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Asia Regional REDD Program Planning

Assessment Report

This report was prepared for the United States Agency for International Development Regional Development Mission for Asia.

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Photos *(clockwise from top left): High Conservation Value Forest in Berau District, East Kalimantan; Indonesia (B. Flaming); monocable logging in Indonesia (TNC); household fuelwood use by Karen minority in northern Thailand (B. Flaming); forest ordination ceremony in northern Thailand (B. Flaming).*

ASIA REGIONAL REDD PROGRAM PLANNING ASSESSMENT

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The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.
Due to the rapidly evolving context of REDD and the global climate change negotiations and finite resources available, there are bound to be omissions, errors, and gaps in this report.

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ACROYNMS

ADB	Asian Development Bank
AFOLU	Agriculture, Forestry, and Other Land Use
ARBCP	Asian Regional Biodiversity Conservation Program
APEC	Asia-Pacific Economic Cooperation Forum
APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
ASEAN	Association of Southeast Asian Nations
ASOF	ASEAN Senior Officials on Forestry
AusAID	Australian Agency for International Development
BCI	Biodiversity Corridor Initiative
CCBA	Climate Community Biodiversity Alliance
CCI	Clinton Climate Initiative
CFI	Community Forestry International
COP	Conference of the Parties
CTI	Coral Triangle Initiative
DOF	Department of Forestry (Laos)
DNP	Department of National Parks, Wildlife, and Plant Conservation (Thailand)
FA	Forest Administration (Cambodia)
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility (World Bank)
FD	Forest Department (Bangladesh)
FECOFUN	Federation of Community Forestry Users, Nepal
FIO	Forest Industry Organization
FIPI	Forest Inventory and Planning Institute (Vietnam)
FLEG	Forest Law Enforcement and Governance
FSC	Forest Stewardship Council
FY	Fiscal year
GEF	Global Environment Facility
GHG	Greenhouse gas
GIS	Geographic information systems
GMS	Greater Mekong Subregion
Ha	Hectare
HCVF	High Conservation Value Forest
HOB	Heart of Borneo
IPAC	Integrated Protected Areas Co-management project
IPCC	International Panel on Climate Change
IUCN	International Union for the Conservation of Nature
JFM	Joint Forest Management
JICA	Japan International Cooperation Agency
LEDS	Low Emissions Devleopment Strategies
LULUCF	Land Use, Land Use Change, and Forestry
MAF	Ministry of Agriculture and Forestry (Laos)
MARD	Ministry of Agriculture and Rural Development
MOE	Ministry of Environment
MONRE	Ministry of Natural Resources and Environment

	(Thailand, Vietnam)
MPA	Marine protected area
MRC	Mekong River Commission
MRV	Monitoring, Reporting, and Verification
M	Million
Mt	Million tons
NAFES	National Agriculture and Forestry Extension Service (Laos)
NAFRI	National Agriculture and Forestry Research Institute (Laos)
NP	National Park
ONEP	Office of Natural Resources and Environmental Policy and Planning (Thailand)
PA	Protected Area
PES	Payment for Environmental (Ecosystem) Services
PFAN	Private Financing Advisory Network
PNG	Papua New Guinea
R-PIN	Readiness Preparation Idea Note
R-PP	Readiness Preparation Proposal
RAFT	Responsible Asia Forestry and Trade
RDMA	Regional Development Mission for Asia
RECOFTC	Regional Community Forestry Training Center (now known as the Center for People and Forests)
REDD	Reduced Emissions from Deforestation and Forest Degradation
REDD-plus	REDD plus sustainable forest management, conservation, and enhancement of forest carbon stocks
REL	Reference Emission Level
REO	Regional Environment Office
RSPO	Roundtable on Sustainable Palm Oil
SBSTA	Subsidiary Body on Scientific and Technological Advice
SUFORD	Sustainable Forestry and Rural Development Project
t	tons
TGO	Thailand Greenhouse Gas Management Organization
TIMO	Timber Investment and Management Organization
TNC	The Nature Conservancy
TRAFFIC	The Wildlife Trade Monitoring Network
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
USG	United States Government
VCS	Voluntary Carbon Standard
WCS	Wildlife Conservation Society
WDPA	World Database on Protected Areas
WREA	Water Resources and Environment Administration (Laos)
WWF	Worldwide Fund for Nature

EXECUTIVE SUMMARY

An estimated 15% of global greenhouse gas (GHG) emissions come from deforestation, forest degradation, and land use change. Over half of this is generated from eight countries in Asia, with the top three--Indonesia, Malaysia, and Burma--representing nearly 45% of the global total. Emissions from deforestation are also significant in Papua New Guinea, Nepal, the Philippines, Cambodia, Thailand, Sri Lanka, and Laos, where the forest sector can represent from 50-80% of a country's total emissions. Reducing these emissions by avoiding deforestation and improving forest management is a key approach for cost-effective climate change mitigation, in addition to generating important biodiversity conservation and livelihood benefits as well.

International commitments to support forest sector mitigation are growing and include negotiations for a global mechanism—known as Reducing Emissions from Deforestation and forest Degradation (REDD)[1]--to provide financial incentives for developing countries. In Copenhagen in December 2009[2], the international community made pledges approaching $30 billion to support climate change mitigation and adaptation, including a $1 billion commitment from the United States to support *'Sustainable Landscapes*' over the next three years. In recognition of Asia's significant role to play in mitigating greenhouse gas emissions and to support US Government commitments, this assessment report identifies the priority programming needs and opportunities at the regional level to address forest sector mitigation in Asia.

Assessment Objectives, Scope, and Methods

The objective of the assessment was to identify priority REDD opportunities and challenges for the Asia region and to recommend effective interventions, tools, platforms, partners, and program activities to address forest sector mitigation. This report will be used to inform the planning process for possible future regional activities funded by USAID/RDMA that address *Sustainable Landscapes* needs and requirements. The report will be shared widely with USAID bilateral missions in Asia, USAID offices in Washington, US Embassies in Asia, other US Government agencies, multilateral development banks, and development partners.

Twelve countries were considered in the scope of this assessment, categorized into three sub-regions: **Lower Mekong** (Cambodia, Laos, Thailand, and Vietnam); **Insular Southeast Asia** (Indonesia, Malaysia, Papua New Guinea, and the Philippines); and **South Asia** (Bangladesh, Bhutan, India and Nepal). Data for China, Burma, and Sri Lanka, where presented, is only for comparative purposes and is not intended for program planning. This assessment focused on programming opportunities at the regional level and did not specifically address opportunities for individual countries.

[1] For the purposes of this report, 'REDD' refers to and is used interchangeably with 'REDD-plus', which includes conservation, sustainable forest management, and enhancement of forest carbon stocks (restoration) in addition (-plus) to avoiding deforestation and reducing degradation.

[2] See Copenhagen Accord at: http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf

In February 2010, a team comprised of a lead consultant and five technical experts from the USDA Forest Service, Department of State, and USAID/RDMA conducted this assessment. The team conducted literature reviews and held consultations with 60 individuals from more than 40 organizations through workshops, roundtable discussions, and a survey questionnaire. Participants included government agencies, multilateral organizations, donors, international and local non-governmental organizations (NGOs), and representatives of other US Government agencies and USAID Missions.

Findings and Recommendations

The assessment was structured to answer three key questions that pertain to (1) opportunities and challenges, (2) recommendations for regional programming and potential synergies between USAID regional and bilateral mission activities, and (3) options for coordinating and collaborating with partners in the region. The responses to the three questions are provided below.

Question #1 ***What are the opportunities and challenges in countries of the Asia region to deliver meaningful forest sector mitigation?***

Opportunities to deliver meaningful forest sector mitigation in Asia

High potential for emissions reductions in Asia

Asia has extensive forests resources and some of the highest deforestation rates in the world. Indonesia is the world's top forest emitter, due in large part to extensive clearing and burning of carbon-rich peat lands. Malaysia and Burma rank third and fourth respectively (behind Brazil), while Papua New Guinea, Nepal, Philippines, Cambodia, Thailand, Sri Lanka, and Laos also rank relatively high. Reducing deforestation and forest degradation in these countries would therefore have significant global mitigation benefits. In Bangladesh, Bhutan, China, India, and Vietnam, forest loss is relatively stable or reversed, resulting in net increases in forest carbon stocks. Avoiding deforestation is likely to result in more rapid and significant reductions compared to afforestation, where smaller gains would be made over longer time periods.

Strong global commitments to REDD

The growing global support for an international REDD mechanism, including pledges in Copenhagen approaching $30 billion for climate change mitigation and adaptation, has stimulated action. Even though a global agreement is still under negotiation and the operational rules are not yet fully defined, early investments are already moving many countries forward. That the developed and developing countries are both supportive is helping generate important political will to make REDD a global reality.

Promise of sustainable financing for conservation

Through increased funding for forest conservation, sustainable management, and restoration, developing countries have the opportunity to reduce emissions, sequester carbon, conserve biodiversity, and receive payments for doing so from developed countries. These payments would serve as key investments to improve livelihoods and support the transition to a low emissions future. The promise of REDD as a long-term financing mechanism is mobilizing the forest sector like never before and gaining political traction to strengthen forest governance and address the drivers of deforestation. In the meantime, the growing voluntary and compliance markets for carbon offsets are helping to demonstrate the 'proof of concept' during this early developmental phase and providing tangible financial incentives. The potential for substantial financial resources is serving as strong encouragement to conduct the necessary institutional, political, and fiscal reforms that will be needed to participate in a global REDD mechanism.

Rich regional experience being developed

The diverse range of institutional and forest governance arrangements across Asia are providing key lessons to inform REDD development and implementation. Early experiences in many countries with Payments for Ecosystem Services (PES) and REDD initiatives led by UN-REDD and the World Bank Forest Carbon Partnership Facility, among others, are acting to jump-start 'REDD readiness' in the Asia region.

Achieving multiple co-benefits

In addition to mitigating climate change, conserving forested ecosystems may also have the potential to contribute significantly to protecting biodiversity, improving livelihoods for the millions of forest-dwelling communities in Asia, and strengthening resiliency to climate change. The inclusion of strong social and environmental safeguards in a future climate change agreement and the pro-poor approach being taken by some countries would further support the actualization of these co-benefits.

New technological developments

A number of new technologies could support forest sector mitigation through reducing monitoring and other transaction costs. Remote sensing technologies and new satellites are becoming cheaper and more accurate in measuring changes in forests and carbon stocks. Combined with geographic information systems and other modeling applications, powerful tools are becoming available to inform spatial planning and integrated decision-making. In addition, other new technologies, such as mobile phone banking, could also be applied to reduce costs of transferring REDD payments.

Challenges in Forest Sector Mitigation

REDD is evolving, with rules still being defined

The global climate change negotiations are ongoing, and there are many details for a future REDD mechanism that still need to be worked out. While some of the key issues are becoming clearer, the operational rules for how such a mechanism would be implemented have not yet been fully defined. As new methodological procedures are being developed, their implementation is constrained by slow approval processes and limited replication. During this early developmental phase, a flexible, adaptive approach will be required to adjust to the situation as details evolve.

Technical capacities are weak

Current technical capacities to accurately monitor changes in forest cover and carbon stocks are variable across the region and rather low in some countries. In order to set the foundation for a global REDD mechanism and to strengthen market confidence in forest offsets, substantial capacity building efforts will be needed to strengthen the scientific capacities for forest management and measurement, increase understanding of environmental economics and resource valuation, and promote informed decision-making and strategic investing. These capacity constraints make scaling-up REDD efforts very challenging since appropriate expertise is not available and there is limited capacity to absorb the large amounts of money that are being pledged. Capacity building needs will therefore have to be balanced with the absorptive capacity of government agencies and other stakeholders.

Significant institutional, policy, and governance reforms are needed

While REDD is highly technical, many of the important decisions to be made are actually more political in nature. For example, benefit-sharing is both a technical question of how to incentivize forest protection, but also a political decision about how to trade-off different internal government politics. Integrated planning across line agencies is currently rare, but coordinated policies will be necessary to minimize conflicting policy targets (e.g. between agricultural expansion and forest conservation). The roles and responsibilities of various government ministries and other stakeholders will need to be clearly defined, including contentious issues related to community and indigenous rights. Supportive government policies will be needed, particularly increased clarity over forest and carbon ownership and how REDD revenues would be distributed.

Social and environmental risks

Civil society organizations and community groups in some countries are currently not supportive of a global REDD mechanism, citing fears of the global commoditization of forests and further limitations on traditional rights to forest resources (similar to what happened with the expansion of protected areas for biodiversity conservation). Currently, effective multi-stakeholder processes to deal with such conflicts are few. There are also legitimate concerns about the distribution of costs and benefits, citing elite capture of financial flows and uncertainties that REDD payments would be sufficient to overcome local opportunity costs. Emphasis on forest carbon conservation could also have negative implications on biodiversity if monoculture tree plantations were encouraged at the expense of natural forests.

Insufficient coordination

A dizzying array of development partners, donor organizations, multilateral development banks, non-government organizations, private sector project developers and speculators are rushing to support REDD-readiness in the region. Differing interests, objectives, and capacities have resulted in a shotgun approach that is neither strategic nor coordinated. National government agencies working on REDD lack a strategic framework and the manpower to coordinate and make effective use of existing efforts and resources.

Weak private sector engagement

While private sector involvement will be key to ensure long-term sustainable financing for REDD through existing and future voluntary and compliance markets, it is currently low in the region. Some good examples of public-private partnerships for REDD do exist, but potential investors have generally tended to shy away due to uncertainties in a global climate change deal, high transaction costs, and perceived risks in forest carbon offsets, particularly in some Asian countries with a history of illegal logging and corruption. Obstacles to investment and associated risks will need to be mitigated to encourage greater private sector financing.

Addressing leakage

There is a risk that effectively reducing deforestation in one region or country will simply be displaced elsewhere to another region or country where forest governance is weaker. Known as 'leakage', this phenomenon has national, regional and global implications for demonstrating effective forest sector mitigation. International trade in timber and wood products would also likely need to be included in this equation, but currently there is little guidance on how to address this issue.

Question #2 ***With respect to future RDMA programming, what interventions, tools, and program activities are most needed and appropriate at the regional level to most effectively address REDD-plus opportunities and challenges, and how can regional activities best complement potential national-level activities?***

To produce meaningful forest sector emissions reductions in Asia, the interventions, tools, and program activities needed at the regional level would include: (1) developing and promoting regional capacities, standards and tools; (2) replicating regionally-applicable models and best practices across countries; (3) improving the management of transboundary forest landscapes; (4) fostering regional cooperation; and (5) strengthening regional institutions and networks.

1. Developing and promoting regional capacities, standards and tools

Reducing deforestation at a meaningful scale and participating in a global REDD mechanism will require strengthened skills and capacities for improved forest management and monitoring. New knowledge of environmental economics and resource valuation methods will also be needed to inform strategic decision-making and investing. This could be done cost-effectively at a regional level through joint training programs for monitoring, reporting, and verification (MRV), for example, and the development of training manuals and curriculum, etc. Such joint regional efforts would also help harmonize standards for some technical issues like defining 'forest', setting baselines, etc. Different trainings will be needed for different stakeholders, e.g. negotiators, government officials designing REDD frameworks, international or national organizations, technical experts, local communities, etc.

Regional programming can also focus on conducting regional analyses, mapping, and visioning exercises to advance understanding of the interactions between forest carbon dynamics, deforestation trends and drivers, timber trade flows, projected climate change impacts, biodiversity and livelihood co-benefits, opportunity costs and market factors, and future infrastructure development plans, among other issues. Greater understanding will also be needed regarding the distribution of costs and benefits to various stakeholders. Analytical capacities could also be complimented by efforts to develop regional decision support tools like SERVIR, a geospatial information sharing platform, for the Asia region as a whole, or for a given geographic sub-region.

Support for the development of new REDD methodologies and models would also have wide-reaching regional impacts. While a generic, modular REDD methodology currently exists, similar methods are not available for a number of other important forest models, including: improved forest management (including reduced impact logging), community forestry, shifting cultivation, degradation, forest conservation, assisted natural regeneration, enhancement of carbon stocks, bundling of geographically distinct forests, stacking of ecosystem services (e.g. carbon plus water), and ecosystem-specific methodologies (e.g. mangroves, peat lands, etc.). In addition, supporting development of a practical nested approach to reconcile how REDD projects will fit into national frameworks and systems will help to encourage sub-national actions. Development of these models and methodologies should be generic and modular so they are transferable between countries and sites to allow for regional replication.

The uncertainties involved in the global climate negotiations and the specific operational rules surrounding REDD will require an adaptive learning approach. Regional engagement can effectively forge strong links to UNFCCC and IPCC processes in order to bring current rules and procedures to countries in the region in a consistent, accurate, and cost-effective manner. This could be achieved for example through development of a regional 'learning hub' or 'technical helpdesk' that maintains information on a variety of topics, such as: US legislation, UNFCCC negotiations (overall and REDD specifically), types of carbon markets,

available REDD methodologies, training resources, MRV options (e.g. satellite types, costs, ease of access, data availability, etc.), REL options, and summary of policy approaches to reduce deforestation, etc.

2. Replicating models and best practices across countries

During this early phase of REDD development, a diversity of experiences with new models and approaches are being generated around the region, but there have so far been little efforts to document, synthesize, and disseminate this information. Regional programming can assist in filling this gap, as well as promoting replication of best practices and promising approaches.

As discussed above, regional programming can be instrumental in supporting the development of specific REDD methodologies with regional applicability. For example, these could help address common forest carbon accounting methodologies for forest types shared between countries. A community forestry model would have applications for almost every country across the region.

How countries are addressing the common challenges associated with REDD planning and implementation could be very instructive. Sharing best practices that relate to common issues such as policy development and reforms to reduce deforestation and protect carbon-rich forests, approaches to maximize co-benefits, the promotion of legal timber trade and sustainable forest management, equitable benefit sharing, and private sector engagement could help catalyze REDD experiences across the region.

Replication and scaling-up regionally can occur through sharing and exchange visits, as well as through existing regional platforms and initiatives, such as ASEAN, Greater Mekong Subregion, Mangroves for the Future, Coral Triangle Initiative, and others (see point five below).

3. Improving the management of transboundary forest landscapes

Achieving meaningful forest sector mitigation in Asia will be best done through planning and implementation at the large scale of forest ecosystems and landscapes. Regional programming is strategically placed to support this effort through improving the management and protection of important transboundary forest landscapes. Landscape–level protection will also support ecosystem-based adaptation efforts. Examples of such landscapes, which are important for both carbon and biodiversity conservation, could include:

Lower Mekong (Cambodia, Laos, Thailand, Vietnam)
Eastern Himalayas (Bhutan, Nepal, northeast India)
Heart of Borneo (Indonesia, Malaysia, Brunei)
Sundarban mangroves (Bangladesh, India)
Papua, Indonesia and *Papua New Guinea*

The objective in these locations would be to actualize REDD financing to protect and restore key transboundary ecosystems and landscapes for biodiversity conservation and climate

change mitigation and adaptation. Sub-national or provincial approaches could be piloted in these key landscapes to demonstrate REDD mechanics on the ground and help inform national-level systems, policies, and processes, while contributing to the overarching objective of landscape protection. As reducing deforestation and forest degradation will require strategic decisions regarding trade-offs at the local level, it is important that pilot interventions be grounded in actual geographies. Needless to say, such an approach would also be able to achieve demonstrable emissions reductions and would necessitate strengthening management of protected areas, addressing development scenarios and trade-offs, and strengthening rural food, energy, and livelihood security.

Working in key transboundary landscapes will also support sharing of common approaches and methodologies between countries where needed, as well as contributing to improved regional cooperation.

4. Fostering regional cooperation and strengthening regional institutions and networks

Making progress in addressing global climate change will require unprecedented cooperation from the entire global community. Regionally coordinated responses to climate change will make national mitigation and adaptation strategies more effective and also prevent negative unintended consequences of individual, uncoordinated actions. Strengthened regional cooperation can also help mitigate potential transboundary conflicts over resources and therefore enhance regional security. In addition to cooperation between countries, regional programming efforts can also help facilitate regional coordination between donors, development partners, etc. to present a unified and consistent approach to support REDD-readiness in the region.

Approaches to foster regional cooperation could include improving the management of specific transboundary forest landscapes, as mentioned above, as well as through regional platforms, institutions, and initiatives such as ASEAN (as described in more detail below). Regional programming activities could include study tours and exchanges, implementing joint activities, and sharing of lessons and best practices. USAID could consider supporting a periodic regional conference or event to foster this kind of learning and collaboration between countries, donors, and other USAID missions. Other specific areas that could lend themselves to regional cooperation include support to developing country negotiators, preparing and implementing REDD-readiness plans and proposals, and issues related to trade policies, etc.

A number of regional institutions, networks, and initiatives exist in the region and are engaged in REDD efforts. Regional programming should seek to strategically engage key regional bodies to strengthen them as platforms for sharing of information and experiences and advancing REDD practice in Asia. ASEAN is the main intergovernmental regional organization for the ten Southeast Asian countries. GTZ is currently supporting a REDD 'knowledge network' with ASEAN that could be engaged with and strengthened. Another intergovernmental platform is the Greater Mekong Subregion, involving all six countries of

the Mekong Basin, supported by the Asian Development Bank. There is already some momentum growing to engage at least the four lower Mekong countries in REDD (already being supported by RDMA, and) through this platform, and ADB has plans for extensive investments in REDD and PES. Other regional bodies of relevance include Mangroves for the Future, Coral Triangle Initiative, ASEAN Center for Biodiversity, Roundtable on Sustainable Palm Oil, World Bank Global Tiger Initiative, etc. UN-REDD and the World Bank Forest Carbon Partnership Facility are leading many of the REDD-readiness efforts in the region. UN-REDD is working towards hosting an Asia regional REDD donor coordination meeting later in 2010. USAID should support these efforts and aim to compliment and add value where needed.

Synergies between USAID Regional and Bilateral Programs

While implementation of REDD will occur primarily at the national level, regional efforts can support national efforts and catalyze REDD practice across the Asia region through (1) the sharing of lessons and experiences across countries, (2) replication of best practices and successful models for reducing deforestation, (3) regional harmonization and standardization of methodologies and procedures, (4) fostering efficient coordination, and (5) promoting effective management of transboundary forest ecosystems and landscapes. In addition, regional programs can fill gaps where needed (e.g. in USAID non-presence countries) and compliment existing bilateral programs, in consultation with relevant Missions. Strong strategic links to USAID bilateral missions and programs could greatly facilitate achieving these objectives. In addition, RDMA should build upon the strong foundation and momentum of its Responsible Asia Forestry and Trade (RAFT) and Asia Regional Biodiversity Conservation Program (ARBCP) programs promoting sustainable forest management and Payments for Environmental Services (PES).

Regional program activities can provide a foundation or platform for coordination and implementation that national-level programs can build upon and leverage. Regional-level analyses of forest carbon dynamics, deforestation trends and drivers, timber trade flows, projected climate change impacts, and future infrastructure development plans, among other issues, can provide important insights to inform the context within which bilateral programs operate. Regional activities can also benefit from lessons learned and experiences of bilateral programs, which are able to achieve greater depth in terms of national policy development and support for site-based demonstration projects.

USAID bilateral missions can make use of the tools, guidance, training manuals and educational materials, etc. developed at the regional level. Through partnerships with regional organizations, networks, and platforms, a pool of regional practitioners and trainers can be built to support bilateral efforts through peer-to-peer cooperation, training-of-trainers, and sharing of lessons learned. Bilateral programs could also cooperate with regional efforts to promote public-private partnerships and facilitate access to financing for community and private sector forest mitigation projects.

Specifically, USAID bilateral missions in Indonesia, Cambodia, and India will be receiving *Sustainable Landscapes* funding in FY2010. Significant financing is also expected to go to Indonesia for a forestry and climate change center of excellence. Extensive USAID bilateral investments will generate much experience and could position such programs as regional leaders in specific areas: for example, Indonesia as a regional leader in peat management and sustainable forest management (relevant for Malaysia, PNG, and other countries); Cambodia as a leader in community forestry and REDD (relevant for many Asian countries); and India as a leader in reforestation and joint forest management (also with many regional applications). Other USAID bilateral programs, which may not currently be expecting *Sustainable Landscapes* funding, are also undertaking programs that support forest conservation, watershed management, climate change adaptation, and rural poverty alleviation and which are generating lessons that could also be shared regionally. These programs include mangrove conservation, adaptation and co-management in Bangladesh, watershed management in Nepal, and assisted natural regeneration and adaptation in the Philippines. Vietnam is also expecting *Sustainable Landscapes* funding in FY2011 and RDMA could play a supporting role in helping develop this new program. In those non-presence countries without a USAID bilateral mission (e.g. Malaysia, Papua New Guinea, Laos, and Thailand), RDMA could provide greater support for national REDD implementation, policy development, and field demonstration projects.

Question #3 ***How can RDMA best coordinate with and leverage the efforts of regional platforms (e.g. ASEAN), bilateral missions and other donors, multilateral development banks, national governments, international non-governmental organizations (NGOs), universities, the private sector, and others to address priority REDD-plus opportunities and challenges?***

A multitude of donors, non-governmental organizations, regional institutions, and others have been actively supporting REDD readiness in the Asia region over the last few years. RDMA can best coordinate with and leverage these efforts through close collaboration and implementing complimentary activities that are value-added and fill current gaps. The UN-REDD Program (a joint effort of FAO, UNDP and UNEP) and the World Bank's Forest Carbon Partnership Facility have been some of the most active, supporting REDD readiness in multiple countries across the region, and should be viewed as key partners. In addition to these programs, national governments are also engaged in regional intergovernmental institutions and platforms such as ASEAN and the Greater Mekong Subregion. USAID efforts can work with GTZ and ADB, who are supporting ASEAN and GMS REDD efforts, to help provide additional support for the sharing of REDD experiences and lessons between governments. A number of the REDD national focal points within ASEAN have been holding informal meetings to coordinate their REDD policies, and share ideas about REDD implementation, etc. Supporting this process over the next few years could be well received by the various country delegations

AusAID, GTZ, Finland, Norway, JICA, SNV, and other **bilateral donors** have active forestry and national REDD programs in many countries across the region. USAID bilateral missions are also developing REDD and climate change programs in Indonesia, Cambodia, India, Bangladesh, Philippines, and Nepal and should be considered key partners. In addition, many pilot projects are being developed and implemented by **non-governmental organizations**, a number of which have a regional presence (e.g. Wildlife Conservation Society, The Nature Conservancy, WWF, Fauna and Flora International, Pact, Conservation International, Community Forestry International, RECOFTC, IGES, etc.). **Universities** and academic institutions, some with regional presence such as CIFOR and the Asian Institute of Technology, can serve as key partners to conduct scientific research and training, and assist in methodology development.

The **private sector** is key for the sustainability of REDD efforts as a long-term source of sustainable financing through the voluntary and compliance carbon offset markets. However, private sector engagement with REDD in Asia is currently rather low due to a perception of risk, high transaction costs, and little experience with forest offsets in the region. USAID regional programming could help overcome some of these barriers and enhance market readiness across the region in a cost-effective manner through a variety of potential activities.

Regional programming could support analytical work to gain a greater understanding of the current state of (voluntary and compliance) forest carbon markets in Asia, who is currently interested and at what level, and what are the current perceptions and obstacles. Such analyses could inform strategies and specific activities to effectively engage with and support market development and expansion.

More specifically, regional programming could encourage private sector investment in key landscapes where USAID is investing, such as priority forest landscapes and program sites. It may be an appropriate role for public sector funds to help subsidize risk and encourage early private sector investments in REDD, similarly to how the micro-finance sector began. USAID could encourage public-private partnerships, or a Global Development Alliance type of approach, to leverage resources and stimulate private sector investments in REDD pilot projects for example. The airline sector and other companies with progressive Corporate Social Responsibility policies could be potential early partners. Other potential partners could be 'green businesses' and companies involved in trade in sustainable wood products, for example, who may be interested in supporting sustainable forest management.

A global REDD mechanism will require the development of a whole new industry of skilled, independent third party auditors to verify and validate (as part of MRV--Monitoring, Reporting, and Verification) potential carbon emissions reduction credits. While it is not clear yet how verification would occur at the national and international levels, there will be a clear need for these specific technical skills at scales ranging from pilot projects to the national level. USAID regional programming could assist in building this new sector and

creating 'green jobs' through training programs, curriculum development with universities, small business support, etc.

One specific regional initiative to consider could be to support a **Forest Carbon Project Development Facility**, which could perhaps be modeled on the USAID-supported Private Financing Advisory Network (PFAN) for clean energy. PFAN provides mentoring expertise to help build skills in project development and get projects to market. Through a competitive process, developers present their proposals to potential investors who then decide which projects to fund. Such an approach could be piloted for forest carbon projects to help build capacities, link developers and investors, and increase private sector confidence in forest mitigation programs.

Market readiness can also be enhanced through support of information and decision making tools that provide advice on potential investment risk. An example that currently exists is the **Forest Carbon Index** (FCI), which compiles and displays global data related to biological, economic, governance, investment, and market readiness conditions around the world, revealing the best places and countries for forest carbon investments. Support could be provided to increase quality and quantity of information relevant to the Asia region.

In assessing strategic opportunities and potential partners in this very dynamic environment, it is recommended that USAID/RDMA conduct more detailed stocktaking of organizations and activities and continue to monitor progress of ongoing activities and the initiation of new programs, both to avoid duplication and to identify the best opportunities for cooperation and collaboration. RDMA will need to continue to assess gaps and build on the efforts of other donors and NGOs, particularly in instances where current programs and projects are ending or phasing out. In addition, it will be important to identify and participate actively in the most appropriate platforms and networks for sharing tools and methods, best practices, and project results.

Conclusion

In summary, the Asia region represents a significant source of global forestry-based GHG emissions and is therefore a strategic area for cost-effective climate change mitigation. In order to actualize these opportunities and capitalize on the growing global commitment to an international REDD mechanism, a broad array of technical capacities, as well as institutional, policy, and governance reforms will need to occur. RDMA is well-positioned to support this process through a regionally-coordinated approach emphasizing the sharing of lessons and experiences across countries, the replication of models and best practices, and the standardization of methodologies, tools, and policies to improve the management of important transboundary forested landscapes.

1. INTRODUCTION

1.1 Background

The Asia region is central to US and international efforts to address global climate change due to its significant and growing share of global greenhouse gas emissions, as well as to its vulnerability to the projected future impacts of climate change. Deforestation and land use change represent a significant source of the region's overall emissions, and are estimated to account for 15% or greater of total global emissions (IPCC 2007). The current United Nations Framework Convention on Climate Change (UNFCCC) negotiations recognized this potential, resulting in the Copenhagen Accord[3] calling for "the immediate establishment of a mechanism including REDD-plus[4], to enable the mobilization of financial resources from developed countries". In Copenhagen, the United States Government (USG) made a landmark commitment of $1 billion over the next three years (2010-2012) for reduced emissions and increased sequestration related to forests. At the same time, negotiations on adaptation to climate change have also highlighted the important contributions of trees, forests, and soil carbon to reducing climate change vulnerabilities and impacts.

Global climate change priority areas for the US Government include the three climate change pillars of clean energy, adaptation, and sustainable landscapes. Activities under the 'Sustainable Landscapes' pillar aim to "assist countries[5] to reduce greenhouse gas (GHG) emissions and enhance sequestration of carbon associated with land use and management, including forestry." Globally, USAID is expecting to program approximately $75 million in 2010 in support of this objective. In addition, the US Government's International Climate and Clean Energy Strategy for 2011 identifies Landscape Management as a key focus to promote low carbon economic growth. The development challenge is to transition towards land use practices that store and sequester more carbon than was occurring under previous land use patterns, while maintaining a country's ability to produce food and conserve land that provides environmental services such as clean water, biodiversity, and cultural and recreational uses. Countries to be supported are those which have significant forested areas under threat of deforestation; with a potential for dramatically increasing carbon storage and sequestration; and with landscapes with high concentrations of existing terrestrial carbon such as peatlands, mangroves, etc. This would include countries that are major emitters of carbon from land use activities, with a loss of carbon sinks a significant factor in their emissions profiles. USG support will assist such countries to:

- promote land and forest uses that reduce greenhouse gas emissions;
- conserve land and forested areas that are storing significant amounts of carbon;

[3] http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf

[4] REDD = Reduced Emissions from Deforestation and forest Degradation. REDD-plus expands this concept beyond avoided deforestation to include forest conservation, sustainable forest management, and enhancement of forest carbon stocks. For the purposes of this report, 'REDD' refers to and is used interchangeably with 'REDD-plus'

[5] Guidance issued so far limits USG funding support to only those countries that have associated with the Copenhagen Accord. To date, all target countries in the Asia region have associated with the Accord, except for Thailand and the Philippines.

