



An Analysis of Opportunities for USAID Indonesia's Water and Energy Team to Incorporate Global Climate Change Activities in the Natural Resource Management and Energy Sectors

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List of Acronyms

ACCACC	Assisting Coastal Communities Adapt to Climate Change
AIDF	Adaptation to Increased Drought and Flooding
APP	Asia-Pacific Partnership on Clean Development and Climate
BHS	Basic Human Services
CATHALAC	Water Center for the Humid Tropics of Latin America and the Caribbean
CCRE	Coasts and Coral Reef Ecosystems
CDM	Clean Development Mechanism
CE	Clean Energy
CIFOR	Center for International Forestry Research
CI	Conservation International
CITES	Convention on the International Trade in Endangered Species
CO ₂	Carbon Dioxide
COP	Conference of Parties
CPE	Clean Productive Environment
CRMP	Coastal Resources Management Program
CSR	Corporate Social Responsibility
CTF	Clean Technology Fund
CTI	Coral Triangle Initiative
CTO	Cognizant Technical Officer
DFNS	Debt for Nature Swap
DKP	Ministry of Marine and Fisheries
DSM	Demand-side management
ENSO	El Niño, La El Niña, and the Southern Oscillation
ESP	Environmental Services Program
EPA	Environmental Protection Agency
ETR	Electricity Tariff Reform
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization (of the United Nations)
FFI	Fauna and Flora International
FLEGT	Forest Law Enforcement and Governance and Trade
FLU	Forests and Land Use Change
FOMAS	Forest Monitoring and Assessment System
FRIS	Forest Resource Information System
FSC	Forest Stewardship Council
FWI	Forest Watch Indonesia
FWRE	Freshwater Resources and Ecosystems
GCC	Global Climate Change

GDA	Global Development Alliance
GEOSS	Global Earth Observation System of Systems
GFW	Global Forest Watch
GHG	Greenhouse gas
GOI	Government of Indonesia
GTZ	German Technical Cooperation
HIV/AIDS	Human immunodeficiency virus / Acquired immune deficiency syndrome
HTI	Hutan Tanaman Industri (plantation forest)
LFE	Linking Forests and Energy
IAMP	Improving Adaptation and Mitigation Planning
ICCS	Integrative Climate Change Services Initiatives
ICRAF	International Center for Research in Agroforestry
IRE	Increased Renewable Energy
IEA	International Energy Agency
IFCA	Indonesia Forest Climate Alliance
IPP	Independent Power Producer
IPPC	Intergovernmental Panel on Climate Change
IVMS	Indonesia Visualization and Monitoring System
KEHATI	Indonesian Biodiversity Foundation
LULUCF	Land Use, Land-use Change and Forestry
m ³	Cubic meter
MES	Modern Energy Services
MFin	Ministry of Finance
MoF	Ministry of Forestry, GOI
MoE	Ministry of Environment, GOI
Mt/y	Million metric tons per year
MW	Megawatt
NASA	Air and Space Administration
NCCC	National Council for Climate Change
NGO	Non-governmental organization
NRB	Natural Resources and Biodiversity
OCSP	Orangutan Conservation Services Program
PFAN	Private Financing Network
PES	Payment for ecosystem services
PLN	PT Perusahaan Listrik Negara (Indonesia's National Electric Company)
PSSF	Private Sector Sustainability Facility
RDMA	USAID Regional Development Mission for Asia
REDD	Reducing Emissions from Deforestation and Degradation
RSPO	Roundtable on Sustainable Palm Oil
RSP	Regional Service Provider
SERVIR	Spanish acronym for Regional Visualization and Monitoring System

SITE	Site based activity
TFCA	Tropical Forest Conservation Act
TNC	The Nature Conservancy
UK	United Kingdom
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nations
US	United States of America
USAID	US Agency for International Development
USDA-ARS	US Department of Agriculture – Agricultural Research Service
USG	US Government
WGI	Working Group I of the IPCC
WRI	World Resources Institute
WWF	World Wildlife Fund or World Wide Fund for Nature Indonesia

Executive Summary

Indonesia has become the third largest greenhouse gas emitter worldwide, primarily due to emissions from the forestry sector (deforestation and forest degradation). Emissions from the decomposition and burning of peat are a significant component. Growth in energy consumption is expected to lead to a 213% increase in greenhouse gas emissions in Asian countries from 2002 to 2030, with Indonesia expected to more than double its energy emissions in the next decade.

