldwide. Although fishery exports contribute about \$6 billion annually to Thai GDP, fish stocks are in decline. Catch per unit of effort decreased by 87 percent between 1966 and 2003. In addition, low growth in total catch despite enhanced efforts and an increase in the catch of low-value fish species indicate unsustainable fishing practices (World Bank 2006).

Intact mangrove forests provide a multitude of ecosystem services, including spawning and nursery areas for fish species, habitat for birds, and protection from wave energy and coastal erosion. Although total mangrove forest area decreased from 368,000 hectares in 1961 to 240,000 hectares in 2002, total mangrove area has increased somewhat in recent years due to restoration efforts by coastal communities. The primary causes of mangrove deforestation are the charcoal and timber industries and land conversion for residential, industrial, and aquaculture development.

*Coral reefs.* Thailand has approximately 153 square kilometers of coral reefs, 51 percent in the Andaman Sea and 49 percent in the Gulf of Thailand. Coral reefs are rich in biodiversity, and healthy reefs are important for the sustainability of fisheries. Thailand's reefs are becoming increasingly degraded from a range of factors, including land-based pollution, unsustainable fishing practices, overexploitation, climate change, and coral bleaching. About 37 percent of total coral reef area has been categorized as degraded (ONEP 2009). Continued degradation of coral reefs will have far-reaching impacts on marine biodiversity. For instance, there will be no protection of the mangroves and seagrass from strong current and waves, and no breeding place for many types of coral reef animals.

### **C. Overview of the Social and Economic Context**

The total population of Thailand is 67.31 million, with an estimated annual growth rate of 0.6 percent and an urban population of 34.4 percent. The annual GDP growth rate is 7.6 percent, and per capita GDP is \$4,874 (ADB 2011). Growth projections remained strong until a flooding disaster in late 2011. Industry comprises the largest portion of GDP (44 percent), followed closely by services (43 percent). Exports of goods and services comprise close to two-thirds of GDP (CIA 2012).

Thailand's economy is the fourth-strongest in Southeast Asia, behind Singapore, Brunei, and Malaysia. In 2011, the World Bank upgraded Thailand from lower-middle income country status to upper-middle income country status owing to increased social and economic development. Following recovery from the Asian financial crisis in the late 1990s, Thailand sustained high economic growth rates, resulting in a significant

reduction in poverty rates. The benefits of economic growth have not been equally distributed between the urban and rural populations, resulting in growing inequality.

Although the urban population is growing as a result of continued industrialization, Thailand's population is mostly rural (more than 65 percent) and concentrated in the northern and central rice-growing areas. Rural areas in Thailand have a higher incidence of poverty and tend to rely more directly on natural resources for their livelihoods.

Approximately 27 percent of the total land area is arable, and almost 7 percent of land is permanent cropland. FAO reports 44 percent of the population depended on agriculture for their livelihood in 2007, down from 57 percent in 1990. The contribution of agriculture to GDP, currently 12 percent, has been falling over the last two decades. Rice and rubber are Thailand's most important agricultural commodities, and Thailand is the leading exporter of both in the world market. Other agricultural commodities of note are fish and fish products, shrimp, tapioca, corn, and sugar.

#### **D. Threats to Biodiversity and Tropical Forests**

The main driver of threats to biodiversity and tropical forests in Thailand is rapid regional economic growth, population growth, and the rise of wealthy and middle-class consumers with a taste for rare and high-value products. The most important threats are listed below.

- *Illegal trade and exploitation of wild animals and plants.* There has been a drastic decline in the population of many species with high commercial value, many of which are now rare, endangered, or locally extinct, such as the Indochinese tiger, Asian elephant, pangolin, rosewood, and numerous wild orchid species
- *Illegal logging.* In particular, illegal rosewood logging and smuggling driven by unprecedented demand for luxury redwood furniture in China is a key threat to the primary forests of Thailand. The government has failed to control the rampant illegal international trade (EIA 2012; Woods et al 2011).
- *Deforestation and land use change.* High demand for land to build resorts and hotels, combined with ambiguous tenure relations in forest reserve areas, has resulted in continuous deforestation and degradation. Mangrove forests are threatened by shrimp farming and construction of residential areas and factories. This has led to a loss of mangrove biodiversity, aquifer habitat loss, saltwater intrusion, and coastal erosion.
- *Invasive alien species.* Of approximately 3,500 alien species in Thailand, some have been distributed in the wild and have become invasive, threatening other organisms, ecosystems, and biodiversity and causing significant economic loss. Important invasive alien species include the giant sensitive plant (*Mimosa pigra*), janitor fish (*Pterygoplichthys spp*), Mexican sunflower (*Tithonia diversifolia*), and golden apple snail (*Pomacea canaliculata*) (ONEP 2009).