- provide sound governance of land and forest areas to reduce emissions; and
- provide economic alternatives to wide-spread forest clearing.

With these new policy developments in mind, the USAID's Regional Development Mission for Asia (USAID/RDMA) has conducted this REDD-plus program planning assessment to identify the interventions, tools, platforms, partners, and program activities that are most needed and appropriate to effectively address REDD-plus opportunities and challenges in Asia at the regional level. Through desktop research as well as consultations in Bangkok, Jakarta, and other locations, the assessment has identified key areas for future USAID/RDMA investments to address the drivers of deforestation and degradation and regional challenges associated with successful mitigation in the land use sector.

1.2 The Role of USAID / RDMA

As part of USAID's early efforts to deepen engagement on climate change, in 2008 the RDMA prepared a "Road Map" describing general overall priorities and direction for addressing climate change in the Asia-Pacific region[6]. Building from the Road Map, RDMA has been increasingly active in addressing climate change programming through clean energy and forestry-related activities.

As an outcome of the Road Map, two of RDMA's current biodiversity programs have subsequently incorporated REDD-plus components into their existing programs. The Responsible Asia Forestry and Trade (RAFT) program is working with industrial timber concessions to reduce emissions through reduced impact logging practices and developing capacities to assess emissions reductions, as well as developing a regional REDD Learning Network to share experiences and promote the role of sustainable forest management in climate change mitigation. The Asia Regional Biodiversity Conservation Program (ARBCP) has been a leader in promoting and implementing Payments for Environmental Services (PES) policies and field practices in the region. Focusing on a pilot site in southern Vietnam, the program is bundling forest carbon offsets to its successful watershed services PES payment mechanisms. In 2010, the program will be conducting regional trainings on key REDD issues for Mekong countries. While these activities have made some progress in developing REDD-plus in the region, a comprehensive and strategic effort has not yet been fully developed.

The RDMA Road Map also identified additional priority areas of support if additional funding becomes available, including:

- Promoting carbon sequestration and GHG emissions mitigation through regional cooperation activities and sharing of best practices supporting afforestation,

[6] see "Global Climate Change in the Asia-Pacific Region: An Analysis and Road Map for the USAID Regional Development Mission for Asia" http://www.usaid.gov/rdma/documents/RDMA_GCC_Analysis_Road_Map_2008_07_24.pdf.

reforestation, agroforestry, conservation of natural ecosystems, fire management, sustainable agriculture, sustainable forest management, protection of high priority peat lands, or related activities; all of which also increase resilience to climate change;

- Expanding adoption and use of GHG accounting and reporting practices in forestry and land use by government, academic, and private sector partners through regional platforms, and;
- Improving adaptation and resilience of forest, biodiversity, land use resources to ongoing and long-term climate risks through activities that promote, for example: habitat conservation through biological corridors, community based natural resource management, and protected area management; integrated landscape protection using forest resources, restoration of degraded lands, and erosion control; research, policy, or regulatory reform in support of sustainable forest resource management; improved ecosystem resiliency to climatic variability; crop diversification (drought-tolerant and disease tolerant crops); and rehabilitation of coastal mangroves and riparian forests that increase resilience and protect coral reefs from sediment.

Beginning in FY2010, RDMA is expecting to receive new funding for Sustainable Landscapes. In addition to the RDMA, USAID bilateral missions in the region are also exploring potential forestry and climate change and REDD-plus programs, such as in Cambodia, India, and Indonesia. Additionally, a number of Missions that program significant levels of biodiversity funds (e.g. Bangladesh, Nepal, Philippines, Cambodia, and Indonesia) are also considering programs with a climate change component. There are therefore a number of important strategic and coordination issues to explore as the RDMA weighs its options for promoting climate change mitigation and REDD-plus activities, capacity building, and information sharing across the region.

RDMA's Regional Environment Office (REO) manages regional environmental activities across Asia in the areas of water and sanitation, biodiversity conservation and forestry, and climate change and clean energy. Through this role, the REO works to address transnational challenges, catalyze change by sharing and replicating innovation, and sustain impacts through regional institutions or networks such as the Association for Southeast Asian Nations (ASEAN), Asia Pacific Economic Cooperation (APEC), and the Mekong River Commission (MRC). An important part of REO programs includes coordination and cooperation with donors to leverage resources and align activities as well as public-private partnerships. While many REO programs are technical in nature, REO also implements activities to address cross-cutting environmental governance challenges across Asia. Short descriptions of REO's current biodiversity and forestry programs are presented in Appendix I. In addition to implementing regional programs, RDMA also has a mandate to represent USAID in countries that do not currently have bilateral USAID Missions, including China, Laos, Burma, Thailand, Malaysia, and Papua New Guinea.

1.3 Scope of Assessment

The purpose of this assessment was to conduct a regional analysis which identifies the REDD-plus opportunities and needs of the Asia region and potential responses to meet these needs. The results of the assessment will inform the planning process for possible future activities funded by USAID/RDMA that address regional REDD-plus priorities. The assessment sought to answer the following specific questions:

1. ***What are the opportunities and challenges in countries of the Asia region to deliver meaningful forest sector mitigation?*** *(including identifying opportunities for multiple co-benefits resulting from emissions reductions, biodiversity conservation, local livelihoods, and climate resiliency).*

2. ***With respect to future RDMA regional programming, what interventions, tools, and program activities are most needed and appropriate at the regional level to most effectively address REDD-plus opportunities and challenges, and how can regional activities best complement potential national-level activities?***

3. ***How can RDMA best coordinate with and leverage the efforts of regional platforms (e.g. ASEAN), USAID bilateral missions and other donors, multilateral development banks, national governments, international NGOs, universities, the private sector, and others to address priority REDD-plus opportunities and challenges?***

The Assessment covered twelve developing countries in the Asia region where USAID is currently working. The countries included in the assessment were categorized into three sub-regions that included: **Lower Mekong** (Cambodia, Laos, Thailand, and Vietnam); **Insular Southeast Asia** (Indonesia, Malaysia, Papua New Guinea, and the Philippines); and **South Asia** (Bangladesh, Bhutan, India, and Nepal). Data was occasionally presented for China, Burma, and Sri Lanka, and is intended for comparative purposes only and for program planning. This assessment focused on programming opportunities at the regional level and did not specifically address opportunities for individual countries.

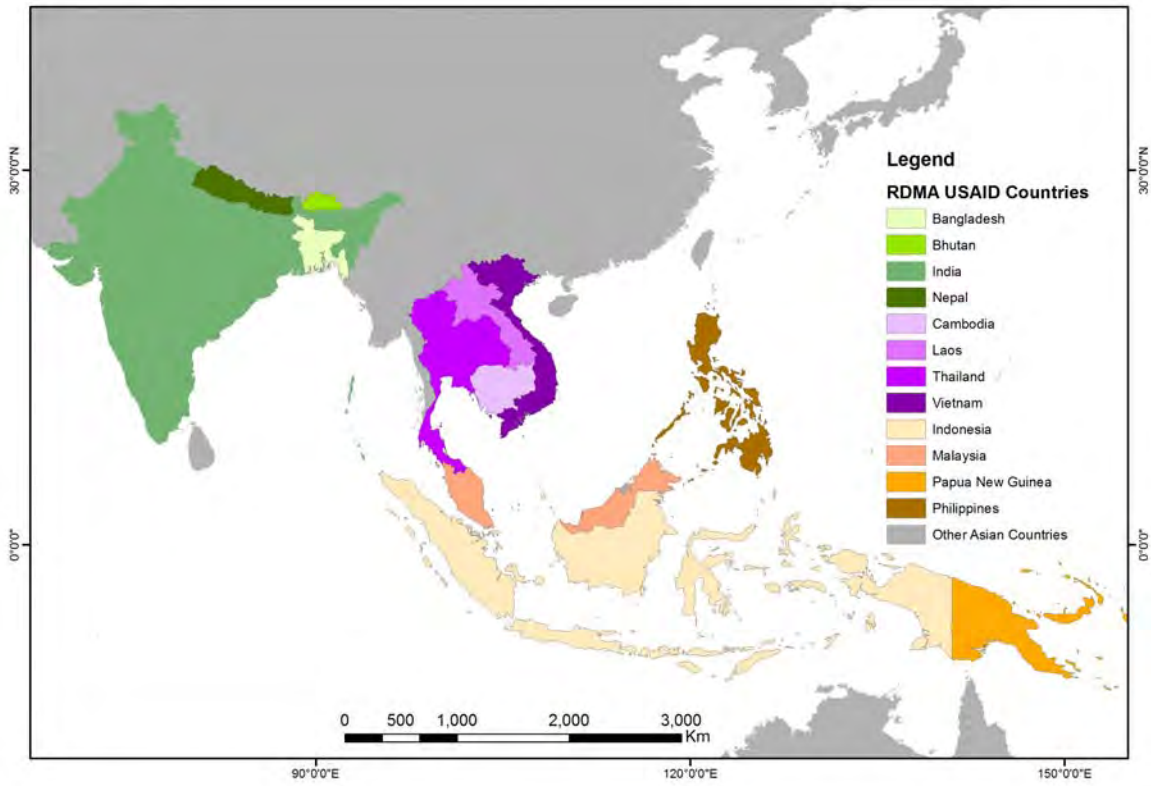


Figure 1. Map of the Asia Region

1.4 Assessment Team

To conduct this assessment, an Assessment Team of six members was assembled, and included:

- Scott Stanley, Forest Carbon, Consultant - Team Leader
- Dr. Apichai Thirathon, USAID/RDMA, Regional Environment Office
- Mr. Barry Flaming, USAID/RDMA, Regional Environment Office
- Dr. Deborah Lawrence, US Department of State/Washington, Office of Global Change
- Dr. Boone Kauffman, Ecologist, US Forest Service Northern Research Station
- Dr. Malcolm North, Ecologist, US Forest Service & University of California, Davis

[*See Appendix II for more information on Team members*]

1.5 Assessment Methods

A rapid assessment was conducted through a combination of literature review, stakeholder consultations and roundtable discussions. Members of the team began the assessment by attending a regional workshop hosted by the Food and Agriculture Organization (FAO) in Bali, Indonesia on February 3 addressing the current status of REDD post-Copenhagen. This was followed by a two-day strategy planning workshop hosted by the RDMA-funded RAFT program to develop future strategic directions for the regional REDD learning network activity. Numerous consultations were held with regional stakeholders at these meetings. In addition, four roundtable discussions with REDD practitioners in the region were held in

Bangkok and Jakarta (two in each city), which included a country survey questionnaire (see Appendix IV) to solicit subjective information about country status in relation to REDD. Assessment team members also conducted consultations at a regional Payments for Environmental Services (PES) workshop held in Laos. Consultations occurred with representatives from governments, non-governmental organizations (NGOs), donors, bilateral and regional development partners, multilateral development banks, and USAID Missions. Telephone consultations were also conducted with individuals in some of the other countries and some written responses to the assessment questions were also received. In all, 60 individuals representing more than 40 organizations were consulted from February 3 to March 2, 2010. [*For a list of those consulted, see Appendix III.]*

The team also used the consultation process to learn about the priorities and programs of other donors and organizations in order to identify potential project partners and areas of potential duplication. The consultations helped to identify sources of current and potential institutional and technical capacity, as well as the particular needs for improving that capacity, and considerations of effective approaches for implementing REDD. Support to and cooperation with regional institutions and national institutions with a significant regional role or regional influence has been given significant emphasis in order to ensure the sustainability of the impacts of USAID and RDMA programs.

2. BACKGROUND ON REDD

The REDD concept first began as a joint proposal from governments of Costa Rica and Papua New Guinea at the 2005 Conference of the Parties (COP) in Montreal, and was directed at Reducing Emissions from Deforestation through payment mechanisms that would offset the foregone opportunity costs of converting forests. The concept then grew to include emissions caused by forest Degradation as well, and then at COP 15 in Copenhagen, the concept was expanded to include forest conservation, sustainable forest management, and enhancement of forest carbon stocks (now known as REDD-plus). There are also some efforts to expand REDD even further by including the agriculture sector and encompassing the entire land use sector, but many experts believe that to do so would risk weakening the original intent of the concept aimed at protecting standing forest carbon stocks.

The product of COP15 was the 'Copenhagen Accord'[7] which includes a collective commitment by developed countries to provide additional funding approaching $30 billion for the period 2010 through 2012, including $1 billion from the US to support REDD readiness efforts by developing countries. With the Kyoto Protocol ending in 2012 and a nascent agreement at COP15, the basics of a global emission reductions treaty still need to be forged. Even after a global treaty is signed, it will likely take some time to work out the specific operational procedures and rules, etc. for how a REDD mechanism will function.

Generally, a national REDD mechanism will include the following major components: a national strategy for forest sector mitigation [linked to a country's Low Emissions Development Strategy (LEDS) covering all major emitting sectors]; an implementation framework/plan; setting a reference scenario/reference emission level (REL) of deforestation and degradation; design and implementation of a Monitoring, Reporting, and Verification (MRV) system; and inclusion of environmental and social impact assessment and monitoring.

Operating in this fluid REDD 'environment' is highly complex since it depends on:

- international political processes, which are uncertain;
- development of funding modalities, which are subject to political whim and/or voluntary action in the absence of legally-binding agreements or regulatory carbon markets;
- significant uncertainties over appropriate methods to use for MRV and to set RELs; and
- lack of information or understanding about what approaches actually reduce deforestation.

Efforts to support REDD readiness and implementation to date have generally branched off into two parallel tracks involving compliance and voluntary markets. Under the first track, a future compliance market is envisioned under a UN treaty and efforts are related to creating an enabling environment to facilitate national REDD systems in participating countries.

[7] http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf

Developing countries would establish a national baseline of emissions using historical deforestation rates and associated emissions during the period from 2000-2010. The baseline emissions would be projected into the future under a business as usual scenario (Figure 2, dashed red line).

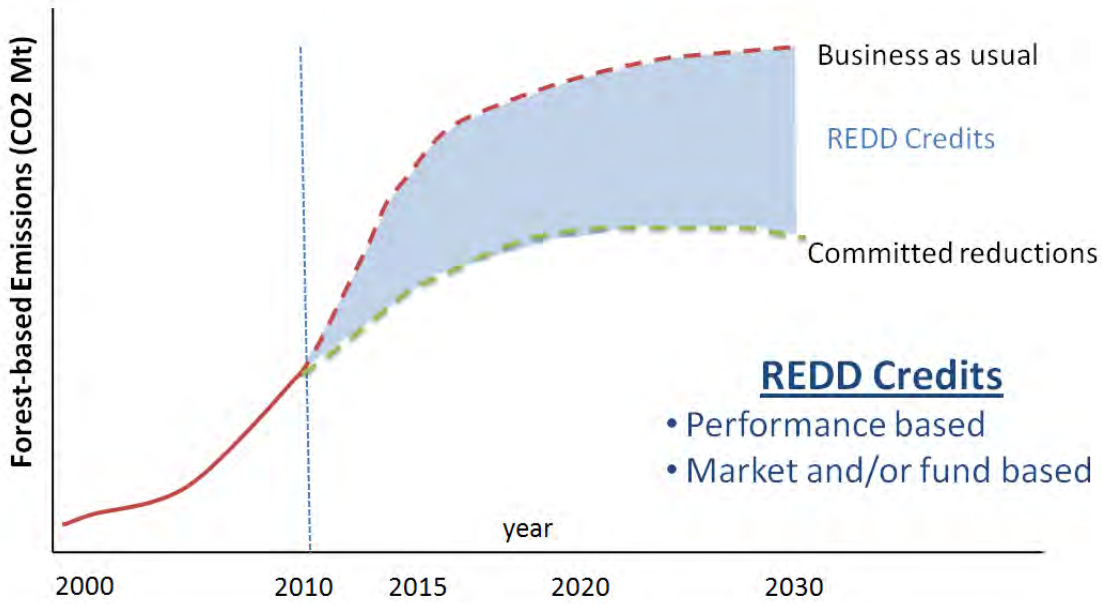


Figure 2. Diagram of forest emissions over time showing two different scenarios, business as usual and a country's committed reductions. The difference between the curves are the REDD credits measured in tons CO2 (shaded area). Curves are illustrative only.

Through successful implementation of strategies to reduce forest-based emissions, a country able to reduce their emissions to a rate below their baseline would thereby be eligible to receive payments for such 'carbon credits'. A REDD mechanism would be performance-based, in other words based on verified and validated emission reductions actually achieved in the past. Obviously, one of the key issues will be how a country sets its baseline. If the 'business as usual' baseline is set unrealistically high, it's likely that the REDD process in that country would lose credibility. A credible methodology using a process that is consistently applied would help facilitate investor confidence.

There is currently limited guidance on specific methods to measure emissions and removals (sequestration) or to set baselines. However, the assumption is that methods contained within the most recent IPCC Guidelines (2006), the 2003 Good Practice Guidance and the GOFC-GOLD REDD Sourcebook v2 (2009) represent current best practice and are likely to be adopted. How to set RELs remains unclear, with the SBSTA decision (CP15) saying that these should be set using historical baselines, adjusted for national circumstances. The second clause leaves wide open the process to set RELs, and this is likely to be highly political. A new body will need to be formed to review proposed country RELs, or an existing body (e.g. SBSTA) given this mandate.

In addition to baseline setting, another key issue will be how countries define 'forest' (e.g. >5 hectares, >5 meters tall, >10% canopy cover, as Thailand has done), since this definition will determine what is to be included in monitoring. It would be to a country's benefit to define 'forest' in a way that maximizes their ability to generate reduction credits. To counter these risks, various developed countries are pushing for independent third-party monitoring, reporting, and verification (MRV), while some developing countries see this as an infringement on their national sovereignty.

National MRV systems will need to be able to accurately and consistently detect changes in forest carbon stocks at the national level in order to monitor expected outcomes and qualify for emissions reduction credits. MRV systems will utilize remote sensing technologies combined with ground-based inventories to assess changes. Some guidance for MRV has been made available through the IPCC (2006) and GHG Good Practice Guidance, and quite a few donors in the region (e.g. JICA, Finland, GTZ, etc.) are supporting countries with developing their MRV systems and reporting capacities (e.g. US EPA).

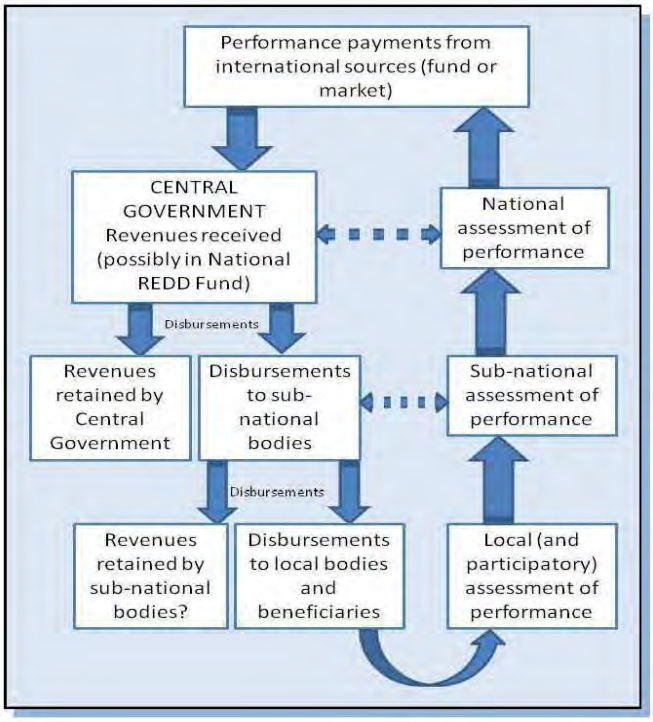


Figure 3. Illustrative REDD system. Source: UN-REDD 2010

Funding options for REDD are still under negotiation and discussion and are likely to come from two options: fund-based or market based. Some countries have preferred to take a fund-based approach rather than a market-based one, with the Brazilian national government being the largest proponent of a fund-based type of REDD system. Brazil established the 'Amazon Fund' where donors provide money to pay for measures that

reduce deforestation and emissions to a targeted amount. A weakness of a fund-based approach is that it would not be attractive to institutional investors since fund-based approaches would not be tied to a market and thus would not have a potential to generate profits if carbon prices increase over time. Therefore, a fund-based approach would be reliant on multilateral and bilateral agencies for capitalizing it, and would not be able to harness the power of the markets.

A market-based REDD system could possibly avoid much of this conflict between developing and developed countries over MRV by letting the countries chose how they conduct MRV, but the price of the credits would be based on quality (how conservatively a baseline is set, among other additionality issues) and risks (how well the country addresses both permanence through fire management and leakage through effective monitoring). Just as Standard and Poor's provides ratings of a country's bonds, a similar organization could rate a country's REDD credits applying the abovementioned criteria. Therefore, a market-based REDD system could provide countries with a powerful incentive to tackle policy reform that reduces investment risks while also ensuring that additionality, leakage, and permanence issues are fully addressed. However, a potential drawback from a market-based approach is that criteria that determine additionality are normally more strictly applied than with a REDD fund. For example, it may not be appropriate to apply market-based REDD funds to revise spatial land use plans since it would be challenging to clearly demonstrate that these led directly to additional emission reductions. A system that combines fund and market-based approaches may be the best option for many countries.

It should be noted here that domestic legislation in the US could have significant implications for how REDD is implemented and funded globally. Current legislation seems to favor a performance-based compliance system that is market-based. If and when domestic legislation is passed, investors may be looking to buy carbon credits in developing countries. It is not clear at this time what impact this might have on ongoing negotiations for a global climate deal, if any. In the meantime, a number of sub-national approaches and actions are being undertaken by states and provinces, such as the Governors' Climate and Forests (GCF) meeting to be held in Aceh, Indonesia between the governor's of Aceh, the State of California and others.

Voluntary Markets

The second parallel track that REDD has been taking is the voluntary carbon markets that operate through carbon exchanges, such as the Chicago Climate Exchange, or in an over-the-counter fashion. Companies voluntarily buy carbon credits in anticipation of a compliance market or to comply with their internal Corporate Social Responsibility (CSR) programs. In 2008, world-wide there were 227 forest-based projects that generated 67 million tons CO_2 of avoided emissions

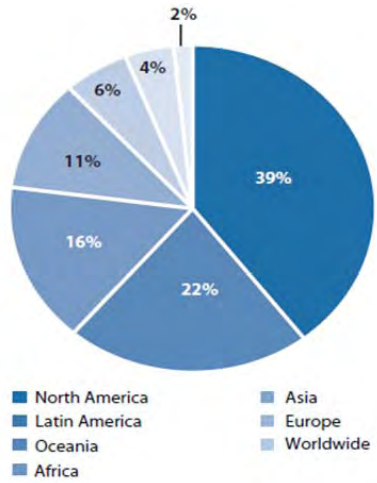


Figure 4. Distribution of forest-based voluntary carbon credits by their originating region in 2008. Source: Ecosystem Marketplace 2010.

credits, worth a value of nearly US$138 million over the first half of 2009 (Ecosystem Market Place 2010). Figure 4. indicates that the North American region generated almost 40% of the voluntary carbon credits while only 6% originated in Asia. Overall, voluntary carbon offsets have been growing steadily, and this trend is seen even in Europe where a compliance market also exists.

Pilot projects under the voluntary carbon market have been a crucial source of learning for governments in a number of countries (e.g. Cambodia, Laos, Indonesia) in terms of methods development, appropriate implementation modalities, thinking through benefit-sharing, how to implement activities that actually reduce deforestation, piloting national legislation, and private sector engagement. Crucially, voluntary carbon market projects offer significant sustained financial incentives (from sale of the carbon credits) that are performance-based. This encourages investment by Governments, local groups and the private sector. As such, voluntary carbon market projects compliment other donor investments well.

Most carbon credits on the voluntary market currently are accredited through the Voluntary Carbon Standard (VCS), which provides global standards for carbon offset projects. Various project-level VCS methods are developed and approved through a robust review process before being certified for use. VCS project methods are currently the most advanced and presumably will be adopted by compliant markets as they emerge. A critical issue for all pilot REDD projects is how they are integrated into national REDD frameworks. A 'nested approach' gives an outline for how this might work, but a much greater level of technical thinking is required to make this idea operational. Developing a sensible nested approach (or similar system) would greatly incentivize sub-national actions.

3. FORESTS IN ASIA—CONDITIONS AND TRENDS

The Asia region has extensive forest resources (Figure 5.) which provide a range of important environmental services for the estimated 450 million people that depend upon them for their livelihoods and survival. In 2005, forests covered over 275 million hectares in the twelve target countries, representing about 37% of the total land area (FAO 2009), and include a diverse range of ecosystems, such as lowland and montane evergreen forests, dry deciduous forests, riparian and seasonally-flooded forests, peat swamp forests, and coastal mangroves.

Figure 5. Map of forest cover in the Asia region, showing current forest cover in green. Source: FAO 2009.

Forests provide food, building materials, medicines, and fuel wood for millions, as well as supply timber for domestic and export markets, protect soils from erosion, and play an important role in the cycling and distribution of freshwater resources. Asia is the largest producer and processor of tropical timber in the world, representing billions of dollars in annual revenues. Asia's forests are also significant sources of the region's terrestrial biodiversity (Barber et al. 2005), as well as crucially important reservoirs of CO_2, holding 11.5% of the global stock of carbon in living forest biomass (Nabhurs et al. 2007). Additionally, some 10% of Southeast Asia's land area consists of extremely carbon-rich peatlands, located predominately in Indonesia, as well as in Papua New Guinea and Malaysia.

Despite their intrinsic and societal values, natural forests in Asia continue to disappear at high rates due to a combination of myriad threats, including: subsistence agriculture; commercial plantation agriculture; illegal logging; unsustainable extraction of timber, fuelwood, and other forest resources; changing climatic conditions; fire; infrastructure development (e.g. dams and roads); urbanization; and mining.

Many countries in the region face serious rates of forest loss, with some amongst the planet's highest, exceeding 1.5% per year. Countries in Asia (excluding China) experienced a total annual net forest loss of more than 2.8 million hectares per year during the 2000-2005 period (FAO 2009), with deforestation rates highest in Indonesia, where 1.9 million hectares were lost on average each year, followed by Burma, Cambodia, the Philippines, Malaysia, and Papua New Guinea (see Table 1 below). Accessible lowland tropical forests have been hardest hit, largely disappearing on the Indonesian islands of Sumatra and Sulawesi, and rapidly disappearing elsewhere. The Asia-Pacific region as a whole lost over 41 million hectares of forest land between 1990 and 2005 (FAO 2006).

Table 1: Forest cover and change, by country (1990-2005)

Country	Land Area (1,000 ha)	Population 1,000 (2006)	Forest Area (2005)			Annual rate of change			
						1990-2000		2000-2005	
			1,000 ha	%	People/ 1,000 ha	1,000 ha	%	1,000 ha	%
Cambodia	17,652	14,196	10,447	59.2	736	-141	-1.1	-219	-2.0
Laos	23,080	5,759	16,142	69.9	2,803	-78	-0.5	-78	-0.5
Thailand	51,089	63,443	14,520	28.4	229	-115	-0.7	-59	-0.4
Vietnam	31,007	86,205	12,931	39.7	150	236	2.3	241	2.0
Mekong	**122,828**	**169,603**	**54,040**	**44.0**	**319**	**-98**	**0.0**	**-115**	**-0.2**
Indonesia	181,157	228,864	88,495	48.8	387	-1,872	-1.7	-1,871	-2.0
Malaysia	32,855	26,113	20,890	63.6	800	-79	-0.4	-140	-0.7
PNG	45,286	6,201	29,437	65	4,747	-139	-0.5	-139	-0.5
Philippines	29,817	86,263	7,162	24	83	-263	-2.8	-157	-2.1
Insular	**289,115**	**347,441**	**145,984**	**50.5**	**420**	**-2,353**	**-1.6**	**-2,307**	**-1.6**
Bangladesh	13,017	155,990	871	6.7	6	0	0	-2	-0.3
Bhutan	4,700	648	3,195	68	4,931	11	0.3	11	0.3
India	297,319	1,151,751	67,701	22.8	59	362	0.6	29	0.0
Nepal	14,300	27,641	3,636	25.4	132	-92	-2.1	-53	-1.4
Sri Lanka*	6,463	19,207	1,933	29.9	101	-27	-1.2	-30	-1.5
South Asia	**329,336**	**1,336,030**	**75,403**	**22.9**	**56**	**281**	**0.4**	**-15**	**0.0**
China*	932,749	1,328,474	197,290	21.2	149	1,986	1.2	4,058	2.2
ASIA total	***1,674,028***	***3,181,548***	***472,717***	***28.2***	***149***	***-184***	***0.0***	***1,621***	***0.3***

Source: State of the World's Forests 2009 (FAO)
** data presented for comparative purposes only*

Despite high rates of deforestation in the region, there are some signs that the rate of forest loss may be slowing down in some countries, and forest cover has actually been increasing in a few Asian countries due to significant reforestation efforts (e.g. China, India, and Vietnam, see Figure 6).

However, this increase has mainly been due to planted forests, which generally have lower values than natural forests in terms of biodiversity, ecosystem services, and carbon storage.

A few countries, including China, Thailand, and Cambodia, have enacted commercial logging bans, which are partially helping to stabilize rates of forest loss domestically, but may result in

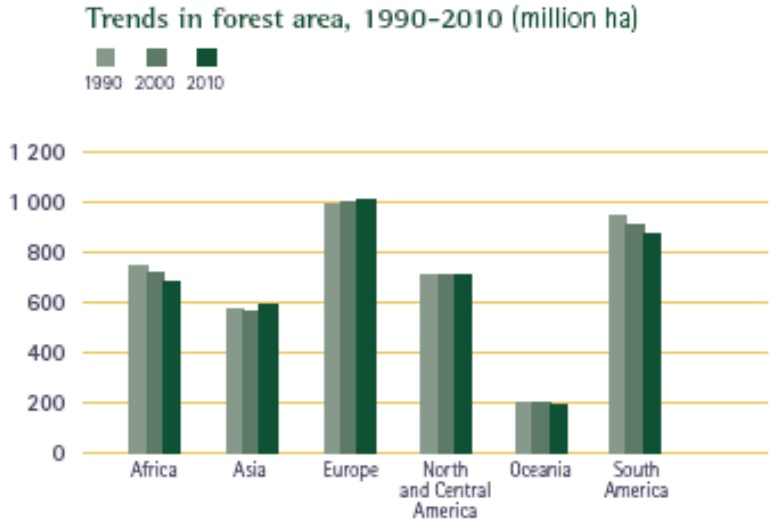


Figure 6. Comparison of trends by region of forest area over three decades (Source: FAO 2010)

the transference of deforestation elsewhere to neighboring countries (known as 'leakage') where governance systems are weaker. A number of countries, such as the Philippines and Nepal, are interested in further increasing their forest cover and have adopted policies focused on natural regeneration, which supports biodiversity conservation, enhanced watershed functioning, and increased forest carbon stocks.

The twelve Asian countries examined for this assessment are illustrated on a forest cover transition curve as shown in Figure 7. (with China and Sri Lanka included for comparison). Developing countries with extensive natural forest have normally exploited their forest resources to fuel economic development. Historically, many countries typically follow this similar curve of deforestation over time. While the slope (deforestation rate) of the curve between countries can be different, the overall shape generally remains the same (Figure 7.).