Indonesia is vulnerable to many expected impacts from climate change. A rise in sea level will impact Jakarta and other low-lying coastal cities and villages, and may change Indonesia's national boundaries as small islands are submerged. A significant portion of the coastal population may have to be resettled, particularly in Java. Indonesia is already suffering from shortages of water, as well as land degradation and desertification, which will be further exacerbated by climate change. Rice crop productivity is already declining due to changes in rainfall onset and amount.

Impacts of Climate Change on Development Assistance. Climate change is projected to not only increase temperatures, but also increase the intensity of the hydrologic cycle and change seasonal precipitation patterns, leading to more intense flooding and greater incidence of drought and heat waves. Climate change has the potential to significantly disrupt food production, modify or disrupt fisheries, expand the range of human diseases and crop pests, result in population shifts in response to rising sea levels, and lead to greater conflict over natural resources, all of which will negatively impact foreign assistance efforts in Indonesia.

Indonesia is highly vulnerable to climate change impacts, with large numbers of poor people reliant on natural resources for their livelihoods. The total product of coastal and marine economic activities in Indonesia is estimated at 15% of GDP, providing employment for some 28.5 million people and approximately 60% of the average Indonesian's animal protein intake. The Indonesian population of 227.8 million is distributed unevenly, with approximately 54% concentrated on the low-lying island of Java. It has been estimated that 96% of Indonesians live within 100 km of the coast. Projected rising sea levels will have an enormous impact on Indonesia's low-lying coastal areas, and could lead to large number of environmental refugees.

Potential adaptation responses. There are a number of concrete actions that can be taken to reduce risks from climate change. In the environmental/natural resource management sector, these include modifying agricultural practices, changing cultivars, better forecasting and monitoring of severe climate events, improved environmental management to reduce fire risk and increase resilience in forests and marine ecosystems, and better spatial/land use planning.

Government of Indonesia Commitment and Priorities. Climate change has become a national policy focus for the Government of Indonesia (GOI). Indonesia has mobilized an intensive national process on reducing emissions from deforestation and forest

degradation (REDD), including establishing the National Secretariat on Climate Change (a coordinating body for the various ministries) and the Indonesia Forest Climate Alliance (IFCA). Indonesia has developed its National Action Plan on Climate Change, and the National Development Planning: Indonesia Responses to Climate Change which lay out their strategy and development plans, including priorities for mitigation and adaptation.

Purpose. USAID Indonesia's Water and Environment Team (W&E) is evaluating its current and future portfolio for opportunities to incorporate appropriate and feasible climate change activities that support substantial aspects of the GOI Action Plan and are in line with Congressional direction on climate change activities associated with development activities. This document is intended to help USAID Indonesia W&E insure that it can meet new global climate change (GCC) earmark requirements if GCC funds are secured. This document should only be viewed as a starting point for analysis and not USAID Indonesia's strategy per se.

GCC Focus Sectors. USAID Indonesia W&E, based on the FAA 118/119, will primarily focus its efforts on Papua, Kalimantan, Sumatra, and Sulawesi in order to conserve tropical forests. Lowland forests, particularly peat lands, due to their high carbon content, are a primary target for both mitigation and adaptation activities. Inclusion of activities will depend on funding availability, plus other on-going analyses.

Analytical Approach. This document builds upon previous work by USAID, interviews, and a two day workshop. The threat analysis from the FAA 118-119 report identified climate change as a major direct threat to biodiversity and tropical forests. The recommendations developed below are based on key underlying assumptions, core objectives, and specific criteria, including the potential of interventions to achieve multiple benefits (e.g. climate change mitigation, biodiversity conservation, and protection of watersheds)

Suggested Programs for Consideration. Each of the GCC focus sectors was assessed with respect to their current status and likely climate change impacts. Opportunities for USAID Indonesia W&E within each sector are identified, and brief program/activity ideas are suggested for consideration. Suggested activities complement other donor programs, but this should be examined in greater detail during the design phase. Inclusion of sectors and activities will depend on funding availability, plus other on-going analyses. The goal of this document is to lay out options.

1) Forestry and Land Use. Changes in forestry and land use management include actions which may be cheaper or easier than some industrial/energy sector actions. These management changes would contribute substantial other benefits as well, such as: a) increased sustainability of agricultural and forest-related activities, thus ensuring reliable revenue streams; b) potentially reduced negative climate change impacts in the future; c) increased resilience of forests and agricultural fields to current climate change impacts; d) increased adaptation by communities; and e) improved conservation of biodiversity.