- *Water pollution.* As a consequence of rapid urbanization, freshwater (surface and groundwater) and marine ecosystems are being contaminated by household, agricultural, industrial, and navigation wastes. This is exacerbated by sedimentation and erosion.
- *Wetland loss and degradation.* Most natural wetlands in Thailand have been converted to agricultural land, and many remaining sites are under pressure. This has led to the extinction of the national breeding populations of most large water birds, including threatened species such as giant ibis and Sarus crane (BirdLife International 2003).
- *Destruction of coral reefs.* The reefs in the Andaman Sea and the Gulf of Thailand have been threaten by fish bombing, pollution, tourist pressure, and rising sea temperatures over an extended period. The government temporarily closed 18 diving sites in marine national parks in 2011 to allow the recovery of coral reefs affected by widespread bleaching. Eleven of these sites have reopened, while 7 will remain closed in 2012.

#### **E. Actions Necessary to Conserve Biodiversity and Sustainably Manage Forests**

Based on the 11<sup>th</sup> national economic and social development plan (2012-2016), the fourth national report on implementation of the Convention on Biological Diversity (2008-2012), and the third draft national master plan on climate change (2010-2019), the following actions are identified as necessary to conserve biodiversity in Thailand.

1. Restructure the production and transportation sectors toward a low carbon economy. Change consumption behavior to achieve a low carbon society. Engage the private sector in conservation and sustainable use of biodiversity resources.
2. Develop practical guidelines or regulations to facilitate sustainable natural resource use, access, and benefit-sharing.
3. Advocate local community rights to access and utilize natural resources sustainably. Strengthen local capacity in natural resource management.
4. Develop mechanisms and encourage local participation in PA and water resource management in river basin systems.
5. Use economic incentives (e.g., REDD, PES) to generate income from natural resource and biodiversity conservation.
6. Develop mechanisms, criteria, and regulations to control and mitigate threats from invasive alien species.
7. Build taxonomic research capacity, establish a biodiversity database, and create a specialized taxonomists networks to enable a strategic response to national biodiversity priorities.

8. Identify areas vulnerable to climate change based on inappropriate land use, natural disaster records, and regional climate change databases. Pilot climate change adaptation projects.
9. Enhance natural resource management by ensuring that government investments are in line with the conservation and restoration of natural resources. Amend laws and regulations in a timely manner. Equitably enforce laws and regulations.

#### **F. Extent to Which RDMA is Addressing the Necessary Actions**

RDMA has only one bilateral program in Thailand (SAPAN), aimed at improving local governance. However, some of RDMA's regional programs that include Thailand address direct and indirect threats to biodiversity and tropical forests. They are listed below.

- SAPAN (the word means “bridge” in Thai), supported by GVP, works to enhance the capacity of key independent agencies (such as the Office of Auditor General and the National Anticorruption Commission), civil society organizations, and the media to participate in political processes and public policy-making in southern Thailand.
- Lowering Emissions in Asia's Forests (LEAF), supported by REO, is being implemented in six countries, including Thailand. It works to strengthen forest management by demonstrating approaches to low carbon development, informing policy, and supporting national REDD+ strategies.
- Asia's Regional Response to Endangered Species Trafficking (ARREST) program, supported by REO, combats illegal wildlife trafficking in Asia, including Thailand.
- Responsible Asia Forestry and Trade (RAFT), supported by REO, worked in eight countries, including Thailand, to improve sustainable forest management, increase regional trade in timber from legal sources, and link forests and climate change. It would be beneficial to continue this approach to biodiversity and forest conservation.
- The Lower Mekong Initiative (LMI) – Managing Sediment and Climate Change in Mekong Basin Dams works with MRC and the water resource authorities of the Lower Mekong countries on hydrologic modeling to promote natural river flow patterns and sediment transport while protecting vital fisheries and natural resources.
- The Mekong River Basin Climate Change Adaptation Program, supported by REO, is a climate change study for agriculture subsectors and ecosystems. It works to identify impact and adaptation options related to food security, biodiversity, and livelihoods.
- The Regional Infectious Diseases Program, supported by OPH, works in partnership with the Asian Collaborative Training Network for Malaria to find solutions for drug-resistant strains of malaria in the border areas between Burma and Thailand, and between Thailand and Cambodia, and to enhance communication among countries on cross-border malaria problems.

## **G. Recommendations**

- Secure biodiversity conservation and sustainable management of natural resources through integrated conservation-economic development planning and implementation.
- Improve enforcement of policies, laws, and regulations on biodiversity and natural resource conservation, and increase monitoring for compliance and effectiveness.
- Incorporate the social and environmental impact of development projects into decision-making processes and ensure their inclusion in cost-benefit analyses and mitigation measures.
- Strengthen the interlinkages among biodiversity, climate, change, and sustainable land management when developing policies and determining the roles and responsibilities of government agencies.
- Establish more corridors between PAs to reduce forest fragmentation and enhance healthy ecosystems for climate resilience.
- Encourage private companies with high social and environmental standards to contribute strategically to environmental compliance, environmental awareness, and green technology both within and outside the country.



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