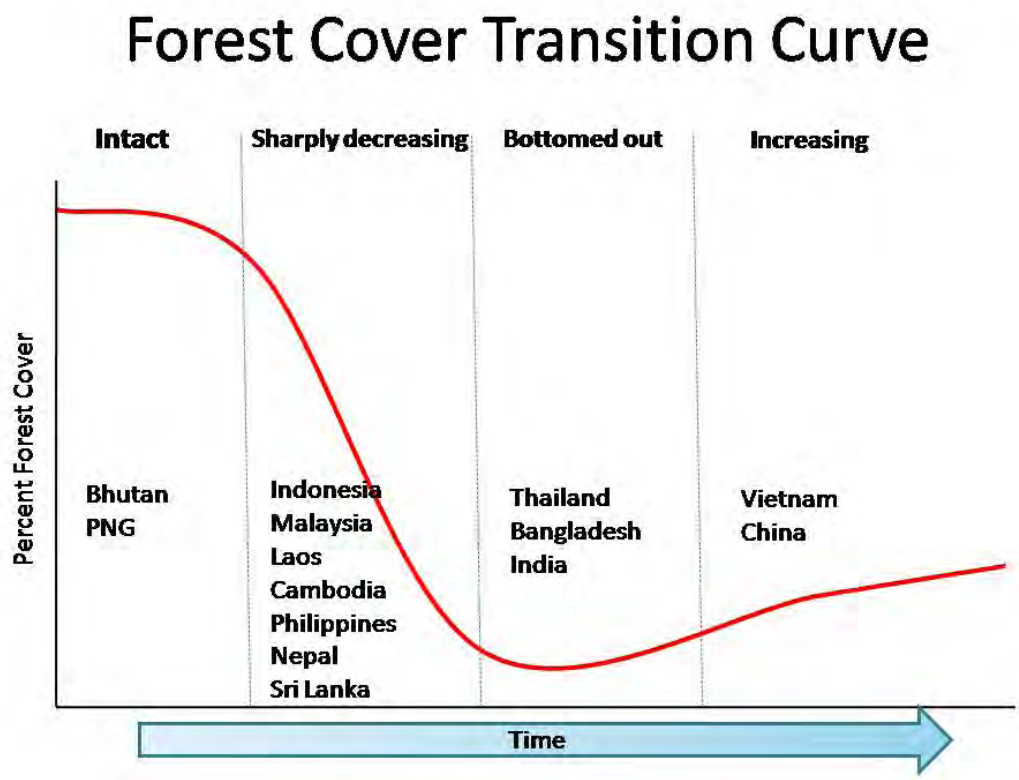


Figure 7. Diagram of the typical forest transition curve, showing relative deforestation over time within Asian countries.

Figure 7. shows the four forest transitional phases typically experienced by most countries. In order to deliver meaningful forest sector mitigation, the countries that fall either in the 'intact' or 'sharply decreasing' transitions should be prioritized. Bhutan's forests appear to be under little threat, while Papua New Guinea's forests are under increasing threat and

may be on the verge of moving into the next transition phase. The countries listed in the 'sharply decreasing' transition are sorted by largest forest area to smallest, suggesting that forest emissions are highest in Indonesia and lowest in Sri Lanka. Indonesia has about 90 million hectares of forest, followed by Papua New Guinea with 30 million and Malaysia with about 20 million hectares. Therefore, based on forest area and each country's deforestation rate, and in order to generate meaningful emissions reductions, USAID should put more emphasis on those countries in the 'sharply decreasing' phase: Indonesia, PNG, Malaysia, Laos, Cambodia, the Philippines, Nepal, and Sri Lanka. Since the USAID bilateral Missions in Indonesia, India, and Cambodia will receive significant *Sustainable Landscapes* climate change funding, RDMA investments should focus more on the other mentioned countries (i.e. PNG, Malaysia, and Laos).

Forest Ownership

Across Asia, forest ownership typically lies with the government (68% of forest lands), with an estimated 27% owned and/or managed by communities and indigenous people, and about 6% owned by individuals and firms (RRI 2010). While government ownership is almost exclusive in many countries (Vietnam, Thailand, Laos, Cambodia, Burma, Indonesia), the context is quite varied. For example, most land in PNG (99%) is under communal ownership with local communities in charge of land use decisions. Through joint forest management programs in India, about 27% of forest lands are under non-governmental ownership or administration, in conjunction with forest authorities. Nepal is well known for its decades-long experiences with community forestry, and Cambodia now has a new community forestry policy to designate about one-fifth (2 million hectares) of its forest estate to formal community management. In many countries, private sector concessionaries and the military are also key forest owners and managers. Issues of who owns forests, and therefore by extension the carbon stored in them, will be contentious areas for governments to address. It is no coincidence that most of the region's remaining forests exist in remote, under-developed areas primarily inhabited by upland ethnic minority and indigenous communities. How governments address local land use rights and indigenous issues will have important implications for stakeholder participation in REDD programs and ensuring equitable distribution of benefits.

3.1 Forest-based Carbon Stocks in Asia

About 50% of the mass of a tree is composed of carbon, and thus the principle factor in determining terrestrial carbon stocks is related to wood volume (and density) variations between forest types. Climate and biophysical factors control forest productivity, wood volume and thus carbon stocks, with the main factors being rainfall, evapo-transpiration rates, solar radiation, and soils. Countries situated close to the equator with higher rainfall spread evenly throughout the year and longer daylight hours typically have higher forest carbon stocks. **Error! Reference source not found.** illustrates the distribution of forest carbon within the region. Besides carbon found in wood, it also accumulates in soils, especially in peat and mangrove forests with waterlogged soils, and represents enormous pools of carbon, as shown in Figure 9.

Figure 8. Map of Asia showing the distribution of aboveground terrestrial carbon stocks with increasing brown color representing larger amounts of carbon. Source UNEP-WCMC 2008.

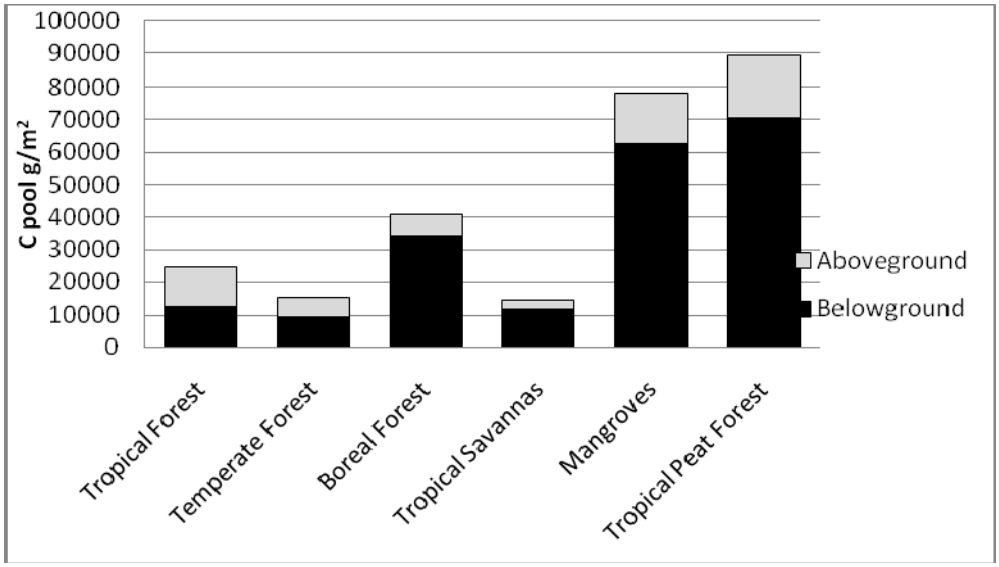


Figure 9. Ecosystem carbon pools (g/m2) of selected forests of the world. Data for forests are from Laffoley and Grimsditch, 2009, except for Asia-Pacific mangrove and peat forests (Donato et al. 2010)

3.1.1 High Carbon forests: Peatlands and Mangroves

3.1.1.1 Peatlands

Peat swamps are typically found in boreal and sub-arctic areas or in wet humid tropical zones (Figure 10) and result from poor drainage that leads to a persistent water table near the soil surface. High water tables create anaerobic conditions that prohibit debris and windblown trees to decompose and over several thousand years resulting in an organic matter layer builds up reaching up to ten meters deep.

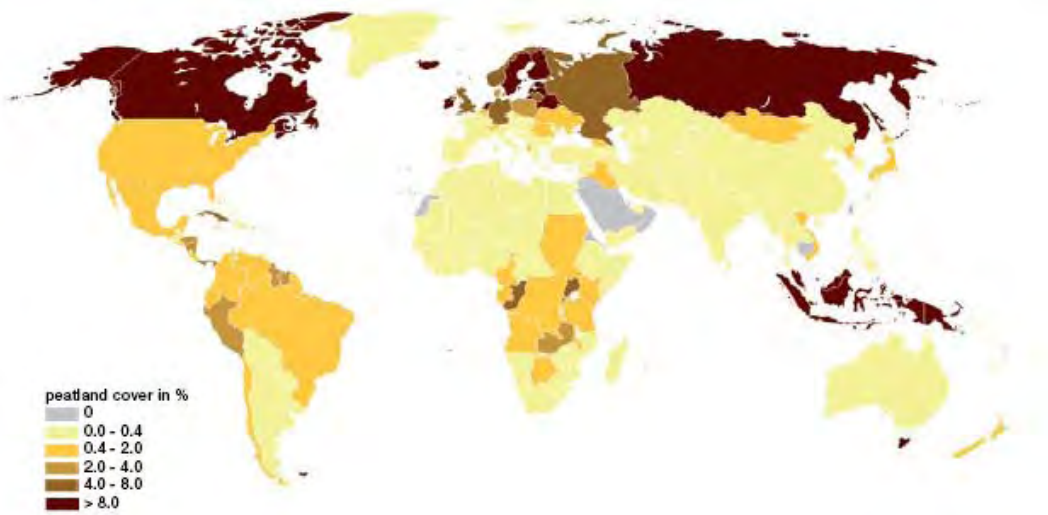


Figure 10. Global distribution of peatlands, with countries that have more than 8% of their areas in peat shown in dark brown (source: Wetland International 2009)

Indonesia has the world's thirds largest expanse of peat, with 26 million hectares (Table 3), and possesses the most expansive tropical peatlands. Papua New Guinea is ranked in ninth place, with Malaysia being ranked 15th. Globally, peatlands are estimated to store more than 550 gigatons of carbon.

Peatlands, because of their added costs to drain, are often the last refuge and remaining intact habitat in degraded landscapes. Additionally, they are preferred habitats for orangutan and tigers. However, as lowland forests become increasingly scarce in Indonesia and Malaysia, the demand for palm oil is increasingly driving the conversion peatlands.

	Country/region	Peatland area (km²)
1	Russia – Asian part	1,176,280
2	Canada	1,133,926
3	Indonesia	265,500
4	Russia – European part	199,410
5	USA (Alaska)	131,990
6	USA (lower 48)	91,819
7	Finland	79,429
8	Sweden	65,623
9	Papua New Guinea	59,922
10	Brazil	54,730
11	Peru	49,991
12	China	33,499
13	Sudan	29,910
14	Norway	29,685
15	Malaysia	26,685
16	Mongolia	26,291
17	Belarus	22,352
18	United Kingdom	17,113
19	Germany	16,668
20	Congo	15,999
	Global total	**3,813,553**

Table 2. The twenty countries containing the largest area of peatlands (Source: Wetlands Int'l 2009)

Figure 11 illustrates peat distribution in the Asian countries with the most expansive peatlands. Early conversion of Sumatra's lowland forests, with their fertile volcanic soils, began in the 19th century to make the way for rubber and then later oil palm plantations. Having run out of lowland areas to convert, peatlands began to be converted on a large scale in the 1990s in Sumatra.

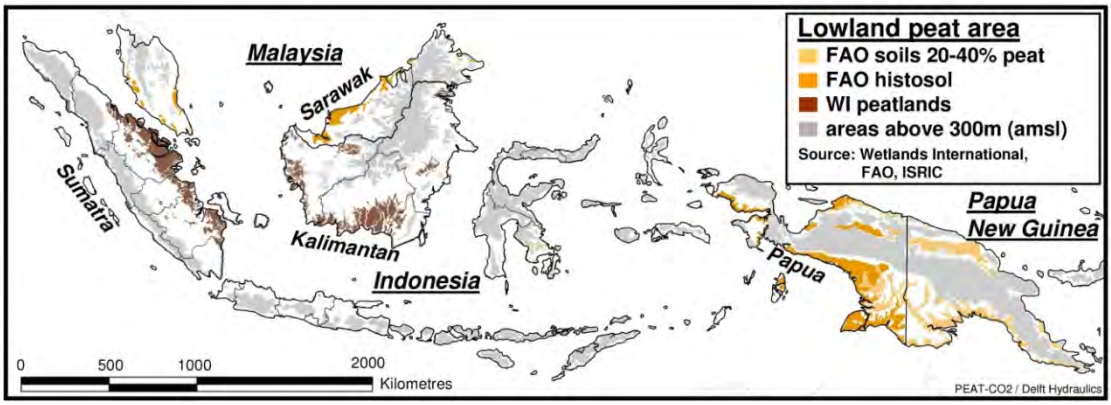


Figure 11. Peat distribution in Malaysia, Indonesia, and PNG (Source: Hooijer et. al 2006)

Currently, emissions from fire and draining peat are estimated to be approximately 5% of all man-made emissions (Figure 12). A particularly salient difference between forest and peat-based emissions are that deep peat areas that are being drained will continue emitting large quantities of CO_2 throughout this century while forest emissions are predicted to taper off and stabilize or decline by mid-century. The expected tapering off of forest-based emissions by 2050 is due to most countries having exhausting their exploitable natural forest by then (Moutinho and Schwartzman, 2005). Additionally, massive reforestation efforts in China and increasingly in India are expected to negate some of the global forest emissions.

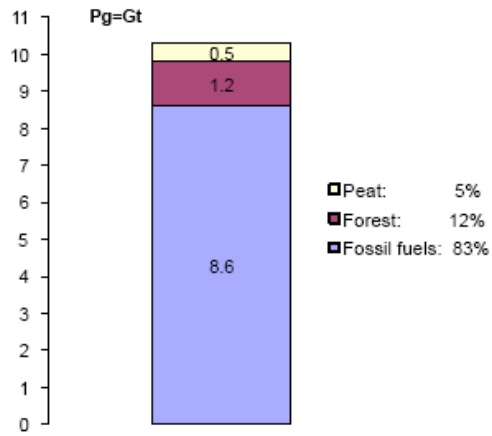


Figure 12. Bar graph of global annual emissions in gigaton (Gt) of CO_2, showing that drainage of peatlands is a significant source. Percentages indicate contribution of global annual emissions (Wetlands International 2009)

Given that peat subsides several centimeters per year until the peat depth is exhausted, oil palm companies periodically dig their drainage canals deeper so that the palm roots don't encounter the water table. As an example, draining peat on 47,000 hectares of peat in Central Kalimantan would produce a staggering 95Mt CO_2, while clear-cutting and burning the residual logs produced only 2.1Mt CO_2 (Stanley 2010).

Of the Asian counties in this assessment, besides the expansive peatlands in Indonesia, and the enormous emissions being generated by large scale conversion, Malaysia and PNG are the countries that have the highest potential to reduce emissions generated from both peat

drainage and deforestation. Since 1990, emissions have risen drastically in peat forests with Indonesia, Malaysia, PNG, and Brunei all showing a 50% emissions increase in that time period (Wetlands 2006).

3.1.1.2. Mangroves

Much has been recently published about the enormous below-ground carbon pools of peat swamps, and their significant contribution to climate change emissions when burned and drained. However, much less attention has been focused on mangroves despite their similarly large belowground carbon storage. In fact, mangroves technically may be defined as peatlands (i.e. 60% organic material in the soil).

Mangroves in Asia are generally found in two broad ecosystem types: fringing communities that occupy narrow coastal belts and mangroves in estuarine communities. Fringing mangroves are especially susceptible to climate change impacts from rising sea levels since their habitat is restricted to narrow belts. Estuarine mangroves are found on river delta systems and may be able to occupy areas further upstream as sea levels rise. Figure **13**. shows the global distribution of mangroves and Table 3 compares historic rates of mangrove loss by country.

Figure 13. Global distribution of mangrove forests, shown in green (source: FAO/Global Landcover Network 2008)

Asia harbors nearly 40% of the world's mangroves (FAO 2007), but has suffered the highest deforestation rate of any region with an average slightly over 1% annual loss. The largest contiguous stand of mangroves are found in the Sundarbans ecosystem, encompassing about one million hectares, of which 60% is in Bangladesh while the remaining 40% is in India. The Sundarbans are protected by law and is an example where conservation efforts have kept the area intact despite mounting population pressures (Figure).

Figure 14. Mosaic LANDSAT imagery of the Sundarbans ecosystem, shown in dark green (Source: USGS 2007)

Of the more than five million hectares of mangroves occurring in Asia, more than 50% are found in just one country – Indonesia (Table 3). Indonesia also tops the list for having lost more mangrove area than any other Asian country, with the first five years of this decade showing a 1.6% annual loss. Cambodia, with only 72,000 hectares of mangroves, was the Asian country with the second most drastic rate of loss, approximating an annual reduction of 1.2%. Malaysia with 567,000 ha and the Philippines with 247,000 ha of mangroves both experienced an annual loss of 0.8%.

In Indonesia, one reason why the country has experienced the most drastic mangrove losses is that while the Ministry of Forestry exercises much control over the management and conversion of lowland forests, permits to clear mangrove forest in Indonesia are easily issued at the sub-district level and require a minimal amount of documentation.

Table 3. Estimates of mangrove area and deforestation rates of mangroves by country from 1980 to 2005. (Source: FAO 2007)

	most reliable estimate		1990	2000	annual change 1990-2000		2005	annual change 2000-2005	
Country	ha	ref year	ha	ha	ha	%	ha	ha	%
Bangladesh	476,215	1995	460,000	476,000	1,600	0.3	476,000	0	0
Cambodia	72,835	1997	82,400	73,600	-880	-1.1	69,200	-880	-1.2
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
Philippines	247,362	2003	273,000	250,000	-2,300	-0.9	240,000	-2,000	-0.8
PNG	464,000	1993	492,000	425,000	-6,700	-1.6			
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
total	**5,271,368**		**5,888,100**	**5,388,900**	**-49,920**	**-0.9**	**5,095,200**	**-58,740**	**-1.2**

The principle driver of mangrove deforestation in Indonesia is aquaculture (shrimp farming), while conversion to agriculture is the main cause in other Asian countries (Figure 15).

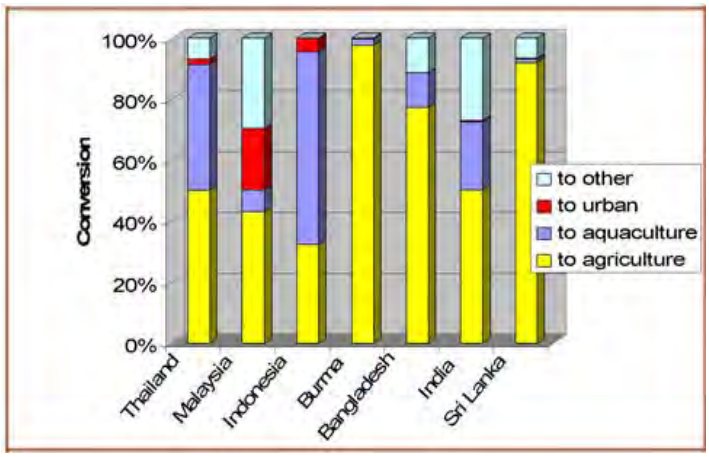


Figure 15. Deforestation agents for Asian countries with extensive mangrove areas
(USGS website: http://edcintl.cr.usgs.gov/ip/mangrove/)

Second to the Sundarbans, Bintuni Bay in Indonesian Papua has the most extensive mangroves in Asia, totaling roughly 400,000 hectares, of which most is unprotected. There has been at least one concessionaire logging mangroves in Bintuni Bay, with large trees being made into lumber while smaller diameter trees are used as charcoal, but the current status of this concession is unknown. Additionally, it does not appear as if any organizations are currently helping to plan for the sustainable management of Bintuni Bay. In 2002-3, The Nature Conservancy conducted a few studies there with funds from BP, who is drilling for natural gas in the Bay.

Several international organizations that focus on mangrove conservation are active in Asia, such as Wetlands International, Mangroves for the Future and the Mangrove Action Project. In addition, the Coral Triangle Initiative could provide a regional platform with which to engage on improving the protection and management of mangroves.

3.2 Forest-based Emissions

Estimates of where GHG emissions will be growing the most indicate that the Asian region will experience the world's largest increases, expanding by more than 75% by 2030, as shown in Figure 16. While much of this growth will be as a result of growing energy demand (particularly in India and China), emissions from deforestation and land use change are significant in Asia as a result of the continued conversion of forests and drainage of peatlands.

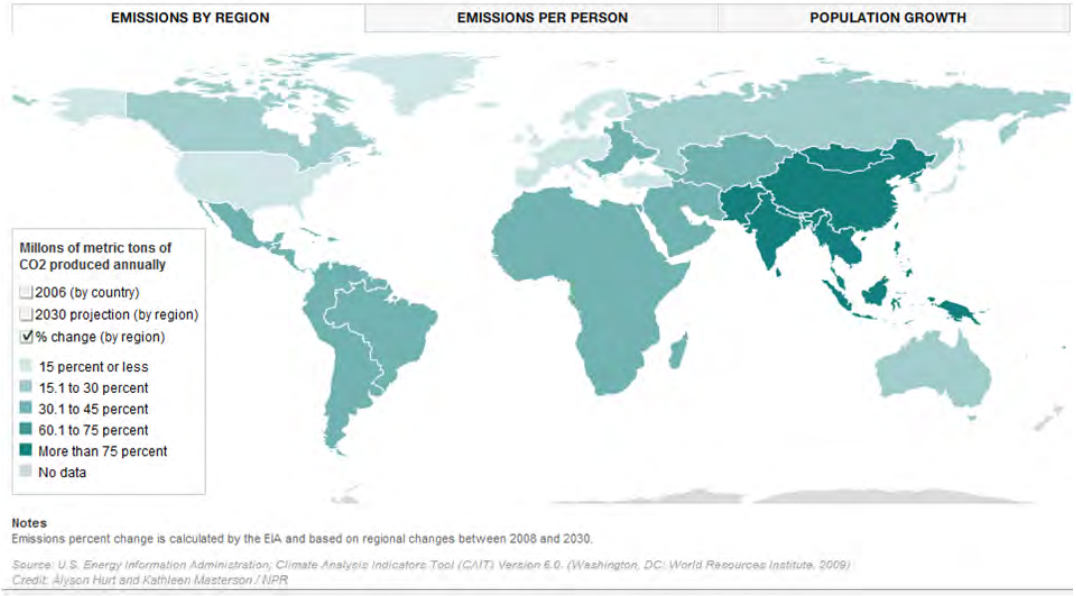
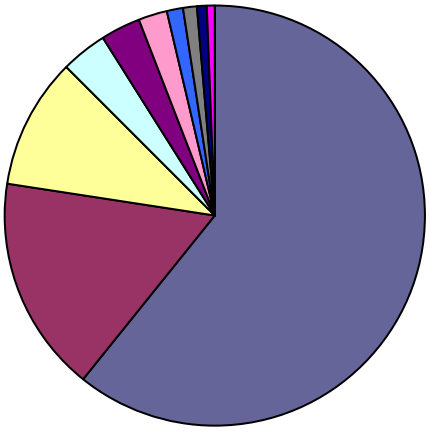


Figure 16. World map indicating estimated percent increase in CO_2 emissions by region. Darker shades of blue indicate higher percent increases with Asia estimated to increase emissions by more than 75% (CIAT, WRI 2009).

It is estimated that about 15% of total global greenhouse gas emissions come from deforestation, forest degradation, and land use change (2,072 of 12,478 Mt carbon). Over half of this is generated from eight countries in Asia, with the top three--Indonesia, Malaysia, and Burma--representing nearly 45% of the global total (Figure 17). Emissions from deforestation are also significant in Papua New Guinea, Nepal, the Philippines, Cambodia, Thailand, Sri Lanka, and Laos, where the forest sector can represent from 50-80% of a country's total emissions. Emissions profiles for each country are included in Appendix V. Reducing these emissions by avoiding deforestation and improving forest management is a key approach for cost-effective climate change mitigation, in addition to generating important biodiversity conservation and livelihood benefits as well.



	Country	LULUCF emissions (Mt C)	Global rank	% LULUCF
	Indonesia	700	1	83.6%
	Malaysia	191	3	80.8%
	Burma	116	4	83.7%
	PNG	39.9	9	94.3%
	Nepal	33.7	11	79.7%
	Philippines	25.9	14	41.6%
	Cambodia	15.3	22	45.0%
	Thailand	13	26	15.3%
	Sri Lanka	8	35	51.0%
	Laos	6.4	38	76.2%
		2,072	*Global total*	
		1,114	*Asia total*	
		53.8%	*% Asia*	

Figure 17. Greenhouse gas emissions from Land Use, Land Use Change, and Forestry (LULUCF) in Asia, 2000. Source: World Resource Institute Climate Analysis Indicator Tool (CAIT)

Indonesia is the world's fourth largest emitter of GHG overall, and by far the global leader in forestry emissions (700 Mt), with 84% of the country's total emissions generated from the forestry sector. Malaysia and Burma are the third and fourth most important forest emitters (behind Brazil), with over 80% of their emissions coming from Land Use, Land Use Change, and Forestry (LULUCF). While Burma hasn't been formally included in this assessment, various statistics on deforestation, GHG emissions, and antidotal evidence suggest that deforestation there has global implications for emissions as well as being able to effectively address issues relating to trans-boundary leakage (displacement of emissions to another country). The international community will need to consider possible engagement strategies to address deforestation and timber trade with Burma. It is recognized that this data is rather dated (2000) and that more updated analyses should be conducted to gain a greater understanding of current emissions trajectories and trends over time.

REDD has the potential to play a significant role in reducing some of these forest-based emissions by providing alternative income streams normally derived from converting forest to other uses. It's estimated that under optimum conditions, REDD-plus could reduce emissions by almost one gigaton of CO_2 per year from 2013 to 2020, the equivalent of taking off the road every car, bus, and airplane in the world. Avoiding deforestation, in particular, will be an economical way to mitigate climate change at a large scale and has the potential to create a market for REDD credits worth an estimated $18 billion per year (Deveny, Nackoney and Purvis 2009).

4. REGIONAL SYNTHESIS OF REDD ISSUES

For the purposes of this assessment, the Asia Region was divided into three sub-regions: **Lower Mekong** (Cambodia, Laos, Thailand, and Vietnam); **Insular Southeast Asia** (Indonesia, Malaysia, Papua New Guinea, and the Philippines); and **South Asia** (Bangladesh, Bhutan, India and Nepal). The following section provides a snapshot of these sub-regions and countries in relation to REDD.

4.1 Lower Mekong Sub-Region

The Lower Mekong Sub-Region encompasses Cambodia, Laos, Thailand, and Vietnam and is characterized by extensive mountainous areas through which the Mekong River traverses. About 175 million people live in this sub-region with a large percentage of the population heavily dependent on the Mekong River for irrigation, fisheries, and transportation. Much of the region's remaining forests are found in the undeveloped upland regions (Figure 18) inhabited primarily by ethnic minority groups. Lowland forests are rare and have almost entirely been converted to agriculture, except for a few remaining locations in northeast Cambodia (e.g. WWF's Lower Mekong Dry Forests ecoregion) and northern Burma (Figure 18). As the last remnants of Southeast Asia's once vast lowland forest ecosystems, these areas should be priorities for protection due to their global biodiversity importance. Other globally significant biodiversity areas include the Tonle Sap-Mekong Peatlands, Greater Annamites Forest, Tenasserim/Western Forest Complex and the Mekong River.

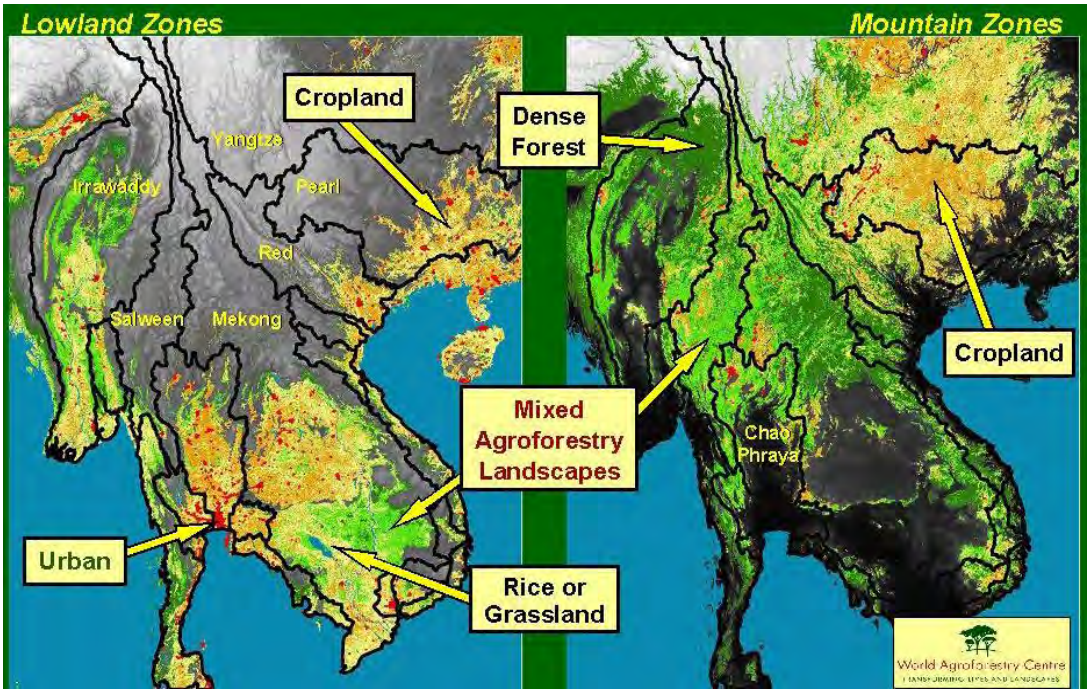


Figure 18. **Lowland and upland zones of the Mekong region. Source: David Thomas, ICRAF.**

Forests of this region are primarily threatened by commercial and subsistence agriculture, fuelwood utilization, infrastructure development (e.g. roads and hydropower), and illegal logging. The securing of long-term agricultural concessions by foreign governments and companies (e.g. China the Middle East) is a recent new trend impacting land use and forests. Commercial logging bans in Thailand and Cambodia, as well as global timber demand, are placing increasing pressure on the remaining forests of Laos and Burma and resulting in transboundary leakage of emissions. Much of the region's remaining significant forest cover is in border areas where governance is weak, conflicts exist, and the military is a key stakeholder.

Common forest types found across this geographic region support a regional approach to REDD in that standardized carbon accounting methodologies could be utilized for all countries. Some momentum has already been generated in supporting Mekong regional REDD efforts through early workshops by RECOFTC and others, and planned support from RDMA's Asia Regional Biodiversity Conservation Program. There seems to be growing political will for cooperation in the region (i.e. regional collaboration is an explicit objective of Vietnam's UN-REDD efforts), particularly on technical issues such as forest carbon measurement, monitoring and MRV, and addressing leakage. UNDP (2009) has compiled a useful matrix of current donor-supported forestry and REDD efforts in the Mekong region. Vietnam is a regional leader in Payments for Forest Environmental Services (PFES), with a hydropower model supported by RDMA/ARBCP that has wide regional applicability. A satellite hub exists in Bangkok which could serve as a data sharing platform for the region as well. A community-based REDD model, as is being advanced in Cambodia, could also have significant regional replicability to strengthen rural livelihood, land tenure, and energy security. There are many NGOs and donors active and supporting REDD in the region, with the ADB's GMS program potentially serving as a platform to expand regional inter-governmental collaboration.