A. Site based activities in Papua, Kalimantan, and Sumatra

Non-sustainable activities that are contributing to increased emissions in the forestry sector need to be reduced. There are specific locations that are crucial to potential emissions reduction, conservation of high levels of biodiversity, and the maintenance of livelihoods, and that would benefit from “on the ground” activities that address direct threats as well as underlying causes. Impoverished communities adjacent to forests in Papua, Kalimantan and Sumatra require some direct assistance to adapt to climate change. Activities would reduce deforestation and degradation, while improving livelihoods and helping ensure food security.

B. The Regional Service Provider

A regional service provider in Sumatra, Kalimantan, and Papua would raise local capacity for sustainable forest management, land use planning, watershed protection, and sustainable financing (e.g., Payment for Environmental Services [PES], voluntary carbon market or Reduction in Deforestation and degradation [REDD]). The center should provide technical support and analyses, training, capacity building, and develop a business model to become sustainable by the end of the project. If possible, it should build upon existing capacity (such as a university or technical institute).

C. Private Sector Sustainability Facility (PSSF)

Private sector investments in natural resources sectors such as forestry, plantation crops and fisheries dwarf both development assistance and government budgets, and are often the driving force determining the pace and nature of natural resource use. Global market pressures for sustainably-produced products and changing national policies – including the new law on corporate social responsibility – are beginning to reshape the investment calculus of the private sector in the country. A cross-cutting Private Sector Sustainability Facility (PSSF) would be aimed specifically at influencing and mobilizing key private sector actors towards responsible and sustainable investments activities, linking their investments to reductions in emissions and conservation in the natural resources sectors and sites where USAID works.

2. Coasts and Coral Reefs. Indonesia’s coral reefs constitute the majority of the “coral triangle”; these coral reefs form the ecological basis for one of the world’s largest marine fisheries, including spawning and nursery grounds that support one of the largest tuna fisheries on Earth. Indonesia’s coral reefs have suffered extensive degradation over the past 30-40 years. In mid-2007, Indonesian President Yudhoyono launched a six-nation political initiative to cooperate in conserving the coral triangle, and the US pledged some \$40 million in support for activities under the initiative.

A. Coral Triangle Initiative

The Coral Triangle Initiative is a new multilateral partnership to safeguard the region’s marine and coastal biological resources. USAID Indonesia W&E is buying into the USAID Regional Development Mission for Asia (RDMA) mechanism to address threats (including climate change) to the coral reefs and marine/coastal areas located within the Coral Triangle. Specific adaptation activities include the development and facilitation of a National Action Plan for the Coral Triangle

Initiative, and improved ecosystem management of fisheries and threatened marine species.

B. Assisting Coastal Communities Adapt to Climate Change

Coastal communities are at increased risks from severe storms and the loss of livelihoods from decreased fisheries production. It is likely that sustainable yields will decrease in the future due to climate change. Activities would help communities adapt to climate change impacts through diversification of livelihoods, and reduce incentives for over-harvesting in the fisheries sector.

3. Freshwater Resources and Ecosystems

Indonesia contains 6% of the world's fresh water reserves, and 21% of the reserves found in Asia. The GOI is concerned about water quality and abundance, and have developed several programs to address this sector. This includes the "Toward Green Indonesia Program" initiated by the Ministry of Environment, designed to improve river water quality, decrease flooding and land slide risk, reduce coastal erosion, and improve water and energy conservation, and the "Model Conservation Villages" initiated by the Ministry of Forestry. The GOI recognizes that access to sufficient freshwater is becoming problematic and is exacerbated by climate change.

A. Adaptation to Increased Drought and Flooding Risk through Improved Environmental Management

Assist poor communities in areas adjacent to freshwater bodies and forests adapt to increased risks from drought and flooding due to climate change through improved environmental management of agricultural lands and forests.

4. Clean Energy

Emissions from fossil fuel combustion are growing at approximately 6 %/year, a rate which will cause a doubling of these emissions in about 12 years. By 2030, fossil fuel GHG emissions in Indonesia could be four times higher than present, on par with today's total emissions from land use and forestry. Indonesia's geography and natural resources provide some of the most favorable conditions for renewable energy development in the world. Although Indonesia has made progress developing some of its geothermal and hydro resources, significant opportunity remains.