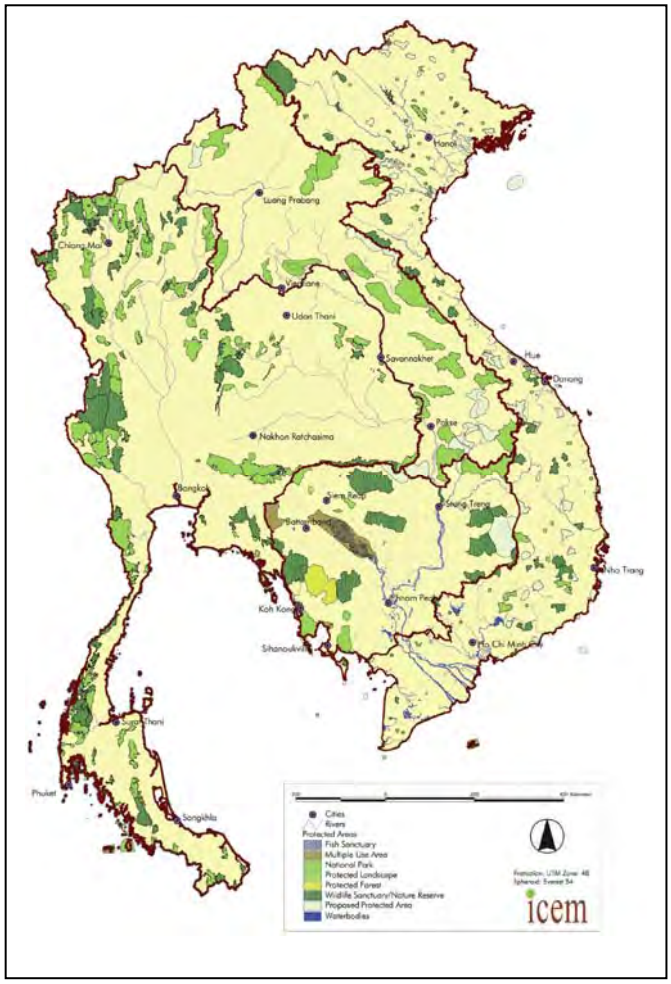


Figure 19. Protected forest areas in Lower Mekong sub-region. Source: ICEM.

A survey questionnarie conducted during this assessment (see Appendix IV) indicated that in this region, the clear legal rights to buy and sell carbon are still very weak, resulting in private sector reluctance to support forest carbon projects. In addition, the level of public awareness related to REDD was also seen as very low in the region, especially in Laos and Thailand. Related to technical aspects, issues dealing with standardized methods for inventorying carbon stocks, consistent methods of estimating GHG emissions, and the number of trained personnel received the lowest scores.

4.1.1 Cambodia

Cambodia has significant forest resources (10.5 M hectares, 60% of land area) and a relatively low population density. Significant forested areas include the lowland dry forests in the northeast, the Cardamom Mountains in the southwest, and the flooded forests of the Tonle Sap. The Tonle Sap flooded forests have high soil carbon stocks resulting from the annual moonsoonal flooding, which seasonally forces the Mekong River to reverse its flow up the Tonle Sap channel greating expaning Southeast Asia's largest lake. This phenomenon supports regional fish stocks on the Mekong, as more than 200 fish species migrate into theses flooded forests to spawn, as well as being key habitat for a multitude of wading birds (FAO 2008).

Although about 25% of the country is under protected area status, deforestation rates in Cambodia are high, even within protected areas. Over the last decade, deforestation rates were estimated at about 2% per year (over 200,000 hectares per year) although this figure has reportedly decreased over recent years to about 0.8% (or 75,000 ha per year). In 2000, Cambodia's forestry emissions were estimated at 15 Mt carbon (global rank 22), which represented 45% of the country's total emissions. Despite a commercial logging moratorium, illegal logging remains a problem. Land grabbing and foreign land concessions for agriculture and tree plantations also contribute to land conflicts and migration. Cambodia has recently undergone a progressive policy target of establishing 2 million hectares of community forests and a number of NGOs have been supporting this process. There is legislation that recognizes community-based concessions for managing timber and non-timber products but forest carbon is techically owned by the government.

Like many countries in Asia, government ministries often have conflicting or overlapping mandates and cooperative planning is rare. The Ministry of Agriculture, Forest, and Fisheries (MAFF) Forest Administration (FA) has been designated the government's lead focal point for REDD. However, the Ministry of Environment (MOE) is responsible for protected areas and is the focal point for UNFCCC reporting (e.g. National Communication, etc.), so coordination between the two ministries will be an important issue. Cambodia has formed a REDD task force, chaired by the FA Director General and including FA, MOE, and Ministries of Land Management and Urban Planning and Construction, with the Clinton Climate Initiative (CCI) and RECOFTC having civil society observer status.

Cambodia has been accepted into both the UN-REDD and World Bank FCPF programs, but so far no funding has been offered. In spite of this, Cambodia has been making good progress due to support from UNDP and FAO to help them develop a "REDD Roadmap," which is expected to be completed by August 2010. There are currently four official REDD pilot projects in Cambodia under various states of development: (a) community forestry in Oddar Meanchy with Pact, CCI, and Community Forestry International; (b) Seima Protected Area in Mondulkiri with Wildlife Conservation Society (WCS); and under development in (c) Prey Long and (d) the Cardamoms. The Oddar Meanchy pilot is nearly ready for verification of carbon emissions reduction credits and is demonstrating a novel approach for bundling of disparate community forests, which is a methodology with potential regional application. This is particularly interesting since the Cambodian government has declared that more than half of net REDD revenues would be given to communities. Another promising example is from improved cookstoves to reduce fuelwood consumption being piloted by the French NGO Geres. Other supporters of REDD efforts in Cambodia include AusAID (funding a National Carbon Accounting System), DANIDA, NZAid, DFID, Japan, Blue Moon Fund, etc. USAID Cambodia's new HARVEST program will also have activities supporting reduced emissions from land use. While Cambodia has relatively good land cover mapping data available for the past eight years (enough for a good baseline), it is in need of an updated national forest inventory.

4.1.2 Laos

Laos has one of the highest relative forest covers in the region (70%, with 16 M hectares) and a small population. These forests are important watersheds for the many tributaries of the Mekong River and are essential to helping Laos achieve its goal of becoming the "battery of Southeast Asia" through sustainable hydropower development. However, much of Lao's forests are in 'degraded' condition (defined as <70% canopy cover, total estimated at 9-10 M ha), highlighting significant opportunities for forest restoration and enhancement of forest carbon stocks under REDD+. In fact, some studies have indicated that the mitigation potential from existing and degraded forests may be the same or greater than that from avoided deforestation (Blazer, et al., 2007). In 2000, Lao's forestry emissions were estimated at 6 Mt carbon (global rank 38), which represented 76% of the country's total emissions. Lao's monitoring of forest canopy cover has been acknowledged as a novel approach with potential for further development of a formal REDD methodology to address degradation (Sandra Brown, personal communication, 2010).

Laos has identified nine major drivers of forest carbon emissions: fire, industrial tree plantations, mining, hydropower, infrastructure development, pioneer shifting cultivation, agricultural expansion, urban expansion, and overharvesting. Challenges facing Laos, as reported by their REDD task force, include coordination with many REDD actors, internal capacity to absorb support, directing financing where needed, uncertainty in UNFCCC negotiations, and leakage. Specifically, the role of international logging companies (e.g. from China, Thailand, and Vietnam) operating in Laos to feed international timber demand are one of the major contributors to emissions leakage. Illegal logging appears to be somewhat

pervasive, with connections to the military. In addition, others have noted low capacities as a key challenge in Laos.

In terms of REDD progress, Laos has developed a National Forest strategy 2020, and is now preparing its R-PP for submission to FCPF Participants Committee by October 2010 following stakeholder consultations in May and August. The $200,000 R-PP preparation grant is currently being dispersed. A REDD task force has been established, with the Planning Division of the Department of Forestry (DOF), Ministry of Agriculture and Forestry (MAF) as the Secretariat, and including National Agriculture and Forestry Research Institute (NAFRI), National Agriculture and Forestry Extension Service (NAFES), National University of Laos, Water Resources and Environment Administration (WREA), Ministry of Industry and Commerce, and National Land Management Authority (Department of Land Management, and Center for Land and Natural Resource Information Management). Major supporters of REDD activities in Laos are many and currently include Japan, GTZ, Finland, WCS, ADB, Blue Moon Foundation, etc. The Forest Research Institute of Japan is supporting forest cover change analysis and technical assistance is also coming from the Air Agency Survey with the Japan Forestry Agency. A few REDD-type forestry projects/activities and REDD pilot projects are being planned and/or implemented by SUFORD, JICA, IUCN, ADB Biodiversity Corridors Initiative, WWF, and RECOFTC. WCS is also developing REDD and hydropower/watershed PES demonstration sites in central Laos.

4.1.3 Thailand

Thailand has 28% forest cover (14.5 M hectares) and has set a national target to increase this to 40% by 2020. The Western Forest Complex on Thailand's western border with Burma is an extensive complex of protected areas and wildlife sanctuaries housing a globally significant tiger population. There are currently 228 protected areas established in Thailand and more being planned. Many of these are to be located in the upland watersheds of northern Thailand which are home to thousands of ethnic minority communities. Conflicts over land and forest resources and tenure in the uplands are commonplace and the source of much tension between government authorities and rural communities. The unsuccessful community forestry movement, which took place over more than a decade, is indicative of the complex issues involved here.

Despite a nationwide logging ban in effect since 1989, deforestation rates in Thailand have reportedly been increasing, from 0.73% in the 1991-1999 period to 1.07% in the 2000-2005 period. In 2000, Thailand's forestry emissions were estimated at 13 Mt carbon (global rank 26), but this represented only 15% of the country's total emissions. Thailand has increased support for upland watershed protection, the creation of community watershed networks, and budget support. The country's extensive coastline also harbors significant mangrove forests (240,000 ha).

In relation to REDD, Thailand is lagging behind its neighbors in many areas. To date, Thailand is only one of two countries in the region (the other being the Philippines) that has not officially adopted the Copenhagen Accord, calling into question the potential for USG

support. Thailand has not yet formally established a REDD task force, although it has identified the relevant agencies involved under the Ministry of Natural Resources and Environment (MONRE): Royal Forest Department (RFD), Department of National Parks, Wildlife, and Plant Conservation (DNP), Forest Industry Organization (FIO), and Department of Marine and Coastal Resources, with support from Office of Natural Resources and Environmental Policy and Planning (ONEP) and Thailand Greenhouse Gas Management Organization (TGO). DNP currently serves as the REDD focal point.

Despite the slow progress, Thailand has strong capacities in remote sensing, GIS, and forest monitoring. It apparently has its own satellite for this and has offered to act as a regional hub for data sharing. It has also been noted that much remote sensing imagery and data may be available from a regional data hub in Bangkok, but that there are currently obstacles to the sharing of data (Sandra Brown, personal communication). Thailand is only in the beginning stages of REL and MRV development but have a formal definition of 'forest' (e.g. >5 ha, >5 m tall, and >10% canopy cover, although this is different from the UNFCCC forest definition). REDD efforts are currently being supported in Thailand by ADB BCI, which is working on a REDD pilot site with DNP in the Western Forest Complex. Global Environment Facility (GEF) funding is being planned to support a 'Sustainable Financing for Protected Areas' project. In addition, WWF is working on plans for a complete country-wide forest mapping using LIDAR technology. There are also a small number of scattered CSR-type pilot activities with REDD/forest carbon offset elements.

In Thailand, the political issues surrounding forest ownership (and by extension future efforts to clarify carbon ownership) are significant. Thai government officials have informally requested support to facilitate dialogue between government agencies and Thailand's active civil society organizations that have voiced strong opposition towards REDD. This opposition is mainly due to fears of further resource exclusion and denial of land rights by the government, as well as perceptions that REDD with a market-based aspect will be a way for industrialized countries to forego real commitments toward substantially reducing their emissions. This impasse has long historic roots and is currently one of the key obstacles to the development of an effective national REDD system. In addition, Thailand's current domestic political crisis may also have implications in terms of its ability to develop momentum for addressing climate change.

4.1.4 Vietnam

Vietnam has an estimated forest cover of 40% (or 13 M hectares), of which about 10.3 M ha is natural forest and 2.8 M ha are plantations. Overall, Vietnam's forests are estimated to store up to 5.4 Gt of carbon (Ravilious, et al. 2008). Vietnam has historically seen a great loss in its forests, and it's protected forests today exist primarily as small, scattered 'islands' of biodiversity. Reconnection of these areas across landscapes through reforestation of biodiversity corridors is one of the key challenges. A number of programs in the mid-1990s, including the five million hectare program, have helped to reverse the trend in deforestation such that today Vietnam is increasing its forest cover. In 2000, it was a net sequester of approximately 13 Mt forest carbon. Since there are no net forestry emissions in Vietnam, the

potential benefits from supporting avoided deforestation activities under a REDD mechanism are uncertain. However, much of these gains are reportedly due to increases in monoculture tree plantations, and it is not clear to what extent Vietnam may still be losing its high-carbon and high-biodiversity native forests. Studies of key biodiversity areas, protected areas, and high carbon stocks indicate that protected areas in Vietnam currently only encompass 9% of the high carbon stocks, which would suggest that much of the remaining aboveground carbon pools could be threatened and may meet additionality criteria, but this would require further study.

In terms of REDD, Vietnam is currently one of the more advanced countries in the region, in particular due to a conductive policy and institutional environment and donor support. Vietnam's strong emphasis on rural poverty alleviation can serve as a model for the region. A national REDD task force is comprised of the Ministry of Agriculture and Rural Development (MARD) and Ministry of Natural Resources and Environment (MONRE), with forest inventory data kept by the Forest Inventory and Planning Institute (FIPI). Vietnam is one of the three initial UN-REDD pilot countries in Asia and has received considerable technical and financial support. USAID/RDMA has also supported development and implementation of a national pilot policy for Payments for Environmental Services (PES), which has helped set the foundation for payment transfer systems as well as generating rich lessons for REDD implementation. This program is also piloting combining (or 'stacking') forest carbon offset payments with payments from watershed PES schemes. UN-REDD has recently conducted an extensive study analyzing design options for a REDD-compliant benefit distribution system (UN-RED 2010). Other REDD support comes from the World Bank FCPF, JICA, Finland, ICRAF and others. Finland is reportedly investing $5 million in a Forest Monitoring and Information System project. SNV has been promoting biogas offset programs and has also conducted analyses looking at REDD potentials in relation to opportunity costs of different agricultural crops as well as mapping of priority REDD sites.

4.2 Insular Southeast Asia

Countries in the Insular Southeast Asia sub-regon--Indonesia, Malaysia, Papua New Guinea, and the Philippines--are Asia's dominant GHG emitters from land use. This sub-region's GHG emissions are several orders of magnitude greater than the two other subregions combined and leave little doubt as to where efforts should be focused in order to achieve meaningful GHG mitigation.

Indonesia and Malyasia are linguistically and culturally simiar and deforestation is principally driven by large industrial-scale conversion to oil palm and pulp and paper plantations. This same driver is now impacting PNG. As has been shown in earlier sections, the countries in this sub-region have expansive forests, as well as enourmous belowground carbon pools, both in peatlands and in mangroves.

Two significant transboundary forest ecosystems are found here: the 'Heart of Borneo' and the island shared by PNG and Papua, Indonesia. The Heart of Borneo (HOB) is a transboundary region of equatorial rainforest spanning about 220,000 square kilometers on

the island of Borneo--roughly 30% of the island's total land area. The region encompasses parts of Brunei; the Indonesian provinces of East, West, Central, and South Kalimantan; and the Malaysian states of Sabah and Sarawak. There has been growing political momentum for collaborative management of this area since a joint declaration was issued in February 2007, facilitated in part by WWF. The three governments have developed a strategic action plan which highlights the need for a sustainable economic model for the HOB through a joint conservation and development approach, including valuing forest ecosystem services and sustainable natural resource management within the area. Due to its elevational gradients and habitat diversity, the HOB is expected to be a climate refuge and the centerpiece of forest and freshwater ecosystem connectivity across the island. Much of the HOB lies over 1,000 m in elevation and is therefore partially self-protecting due to difficulties in access. Efforts should be on identifying large lowland or peat forest under threat with viable populations of the major mammal species.

The forests of Borneo are also being impacted by frequent uncontrolled fires set annually to clear land in agricultural areas and degraded forests. The forest fires of 1997 and 1998 in Borneo were among the largest ever, burning nearly 10 million hectares of forested and nonforested land and releasing between 0.8 and 2.5 billion tons of carbon into the air. The transboundary haze caused by these fires also has been a source of political tension in the region.

The expansive forests of PNG and Papua, Indonesia contain some of the region's last remaining and significant wilderness areas. These forests, and the unique biodiversity they contain, are under increasing threat from unsutainable logging and conversion to oil palm plantations. It is not clear at this time the degree of collaboration between PNG and Indonesia to ensure effective management of this area.

4.2.1 Indonesia

Indonesia is the world's largest forest-based emitter (700 Mt C in 2000, representing 84% of Indonesia's total GHG emissions), with nearly double the emissions from the world's second largest forest emitter—Brazil (375 Mt). Clearly, what is happening in Indonesia in terms of forest management has global implications. Indonesia's huge forest resources (88.5 M ha) still cover half of the country, particularly on the islands of Sumatra, Kalimantan, Sulawesi, and Papua. Deforestation rates are high (2% per year) and amount to about 1.9 M ha per year. Much of this is occurring on high carbon peatlands converted to plantations for oil palm and wood fiber, resulting in enormous emissions. Expansion of oil palm cultivation in Kalimantan, for example, has occurred rapidly, from less than 15,000 hectares in 1984 to nearly a million in 2004. Indonesia also has half of Asia's mangroves (3 M ha), which are also experiencing high deforestation rates (1.6%, or 50,000 ha per year). Indonesia is also one of the largest timber producing nations, with millions of hectares being managed by private concessions. Illegal and unsustainable logging is also a significant contributor to forest loss and emissions.

Only a small fraction of the country's land base is conservation forest, and even in some protected areas deforestation is severe. There is therefore a huge gap between national

park management and reality. Some estimates indicate that $130M is needed per year to effectively manage Indonesia's protected area system, representing a gap in available resources ranging from $30-$100M.

Recent trends in decentralization have created a number of challenges in forest management due to conflicting goals between central and local authorities. The desire of provinces and districts for economic growth through logging, oil palm development, and mining may compromise conservation efforts. These same conflicting mandates are evident in the targets and mandates of various ministries, including between the Ministry of Forestry and the Ministry of Agriculture.

There are extensive efforts underway to support Indonesia's readiness for REDD. A comprehensive assessment of these efforts would take considerable resources and was beyond the scope of this regional assessment. Therefore, only a short summary is provided here. Indonesia has played a leading role in developing regulations addressing REDD and is probably the country with the greatest number of pilot carbon projects with an array of different project developers and implementers. Figure 20 indicates the location of about two dozen carbon projects currently under development in Indonesia. Projects range in scale from site-based, to district, to landscape scale. The status of all of these projects is not currently known, as some may be in flux, partly due to lack of funds and the uncertainity with how the government will tax revenues from carbon sales. In addition, a number of provinces (e.g. Jambi and Papua) have also been developing formal Low Emissions Devleopment Strategies (LEDS).

The challenge for Indonesia now is to capture the learning that is taking place in these pilot projects during this early phase of REDD development, and to disseminate lessons to a wider audience. Initially, the World Bank played a role in bringing project propenents together to share lessons learned, but no further follow up has been seen. Additionally, there appears to be little coordination among donor efforts with REDD, and the projects that are working toward a national or subnational REDD system often view the private sector voluntary projects with suspicion. There clearly is a need for an organization to provide institutional support that captures and dissiminates lessons learned among these many different types of REDD projects.

Support for REDD in Indonesia comes from a wide range of organizations including UN-REDD, AusAID, GTZ, JICA, World Bank, WWF, TNC, Fauna and Flora International, Climate Climate Initiative, and many others. The USAID Indonesia Mission is also now coming out with a large, new, multi-year forestry and climate change program that will focus on high carbon forest conservation in Sumatra, Kalimantan, Sulawesi, and Papua. Additional discussions and planning by a USG interagency team are taking place concerning a USG-supported Center of Excellence for peat management in Indonesia.

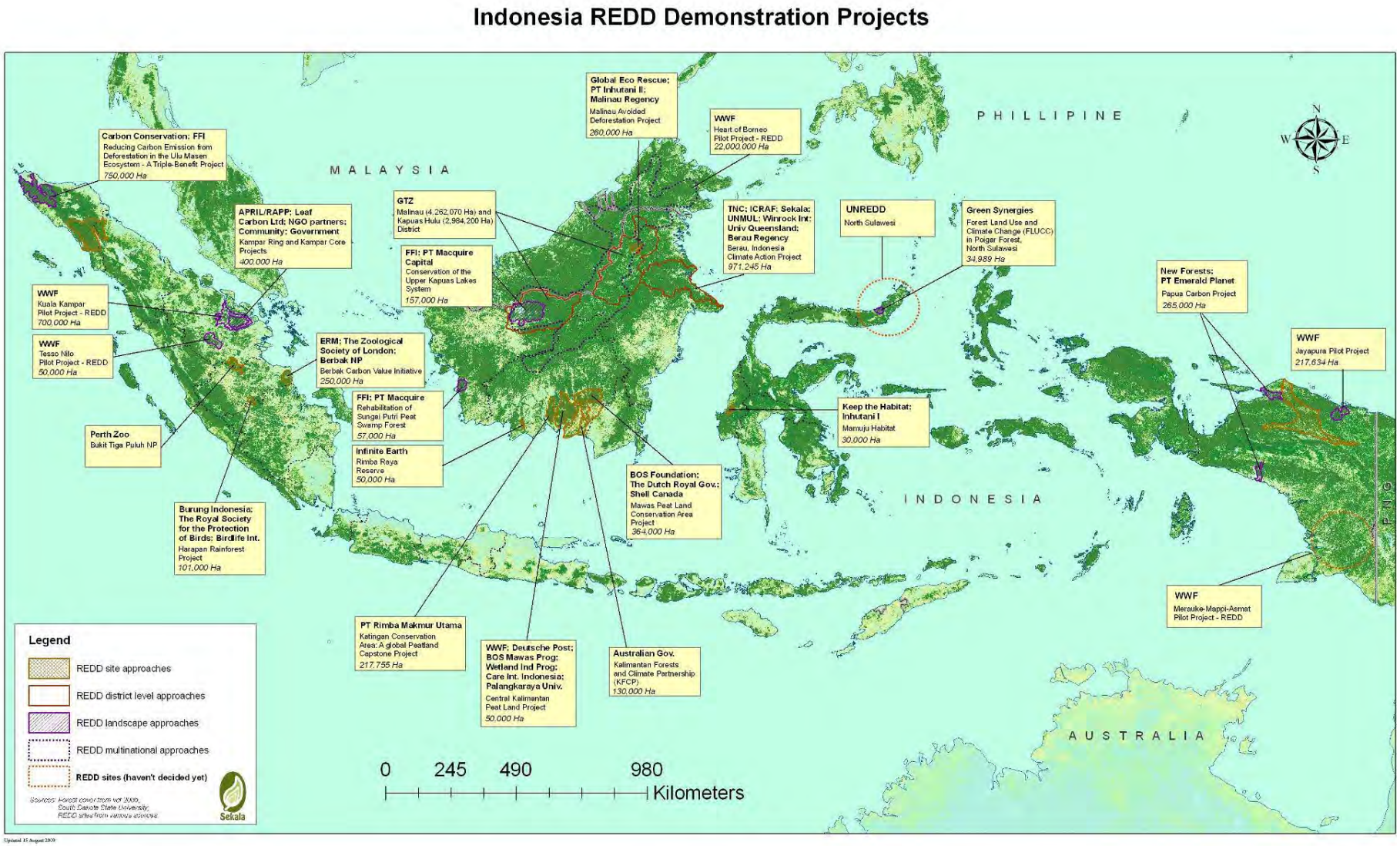


Figure 20. REDD demonstration projects in Indonesia (Source: Sekala 2010)

4.2.2 Malaysia

Malaysia is the world's third largest forest-based emitter, with 191 Mt carbon emitted in 2000 (representing 81% of total national emissions). Malaysia has high forest cover (64% of total land area, 21 M ha) and relatively high deforestation rate (140,000 ha per year). It also has the second largest extent of mangroves in Southeast Asia, with 565,000 hectares. Land use change and emissions are primarily driven by industrial timber harvesting and conversion to plantations of oil palm and rubber. During the 1980s and 1990s, the forests of Borneo were devastated by extensive logging. In recent years, production of oil palm, which thrives in the high-heat, high-humidity environment, has skyrocketed. Between 1984 and 2004, the amount of land under cultivation for oil palm in Malaysian Borneo increased from 184,744 to 1,673,721 hectares.

Forest management in Malaysia is seen as a state issue, and Sabah, Sarawak, and the states of Peninsular Malaysia have a great deal of local autonomy, which may restrict strong national policies. However, Malaysia does have a national emissions reduction target of 40% and a national target of maintaining 50% forest cover. Malaysia currently has about 4.5 M ha of oil palm plantations (1.4 M of which are in Sabah) and a nationwide total target of 6 M ha (which may be revised down to 5 M next year).

Forest management policies and practice appear to be the most progressive in Sabah State, which has a policy that all Sabah forest concessions are independently certified by 2014. Of a total area of 2.6 M ha of production forests, 0.5 M ha of these are industrial tree plantations. To date, only 50,000 ha have been certified, leaving a remaining 2 M ha. In 2010, Sabah expects to have full implementation of reduced impact logging (RIL) practices statewide, that will be open for third-party auditing. Many forest areas have been degraded from over-harvesting in the past, so there is a need for financing for restoration. Fire control during El Nino years is also a serious management concern. Sabah has also taken additional steps to create an enabling environment for REDD, including revising state law to define carbon as a 'forest product' owned (and therefore able to be traded) by the state. Currently, there is a paucity of carbon financing available to pilot REDD initiatives in Malaysia.

Sabah and Sarawak on the Malaysian part of Borneo have been identified by the Forest Carbon Index as one of five 'Global Best Places for Early Investments'[8]. The Forest Carbon Index compiles and displays global data relating to biological, economic, governance, investment, and market readiness conditions for forests and countries around the world, revealing the best places and countries for forest carbon investments. "Because of the relatively good governance and market readiness of Malaysia versus Indonesia and Brunei, the Malaysian parts of Borneo hold the greatest opportunities for early forest carbon investments. As governance improves, Indonesia should also become a major contributor to forest conservation. Although Malaysia scored better than Indonesia in terms of country risk, both countries continue to have significant governance and market regulatory issues that need to be addressed before forest conservation can succeed."

[8] In addition to the Heart of Borneo, other Global Best Places include the Greater Amazon, Mesoamerican Corridor, Eastern Madagascar, and to some extent, the Congo Basin and West Africa.

Some potential may also exit in Peninsular Malaysia. For example, Malaysia Airlines is supporting a pilot project in the peninsula's last remaining peat swamp. In addition, there is a GEF project looking at three peat forests (Sabah, Sarawak, Peninsular). Several Timber Investment and Management Organizations (TIMO) have begun scoping Malaysia and other Southeast Asian countries for opportunities to buy timber concessions. TIMOs in general have strong commitments toward certification both as a way to engage western markets and to demonstrate to their institutional investors that best management practices are being implemented. In Malaysia, two TIMOs operate plantations--New Forest and Phaunos Timber Fund--and both are interested in acquiring natural forest concessions. Partnerships between a TIMO or local concessionaire that has committed to obtaining FSC certification could support piloting of a REDD program in the concession. This particular model could test two hypotheses, one being that REDD revenue will partially compensate for reduced revenues from managing a logged over forest compared to converting it and planting fast-growing timber species. Secondly, improved timber harvesting practices substantially reduce emissions and lead toward faster stand recovery and that could mean shortened harvest cycles. In addition, UNDP is planning to initiate several conservation projects in Sabah and has expressed a strong wiliness to partner. While RDMA's RAFT program has been supporting forest certification of timber concessions, it has not gone so far as to trial REDD pilot projects with concessions except under TNC's Berau Forest Carbon Project.

4.2.3 Papua New Guinea

Papua New Guinea (PNG) has high forest cover (65%, 29.5 M ha) and ranks ninth in the world for forest-based emissions (40 Mt carbon in 2000, representing 94% of total national emissions). PNG has a total of 15 M ha under production forestry, of which 8 M ha are under some form of concession management. There are only about 62,000 ha of tree plantations nationwide. Most of PNG's land is communally owned, where community land tenure is recognized through the traditional Melanesian system of clan ownership. Clans nominally control almost all of PNG's natural forest, leaving communities with the option to hand over management rights to timber concessionaires in exchange for a proportion of the royalties. Illegal and unsustainable timber extraction and the expansion of oil palm plantations are some of the main drivers affecting forest loss. However, subsistence agriculture also appears to be an important and growing driver of emissions in PNG as well (Figure 21).

PNG is one of the early proponents of a global REDD mechanism and one of the original three UN-REDD pilot countries in Asia. It is also participating in the World Bank FCPF but has elected not to accept World Bank funds in exchange for a larger UN-REDD joint program. However, recent political tensions have resulted in UN-REDD putting its support on hold until more clarity is established in terms of the responsible agencies for REDD implementation at the national level (e.g. between the Office of Climate Change and the Department of Environmental Conservation). Specifically, the Office of Climate change had signed carbon sales agreements, but had no rights to do so on customary lands. Legislation to clarify carbon rights in under progress now. There is generally strong awareness of REDD throughout the country, also as a result of 'carbon cowboys' which may have led to unreasonably high expectations.

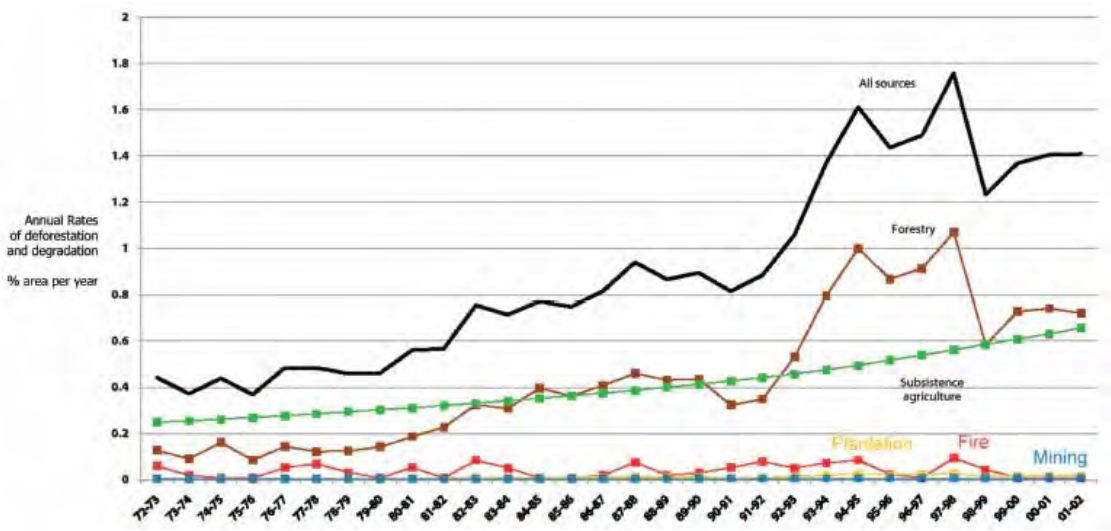


Figure 21. Estimation of annual rates of forest cover change (% per year) in PNG for each driver of change, 1972 to 2002. (Shearman et al 2008)

PNG's second National Communication is being prepared new this year with support from UNDP and will include the forest sector. PNG is also developing a national climate change strategy that will have three components: Low Carbon Strategy (energy, transport), REDD+, and Adaptation

The Forest Authority has strong skills in forest monitoring and is developing four provincial pilot projects, to be selected by an interagency team based on an approved provincial forest plan, low risk from natural disasters/hazards, and expression of interest. In addition, a number of NGOs are also developing pilot projects, including community REDD in Manus and New Islands (WCS), Gulf province (Conservation International), Aidelberg project (TNC), and potentially by WWF.

A new national forest inventory is likely needed, along with updating of the AusAID-funded Forest Inventory Mapping System. Other needs expressed include raising awareness to counteract high expectations due to the Office of Climate Change (now dissolved), media, and carbon cowboys.

Figure 22 illustrates how geospatial mapping exercises can assist in identifying potential sites for REDD projects. Figure 22 indicates forest areas in PNG most vulnerable to conversion due to flat terrain with soils suitable for agriculture. Timber concessions are also shown. Figure 23 overlays carbon stocks and high biodiversity areas to help identify potential sites for REDD that capture biodiversity co-benefits. From this example, at least three sites would meet additionality criteria and would capture substantial biodiversity co-benefits.

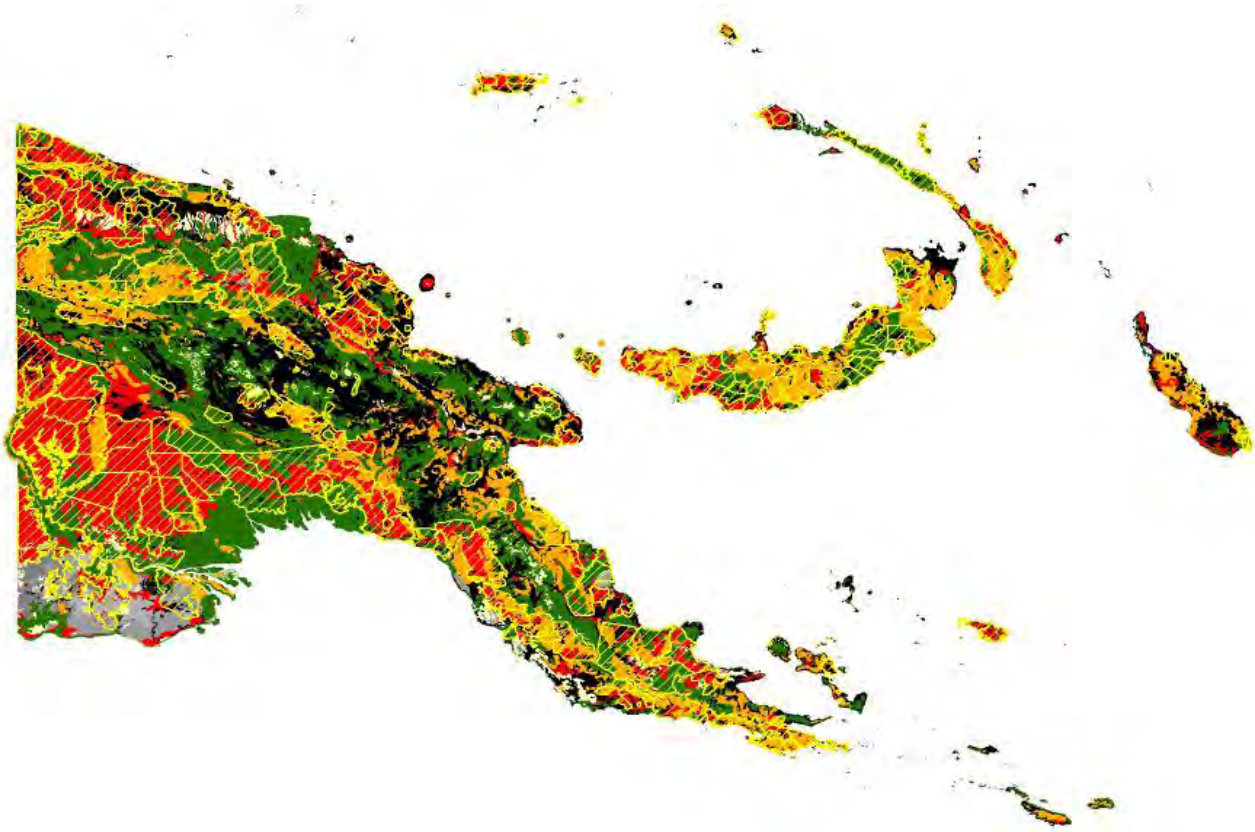


Figure 22. PNG showing vulnerable areas to conversion with red representing areas most vulnerable and therefore highest potential for REDD. Green areas are self-protecting due to steep slopes are high elevations. Yellow lines indicate timber concessions (Lipsett-Moore/TNC 2009)

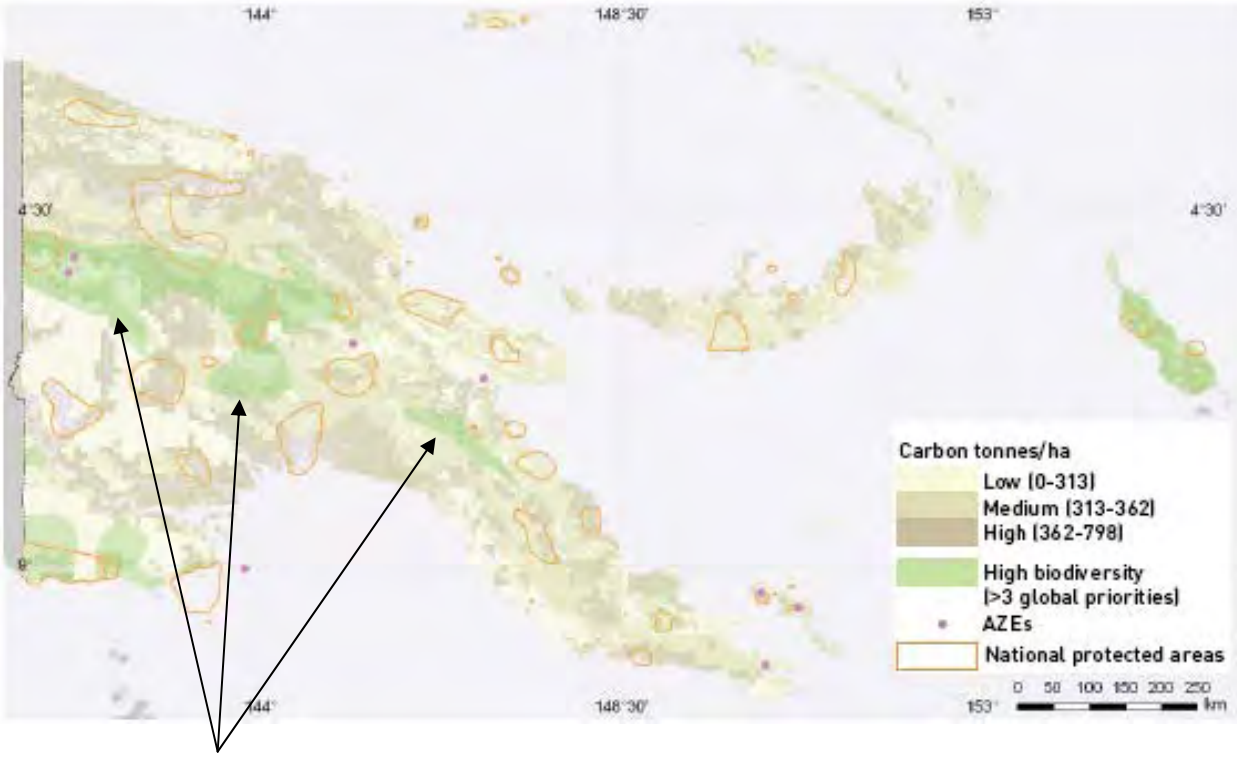


Figure 23. Map of PNG indicating carbon stocks and areas of high biodiversity. Arrows indicate promising sites for REDD using vulnerability, carbon stocks, and biodiversity as criteria. (Source Ravilious, K, et al. 2008).

4.2.4 The Philippines

The Philippines was ranked the world's fourteenth largest forest emitter in 2000, with 26 Mt carbon emitted, representing 42% of total national emissions. The Philippines has about 24% forest cover with 7 M hectares. Population pressures are significant, and deforestation rates are consequently high (over 2%, or 160,000 hectares per year). The Philippines has protected its remaining mangrove forests, and peatlands aren't extensive there. These forests are particularly and increasingly important for protection from frequent cyclones and storm events. The Philippines has been active in developing and promoting approaches for aassisted natural regeneration to help restore degraded forests, with support from FAO. These approaches could present useful examples for other countries in the region. The Philippines has observer status under the UN-REDD program but additional details on the state of REDD readiness there are not available at this time.

4.3 South Asia

Of the four countries in the South Asia sub region--Bangladesh, Bhutan, India, and Nepal—only Nepal is reported to have significant forest emissions. Bhutan has no net emissions, while Bangladesh and India report net carbon sequestration through afforestation efforts. This is particularly significant in light of the very high population densities and pressures on forests in South Asia, particularly for fuelwood and fodder. However, a 2007 study on deforestation trends did identify several forests that had experienced significant deforestation in India and Bangladesh, as shown in Figure 24. This forest change analysis indicates that the mangroves of the Sundarbans have experienced degradation in addition to a substantial area in Burma that borders Bangladesh. The role of international timber trade and implications for leakage in relation to South Asia need further investigation.

In terms of regional approaches, South Asia has two important transboundary forest ecosystems: the Sundarban mangroves (see Section 3.1.1.2), which are shared by Bangladesh and India, and the montane forests of the Himalayas shared by India, Nepal, and Bhutan. The U.S. Forest Service (USFS) has been active in both of these areas, having piloted methods for forest carbon accounting in the Sundarbans with support from USAID. In addition, USFS has initiated dialogue with Bhutan, Nepal, and India on regional cooperation in the eastern Himalayas. Similar forest types could mean an economy of scale in assisting all three countries simultaneously to develop forest carbon accounting and monitoring methodologies, etc.

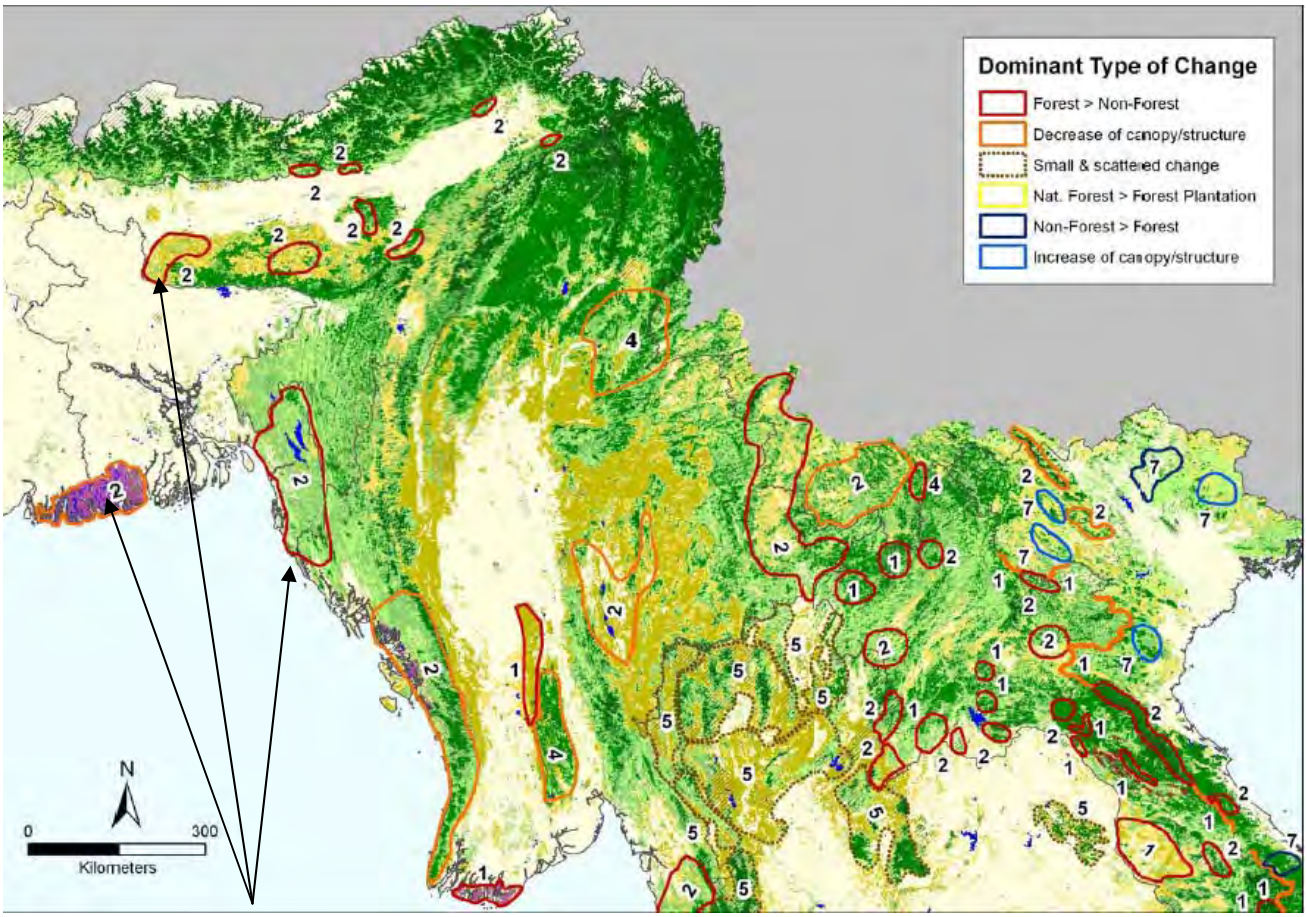


Figure 24. South and Southeast Asia with forest areas that experienced deforestation and degradation 1990 – 2005. The arrows represent areas of special concern (Stibig, et al. 2007)

4.3.1 Bangladesh

Bangladesh is a forest poor country, with less than 7% cover and only 870,000 hectares. Population pressures are significant, with only 6 ha of forest available for every 1,000 people (FAO 2009). Bangladesh also has about 475,000 ha of mangroves, located primarily in the Sundarbans. While one study has indicated that the Sundarbans did suffer some degradation over the last 15 years (Stibig, et al. 2007), this was contradicted by a USGS study which showed this area as largely intact. The country's emissions in 2000 were reportedly negative, in other words, Bangladesh's forests sequestered/stored a net 3.5 Mt carbon. This would provide some opportunities for potential carbon credit trading under a global REDD-plus framework.

USFS has been working with USAID/Bangladesh's Integrated Protected Areas Co-management (IPAC) project and the Forest Department (FD) of Bangladesh to build capacities in forest inventory and carbon accounting in mangroves and other wet forests. Building on the trainings and the development of mangrove carbon accounting protocols (Donato et al. 2009), the FD has completed field work in the Sundarbans. This effort is expected to result in a scientifically rigorous carbon estimate for the Sundarbans,

information the country plans to use to develop a REDD proposal. IPAC is simultaneously establishing co-management committees near protected areas, including the Sundarbans, which will include community members in protected areas management and establish benefit-sharing mechanisms to share revenues from ecotourism and other ecosystem services with community members. Such systems could provide a foundation for future REDD programs. IPAC has also been supporting carbon estimation work in other forests throughout Bangladesh. Overall, Bangladesh is building capacities for carbon estimation and has strong interest in REDD programs, even though it is not formally being supported by UN-REDD or FCPF. Additional technical assistance at the national level, including the examination of necessary policy and governance reforms, would help ensure the success and sustainability of REDD programs.

4.3.2 Bhutan

Bhutan is relatively-speaking one of the most forest rich countries in Asia, with 68% forest cover and a total area of 3.2 M ha. With a small population, the country has 5,000 ha of forest for every 1,000 people. Bhutan has reported zero net emissions from forestry in 2000, indicating forest cover is stable and relatively well conserved. This would not be likely to provide many opportunities for REDD payments however. While forest conservation is now included under REDD-plus, it remains uncertain how countries would be able to receive payments for effective conservation where no emissions reductions are generated. This remains one of the most contentious issues under debate for an effective REDD mechanism, as it has implications in terms of providing perverse incentives—i.e. that the big emitting countries will receive payments for reducing deforestation, while those that have done a good job in conserving forests would not be rewarded.

Given the mostly intact forests in Bhutan, and government commitment to maintain 60% forest cover and over 50% protected areas, the country has not seen REDD as very relevant for them. One interesting question worth investigating would be to understand how it has been able to achieve these successful results, despite domestic and international demands for timber and economic growth. Bhutan could perhaps serve as a good model for the region as well as for how conservation could be address under REDD-plus. While Bhutan has not completed a forest inventory in over twenty years, they are currently working with the USFS and Yale University to develop a methodology for a national forest inventory and are looking for funding to help implement it.

4.3.3 India

India has 67.7 M ha of forests covering an estimated 23% of the country. Only 4.7% of the country is managed under formal protected areas. In 2000, India reported a net gain in forest carbon of 11 Mt, as a result of extensive reforestation efforts. While no net deforestation is reported, there is still diversion of forests for agriculture (shifting cultivation) on about 10 M ha, particularly in the more remote northeast states (Aggarwal et. al 2009).

Most of the country's forests are formally owned by the government (97%), with 3% owned by private entities and communities. About 28% are managed by about 100,000 community forest protection committees, in collaboration with the forest department, under a Joint Forest Management (JFM) program implemented since 1990. India has enacted legislation to clarify land rights and enhance a supportive policy framework, including the Joint Forest Management Resolution of 1990 and Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006. However, recognition of rights remains an issue, especially for the 18% of 'unclassified' forests in the northeastern states.

India has developed a National Action Plan on Climate Change (2008) that sets a target to afforest wastelands and degraded forest in order to bring one-third of the country under forest cover. A REDD cell has been created at the Ministry of Environment and Forests for coordinating with other ministries (Ministry of Agriculture, National Rain-fed Area Authority, Ministry of Rural Development), and the Indian Council for Forestry Research and Education, Forest Survey of India, National Remote Sensing Agency, and state forest departments.

India has also recognized the important linkages between energy security and forests, as an estimated 65% of rural and 22% of urban populations depend on fuelwood for cooking. The Ministry of New and Renewable Energy is promoting improved cookstoves, noting a potential of 85 million units, which could save an estimated 17 Mt of fuelwood every year. However, plans to promote jathropha on wastelands for biofuel production to meet the national target of 5% replacement would require an estimated 2.29 M ha, putting additional pressures on land and forests.

India reportedly has strong forest monitoring capacities, having launched several satellites that provide medium resolution imagery suitable for monitoring forest cover change. Forest cover is assessed on a biennial cycle based on digital interpretation of satellite imagery and intensive ground truthing. India is now modifying its National Forest Inventory for the purposes of REDD MRV.

Linkages between forests and livelihoods are beginning to provide some examples of interactions between climate change adaptation and mitigation, where adaptation strategies may be financed through carbon offset payments under such programs as REDD. In northeast India, for example, Community Forestry International has documented how forest degradation is exacerbating the impacts of climate change reflected in the deteriorating function of watershed hydrology. There and in the Chittagong Hill Tract

in Bangladesh, shifting cultivation systems have become overburdened by expanding populations leading to a systematic degradation of watershed forests. Longer, hotter dry seasons linked to long-term climate change are no longer buffered by moisture-producing forest-covered watersheds. This process of aridization is widespread throughout many upland areas of South and Southeast Asia, often leading to severe water shortages despite being located in areas of high rainfall (M. Poffenberger, personal communication).

4.3.4 Nepal

Nepal ranks eleventh in the world for forest emissions, with 34 Mt carbon produced in 2000 (and representing 80% of total national emissions). Forest cover in Nepal is 25% of the total land area, or 3.6 M ha, with deforestation rates averaging about 1.4% per year (132,000 ha). Nepal has over two decades of experience with promoting community forestry and is seen as one of the most progressive countries on this issue. Over 20% of the country's forest cover is managed by over 10,000 community forest user groups, which are organized into a national network known as FECOFUN (Federation of Community Forestry Users, Nepal).

FECOFUN and WWF/Nepal are already actively involved in REDD pilots, building on the extensive network of community forest user groups. These community groups often have both secure tenure rights and existing benefit-sharing mechanisms, resolving two major limitations in a country's REDD readiness. WWF/Nepal is also developing manuals for community-based forest inventory and monitoring and training community user groups in the methodology. Other active organizations include Community Forestry International and CARE. One of the REDD challenges in Nepal will revolve around overcoming the transaction costs of transferring payments to such a large number of stakeholders. Lessons from the phone banking movement in Kenya and East Africa could be valuable. In addition, the Oddar Meanchy community forestry REDD pilot in Cambodia may also provide important and relevant insights for Nepal.

Nepal is seen as a regional leader in REDD readiness. As part of the World Bank Forest Carbon Partnership Facility (FCPF), the government has an active REDD cell that is preparing their readiness plan proposal, including identifying necessary policy reforms and planning pilot activities. At a national level, the Embassy of Finland is currently working with the Government of Nepal on a national forest inventory. It is not clear whether the methodology being used will be sufficient for project-level REDD programs, however.

5 OPPORTUNITIES AND CHALLENGES IN ASIA TO DELIVER MEANINGFUL FOREST SECTOR MITIGATION

Identifying opportunities and challenges was done in several different ways, including interviews with recognized experts, semi-structured roundtable discussions, organized workshops, through a survey questionnaire, and applying the team's professional knowledge. A summary of the main opportunities and challenges is presented here.

5.1 Opportunities to deliver meaningful forest sector mitigation in Asia

High potential for emissions reductions in Asia

Asia has extensive forests resources and some of the highest deforestation rates in the world. Indonesia is the world's top forest emitter, due in large part to extensive clearing and burning of carbon-rich peat lands. Malaysia and Burma rank third and fourth respectively (behind Brazil), while Papua New Guinea, Nepal, Philippines, Cambodia, Thailand, Sri Lanka, and Laos also rank relatively high. Reducing deforestation and forest degradation in these countries would therefore have significant global mitigation benefits. In Bangladesh, Bhutan, China, India, and Vietnam, forest loss is relatively stable or reversed, resulting in net increases in forest carbon stocks. Avoiding deforestation is likely to result in more rapid and significant reductions compared to afforestation, where smaller gains would be made over longer time periods.

Strong global commitments to REDD

The fundamental opportunity of REDD-plus is the international commitment of capital and political will to reduce greenhouse gas emissions and increase carbon storage. The growing global support for an international REDD mechanism, including Copenhagen pledges approaching $30 billion to support climate change mitigation and adaptation, has stimulated action. Never before has the world's attention been so focused on conserving tropical forests to mitigate climate change while ensuring that environmental and social safeguards are met. Even though a global agreement is still under negotiation and the operational rules are not yet fully defined, early investments are already moving many countries forward. That the developed and developing countries are both supportive is helping generate important political will to make REDD a global reality.

Promise of sustainable financing for conservation

Through increased funding for forest conservation, sustainable management, and restoration, developing countries have the opportunity to reduce emissions, sequester carbon, conserve biodiversity, and receive payments for doing so from developed countries. These payments would serve as key investments to improve livelihoods and support the transition to a low emissions future. The promise of REDD as a long-term financing mechanism is mobilizing the forest sector like never before and gaining political traction to strengthen forest governance and address the drivers of deforestation. In the meantime, the growing voluntary and compliance markets for carbon offsets are helping to demonstrate the 'proof of concept' during this early developmental phase and providing tangible financial

incentives. The potential for substantial financial resources is serving as strong encouragement to conduct the necessary institutional, political, and fiscal reforms that will be needed to participate in a global REDD mechanism.

Specifically, it is envisioned that the enactment of market-based REDD mechanisms would support increased accountability and governance in the forestry sector. A market-based system would likely link the price of carbon to quality and risk aspects on a country-specific basis, therefore providing a powerful incentive to address these issues. Experience with market-based forest certification in Indonesia, for example, has been somewhat successful in promoting forest policy reform including a newly adopted timber legality standard. REDD may provide a means of incentivizing improved forest stewardship and governance using a more fungible commodity, carbon.

Rich regional experience being developed

The diverse range of institutional and forest governance arrangements across Asia are providing key lessons to inform REDD development and implementation. Early experiences in many countries with Payments for Ecosystem Services (PES) and REDD initiatives led by UN-REDD and the World Bank Forest Carbon Partnership Facility, among others, are acting to jump-start 'REDD readiness' in the Asia region. While the funding mechanisms in REDD may be new, the desired outcomes are similar to many conservation and PES projects implemented over the last 20 years. There is therefore a rich knowledge base on a range of effective conservation strategies that can and should be tapped.

Although there are at present insufficient demonstration projects to illustrate REDD concepts and feasibility broadly across the region, the number of such pilot activities has been increasing substantially. Now there is some kind of pilot project being developed or implemented in nearly all of the target countries in the region. The diversity of pilot projects and plans is highest in Indonesia, as was illustrated above in Figure 20, and are also occurring in many other countries across the region. Such early experiences are useful in catalyzing learning and sharing of lessons, and efforts should be made to analyze these experiences and disseminate best practices and successful approaches.

Achieving multiple co-benefits

In addition to mitigating climate change, conserving forested ecosystems may also have the potential to contribute significantly to protecting biodiversity, improving livelihoods for the millions of forest-dwelling communities in Asia, and strengthening resiliency to climate change. The inclusion of strong social and environmental safeguards in a future climate change agreement and the pro-poor approach being taken by some countries would further support the actualization of these co-benefits.

New technological developments

A number of new technologies could support forest sector mitigation through reducing monitoring and other transaction costs. Remote sensing technologies and new satellites are becoming cheaper and more accurate in measuring changes in forests and carbon stocks.

Combined with geographic information systems and other modeling applications, powerful tools are becoming available to inform spatial planning and integrated decision-making. Emerging technologies are making information more readily and freely available, such as the efforts of Google Earth to provide a free platform for monitoring forest change, and the newest satellites using L-band RADAR capable of penetrating clouds, an example being the ALOS satellite with PALSAR sensor. In addition, other new technologies, such as mobile phone banking (as is occurring in eastern Africa) whereby credits can automatically be sent to rural phone users, could also be applied to reduce costs of distributing REDD revenues.

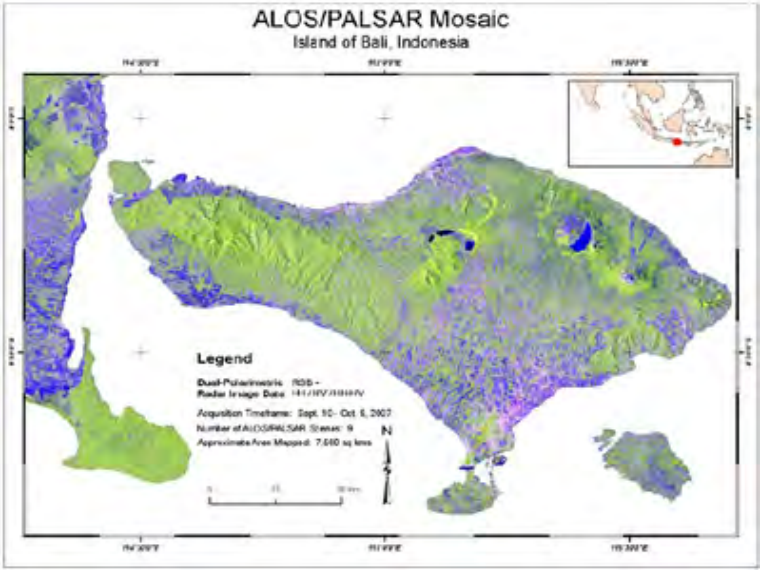


Figure 25. An example of high resolution ALOS/PALSAR imagery, of Bali, Indonesia

5.2 Challenges in Forest Sector Mitigation

The major REDD challenges are related to political and governance, social, and technical issues and are summarized below.

REDD is evolving, with rules still being defined

The global climate change negotiations are ongoing, and there are many details for a future REDD mechanism that still need to be worked out. While some of the key issues are becoming clearer, the operational rules for how such a mechanism would be implemented have not yet been fully defined. As new methodological procedures are being developed, their implementation is constrained by slow approval processes and limited replication. During this early developmental phase, a flexible, adaptive approach will be required to adjust to the situation as details evolve.

Technical capacities are weak

Current technical capacities to accurately monitor changes in forest cover and carbon stocks are variable across the region and rather low in some countries. In order to set the foundation for a global REDD mechanism and to strengthen market confidence in forest offsets, substantial capacity building efforts will be needed to strengthen the scientific capacities for forest management and measurement, increase understanding of environmental economics and resource valuation, and promote informed decision-making

and strategic investing. These capacity constraints make scaling-up REDD efforts very challenging since appropriate expertise is not available and there is limited capacity to absorb the large amounts of money that are being pledged. Capacity building needs will therefore have to be balanced with the absorptive capacity of government agencies and other stakeholders.

Technical challenges were more frequently cited during consultations than were political or social issues, but it is not certain if this was due to more concern on technical issues or if there was bias from the participants, of which a majority are involved in the more scientific and technical aspects of REDD. Some of the major technical challenges were the lack of capacity and standardized methods for carbon and GHG emissions estimates, which are needed to implement MRV at national or sub-national scales. Many countries also lack recent national forest inventories that could serve as assessments of carbon stocks.

Economic valuation methods, and cost-benefit analyses should inform decision making that would allow for consideration of a range of choices and trade-offs that will need to be made with a REDD mechanism in place (e.g. conservation versus oil palm development, etc.). Understanding the economic values of forests under different and changing scenarios (e.g. variable carbon prices, etc.) so that decisions can be made that result in greatest benefit including the full range of values and co-benefits (biodiversity, livelihoods, resiliency, water, and carbon) will be a key tool needing capacity development.

Significant institutional, policy, and governance reforms are needed

While REDD is highly technical, many of the important decisions to be made are actually more political in nature. For example, benefit-sharing is both a technical question of how to incentivize forest protection, but also a political decision about how to trade-off different internal government politics. Integrated planning across line agencies is currently rare, but coordinated policies will be necessary to minimize conflicting policy targets (e.g. between agricultural expansion and forest conservation). For example, in Indonesia the Ministry of Agriculture has a target for expanding oil palm by three million hectares, while the Indonesian president in Copenhagen committed to a GHG reduction of 26% by 2020. The roles and responsibilities of various government ministries and other stakeholders will need to be clearly defined, including contentious issues related to community and indigenous rights. Supportive government policies will be needed, particularly increased clarity over forest and carbon ownership and how REDD revenues would be distributed.

Issues related to governance are perhaps the most intractable to solve, and invariably during consultations corruption and lack of accountability were frequently raised as impediments toward creating a credible REDD system. A country's desire to participate in REDD will necessitate it to at least partially address various aspects regarding governance. The current lack of legal precedent and legislative ambiguity that exists in the region related to carbon rights, including taxation issues, was cited as a main cause for the paucity of private sector investment in carbon projects. Results from the survey questionnaire indicated that legal uncertainty over carbon rights remains one of the most serious issues for most countries in

the region. Even in Indonesia, which was the first country to develop REDD regulations, there still lingers much legal ambiguity over carbon rights, including no policy guidance on how carbon will be taxed, nor how the benefits should be distributed.

Social and environmental risks

Civil society organizations and community groups in some countries are currently not supportive of a global REDD mechanism, citing fears of the global commoditization of forests and further limitations on traditional rights to forest resources (similar to what happened with the expansion of protected areas for biodiversity conservation). Currently, effective multi-stakeholder processes to deal with such conflicts are few. There are also legitimate concerns about the distribution of costs and benefits, citing elite capture of financial flows and uncertainties that REDD payments would be sufficient to overcome local opportunity costs. Emphasis on forest carbon conservation could also have negative implications on biodiversity if monoculture tree plantations were encouraged at the expense of natural forests.

One of the main social issues centers around community rights to resources, including forests and potential carbon revenues. There is fear that REDD will lead to further limitations on access to resources and increased pressures on rural communities to conserve forests and limit subsistence and commercial agricultural activities. This threat has been previously experienced with biodiversity conservation with the establishment of new protected areas, and could be exacerbated by government efforts to control carbon rights and benefits. This has been a key underlying issue fostering mistrust between communities and national governments in some places (e.g. Thailand). Since countries do not yet have clear guidance on equitable benefit distribution mechanisms, another concern is that the revenues could be captured by the elite, as has been the case with other natural resource revenues. The Government of Indonesia has begun developing guidance on benefit distribution and UN-REDD has supported a study on the design of a REDD-compliant benefit distribution system for Vietnam (UN-REDD 2010).