A. Electricity Tariff Reform.

Electricity tariff reform is the single most important factor which could lead to accelerated clean energy development in Indonesia. Building sufficient consensus and the political will required to implement the current plans for a 30% tariff increase in 2010 would be an important first milestone for this program. Although progress would be incremental, the cost of implementing such a program is trivial compared to the benefit of addressing the myriad of clean energy development barriers.

B. Renewable Energy Development

Renewable generation capacity could significantly reduce the PT Perusahaan Listrik Negara (PLN – the National Electric Company) reliance on diesel generation to meet the power requirements of isolated grids. In addition, augmenting the generation

capacity in rural areas with lower cost sources will provide an incentive for PLN to expand coverage to Indonesia's unserved populations. Success will require cooperation and support from PLN.

C. The Private Financing Network (PFAN)

Provide assistance to renewable and energy efficiency project developers in creating "bankable" project proposals and then walk them through the process until they attain private financing. PFAN could help develop small (under \$50M) projects in Indonesia. This could be followed by a larger program that sets up an institution in Indonesia to foster good projects from conception to completion, including a regular marketplace that brings together project developers and financiers. This would be a high profile, high impact way to help the GOI achieve its Low Carbon Growth Strategy.

D. Linking Forests and Energy

As part of other activities, development of institutional or household biogas systems could be used to help reduce carbon emissions and deforestation through decreased fuel wood requirements. This would also improve indoor air quality and sanitation. Improved watershed management is a requirement for small scale hydro operation providing another opportunity for synergies between a future environment and energy program.

5. Cross-Cutting Climate Change Services. Developing countries such as Indonesia face significant hurdles for climate change mitigation and adaptation efforts, some of which stem from basic information and institutional issues that deter economic growth. The United States is playing a lead role in international efforts such as the Global Earth Observation System of Systems (GEOSS), which gives communities early warning of natural disasters, and improves decision-making for forest and land use, agriculture, coastal development, fisheries, and other economic sectors that are affected by climate variability and change through its SERVIR project (www.SERVIR.net; <http://servir.nsstc.nasa.gov/>). There is demonstrated activity and interest by the GOI in monitoring climate change impacts and emissions.

A. Indonesia Visualization and Monitoring System (IVMS)

IVMS would strengthen the regional information base for action on climate change, supporting both mitigation (e.g., monitoring forest cover and primary productivity as indicators of carbon) and adaptation (e.g., monitoring and predicting climate related events thus allowing for improved response) activities. IVMS would be operated by an Indonesian institution and provide information and tools for mainstreaming adaptation into development; a "one stop shop" for environmental, climate, and development data and information to support adaptation. IVMS would build upon existing government and NGO web-sites through links, and provide unified access to environmental information and remote sensing at the provincial and district level. The portal would provide public information access, ability to monitor and evaluate environmental assets, climate information and forecasting, and tools to make informed environmental decisions regarding resource use.

B. Improving Indonesia's Adaptation and Mitigation Planning

Indonesia is required to develop climate change scenarios and calculate GHG emission levels and sources as inputs for their Second United Nations Framework Convention on Climate Change (UNFCCC) National Communication. This is a key starting point for developing specific adaptation and mitigation programs. Indonesia does not have the necessary climate change models or the data quality, archiving, and management systems required for accurately reporting on GHG emissions. This activity would improve their capacity to model climate change impacts, develop planning scenarios, and manage their emissions data.

C. Improving the Enabling Environment to Address Climate Change Impacts

There are a number of legal, institutional, and policy issues that must be addressed in order to make substantive progress in addressing climate change impacts. A policy/governance activity could be implemented as a stand alone activity (perhaps in coordination with the Democracy/Governance office), or included as a component of individual projects. Support could be provided regarding the Lacey Act, the Legal Timber Protection Act, the Timber Legality Assurance System, addressing land tenure concerns, and modifying or eliminating policies that are barriers to implementation of energy efficiency, clean energy activities, REDD, etc.

1. Overview

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007, WGI) has concluded that it is “unequivocal” that Earth’s climate is warming, “as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level”. The report also states that it is “very likely (greater than 90% probability)” that emissions of heat-trapping gases (e.g., carbon dioxide and methane) from human activities have caused “most of the observed increase in globally averaged temperatures since the mid-20th century”. Evidence that human activities are the major cause of recent climate change is even stronger than in prior assessments.