While the level of involvement for rural communities in the REDD process remains unclear, the Forest Stewardship Council and the UN Declaration on the Rights of Indigenous Peoples recognize a principle called 'free prior informed consent'. There is quite a bit ambiguity over the interpretation of this term, and some Asian countries do not formally recognize 'indigenous people' (e.g. Indonesia and Thailand). Issues related to social equity and the distribution of costs and benefits associated with participation in REDD programs will clearly need to be addressed for REDD to be effective.

Insufficient coordination

A dizzying array of development partners, donor organizations, multilateral development banks, non-government organizations, private sector project developers and speculators are rushing to support REDD-readiness in the region. Differing interests, objectives, and capacities have resulted in a shotgun approach that is neither strategic nor coordinated.

National government agencies working on REDD lack a strategic framework and the manpower to coordinate and make effective use of existing efforts and resources.

Another challenge often cited was the paucity of REDD pilot projects that can generate early experiences. Those that do exist are mostly geared toward the voluntary carbon market and there hasn't been a mechanism to capture and disseminate lessons learned from these projects. Additionally, there isn't an institution that serves as a central clearing house for REDD knowledge and data. In Indonesia, for example, there is an almost complete disconnect between support for REDD readiness under a potential compliance market and the voluntary market sector. Within the Department of Forestry, voluntary market projects are administered by the Directorate of Production Forest, while the compliance REDD market is administered by the Research Directorate, and friction between these agencies has been another limiting factor in sharing information among different projects.

Lastly, as the world's population increases and given the additional environmental stress from predicted climate change, food security issues will increasingly become paramount. Last year, much of the developing world experienced food shortages, steep price hikes of agricultural commodities, and large-scale protests. Concerted efforts to raise agricultural production and decrease wastage in food storage will need to take place, but presently most Asian countries don't have effective agricultural extension services. The pressure to increase food production may cause countries that made early commitments to REDD to rethink those efforts, and to avoid this scenario, a high degree of inter-agency coordination in land use planning is necessary, which is practically absent in most countries.

Weak private sector engagement

While private sector involvement will be key to ensure long-term sustainable financing for REDD through existing and future voluntary and compliance markets, it is currently low in the region. Some good examples of public-private partnerships for REDD do exist, but potential investors have generally tended to shy away due to uncertainties in a global climate change deal, high transaction costs, and perceived risks in forest carbon offsets, particularly in some Asian countries with a history of illegal logging and corruption. Obstacles to investment and associated risks will need to be mitigated to encourage greater private sector financing.

Addressing leakage

There is a risk that effectively reducing deforestation in one region or country will simply be displaced elsewhere to another region or country where forest governance is weaker. Known as 'leakage', this phenomenon has national, regional and global implications for demonstrating effective forest sector mitigation. International trade in timber and wood products would also likely need to be included in this equation, but currently there is little guidance on how to address this issue. To successfully address these cross-border issues will require a regional approach toward REDD, but to date there is no organization with this mandate.

6 KEY CONSIDERATIONS FOR REDD PROGRAMMING

This section highlights a few key issues to consider for REDD program planning, including integrating adaptation with mitigation strategies, addressing co-benefits such as biodiversity conservation and poverty alleviation, and considering linkages between REDD and food security. Forest ecosystems provide many important environmental services related to carbon storage, habitat for biodiversity, water storage and regulation of water and sediment flows, and support of natural resource-based livelihoods. Applying these lenses could be instructive in identifying priority locations for REDD investments that are at lower risk from climate change impacts or that result in higher levels of co-benefits being generated.

6.1 Integrating Adaption and Mitigation Strategies

There are an estimated 450 million forest-dwelling people living in Asia that are directly dependent on forest resources for their livelihoods and survival. This combined with the important carbon storage role of forests means they are unique as a nexus between climate change mitigation and adaptation and provide opportunities to implement integrated approaches to climate change. Forests impact, and are impacted by, climate change. It will therefore be important to develop a greater understanding of these relationships and how forests are likely to respond to future climate scenarios. Many forested ecosystems are likely to be challenged beyond their capacity to adapt over the course of the century by an unprecedented combination of climate change, and associated disturbances such as deforestation and land conversion, forest fires, and forest degradation.

The global community, including USAID, are and will be making substantial investments in REDD in the near future. In order to reduce potential risks to these investments, some analysis will be needed to strategically assess areas that are either: a) highly vulnerable to sea level rises (e.g. mangrove forests), other natural disasters, or climate change induced stressors, or are b) somewhat resilient to climate change events. In essence, a rapidly changing climate could mean that some forest areas could become large GHG emitters even if all man-made local disturbances were eliminated, potentially as a result of extreme droughts that could cause peatlands to oxidize or be vulnerable to lighting strikes and wildfires. Changing hydrologic cycles will be one of the key determinants of future forest conditions.

An ecosystem-based approach to climate change adaptation is being developed and promoted as a key strategy that emphasizes the inherent resilience of the cohesive biological diversity of intact natural systems. Various studies have suggested that forests with high biodiversity can better withstand the impacts of climate change (Schroth, et al., 2009). Additionally, research on island biogeography shows that fewer but larger contiguous forest areas are capable of sustaining a greater number of species, especially large mammals than many isolated smaller areas (Barry and Moore 2000). Furthermore, choosing expansive landscapes that contain a mosaic of forest types and a range of elevational gradients would be one of the better ways to ensure some level of resiliency. With every 1,000 m of elevational rise, ambient temperature decreases by 2° centigrade; thus forests with wide

elevational gradients may allow various plant and animal species to migrate upslope as temperatures increase. Ensuring that selected REDD forests still contain viable populations of intact wildlife populations and keystone species such as tigers is another way to build in resiliency. Research done in Yellowstone National Park showed that when wolves were eliminated from the park, the riverine birch forest community disappeared over a 70-year time period. This was due to the fact that in the absence of wolf populations, deer had browsed all of the tree species regeneration, leaving only grasses and sedges as the dominant plants.

In addition to enhancing resiliency, intact ecosystems also further the related objectives of promoting biodiversity conservation and forest-based GHG mitigation. One concrete approach to achieve this is through integrating climate vulnerability and adaptation assessments into forest ecosystem planning. This could involve establishing systems to anticipate climate stressors on forest and landscape management, and identify and promote joint benefits of ecosystem services. Additional approaches include applying accepted conservation biology practices to choose more resilient areas to climate change as one consideration in selecting potential forest conservation/REDD areas.

RDMA's recent 'Asia-Pacific Regional Climate Change Adaptation Assessment' report also recognized these important linkages and recommended an illustrative regional Forest Ecosystems Adaptation Initiative that would promote sustainable landscapes through greater consideration of both climate and non-climate stressors of forested ecosystems. Specific activities recommended included support for regional analyses of climate impacts on forested ecosystems, integration of climate vulnerability and adaptation assessments into forest ecosystem planning, and promoting transboundary cooperation and sharing of best practices.

In terms of specific areas in Asia vulnerable to climate change impacts, a recent study showed that the Philippines and Cambodia were the two most vulnerable countries in the region (EEPSEA 2009). The study conducted various analyses by overlaying various factors with weighted rankings to produce the map in Figure .

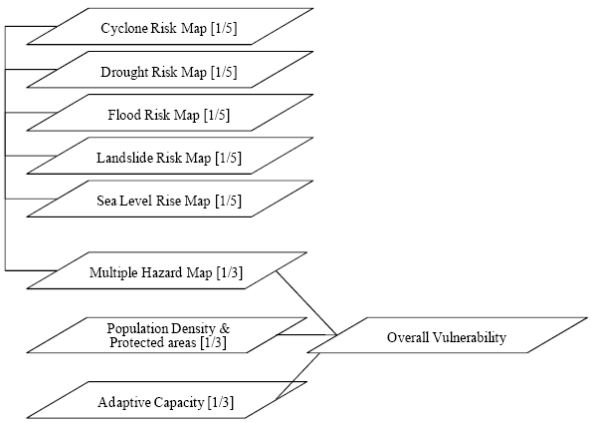


Figure 26. Data layers that were overlaid to produce the map shown in Figure 27.

The ranking in Figure is by province and it's notable that Cambodia and Philippines were ranked highly vulnerable throughout almost all their territories. This ranking suggests that crop failures due to climate change may be much more severe in those two countries. Additionally, this map could be used as a decision support tool in cases where agricultural

expansion is unavoidable and highly vulnerable areas should be excluded wherever possible. Preference would then be given to REDD in those vulnerable areas only as long as the forests possess characteristics associated with resiliency toward climate change. It could also be insightful to map areas under rain-fed agriculture as these are likely to be significantly impacted by climate change.

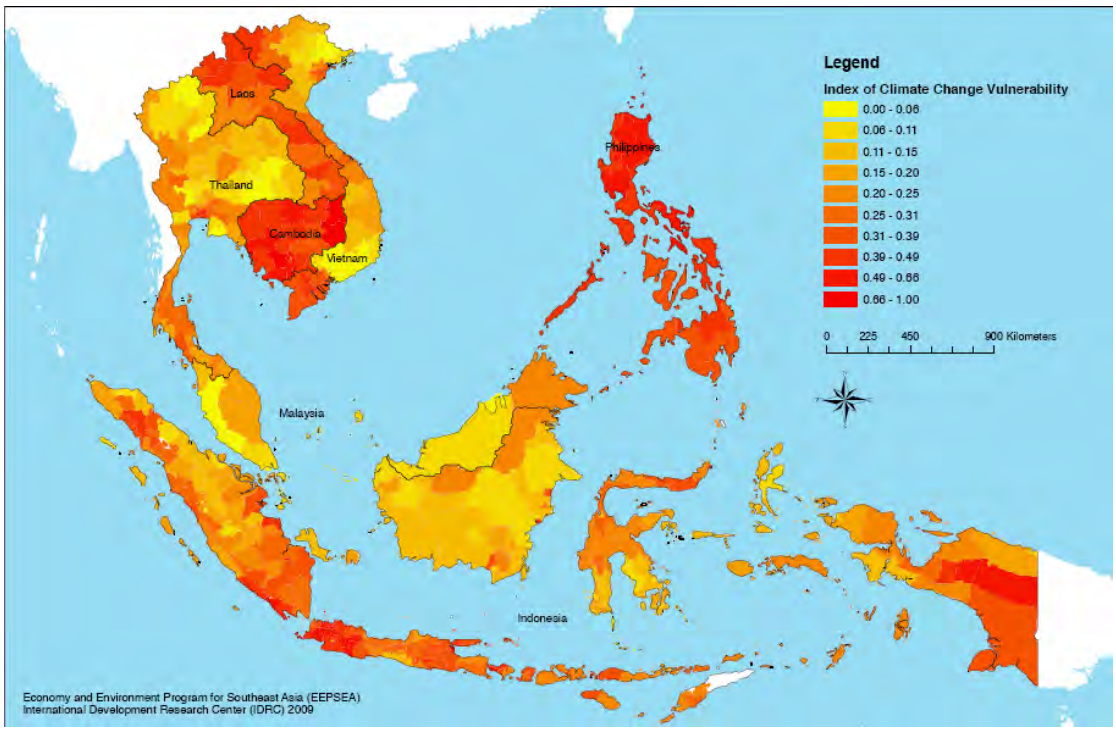


Figure 27. Map of vulnerable provinces to climate change in Southeast Asia (Yusuf and Herminia 2009)

6.2 Maximizing Co-benefits

Because forest ecosystems provide so many important environmental services (e.g. carbon storage, habitat for biodiversity, water storage and regulation of water and sediment flows, and support of natural resource-based livelihoods), their conservation and sustainable management can result in a multitude of benefits to society. Efforts to conserve forests under REDD for example should therefore have an understanding of these multiple co-benefits and seek to maximize them where feasible and practical.

One of the tools being developed to assist in determining where opportunities for realizing these co-benefits may lie includes spatial mapping of high carbon and high biodiversity. Areas important for terrestrial biodiversity imply the presence of high quality forest. Figure 32 demonstrates the potential of this kind of mapping exercise. Areas where high carbon and high biodiversity overlap, and are facing significant threats, could therefore be prioritized for REDD implementation. Other forested landscapes important from a

biodiversity perspective, such as key tiger ranges as identified under the World Bank's Global Tiger Initiative, could also serve to help identify intact forests needing protection. In fact, there was much discussion at a recent Tiger Ministerial Meeting in Hua Hin, Thailand focused on accessing REDD funding to help strengthen wildlife law enforcement and protection of tigers and their habitats.

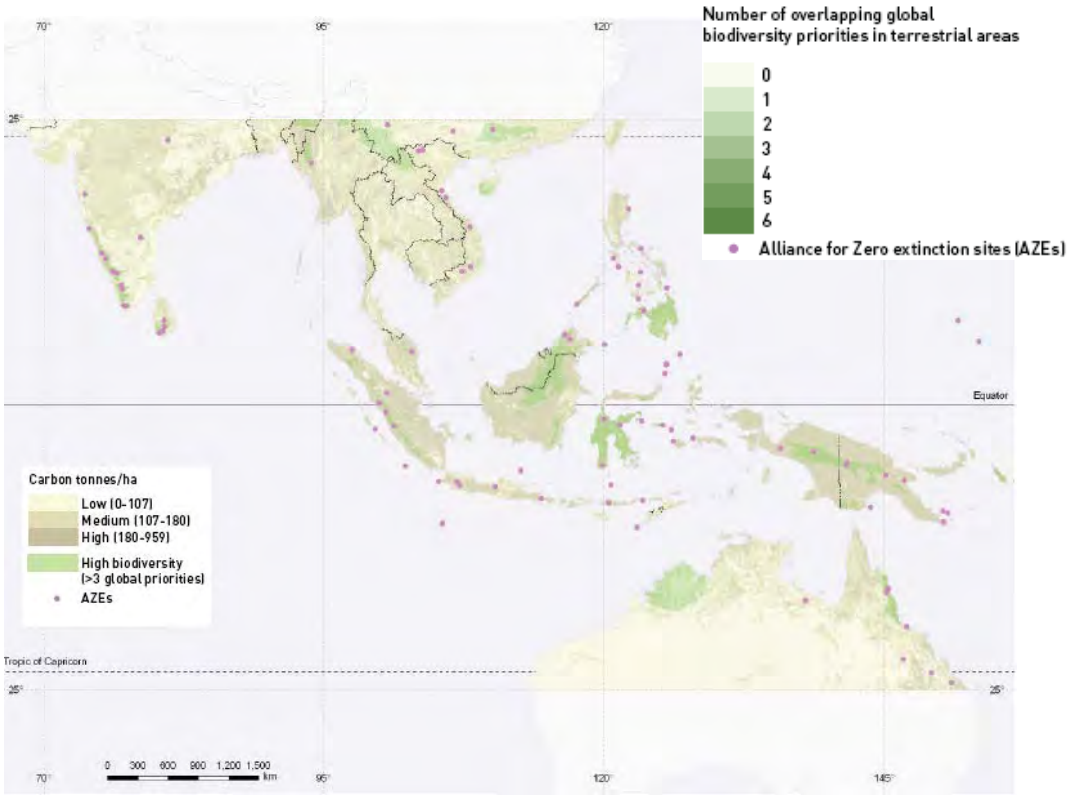


Figure 28. Asia Region showing the overlap of carbon with six different methods that measure biodiversity levels. The areas deemed with 'high biodiversity' are where at least four of the biodiversity mapping exercises have overlapped – represented by mid to dark green (Ravilious, et al. 2008).

In addition to spatial mapping, other tools are readily available to help identify areas with substantial co-benefit opportunities. An example of which is the principle of High Conservation Value Forest (HCVF), which aims to identify critically important ecological and/or social values in management areas (e.g. timber concessions) to ensure that the identified values are maintained or enhanced. In 1999, the Forest Stewardship Council (FSC), a multi-stakeholder timber certification body, replaced their principle that addressed the conservation of old growth forests with the principle of HCVF. Because HCVF covers both ecological and social aspects and operates at two scales, the forest management unit and at the landscape, its versatility has led other organizations to adopt this principle, including the

Roundtable on Sustainable Palm Oil (RSPO) and some leading banks such as HSBC and Rabobank. Banks may view this as a risk reduction mechanism and require HCVF assessments be done before loans are granted to finance oil palm estates. In the case of carbon projects, HCVF could serve as a filter to identify forest areas with important co-benefits thus helping to maximize the return on investment.

In addition to biodiversity conservation and climate change adaptation, as described above, another important co-benefit is that of rural livelihood security and poverty alleviation for the millions of forest-dependent families in Asia. These communities are important forest managers and key stakeholders in REDD implementation. How they are included in REDD development and benefit from potential revenues (or not) will be key factors influencing the success of REDD. The relatively low opportunity costs of subsistence agriculture in remote, forested regions could perhaps be met or overcome by potential REDD payments, therefore providing sufficient local incentives for reducing deforestation and degradation. A number of countries are considering and/or adopting pro-poor policies that intend to bring tangible benefits to the rural poor and provide adequate incentives for local action. Whether or not incentives are sufficient will depend on the quantity of carbon stocks under threat, the price of carbon, and the opportunity costs involved. Increasing pressures on available land resources from expanding agriculture, conservation under REDD, and climate change impacts are likely to lead to increasing opportunity costs over time. SNV in Vietnam has conducted some preliminary studies looking at opportunity costs associated with various agricultural crops. Future scenario building and modeling efforts that address these inter-relationships could also help inform decisions on REDD investments.

6.3 Impacts of population growth and food security

Rarely do discussions about REDD consider how population growth and food security issues (as well as climate change resiliency) will put increasing pressure on forests. A growing global population (50% more by 2030) and increasing prosperity that fosters dietary changes will mean that agricultural production will need to greatly increase, potentially resulting in competing land uses with forest conservation for REDD payments. Climate change will most likely cause crop failures and reduced productivity due to increased droughts, desertification or flooding; thus, exacerbating further the issue of feeding an increasingly populated world. When taken together, increasing demand combined with decreasing agricultural production on current lands is bound to lead to further forest conversion.

Therefore, the anticipated increasing pressure on natural landscapes should be taken into account when planning REDD investments, and knowing which forest landscapes are most at risk to future agricultural conversion can help guide the incentive structure needed with REDD. Increasing pressures on land will also increase the opportunity costs associated with land use decisions and could make REDD less attractive or effective. A study by UNEP/WCMC (2009) determined that from 6 to 18 million hectares per year of additional agricultural areas would be needed to meet predicted food security needs in 2050. The study analyzed areas most at risk from future conversion taking into account land use status, biophysical land

suitability for agriculture, and future economic pressures. The results suggested that half of all tropical forests possess a high risk of at least 10% of it being converted (Figure).

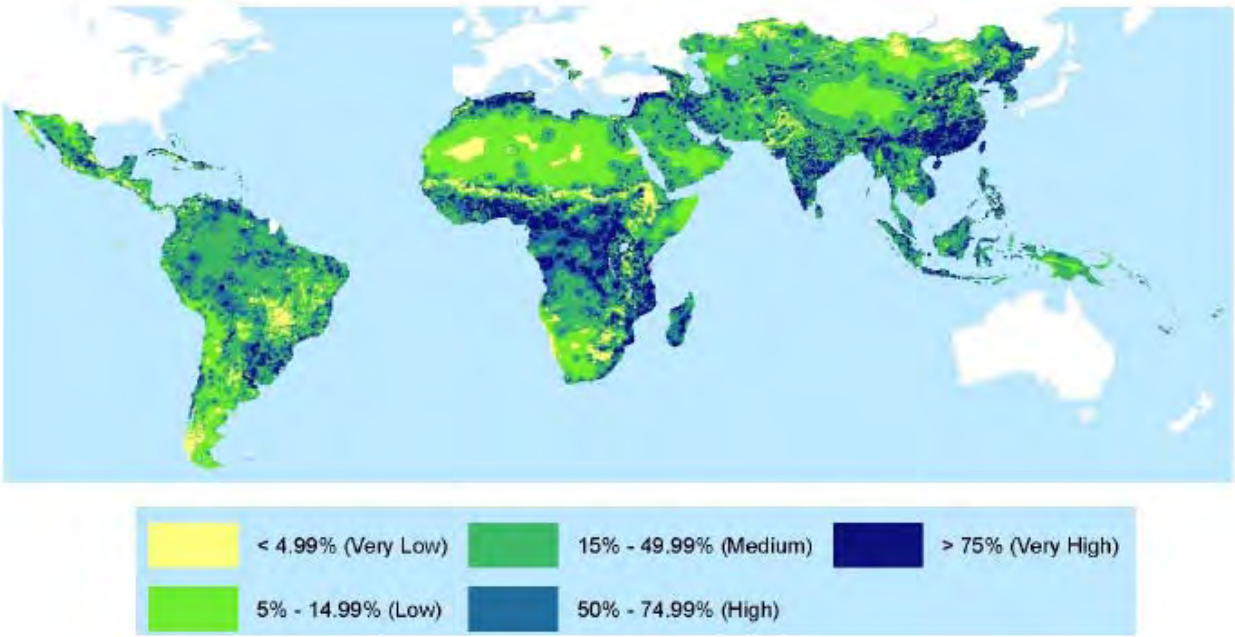


Figure 29. Global map indicating risk of forest emissions from agricultural conversion (at least 10% converted) with darker color representing higher risk. (Source: UNEP/WCMC 2009).

Figure indicates that Asia ranks as the second highest region for forest areas with high risks of generating emissions from agricultural conversion.

For REDD to generate meaningful emission reductions over the next 40 years, it will be essential that appropriate analyses of food security issues are conducted and that REDD site planning should be done in collaboration with agricultural planning departments.

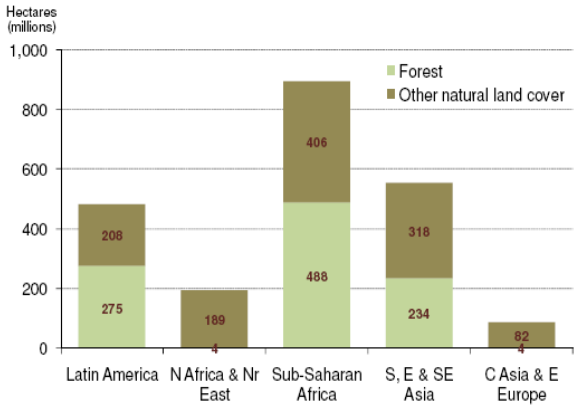


Figure 30. Regions at high or very high risk of additional conversion (Strassburg, et al., 2009)

Appropriate steps that incorporate the key considerations in this section are recommended, and involve first applying conservation biology principles and HCVF assessments to choose resilient forest lands that possess substantial co-benefits. This could then be followed by

assessing the risk of agricultural conversion to these candidate REDD sites. The benefits generated by REDD need to be commensurate with the conversion risks. Because future food security issues will most likely over-ride REDD decisions, it's strongly recommended that at a minimum projects that address food security are as integrated as possible with REDD efforts. The countries of the Lower Mekong sub-region are one area where REDD planning and food security issues should be linked due to high economic development pressures, and rapidly expanding populations that are vulnerable to climate change impacts.

7 RECOMMENDATIONS FOR REGIONAL PROGRAMMING

Given the uncertainties regarding the UN climate change negotiations and the form the compliance REDD market may eventually take, it is advantageous to take a **'no regrets' approach** toward programming during this early learning and developmental phase. At the core of this type of approach are the following aspects:

1. The voluntary carbon market exists now and is growing substantially, but is constrained by lack of legal certainty and lack of investor confidence. While the voluntary market has not received substantial support from bilateral aid agencies since it is seen as a private sector initiative, promoting public/private partnerships could help strengthen carbon markets.
2. Support for REDD projects should seek to generate significant biodiversity and social co-benefits in addition to reduced emissions. No matter what form REDD eventually takes, conserving High Conservation Value Forests should be an integral part of a no-regrets approach.
3. Flexibility should be built into the programming approach to adapt to changing circumstances and as details become clearer from international negotiations.
4. Supporting the development of various different types of REDD models and methodologies is another way to build in flexibility in an uncertain and changing environment.
5. Foster a learning environment during this developmental stage, given that the science and applied techniques to assess carbon stocks and GHG emissions are rapidly evolving, and compliance markets have yet been developed. Resources should be devoted to monitoring programmatic impacts and documenting and disseminating the lessons learned.

Approaches toward programming

Three general approaches toward programming can be used as lenses to view potential interventions----geographic (where), thematic (what), and programmatic (how). Given the broad programmatic scope and geographic mandate of RDMA and level of uncertainty with REDD, a flexible program should incorporate aspects of all three approaches, as shown in Figure 31. A geographic approach would be used in priority countries with high levels of forest-based emissions and that possess High Conservation Value Forests. The countries listed in the 'sharply declining' transition in Figure 7 (e.g. Indonesia, Malaysia, Laos, Cambodia, Philippines, Nepal, and Sri Lanka) should be the geographic focus, along with PNG. A thematic approach should focus on addressing the challenges that were most often mentioned during consultations, such as: supporting efforts to develop effective MRV and GHG accounting and promoting their application consistently among countries. A programmatic approach would also help to address some of the constraints with REDD by improving collaboration among implementers and through increased information sharing methods.

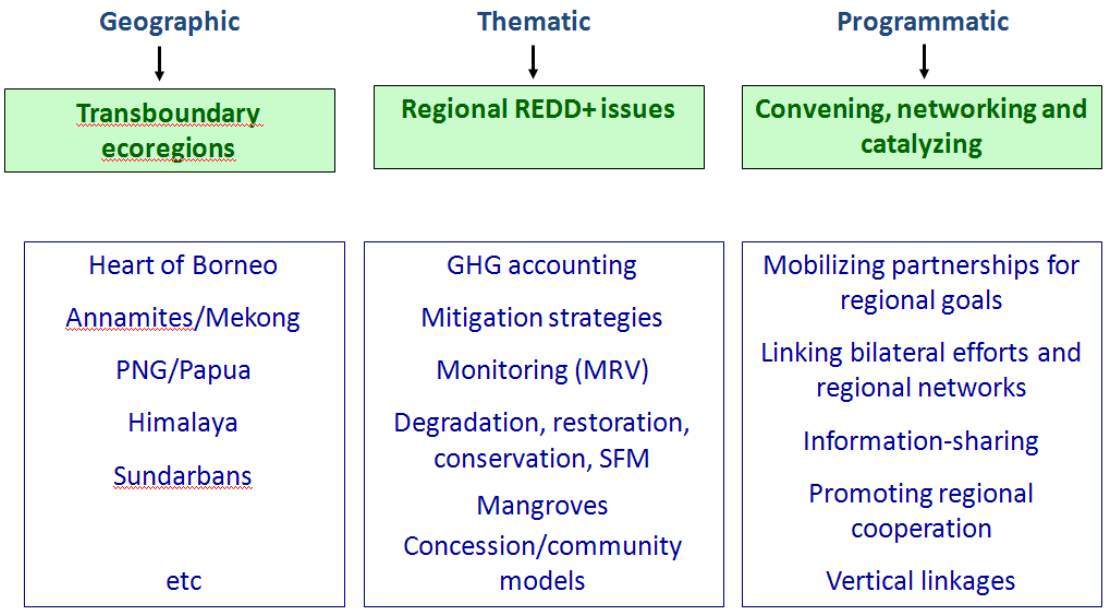


Figure 31. Three approaches toward programming with illustrative activities under each approach.

More specifically, the following sections seek to answer the key assessment question:

Question #2 ***With respect to future RDMA programming, what interventions, tools, and program activities are most needed and appropriate at the regional level to most effectively address REDD-plus opportunities and challenges, and how can regional activities best complement potential national-level activities?***

To produce meaningful forest sector emissions reductions in Asia, the interventions, tools, and program activities needed at the regional level would include: (1) developing and promoting regional capacities, standards and tools; (2) replicating regionally-applicable models and best practices across countries; (3) improving the management of transboundary forest landscapes; (4) fostering regional cooperation; and (5) strengthening regional institutions and networks. These are described in greater detail below.

7.1 Developing and promoting regional capacities, standards and tools

Reducing deforestation at a meaningful scale and participating in a global REDD mechanism will require strengthened skills and capacities for improved forest management and monitoring. New knowledge of environmental economics and resource valuation methods

will also be needed to inform strategic decision-making and investing. This could be done cost-effectively at a regional level through joint training programs for monitoring, reporting, and verification (MRV), for example, and the development of training manuals and curriculum, etc. Such joint regional efforts would also help harmonize standards for some technical issues like defining 'forest', setting baselines, etc. Different trainings will be needed for different stakeholders, e.g. negotiators, government officials designing REDD frameworks, international or national organizations, technical experts, local communities, etc.

Regional programming can also focus on conducting regional analyses, mapping, and visioning exercises to advance understanding of the interactions between forest carbon dynamics, deforestation trends and drivers, timber trade flows, projected climate change impacts, biodiversity and livelihood co-benefits, opportunity costs and market factors, and future infrastructure development plans, among other issues.

While much of current research focuses on understanding costs and benefits of REDD at broad scales, e.g. comparing profits from oil palm and REDD, a key question will be to clarify the costs and benefits at different scales and to different stakeholders. For example, an oil palm company would not necessarily receive any benefits from REDD, which might go instead to local people or governments. How would tax revenue from REDD to Governments compare with potential tax revenues from alternative land uses like oil palm? At the local level, how would the benefits from REDD compare with revenues from other land uses to community groups?

In addition, greater understanding is needed about what activities actually reduce deforestation, and key findings need to be disseminated to decision-makers. Questions include: trade-offs between enforcement and incentives (i.e. is it better to pay people not to clear forest, or give incentives to government officers to enforce the law, or both? and if so, what is the right mix?); or the impact of agricultural intensification policies on forest cover; or the importance of decentralized decision-making (e.g. to local groups) versus top-down Government policies.

Given the importance of incentives to REDD, surprisingly little is known about how benefit-sharing should be setup. Questions include whether incentives should be given at the household or communal scale [or both]; if incentives reinforce environmental protection laws, or encourage people to think that the laws are flawed; or the level of incentives to provide.

Strengthened analytical capacities could also be complimented by efforts to develop **regional decision support tools** like SERVIR, a geospatial information sharing platform, for the Asia region as a whole, or for a given geographic sub-region. The SERVIR database was originally developed for Latin America to serve as a decision support tool for disaster relief management and now serves as a depository for an array of satellite imagery, which works

as a one-stop shop for natural resource data. The Forest Carbon Index (FCI)[9] is another example of a practical decision support tool for choosing which countries would make promising REDD investment opportunities by examining carbon, threats, and investment risk levels. Currently, the FCI examines all countries worldwide and suffers from the coarseness of global datasets. Support for more accurate and higher resolution Asian regional and national datasets would encourage investments in Asian countries that have addressed governance and legal reform by generating lower risks scores. The risk scores provide some indication of forest governance and promoting this type of market-based approach may be more successful than simply lobbying for better governance.

A global REDD mechanism will require the development of a whole new industry of skilled, independent third party auditors to verify and validate (as part of MRV--Monitoring, Reporting, and Verification) potential carbon emissions reduction credits. While it is not clear yet how verification would occur at the national and international levels, there will be a clear need for these specific technical skills at scales ranging from pilot projects to the national level. USAID regional programming could assist in building this new sector and creating 'green jobs' through training programs, curriculum development with universities, small business support, etc.

Supporting the development of new REDD **methodologies and models** would have regional applicability and impact. While a generic, modular REDD methodology currently exists, similar methods are not available for a number of other important forestry models, including:

- sustainable/improved forest management (including reduced impact logging)
- community forestry (a replicable model exists in Cambodia)
- shifting cultivation
- degradation
- forest conservation
- assisted natural regeneration
- enhancement of carbon stocks
- bundling of geographically distinct forests
- stacking of ecosystem services (e.g. carbon plus water)
- ecosystem-specific methodologies (e.g. mangroves, peatlands, etc.)

Specifically, the conservation of mangrove forests uniquely combines both mitigation and adaptation strategies, and has been underrepresented in REDD negotiations. Support for regional mangrove conservation model could consist of:

- Collaborating with the USAID Bangladesh Mission to provide support for and regional scaling of the forest carbon inventory training conducted by the USFS in the Sundarbans.

[9] http://www.forestcarbonindex.org/index.html

- Support on-going joint efforts of USFS and CIFOR to develop carbon accounting methodologies for carbon stocks in various geographic areas.
- Support development of techniques for mangrove restoration and evaluate the carbon sequestration potential of regenerating stands.
- Implement pilot projects on mangrove restoration that utilize REDD as a long-term funding mechanism.
- Evaluate whether an organization similar to RSPO for shrimp aquaculture exists or could feasibly be established in Southeast Asia. One of the core principles for this type of organization would be no conversion of mangroves that posses HCVFs.
- Strengthen regional platforms such as the Coral Triangle Initiative (CTI) to coordinate mangrove conservation. This could include an evaluation of current marine sites where the highest threats are terrestrial-based and that possess relatively intact forests, including mangroves, as well as the feasibility of conducting a 'Ridges to Reefs' integrated approach in appropriate sites.

Similarly, a regional approach could assist in scaling-up efforts and best practices in conservation of carbon-rich peatlands as well. Significant investments are going into Indonesia in particular, and these experiences could be shared and expanded to Malaysia and PNG as opportunities become available.

In addition, supporting development of a practical nested approach to reconcile how REDD projects will fit into national frameworks and systems will help to encourage sub-national actions. Development of these models and methodologies should be generic and modular so they are transferable between countries and sites to allow for regional replication.

The uncertainties involved in the global climate negotiations and the specific operational rules surrounding REDD will require an adaptive learning approach. Regional engagement can effectively forge strong links to UNFCCC and IPCC processes in order to bring current rules and procedures to countries in the region in a consistent, accurate, and cost-effective manner. This could be achieved for example through development of a regional 'learning hub' or 'technical helpdesk' that maintains information on a variety of topics, such as: US legislation, UNFCCC negotiations (overall and REDD specifically), types of carbon markets, available REDD methodologies, training resources, MRV options (e.g. satellite types, costs, ease of access, data availability, etc.), REL options, and summary of policy approaches to reduce deforestation, etc.

7.2 Replicating models and best practices across countries

During this early phase of REDD development, a diversity of experiences with new models and approaches are being generated around the region, but there have so far been little efforts to document, synthesize, and disseminate this information. Regional programming can assist in filling this gap, as well as promoting replication of best practices and promising approaches.

As discussed above, regional programming can be instrumental in supporting the development of specific REDD methodologies with regional applicability. For example, these could help address common forest carbon accounting methodologies for forest types shared between countries. A community forestry model would have applications for almost every country across the region.

How countries are addressing the common challenges associated with REDD planning and implementation could be very instructive. Sharing best practices that relate to common issues such as policy development and reforms to reduce deforestation and protect carbon-rich forests, approaches to maximize co-benefits, the promotion of legal timber trade and sustainable forest management, equitable benefit sharing, and private sector engagement could help catalyze REDD experience across the region.

Replication and scaling-up regionally can occur through sharing and exchange visits, as well as through existing regional platforms and initiatives, such as ASEAN, Greater Mekong Subregion, Mangroves for the Future, Coral Triangle Initiative, and others (see Sections 7.5 and 8 below).

7.3 Improving the management of transboundary forest landscapes

Achieving meaningful forest sector mitigation in Asia will be best done through planning and implementation at the large scale of forest ecosystems and landscapes. Regional programming is strategically placed to support this effort through improving the management and protection of important transboundary forest landscapes. Landscape–level protection will also support ecosystem-based adaptation efforts. Examples of such landscapes, which are important for both carbon and biodiversity conservation, could include:

- *Lower Mekong* (Cambodia, Laos, Thailand, Vietnam)
- *Eastern Himalayas* (Bhutan, Nepal, northeast India)
- *Heart of Borneo* (Indonesia, Malaysia, Brunei)
- *Sundarban mangroves* (Bangladesh, India)
- *Papua, Indonesia* and *Papua New Guinea*

The objective in these locations would be to actualize REDD financing to protect and restore key transboundary ecosystems and landscapes for biodiversity conservation and climate change mitigation and adaptation. Sub-national or provincial approaches could be piloted in these key landscapes to demonstrate REDD mechanics on the ground and help inform national-level systems, policies, and processes, while contributing to the overarching objective of landscape protection. As reducing deforestation and forest degradation will require strategic decisions regarding trade-offs at the local level, it is important that pilot interventions be grounded in actual geographies. Needless to say, such an approach would also be able to achieve demonstrable emissions reductions and would necessitate strengthening management of protected areas, addressing development scenarios and trade-offs, and strengthening rural food, energy, and livelihood security. Anecdotal evidence

indicates that the cost of developing a site-based REDD project may range from about $400,000 - $600,000 or more per site, with much of this contributing towards establishing project MRV and REL (about $300,000 per site) (Tom Clements, personal conversation).

The four countries of the Lower Mekong sub-region are a good example of where applying a regional geographic approach makes sense. The forests of these countries are similar, the potential for generating significant emissions is high, and issues of regional leakage are a legitimate concern. Furthermore, there is some agreement among these countries to work together and collaborate on REDD issues. Because of the above characteristics, an integrated approach that combines REDD, adaptation, and biodiversity together could be explored. Additionally, planning for REDD will need to involve a close collaboration with agencies working toward long-term food security in each country. Thus, close coordination, and potentially joint funding support, between regional and bilateral food security programs with REDD efforts is recommended. Pooled funds would also emphasize to the host countries the importance of coordinated efforts with REDD, adaptation, and food security, as well as supporting the US Lower Mekong Initiative, announced by Secretary of State Hillary Clinton in July 2009. RDMA is in a key position to actively support this USG initiative through support to REDD readiness in the Mekong.

Working in key transboundary landscapes will also support sharing of common approaches and methodologies between countries where needed, as well as contributing to improved regional cooperation.

7.4 Fostering regional cooperation and strengthening regional institutions and networks

Making progress in addressing global climate change will require unprecedented cooperation from the entire global community. Regionally coordinated responses to climate change will make national mitigation and adaptation strategies more effective and also prevent negative unintended consequences of individual, uncoordinated actions. Strengthened regional cooperation can also help mitigate potential transboundary conflicts over resources and therefore enhance regional security. In addition to cooperation between countries, regional programming efforts can also help facilitate regional coordination between donors, development partners, etc. to present a unified and consistent approach to support REDD-readiness in the region.

UN-REDD has begun efforts to establish a REDD donor roundtable to enhance coordination and RDMA can play a strong supporting role in this initiative. Other mechanisms for donor coordination may also exist in specific countries, such as the PNG Development Partners for Climate Changes chaired by the British High Commission with participation from AusAID. RDMA can also help coordinate various USG agencies that are currently providing technical support in the region, including the USFS and EPA. Since there are a number of bilateral and multilateral organizations already working on REDD, the first step would be to closely coordinate with UN-REDD, the World Bank, and others to identify gaps that could be addressed by RDMA.

Approaches to foster regional cooperation could include improving the management of specific transboundary forest landscapes, as mentioned above, as well as through regional platforms, institutions, and initiatives such as ASEAN (as described in more detail below). Regional programming activities could include study tours and exchanges, jointly implementing activities, supporting 'learning networks', and sharing of lessons and best practices. USAID could consider supporting a periodic regional conference or event to foster this kind of learning and collaboration between countries, donors, and other USAID missions. Other specific areas that could lend themselves to regional cooperation include support to developing country negotiators, preparing and implementing REDD-readiness plans and proposals, MRV, and issues related to trade policies, etc.

A number of regional institutions, networks, and initiatives exist in the region and are engaged in REDD efforts. Regional programming should seek to strategically engage key regional bodies to strengthen them as platforms for sharing of information and experiences and advancing REDD practice in Asia. ASEAN is the main intergovernmental regional organization for the ten Southeast Asian countries. GTZ is currently supporting a REDD 'knowledge network' with ASEAN that could be engaged with and strengthened. Another intergovernmental platform is the Greater Mekong Subregion, involving all six countries of the Mekong Basin, supported by the Asian Development Bank. There is already some momentum growing to engage at least the four lower Mekong countries in REDD (already being supported by RDMA, and) through this platform, and ADB has plans for extensive investments in REDD and PES. Other regional bodies of relevance include Mangroves for the Future, Coral Triangle Initiative, ASEAN Center for Biodiversity, Roundtable on Sustainable Palm Oil, World Bank Global Tiger Initiative, etc. UN-REDD and the World Bank Forest Carbon Partnership Facility are leading many of the REDD-readiness efforts in the region. UN-REDD is working towards hosting an Asia regional REDD donor coordination meeting later in 2010. USAID should support these efforts and aim to compliment and add value where needed.

One specific regional initiative to consider could be to support a **Forest Carbon Project Development Facility**, which could perhaps be modeled on the USAID-supported Private Financing Advisory Network (PFAN) set up to leverage financing for clean energy investments. PFAN provides mentoring expertise to help build skills in project development and get projects to market. Through a competitive process, developers present their proposals to potential investors who then decide which projects to fund. Such an approach could be piloted for forest carbon projects to help build capacities, link developers and investors, and increase private sector confidence in forest mitigation programs. In addition, such efforts could help overcome two primary barriers to catalyzing REDD practice: high transaction costs for project development and lack of access to investors and capital.

Overcoming these barriers is important and timely. Despite the fact that the voluntary carbon market is the only REDD mechanism operating and will be so for at least several more years, most donor support is aimed at preparing developing countries for the future

compliance market. Many of the most threatened forests would have disappeared before the compliance market begins to operate. In order to unleash the power of the markets geared toward saving Asia's most biologically rich but threatened forests, RDMA should help catalyze private sector investments to substantially increase the number of REDD pilot projects. Experience has shown that many countries only develop appropriate policies in response to investor concerns, rather than from pressure from bilateral donor agencies.

Synergies between USAID Regional and Bilateral Programs

While implementation of REDD will occur primarily at the national level, regional efforts can support national efforts and catalyze REDD practice across the Asia region through (1) the sharing of lessons and experiences across countries, (2) replication of best practices and successful models for reducing deforestation, (3) regional harmonization and standardization of methodologies and procedures, (4) fostering efficient coordination, and (5) promoting effective management of transboundary forest ecosystems and landscapes. In addition, regional programs can fill gaps where needed (e.g. in USAID non-presence countries) and compliment existing bilateral programs, in consultation with relevant Missions. Strong strategic links to USAID bilateral missions and programs could greatly facilitate achieving these objectives. In addition, RDMA should seek to build upon current investments and successes of its Responsible Asia Forestry and Trade (RAFT) and Asia Regional Biodiversity Conservation Program (ARBCP) programs.

Regional program activities can provide a foundation or platform for coordination and implementation that national-level programs can build upon and leverage. Regional-level analyses of forest carbon dynamics, deforestation trends and drivers, timber trade flows, projected climate change impacts, and future infrastructure development plans, among other issues, can provide important insights to inform the context within which bilateral programs operate. Regional activities can also benefit from lessons learned and experiences of bilateral programs, which are able to achieve greater depth in terms of national policy development and support for site-based demonstration projects.

USAID bilateral missions can make use of the tools, guidance, training manuals and educational materials, etc. developed at the regional level. Through partnerships with regional organizations, networks, and platforms, a pool of regional practitioners and trainers can be built to support bilateral efforts through peer-to-peer cooperation, training-of-trainers, and sharing of lessons learned. Bilateral programs could also cooperate with regional efforts to promote public-private partnerships and facilitate access to financing for community and private sector forest mitigation projects. Bilateral programs are also in a strong position to explore possibilities to participate in The Tropical Forest Conservation Act, allowing developing countries whose sovereign debt is held by the US Government to reduce or cancel portions of the debt in exchange for the country's commitment to protect tropical forests. Linking a debt for nature swap with REDD could be explored as it could serve as a trial for valuing carbon credits in targeted countries.

Specifically, USAID bilateral missions in Indonesia, Cambodia, and India will be receiving *Sustainable Landscapes* funding in FY2010. Significant financing is also expected to go to Indonesia for a forestry and climate change center of excellence. Extensive USAID bilateral investments will generate much experience and could position such programs as regional leaders in specific areas: for example, Indonesia as a regional leader in peat management and sustainable forest management (relevant for Malaysia, PNG, and other countries); Cambodia as a leader in community forestry and REDD (relevant for many Asian countries); and India as a leader in reforestation and joint forest management (also with many regional applications). Other USAID bilateral programs, which may not currently be expecting *Sustainable Landscapes* funding, are also undertaking programs that support forest conservation, watershed management, climate change adaptation, and rural poverty alleviation and which are generating lessons that could also be shared regionally. These programs include mangrove conservation, adaptation and co-management in Bangladesh, watershed management in Nepal, and assisted natural regeneration and adaptation in the Philippines. Vietnam is also expecting *Sustainable Landscapes* funding in FY2011 and RDMA could play a supporting role in helping develop this new program. In those non-presence countries without a USAID bilateral mission (e.g. Malaysia, Papua New Guinea, Laos, and Thailand), RDMA could provide greater support for national REDD implementation, policy development, and field demonstration projects.

8. REGIONAL PLATFORMS AND POTENTIAL PARTNERS

Regional platforms or partners with high potential for collaboration are highlighted in this section. All of these organizations are active in the region and RDMA will need to consider the most effective means to engage with and compliment these existing efforts. RDMA can best coordinate with and leverage the efforts of regional platforms (e.g. ASEAN), USAID bilateral missions and other donors, multilateral development banks, national governments, international NGOs, universities, the private sector, and others to address priority REDD-plus opportunities and challenges through an adaptive and collaborative approach.

Question #3 ***How can RDMA best coordinate with and leverage the efforts of regional platforms (e.g. ASEAN), bilateral missions and other donors, multilateral development banks, national governments, international non-governmental organizations (NGOs), universities, the private sector, and others to address priority REDD-plus opportunities and challenges?***

A multitude of donors, non-governmental organizations, regional institutions, and others have been actively supporting REDD readiness in the Asia region over the last few years. RDMA can best coordinate with and leverage these efforts through close collaboration and implementing complimentary activities that are value-added and fill current gaps. The UN-REDD Program (a joint effort of FAO, UNDP and UNEP) and the World Bank's Forest Carbon Partnership Facility have been some of the most active, supporting REDD readiness in multiple countries across the region, and should be viewed as key partners. In addition to these programs, national governments are also engaged in regional intergovernmental institutions and platforms such as ASEAN and the Greater Mekong Subregion. USAID efforts can work with GTZ and ADB, who are supporting ASEAN and GMS REDD efforts, to help provide additional support for the sharing of REDD experiences and lessons between governments. A number of the REDD national focal points within ASEAN have been holding informal meetings to coordinate their REDD policies, and share ideas about REDD implementation, etc. Supporting this process over the next few years could be well received by the various country delegations

AusAID, GTZ, Finland, Norway, JICA, SNV, and other **bilateral donors** have active forestry and national REDD programs in many countries across the region. USAID bilateral missions are also developing REDD and climate change programs in Indonesia, Cambodia, India, Bangladesh, Philippines, and Nepal and should be considered key partners. In addition, many pilot projects are being developed and implemented by **non-governmental organizations**, a number of which have a regional presence (e.g. Wildlife Conservation Society, The Nature Conservancy, WWF, Fauna and Flora International, Pact, Conservation International, Community Forestry International, RECOFTC, IGES, etc.). **Universities** and academic

institutions, some with regional presence such as CIFOR and the Asian Institute of Technology, can serve as key partners to conduct scientific research and training, and assist in methodology development.

The **private sector** is key for the sustainability of REDD efforts as a long-term source of sustainable financing through the voluntary and compliance carbon offset markets. However, private sector engagement with REDD in Asia is currently rather low due to a perception of risk, high transaction costs, and little experience with forest offsets in the region. USAID regional programming could help overcome some of these barriers and enhance market readiness across the region in a cost-effective manner through a variety of potential activities.

Regional programming could support analytical work to gain a greater understanding of the current state of (voluntary and compliance) forest carbon markets in Asia, who is currently interested and at what level, and what are the current perceptions and obstacles. Such analyses could inform strategies and specific activities to effectively engage with and support market development and expansion.

More specifically, regional programming could encourage private sector investment in key landscapes where USAID is investing, such as priority forest landscapes and program sites. It may be an appropriate role for public sector funds to help subsidize risk and encourage early private sector investments in REDD, similarly to how the micro-finance sector began. USAID could encourage public-private partnerships, or a Global Development Alliance type of approach, to leverage resources and stimulate private sector investments in REDD pilot projects for example. The airline sector and other companies with progressive Corporate Social Responsibility policies could be potential early partners. Other potential partners could be 'green businesses' and companies involved in trade in sustainable wood products, for example, who may be interested in supporting sustainable forest management.

USAID regional programming could assist in creating 'green jobs' through building a new sector of skilled, independent third party auditors to verify and validate (as part of MRV--Monitoring, Reporting, and Verification) potential carbon emissions reduction credits through training programs, curriculum development with universities, small business support, etc. Additionally, creation of a **regional Forest Carbon Project Development Facility and regionalization of the** Forest Carbon Index**, as** described above, could significantly enhance market readiness.

In assessing strategic opportunities and potential partners in this very dynamic environment, it is recommended that USAID/RDMA conduct a more detailed stocktaking of organizations and activities and continue to monitor progress of ongoing activities and the initiation of new programs, both to avoid duplication and to identify the best opportunities for cooperation and collaboration. RDMA will need to continue to assess gaps and build on the efforts of other donors and NGOs, particularly in instances where current programs and projects are ending or phasing out. In addition, it will be important to identify and

participate actively in the most appropriate platforms and networks for sharing tools and methods, best practices, and project results.

Some of the main regional organizations currently active in supporting REDD in Asia are highlighted below:

UN-REDD

The UN-REDD Programme (http://www.un-redd.org/) is a joint collaborative effort to support REDD readiness informed by the technical expertise of three UN agencies: FAO, UNDP and UNEP. The first set of nine UN-REDD Programme pilot countries included three in Asia and the Pacific: Indonesia, Papua New Guinea, and Vietnam. In October 2009, the UN-REDD Programme Policy Board granted observer status to five new countries including three in Asia: Cambodia, Nepal, and Sri Lanka. The Philippines and the Solomon Islands are also expected to join soon as well, and will bring the total to eight countries.

Program activities focus on building capacities at the national level and demonstrating application at the sub-national level. Pilot provinces have been selected in Vietnam (Lam Dong, where ARBCP is piloting PES) and Sulawesi, Indonesia. Vietnam's program has an explicit objective to work on regional cooperation. Each country has investments of about $4-5 million per country (although a bit higher in Indonesia). Recently, the program was put on hold in PNG due to ongoing political challenges. UN-REDD expects it will require about a two year effort to develop a country's readiness for REDD.

While there is a strong demand from countries, Norway is currently funding only the initial nine countries globally, and therefore there is currently no funding for the later five participants. (This is similar to the World Bank's FCPF, which only has funding for 20 of 37 countries.) In Cambodia, UNDP and FAO are now using core funding to support efforts there.

Five of these eight UN-REDD target countries are also members of the World Bank's FCPF, of which the U.S. has generally been more supportive due to perceived weaknesses in UN-REDD in terms of:

- lack of explicit safeguards or evaluations (e.g. no explicit process for checking on biodiversity, indigenous communities/stakeholder engagement, etc);
- Lack of a record of strong fiduciary responsibility; and
- Skewed governance arrangement, which is heavily weighted to recipient countries, plus civil society and indigenous groups. In addition, that the UN agencies themselves (implementers of the fund) are on the governing body is viewed as particularly problematic.

Recently, there have been discussions leading to the two programs appearing to be moving closer together.

World Bank Forest Carbon Partnership Facility

The World Bank's Forest Carbon Partnership Facility (FCPF) (http://www.forestcarbonpartnership.org) involves 37 participating countries globally, including seven in Asia: Cambodia, Laos, Thailand, Vietnam, Indonesia, Papua New Guinea, and Nepal. Laos and Nepal have signed a grant agreement already, while Indonesia and Vietnam have not signed grant agreements yet. Cambodia and Thailand are not yet eligible for grants, while PNG has advised that until other countries have received FCPF grants, it will only seek resources from UN REDD and not from the FCPF.

Readiness activities under the FCPF Readiness Fund are limited to early planning, mostly analytical work and system design, and occur under two phases: Formulation, including *Readiness Preparation Idea Note (R-PIN)* and *Readiness Preparation Proposal (R-PP);* and Preparation, including *Readiness Package (R-Package).*

Many countries in the region now are preparing their R-PPs for submission later this year. There have been criticisms of FCPF that funding support is slow to materialize, with Vietnam and Laos not having received funding support yet. FCPF in Vietnam is expected to channel initial funding to UN-REDD for its RPP and FCPF activities there are closely linked to UN-REDD activities anyway.

Indonesia was one of three countries globally that have presented their R-PP (June 2009), after which $3.6 million was allocated for readiness preparation, authorizing the World Bank to finalize due diligence to prepare grant agreement (including safeguards, procurement and financial management reviews).

Asian Development Bank (ADB) Greater Mekong Subregion (GMS)

Under the Asian Development Bank's (ADB) Greater Mekong Sub-region (GMS) initiative, Cambodia, China, Laos, Burma, Thailand, and Vietnam share a program of regional economic cooperation, including infrastructure development and trade facilitation to promote the freer flow of goods and people in the sub-region. ADB is planning on investing over $1.3 billion over the next three years in infrastructure, transportation, hydropower, and tourism. The ADB has established the Environment Operations Center (EOC) Core Environment Program (CEP), with funding support from Finland and Sweden, to address environmental impacts of these investments through four major programs: the Biodiversity Corridors Initiative (BCI), Strategic Environmental Assessments (SEA), Environmental Performance Assessment (EPA), and capacity building. Under new leadership, the EOC is currently planning a Phase II of the program, which would build upon Phase I (2006-2009) successes and scale up impacts. Phase II (2011-2015) is expected to consist of three tracks, including: (a) integrated landscape-level planning and management (with activities focused around GMS economic corridors, and targeted livelihood improvement and ecosystem restoration); (b) 'upstreaming' SEA in decision-making and programming, and; (c) monitoring and compliance. Over 2010-2011, ADB is expecting to initially invest $1 million for REDD readiness in Thailand, Laos, and Cambodia, plus an additional $30 million in loans to Vietnam

for support of PES and REDD development there. These initial investments are expected to lead to much greater levels of future support.

ASEAN and GTZ

The ASEAN Framework on Climate Change and Food Security, which has been endorsed by the Ministers of Agriculture and Forestry, provides a framework for ASEAN engagement in climate change and is expected to be the focus of new investments from GTZ. These are expected to include about 3 million Euros to support the multi-sectoral framework adopted by the ASEAN ministers. However, as ASEAN is known to be generally weak on policy management, it will face challenges in trying to implement a multi-sectoral approach.

GTZ supports forestry programs throughout Asia, particularly with ASEAN, Indonesia, Laos, and Vietnam. The ASEAN-German Regional Forest Programme for Southeast Asia (ReFOP) (http://www.aseansec.org/20360.htm) began in 2003 and its second phase will be completed in July 2010. It has supported the ASEAN Secretariat and ASEAN Member Countries in enhancing regional cooperation in forestry, particularly in timber certification, establishment of forest clearing house mechanism (http://www.aseanforest-chm.org), strategic monitoring, regional positioning and resource mobilization through a forest trust fund mechanism.

Part of ReFOP's legacy includes two demand-driven **'knowledge networks'** on Forest Law Enforcement and Governance (FLEG) and REDD. These networks have been focused on intergovernmental processes and have not been multi-stakeholder or inclusive of NGOs and academia. The knowledge networks are for members only and are meant to be by and for regional nationals (development partners/donors are not members). There are a limited number of participants involved, about 1 to 2 per country. The work is overseen by officials and the Secretariat. It works like an informal advisory committee, but decisions are made by ASOF (ASEAN Senior Officials on Forestry). An example of their outputs was the ASEAN Common Position on REDD developed by the network and later endorsed by ASOF. While much of ASEAN's efforts are typically related to developing generalized joint positions, there are also opportunities to share lessons among countries, as for example the 'training for ASEAN Readiness Plan'.

A new support program is currently being designed by GTZ that will not have forestry as a major focus, but will still have it as a component and expects to continue some of the ReFOP activities. IT is primarily expected to help support implementation of the new ASEAN Framework on Climate Change and Food Security. Other regional partners currently include RECOFTC's technical and policy support on FLEG, and as well as potential opportunities with the RAFT-supported REDD learning network.

RDMA also supports ASEAN through a number of programs, including RAFT and ASEAN-Wildlife Enforcement Network, as well as a climate change advisor. Other GTZ forestry

investments include REDD programs in Laos (in protected areas in the northeast) and in Vietnam.

US Forest Service

The USDA Forest Service is the largest forest management organization in the world. Similarly, the Research and Development Division of the Forest Service is the world's largest forest research organization. The Forest Service is a current USAID and RDMA partners and currently quite active throughout Asia in providing technology, technical transfer, and research information concerning mitigation and adaptation strategies to climate change. The primary point of contact for collaboration is US Forest Service International Programs. The Climate, Fire, and Carbon Cycle Sciences Research Work Unit of the Northern Research Station is supporting addressing information gaps critical to implement REDD activities in the Asia-Pacific region, particularly as it relates to the establishment of credible and transparent inventories, understanding land use/land cover change as it relates to the need to establish baselines and approaches to monitoring, reporting and verification. The Forest Service has been a leading US governmental agency in providing technical expertise, producing relevant workshops, and collaborating with forest agencies, NGOs, University researchers. The International Programs of the USFS conducted a course on assessing carbon stocks in the Sundarban mangroves in Bangladesh and is providing support to the Eastern Himalayan countries including Bhutan. USFS has also been a key stakeholder in the USG interagency process in Indonesia working on the design of a peat management Center of Excellence.

US Environmental Protection Agency

The U.S. Environmental Protection Agency's Office of Climate Change has been implementing capacity building activities in Southeast Asia since 2008 related to land-based GHG accounting and inventories in the land use sector (forestry and agriculture) consistent with IPCC and UNFCCC reporting guidelines. These activities support regular National Communications reporting by participating countries to UNFCCC. This program has been replicating initial successes in Central America to the Southeast Asia region, where it is currently working with eight countries, including: Cambodia, Laos, Thailand, Vietnam, Indonesia, Malaysia, the Philippines, and Papua New Guinea.

Regional meetings introduce national focal points (typically from the Ministry of Environment) from participating countries to specific tools, including software and template workbooks, to help simplify and automate data collection, analysis, and reporting. These are followed by modular national-level training events that involve activity data collection (module 1), assigning emissions factors (module 2), and calculations and reporting worksheets (module 3). This initial phase of the program is expected to be completed at the end of 2010 and will culminate in a final regional wrap-up meeting being planned for September or October 2010. Planning for a two-year Phase II is now beginning and is expected to consist of a mitigation module and building land use mapping skills.

The program is being run by the UNFCCC, with support from the US (USAID/EGAT/GCC), Japan, and Switzerland. Future funding support from EGAT is not yet certain. RDMA could contribute additional resources to expand the breadth of work (e.g. add South Asia) and/or increase depth through additional training activities.

Table 4. Preliminary overview of organizations supporting REDD in Asia

Country	UN-REDD	FCPF[1]	USAID / USG	donors	NGOs
Cambodia	X (observer)	R-Pin	Bilateral, RDMA, EPA	UNDP, FAO, ADB, Blue Moon	WCS, Pact, Winrock, CI, RECOFTC
Laos		R-Pin	RDMA, EPA	JICA, GTZ, Finland, ADB, Blue Moon	WCS
Thailand		R-Pin	RDMA, EPA	ADB	WWF
Vietnam	X	R-Pin	RDMA, bilateral (2011), EPA	SNV, Finland, GTZ, JICA, ADB	Winrock, ICRAF, RECOFTC
Mekong sub-region			RDMA, EPA	ADB	WWF, RECOFTC
Indonesia	X	R-PP approved	Bilateral, RDMA, EPA	AusAID, GTZ, Finland	FFI, TNC, WWF, CCI, CIFOR, many
Malaysia			RDMA, EPA	UNDP	WWF
Papua New Guinea	X (on hold)	R-Pin	RDMA, EPA	AusAID	TNC, WCS
Philippines	X (observer)		Bilateral, EPA		
Bhutan			USFS		
Bangladesh			Bilateral, USFS		CFI
India			Bilateral, USFS		CFI
Nepal	X (observer)	R-Pin, 200K formulation grant signed	Bilateral, USFS	Finland	CARE, WWF, FECOFUN
S. Asia / E. Himalayas Sub-region			USFS		
ASEAN			RDMA	GTZ	

1 http://www.forestcarbonpartnership.org/fcp/node/203

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Appendix I: RDMA's Forestry and Biodiversity Activities in Asia

In Asia, many environmental challenges are transnational, such as global climate change, illegal logging, wildlife trafficking, fisheries management and energy security, and therefore require regional cooperation. RDMA's Regional Environment Office (REO) addresses regional environmental challenges through activities that promote regional cooperation as well as through targeted bilateral activities in USAID non-presence countries (e.g. China, Burma, Laos, Thailand, Malaysia, Papua New Guinea). The REO works to catalyze change by sharing and replicating innovation and sustaining program impacts through regional institutions or networks such as the Association for Southeast Asian Nations (ASEAN), Asia Pacific Economic Cooperation (APEC), and the Mekong River Commission (MRC). A key component of REO programs is coordination and cooperation with donors to leverage resources and align activities, including support for public-private partnerships. While many REO programs are technical in nature, REO also implements activities to address cross-cutting environmental governance challenges across Asia.

Currently, the REO supports three regional environment activities with relevance to climate change and REDD:

- **Coral Triangle Initiative (CTI) (2009-2014).** The Coral Triangle is a global center of marine biodiversity covering four million square miles in Southeast Asia and the Pacific. Millions of people depend on this ecosystem, home to the multi-billion dollar tuna industry, for their livelihoods. The CTI is a commitment by the governments of Indonesia, Malaysia, Papua New Guinea, the Philippines, Timor Leste, and the Solomon Islands to safeguard the region's marine and coastal biological resources by promoting sustainable fisheries, sustainable livelihoods, and climate change resilience and adaptation measures. USAID is providing support to governments and other stakeholders implementing the CTI, support to the CTI Secretariat, access to US science and research capabilities and help to share best practices among the six CTI countries. http://www.cti-secretariat.net/ and http://pdf.usaid.gov/pdf_docs/PDACM755.pdf

- **Asia Regional Biodiversity Conservation Program (ARBCP) (2005-2010).** Focusing on the Greater Mekong Subregion, an area of significant ecological importance, the ARBCP works to slow biodiversity loss by improving natural resource management and restoring biodiversity corridors. The program has piloted implementation of a successful Payment for Environmental Services (PES) demonstration site and national pilot policy in Vietnam which is generating millions of dollars in domestic revenues to support biodiversity and forest conservation, as well as local livelihoods. The activity is replicating successes and sharing lessons with interested neighboring countries considering piloting similar PES activities. Watershed payments are being bundled with a voluntary forest carbon offset (REDD) project, and in 2010 Mekong regional trainings are occurring on specific regional REDD issues. The program will be completed in September 2010, with lessons learned informing a new Asia Regional Sustainable Landscapes program.
  (See http://arbcp.com/index.php)

- **Responsible Asia Forestry and Trade (RAFT) Program (2006-2011).** Home to some of the most biologically rich forests in the world, Asia is the world's largest producer and consumer of timber. Illegal logging in the region contributes to global warming and undermines good governance, negatively affecting forest communities and reducing government revenues. Through its support of the RAFT program, USAID helps the region's major timber producing (e.g. Indonesia, Malaysia, Papua New Guinea, and Laos) and processing countries (e.g. Thailand, Vietnam, and China) to increase the legal regional timber trade, improve the sustainability of forest management, strengthen regional cooperation on forest management and trade, and reduce carbon dioxide emissions from forest loss and degradation. RAFT partners are supporting over 30 forest management enterprises to improve forest management on over 3 million hectares of tropical forest lands as they are guided towards independent certification.
  (See http://www.raftprogram.org/)

  Improved forest management practices on RAFT-supported concessions are estimated to reduce CO2 emissions by about 4 million tons per year. Methodology to improve accuracy of estimates is currently being refined with support from Winrock International. In addition, RAFT is also supporting development of a REDD learning network in Asia (Implemented by RAFT partner RECOFTC), which has conducted policy 'distillation' workshops for negotiators and climate change practitioners on key REDD themes: including Issues of Scale; Degradation: Addressing and Assessing the Second 'D'; Negotiating Forest Land-use Change; and Restoration.
  (see http://www.recoftc.org/site/index.php?id=693)

Appendix II: Assessment Team Member Biographies

J. Boone Kauffman, Ph.D., is a senior research ecologist with the Northern Research Station of the USDA Forest Service. Prior to this position he was Director of the Institute of Pacific Islands Forestry in Hilo, Hawaii and a professor of ecosystems ecology at Oregon State University. Dr. Kauffman's current research centers upon understanding the vulnerability of tropical forests to climate change and the development of adaptation and mitigation strategies to climate change. His current research focus is on C dynamics, land use and climate change implications for peat forest and mangroves of the Asia Pacific. These studies are located in Bangladesh, Micronesia, Palau, Indonesia and Hawaii. Dr. Kauffman has a lifelong research interest in ecosystems, disturbance, and restoration ecology in both tropical and temperate landscapes. In particular, his research has centered on the influences of natural disturbances and human perturbations on ecosystem structure and function; the global influences of deforestation, land use, and wildland fire on ecosystems; the influences of land use on riparian/wetland ecosystems; and ecological approaches to restoration. In addition to the locations above he has led research projects in tropical savannas, dry forests, and evergreen forests of Brazil, Mexico, Costa Rica, and Venezuela as well as in forests and grasslands of Africa, Guam, Oregon, Idaho, and California. Dr. Kauffman has authored over 240 scientific publications. He received his Ph.D. in Forest Ecology from the University of California, Berkeley. Boone currently lives in Durham, New Hampshire with his wife and long term partner Dian and their two boys Cimarron and Kenai. He considers himself to be a very fortunate person.

Malcolm North, Ph.D. has been a research forest ecologist with the USDA Forest Service's Pacific Southwest (PSW) Research Station since 1995 and an associate professor at the University of California at Davis since 1998. Dr. North's current research includes a focus on carbon dynamics in forests prone to disturbance particularly from fire. He has worked in temperate forests in the western U.S. and central and northern China, where he is an affiliate professor with Fudan University in Shanghai. Dr. North's research has examined the ecological effects of disturbance and silvicultural manipulations on ecological processes including carbon stores and emissions. He has authored more than 75 publications. Dr. North received a B.A. in English Literature from Vassar College in 1979, an M.F.S. in Forest Ecology from Yale University in 1988 and a Ph.D. in Forest Ecosystems from the University of Washington in 1993. He lives in Davis California.

Apichai Thirathon, Ph.D., joined USAID in November 2005 as the Senior Program Development Specialist (Biodiversity Conservation) for the Regional Environment Office. Prior to this position, Apichai was a Consultant to the Rockefeller Foundation-Southeast Asia Regional Office, working on the Upland Communities in Transition program to improve food security and livelihoods of ethnic groups living in protected areas of the Greater Mekong Sub-region (GMS). From 1994-2001, he was a Senior Lecturer and Associate Dean for the Faculty of Agricultural Production at Maejo University (MJU) in Chiang Mai where he was involved in a number of projects supported by bilateral donors to improve the sustainable

management of natural resources. Prior to that position, he was Chief of the Technical Section of the Thai-Australia and World Bank Land Development Project under the Ministry of Agriculture and Cooperatives. Apichai received a Ph.D. in Agriculture (Agronomy: Crop Physiology) from the University of Queensland and M.Agric. (Crop Science) from the University of Sydney, Australia. He obtained a B.Sc. (Soil Science) from Kasetsart University in Bangkok.

Barry Flaming joined USAID's Regional Development Mission for Asia in August 2008 as a Program Development Specialist, where he manages biodiversity conservation programs in the Regional Environment Office with Apichai Thirathon. Before joining RDMA, he was a Program Manager for CARE Thailand, implementing forest conservation and livelihood development initiatives with upland minority communities. Previous experiences include conducting Environmental Impact Statements for stateside US Government agencies, as well a serving as a Peace Corps volunteer in Thailand. Barry holds a M.Sc. in Forestry from the University of Washington, where he researched carbon and nitrogen cycling and sustainable management of production forests.

Deborah Lawrence, Ph.D., is serving as the scientific advisor on forests and climate in the Office of Global Change at the US Department of State. She participated in the international negotiations of the UNFCCC, supports the US delegation to the World Bank Forest Carbon Partnership Facility, and was part of an inter-agency scoping mission on REDD in Indonesia. She is also an Associate Professor of Environmental Sciences at the University of Virginia. Her research focuses on the ecological effects of deforestation. She has spent the past twenty years conducting field work in Indonesia, Costa Rica, Mexico and Cameroon. She conducts interdisciplinary research with partners in economics, anthropology, geography and hydrology to understand the drivers and consequences of land use change. This work has gained her a Sustainability Science Award from the Ecological Society of America, a Guggenheim Fellowship, a Jefferson Science Fellowship from the National Academy of Sciences, and a Fulbright Scholarship. She was a post-doctoral fellow at Harvard University, earned her Ph.D. (Botany) at Duke University, and received a B.A. (Biological Anthropology) from Harvard University.

Scott Stanley has worked in the tropics (Costa Rica, Guatemala, Panama, Bolivia, Indonesia) for more than 25 years primarily involved with silviculture of natural forests, community-based forest management, forest certification, and protected areas design and management. For the past three years, Mr. Stanley has been directing a forestry consulting company that provides support services for carbon projects including assessing carbon stocks, applying computer models to estimate future GHG emissions, and monitoring forest areas.

Appendix III: List of Experts Consulted

Name	Title	Organization	Consultation
Adrian Forsythe	Vice President	**Blue Moon Fund**	Laos National PES Workshop February 24
Agus Sari	Country Director	**Ecosecurities**	Jakarta roundtable February 24
Andrew Ingles	Head, Livelihoods and Landscapes Strategy, Asia	**IUCN Asia Regional Office**	Bangkok roundtable February 18
Ben Vickers	Climate Change Focal Point	**RECOFTC – The Center for People and Forests**	Bangkok roundtable February 19
Carey Yeager	Senior Environment Specialist	**USAID Indonesia**	Jakarta roundtable February 24
Chris Margules	Vice president, Asia Pacific Field Division	**Conservation International**	Written comments
Cole Genge	Deputy Chief of Party – RAFT	**The Nature Conservancy**	Bangkok roundtable February 19
Daniel Murdiyarso	Environmental Scientist	**CIFOR**	Jakarta roundtable February 23
Daniela Goehler	Technical Advisor	**GTZ (ASEAN-German Regional Forest Program)**	Jakarta roundtable February 24
David Cassels	Senior Policy Advisor Forests and Climate Change, Asia-Pacific Region	**TNC**	Bali workshops February 4
David Plattner	CEO	**Raintrust**	Bangkok roundtable February 19
Dharsono Hartono	President Director	**PT. Rimba Makmur Utama**	Jakarta roundtable February 24
Dian Intarini		**CIFOR**	Jakarta roundtable February 23
Dr. Noviar "Yani" Andayani	Country Director	**Wildlife Conservation Society**	Jakarta roundtable February 24
Eka Ginting	Director	**PT Rimba Raya Conservation**	Jakarta roundtable February 24
Elizabeth Philip	Senior Research Officer	**Forest Research Institute Malaysia (FRIM)**	Bali workshops February 4
Fika Fawzia	Programme Officer on REDD	**GTZ (ASEAN-German Regional Forest Program)**	Jakarta roundtable February 24
Frank Momberg	Asia Director for Program Development	**Fauna and Flora International (FFI)**	Bangkok roundtable February 18
Frederick Kugan	Deputy Director, Forest Planning	**Sabah Forestry Department**	Bali workshops February 4
Geoff Blate	Climate Change Coordinator	**WWF-Greater Mekong Program**	Bangkok roundtable February 19

Goodwill Amos	Manager - Climate Change & REDD	**PNG Forest Authority**	Bali workshops February 3
Hal Howard	Regional Environment, Science, Technology, and Health Officer	**US Embassy Bangkok**	Bangkok roundtable February 18
Hanna Uusimaa		**UNEP**	Bangkok roundtable February 18
Harry Alexander	Assistant Director	**Wildlife Conservation Society**	Jakarta roundtable February 24
Herlina Hartanto	Learning and Application Manager	**The Nature Conservancy**	Jakarta roundtable February 23
Ivy Wong Abdullah	Manager-Forest Conservation	**WWF-Malaysia**	Bali workshops February 4
Jack Hurd	Regional Forest Director / RAFT Chief of Party	**TNC**	Bangkok roundtable February 18
Jeni Pareira		**Global Eco Rescue**	Jakarta roundtable February 23
Jeremy Broadhead		**FAO/World Bank**	Bangkok roundtable February 19
Jim Peters	Chief of Party ARBCP	**Winrock International**	Laos National PES Workshop February 24
Kimberly Todd		**US EPA**	Conference call March 2
Kurt MacLeod	Vice President	**Pact**	Bangkok roundtable February 19
Mahammud Farid	Climate Change Policy Specialist	**Conservation International**	Jakarta roundtable February 24
Mark Poffenberger	Executive Director	**Community Forestry International**	Written comments
Markku Kanninen	Environmental Services	**CIFOR**	Jakarta roundtable February 24
Mausami Desai		**US EPA**	Conference call March 2
Maxine Levin	US Embassy Science Fellow	**US Department of State**	Bangkok roundtable February 19
Muayat Ali Muksht	Director	**PT Peace**	Jakarta roundtable February 24
Neil Scotland	Coordinator, IAFCP	**AusAID**	Jakarta roundtable February 24
Pete Cutter	Kayah Karen / Tenasserim Ecoregion Coordinator	**WWF Greater Mekong Programme, Thailand Country Office**	Bangkok roundtable February 19
Petteri Vuorinen	Regional Natural	**FAO/UN-REDD**	February 10;

	Resources Officer		Bangkok roundtable February 18
Phan Van An	Director	**Ag and Rural Devel. Lam Dong Prov. Vietnam**	Laos National PES Workshop February 24
Pornwilai Saipothong	PES and REDD Capacity Building	**Winrock International**	Bangkok roundtable February 18
Rezal Kusumaatmadja	Partner	**Starling Resources**	Jakarta roundtable February 24
Richard Rice	President	**Save your world foundation (NGO)**	Laos National PES Workshop February 24
Rita Lohani	ARC Assessment Team	**ARD/TetraTech**	Jakarta roundtable February 24
Robert Mather	Head, Country Group 1 (Cambodia, Lao PDR, Vietnam)	**IUCN Asia Programme**	Bangkok roundtable February 18
Robert Oberndorf	Legal consultant	**Independent**	Laos National PES Workshop February 24
Sandeep Singh	Pacific Regional Environmental Affairs Specialist	**US Embassy Fiji**	Jakarta roundtable February 24
Stephen Ogle		**Colorado State University**	Conference call March 2
Suchitra Changtragoon	Head of Forest Genetics and Biotechnology Division	**National Park, Wildlife and Plant Conservation Department**	Bali workshops February 4
Sumit Pokrhel	Energy and Climate Change Coordinator	**Asian Development Bank**	Bangkok roundtable February 18
Supattira (Ke) Rodboontham	Project Management Specialist	**USAID / RDMA**	Bangkok roundtable February 18
Taufig Alimi	National Coordinator	**Clinton Climate Initiative—Forestry**	Jakarta roundtable February 24
Teresa Leonardo	Global Climate Change Advisor	**USAID / RDMA**	Jakarta roundtable February 24
Tim Boyle	Regional Coordinator	**UN-REDD**	February 10; Bangkok roundtable February 18
Tom Clements	Research and Policy Advisor	**Wildlife Conservation Society**	Bangkok roundtable February 18; Written comments; Laos National PES Workshop February 24
Tom Wirth		**US EPA**	Conference call March 2
Tony Djogo	Program Management Specialist	**USAID Indonesia**	Jakarta roundtable February 23
Vitus Ambia		**FPCD Inc (Foundation for People and Community**	Bali workshops February 3

		Development Inc)	
Zhang Jiqiang	VP of Programs	**Blue Moon Fund**	Laos National PES Workshop February 24

Appendix IV: Survey questionnaire results [scores range from 1 (no preparation) to 5 (fully prepared). Number of expert respondents = 38

Scoring system to assess REDD readiness by country

instructions: in each box write a score (1-5) that indicates the country's progress for that component of REDD. Score of 1 indicates no progress

Country	Political Aspects									Social Aspects									Technical Aspects										
Country	REDD Action Plan or Roadmap	Support for Copenhagen Agreement (Declared emissions reduction targets)	Govt. mechanisms to engage multiple stakeholders	Clear legal rights to buy/sell carbon	Governance Reforms related to NRM	Success to date in controlling illegal logging	Funding commitment by national govt	History providing benefits to rural poor from NRM	Number of govt-supported REDD pilot projects	Level of public awareness & understanding	Clear usufruct rights to forests by communities	Recognized Land tenure for communities	Community engagement w/ REDD to date	Influence of civil society organizations w/ govt	Strength and influence of indigenous groups	Number of ICDP Projects providing benefits	Number of PES Schemes providing benefits	Number of Community Forestry Projects	Sub-national or national land use change analyses	Studies examining drivers of land use change	Standardized methods to assess carbon stocks	infrastructure & personnel for forest fire management	Methods to assess forest-based GHG emissions	Sufficient number and quality of trained personnel	Assessments of biodiversity on subnational or national scale	Experience with High Conservation Value Forest Assessments	Last year of national forest inventory	Amount of current donor funding for technical support in $US million	Amount of committed donor funding for 2011 in $US million
Cambodia	2.5	3.4	1.9	2.0	2.4	1.8	1.4	1.8	2.7	1.8	2.3	2.6	2.6	2.7	1.3	6.0	3.0	16.0	2.5	2.9	1.7	1.4	2.0	1.4	3.0	2.0		1.9	0.2
Laos	2.0	1.3	1.6	1.1	1.8	1.8	1.6	1.7	2.0	1.1	2.0	2.0	1.3	1.5	1.4	2.3	2.5	19.0	2.5	2.3	1.6	1.6	1.7	1.4	2.3	1.7		6.7	1.7
Thailand	3.3	1.0	2.3	1.0	2.5	2.3	3.0	1.5	1.0	1.3	2.5	2.5	1.7	3.0	1.7	0.0	0.0	1.0	3.0	2.0	1.7	2.3	1.5	2.0	2.7	2.5		2.3	0
Vietnam	2.9	1.8	2.2	1.7	2.6	2.2	2.4	2.8	2.0	1.5	2.9	2.8	1.6	1.9	1.3	3.3	1.7	12.0	2.6	2.4	1.8	2.4	2.1	2.3	3.0	2.1	0.0	1.8	2
SUB-REGIONAL MEAN	2.7	1.9	2.0	1.5	2.3	2.0	2.1	1.9	1.9	1.4	2.4	2.5	1.8	2.3	1.4	2.9	1.8	12.0	2.6	2.4	1.7	1.9	1.8	1.8	2.7	2.1	0.0	3.1	1
Malaysia	0.0	0.0	3.0	1.0	3.0	2.0	2.0	1.0	0.0	2.0	3.0	3.0	1.0	1.0	1.0	2.0	2.0	2.0	4.0	4.0	3.0	0.0	2.0	2.0	2.0	3.0	0.0	0.0	0
Indonesia	3.0	3.8	2.5	1.9	2.4	2.7	1.9	2.1	10.8	1.8	1.6	1.9	1.8	2.9	1.8	9.4	2.5	5.2	2.7	2.8	2.1	2.5	2.3	2.3	3.2	3.0	0.0	4.6	4.3
Phillipines	0.0	0.0	2.0	0.0	1.0	3.0	0.0	2.0	4.0	2.0	0.0	2.0	1.0	2.0	0.0	0.0	0.0	15.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
PNG	2.0	3.5	2.0	2.3	2.0	1.0	2.0	2.3	1.0	1.8	4.5	4.8	2.5	3.0	4.7	4.0	0.0	0.0	3.0	2.7	1.3	2.0	2.0	1.3	3.0	1.8	0.0	0.6	1
SUB-REGIONAL MEAN	1.3	1.8	2.4	1.3	2.1	2.2	1.5	1.8	4.0	1.9	2.3	2.9	1.6	2.2	1.9	3.8	1.1	5.5	2.4	2.9	1.6	1.1	1.6	1.4	2.0	1.9	0.0	1.3	1.3
Nepal	3.0	0.0	4.0	1.0	4.0	2.5	2.5	3.5	0.0	2.0	3.0	4.5	2.5	3.5	3.5	5.0	0.0	1.0	2.0	3.5	2.0	2.0	2.5	2.0	3.5	2.5	0.0	3.5	0.0
India	0.0	0.0	3.0	1.0	3.0	4.0	0.0	3.0	0.0	4.0	3.0		3.0	4.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	3.0	0.0	3.0	4.0	0.0	0.0	0.0	0.0
Bangladesh																													
Sri Lanka	1.0	1.0	3.0	2.0	0.0	2.0	1.0	0.0	0.0	1.0	3.0	0.0	1.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	3.0	2.0	3.0	3.0	3.0	0.0	0.0	0.0
Bhutan																													
China			3.0		5.0	2.0		4.0		1.0	3.0	3.0		2.0	2.0				5.0	3.0	2.0	2.0	2.0	2.0	5.0	1.0			
SUB-REGIONAL MEAN	1.3	0.3	3.3	1.3	3.0	2.6	1.2	2.6	0.0	2.0	3.0	2.5	2.2	3.1	1.9	1.7	0.0	0.3	1.8	2.6	1.3	2.5	1.6	2.5	3.9	1.6	0.0	1.2	0.0
OVERALL MEAN SCORE	1.8	1.3	2.5	1.4	2.5	2.3	1.6	2.1	2.0	1.8	2.6	2.6	1.8	2.5	1.7	2.8	1.0	6.0	2.3	2.6	1.5	1.9	1.7	1.9	2.9	1.9	0.0	1.9	0.8
Coefficient of Variation (	66	98	24	41	45	28.7	53	44	142	39	36	41	34	30	65	93	115	112	60	35	49	48	42	39	37	49		103	155

APPENDIX V. Other Background Data Tables

Table V.1 National GHG Emissions for target countries in Asia, 2000

Country	LULUCF sources		Non-LULUCF sources		Total GHG emissions		% LULUCF
	Mt C	Global rank	Mt C	Global rank	Mt C	Global rank	
Indonesia	700	1	137	15	837	4	83.6%
Malaysia	191	3	45	33	236	10	80.8%
Myanmar	116	4	23	48	139	16	83.7%
Papua New Guinea	39.9	9	2.4	133	42.3	42	94.3%
Nepal	33.7	11	8.6	84	42.3	41	79.7%
Philippines	25.9	14	36.3	39	62.2	36	41.6%
Cambodia	15.3	22	18.7	58	34	47	45.0%
Thailand	13	26	72.2	26	85.2	31	15.3%
Sri Lanka	8	35	7.7	90	15.7	86	51.0%
Laos	6.4	38	2	139	8.4	106	76.2%
Bhutan	0		0.5	160	0.5	160	0.0%
Bangladesh	-2.5		33.4	42	30.9	52	-8.1%
India	-11		514	5	503	7	-2.2%
China	-13		1,348	2	1,335	2	-1.0%
Vietnam	-13.3		36.6	38	23.3	60	-57.1%
Total – world	2,072		10,405		12,477		16.6%
Total – Asia	1,114		930		2,044		54.5%
% Asia	53.8%		8.9%		16.4%		

Source: World Resource Institute's Climate Analysis Indicators Tool (CAIT), Kevin Gurney of Purdue University
http://rainforests.mongabay.com/GHG_emissions.html

Table V.2 National GHG Emissions by Country, 2000
(sorted by LULUCF source, with Asian countries highlighted)

Country	Non-LULUCF sources		LULUCF sources		Total GHG emissions		% LULUCF
	Mt C	Global rank	Mt C	Global rank	Mt C	Global rank	
Indonesia	137	15	700	1	837	4	83.60%
Brazil	232	8	375	2	607	5	61.70%
Malaysia	45	33	191	3	236	10	80.80%
Myanmar	23	48	116	4	139	16	83.70%
Congo, Dem. Rep	14.1	75	86.6	5	100.7	27	86.00%
Zambia	4.8	109	64.3	6	69.1	34	93.10%
Nigeria	53	30	53	7	106	22	50.20%
Peru	19	56	51.1	8	70.1	33	72.90%
Papua New Guinea	2.4	133	39.9	9	42.3	42	94.30%
Venezuela	65	27	39	10	105	23	37.50%
Nepal	8.6	84	33.7	11	42.3	41	79.70%
Colombia	43.7	35	29	12	72.7	32	39.90%
Mexico	140	14	26	13	166	13	15.90%
Philippines	36.3	39	25.9	14	62.2	36	41.60%
Cote d'Ivoire	4.1	113	24.9	15	29	55	85.90%
Bolivia	10.7	81	22.9	16	33.6	49	68.20%
Cameroon	8.2	88	21	17	29.2	54	71.90%
Canada	186	9	18	18	203	11	8.70%
Madagascar	8.6	85	16.4	19	25	59	65.60%
Ecuador	11.4	79	16.1	20	27.5	57	58.50%
Guatemala	5.9	102	15.4	21	21.3	64	72.30%
Cambodia	18.7	58	15.3	22	34	47	45.00%
Russia	523	4	15	23	538	6	2.80%
Argentina	79	24	15	24	94	28	16.00%
Nicaragua	3.5	119	14.7	25	18.2	74	80.80%
Thailand	72.2	26	13	26	85.2	31	15.30%
Panama	3.2	122	13	27	16.2	85	80.20%
Zimbabwe	9	83	12.9	28	21.9	62	58.90%
Liberia	0.6	158	10.8	29	11.4	96	94.70%
Uganda	7.4	92	10.7	30	18.1	76	59.10%
Benin	2	137	9.9	31	11.9	95	83.20%
Guyana	1	147	9.6	32	10.6	99	90.60%
Pakistan	77.9	25	9	33	86.9	30	10.40%
Sudan	26.3	47	8.3	34	34.6	46	24.00%
Sri Lanka	7.7	90	8	35	15.7	86	51.00%
Ghana	5.7	104	7.6	36	13.3	92	57.10%
Malawi	1.8	143	7.3	37	9.1	103	80.20%
Laos	2	139	6.4	38	8.4	106	76.20%
Turkey	97	22	6	39	103	25	5.60%
Belize	0.3	166	5.9	40	6.2	116	95.20%
Paraguay	7.1	93	5.7	41	12.8	94	44.50%
Botswana	4.2	112	5.4	42	9.6	100	56.30%
Angola	9.2	82	4.9	43	14.1	89	34.80%
Honduras	3.7	117	4.8	44	8.5	104	56.50%

Chile	20.9	53	4.2	45	25.1	58	16.70%
Tanzania	16.1	68	4	46	20.1	68	19.90%
Sierra Leone	1.1	146	3.6	47	4.7	126	76.60%
Kenya	14.4	74	3.2	48	17.6	77	18.20%
Guinea	2.5	132	2.9	49	5.4	123	53.70%
Costa Rica	3.4	120	2.7	50	6.1	118	44.30%
Congo	1.9	141	2.7	51	4.6	127	58.70%
Mozambique	4.1	115	2.5	52	6.6	114	37.90%
Central Af. Rep.	3.1	123	2.5	53	5.6	121	44.60%
Togo	1.6	144	2.4	54	4	132	60.00%
Afghanistan	6.1	101	2.4	55	8.5	105	28.20%
Ethiopia	16.1	69	2.3	56	18.4	72	12.50%
Mali	6.9	97	2.2	57	9.1	102	24.20%
Rwanda	1	148	2.1	58	3.1	138	67.70%
Iran	131	18	2	59	133	19	1.70%
Burundi	0.9	153	1.9	60	2.8	141	67.90%
Belarus	21.5	51	1.5	61	23	61	6.50%
Equatorial Guinea	0.7	156	1.2	62	1.9	149	63.20%
Latvia	2.6	130	1.1	63	3.7	135	29.70%
El Salvador	3.1	124	1.1	64	4.2	131	26.20%
Tunisia	8.4	87	1	65	9.4	101	10.60%
South Africa	114	19	1	66	114	21	0.40%
Japan	359	6	1	67	361	8	0.30%
Gabon	2.7	129	1	68	3.7	134	27.00%
Chad	4.8	108	1	69	5.8	120	17.20%
Australia	134	16	1	70	135	18	0.80%
Senegal	5.2	106	0.9	71	6.1	117	14.80%
New Zealand	19.9	55	0.9	72	20.8	66	4.30%
Slovakia	12.4	78	0.8	73	13.2	93	6.10%
Lithuania	4.1	114	0.8	74	4.9	125	16.30%
Jamaica	3.5	118	0.8	75	4.3	130	18.60%
Egypt	48.5	32	0.8	76	49.3	39	1.60%
Algeria	34.4	40	0.8	77	35.2	45	2.30%
Morocco	15.6	70	0.7	78	16.3	83	4.30%
Namibia	2.8	127	0.6	79	3.4	137	17.60%
Haiti	2	136	0.6	80	2.6	143	23.10%
Estonia	6.2	100	0.6	81	6.8	112	8.80%
Slovenia	5.2	105	0.3	82	5.5	122	5.50%
Korea (North)	30.5	45	0.3	83	30.8	53	1.00%
Guinea-Bissau	0.5	161	0.3	84	0.8	155	37.50%
Niger	3.3	121	0.2	85	3.5	136	5.70%
Libya	16.9	65	0.2	86	17.1	80	1.20%
Lebanon	4.9	107	0.2	87	5.1	124	3.90%
Burkina Faso	5.7	103	0.2	88	5.9	119	3.40%
Albania	1	149	0.2	89	1.2	151	16.70%
Yemen	6.9	96	0.1	90	7	111	1.40%
Solomon Islands	0.1	172	0.1	91	0.2	170	50.00%
Mongolia	7.6	91	0.1	92	7.7	109	1.30%
Iraq	27.5	46	0.1	93	27.6	56	0.40%
Bhutan	0.5	160	0		0.5	160	0.00%
68 other countries with 0 LULUCF emissions omitted							
Switzerland	14.1	76	-0.1		14	90	-0.70%

Gambia	0.4	164	-0.1		0.3	165	-33.30%
Hungary	20.7	54	-0.2		20.5	67	-1.00%
Finland	18.7	59	-0.2		18.5	71	-1.10%
Austria	21.9	49	-0.2		21.7	63	-0.90%
Romania	34	41	-0.4		33.6	48	-1.20%
Swaziland	0.9	152	-0.5		0.4	163	-125.00%
Ireland	18	62	-0.5		17.5	78	-2.90%
Bulgaria	16.9	66	-0.6		16.3	84	-3.70%
Norway	14.7	73	-0.9		13.8	91	-6.50%
Greece	32.8	43	-0.9		31.9	51	-2.80%
Poland	104	21	-1		103	24	-0.50%
Italy	145	11	-1		144	14	-0.60%
Portugal	21.6	50	-1.6		20	69	-8.00%
France	140	13	-2		138	17	-1.20%
Spain	104	20	-2.4		101.6	26	-2.40%
Cuba	13.7	77	-2.5		11.2	97	-22.30%
Bangladesh	33.4	42	-2.5		30.9	52	-8.10%
EU-25	1,290	3	-6		1,284	3	-0.40%
Uruguay	7	95	-6.7		0.3	166	-2233.30%
India	514	5	-11		503	7	-2.20%
China	1,348	2	-13		1,335	2	-1.00%
Vietnam	36.6	38	-13.3		23.3	60	-57.10%
U.S.	1,891	1	-110		1,781	1	-6.20%
Total – world	**2,072**		**10,405**		**12,477**		**16.6%**
Total – Asia	**1,114**		**930**		**2,044**		**54.5%**
% Asia	**53.8%**		**8.9%**		**16.4%**		

Source: World Resource Institute's Climate Analysis Indicators Tool (CAIT), Kevin Gurney of Purdue University
http://rainforests.mongabay.com/GHG_emissions.html

Table V.3 Land Resources and Socio-economic Profiles of Target Countries

Country	LAND			DEMOGRAPHY					ECONOMY					
	total area (sq km)	**% arable land**	**% perma -nent crops**	**population** (2009 est.)	**growth rate** (%, 2009 est.)	**urban popu-lation** (%)	**rate of urbani-zation** (%)	**life expect-ancy** (years)	**GDP** (billion US$, 2008 est.)	**GDP growth rate** (2008 est.)	**GDP per capita** (2008 est.)	**Agricul -ture as % GDP**	**% labor agri-cul-tural**	**% pop below poverty** (2004)
Burma*	676,578	14.9	1.3	48,137,741	0.783	33	2.9	63.4	26.8	1.8	1,100	42.9	70	32.7
Cambodia	181,035	20.4	0.6	14,494,293	1.765	22	4.6	62.1	11.3	5.0	2,000	29.0	75.0	35.0
Laos	236,800	4.0	0.3	6,834,942	2.316	31	5.6	56.7	5.4	7.5	2,100	39.2	80.0	30.7
Thailand	513,120	27.5	6.9	65.905,410	0.615	33	1.7	73.1	273.3	2.6	8,400	11.6	42.6	10.0
Vietnam	331,210	20.1	6.9	86,967,524	0.977	28	3.1	71.6	89.8	6.2	2,800	22.0	55.6	14.8
Mekong SE Asia	1,262,165	18.0	3.7	174,202,169	1.418	28	3.8	65.9	380.8	5.3	3,825	25.5	63.3	22.6
Indonesia	1,904,569	11.0	7.0	240,271,522	1.136	52	3.3	70.8	511.8	6.1	3,900	14.4	42.1	17.8
Malaysia	329,847	5.5	17.5	25,715,819	1.723	70	3.0	73.3	221.6	4.6	15,200	10.1	13.0	5.1
Papua New Guinea	462,840	0.5	1.4	6,057,263	2.069	12	1.9	66.3	8.1	7.0	2,300	33.3	85.0	37.0
Philippines	300,000	19.0	16.7	97,976,603	1.957	65	3.0	71.1	166.9	3.8	3,300	14.7	35.0	30.0
Insular SE Asia	2,997,256	9.0	10.7	370,021,207	1.721	50	2.8	70.4	908.4	5.4	6,175	18.1	43.8	22.5
Bangladesh	143,998	55.4	3.1	156,050,883	1.292	27	3.5	60.3	84.2	5.8	1,500	19.1	63.0	45.0
Bhutan	38,394	2.3	0.4	691,141	1.267	35	4.9	66.1	1.5	5	5,400	22.3	63	23.2
India	3,287,263	48.8	2.8	1,166,079,217	1.548	29	2.4	69.9	1,207.0	7.4	2,900	17.6	60.0	25.0
Nepal	147,181	16.1	0.9	28,563,377	1.281	17	4.9	65.5	12.3	5.3	1,100	32.5	76.0	30.9
Sri Lanka*	65,610	14.0	15.2	21,324,791	0.904	15	0.5	75.1	39.6	6.0	4,400	13.4	34.7	22.0
South Asia	3,616,836	30.7	1.8	1,351,384,618	1.347	27	3.9	65.5	1,305.0	5.9	10,900	22.9	65.5	31.0
China*	9,595,961	14.9	1.3	1,338,612,968	0.655	43	2.7	73.5	4,327.0	9.0	6,000	11.3	43.0	8.0

Source: CIA World Factbook
http://www.cia.gov/library/publications/the-world-factbook/index.html
(accessed November 19, 2009)
** data presented for comparative purposes*