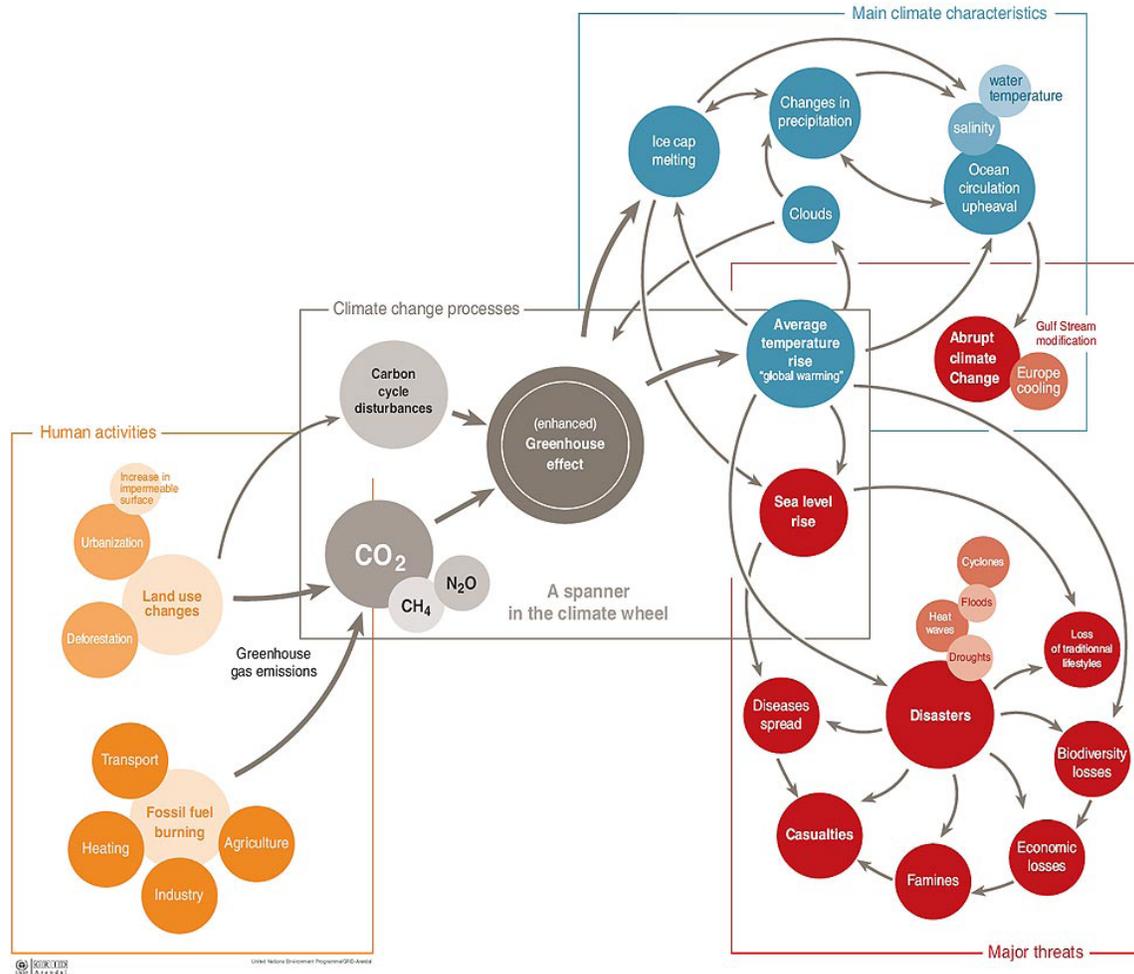
During the past two decades, greenhouse gas emissions from Asian countries have been increasing rapidly. The International Energy Agency estimates that China has overtaken the United States as the largest carbon dioxide emitter from energy, with India (fourth), and South Korea (seventh) among the top emitters. Further, ongoing changes in land use represent significant contributions to carbon dioxide emissions in many of the larger Asian countries such as Indonesia and the Philippines. Including emissions from deforestation, Indonesia has become the third largest greenhouse gas emitter worldwide, primarily from the forest sector. Growth in energy consumption is expected to lead to a 213% increase in greenhouse gas emissions in Asian countries from 2002 to 2030, with Indonesia expected to more than double its energy emissions in the next decade. GHGs are a global problem; the severity of climate change impacts upon a country is not necessarily correlated with the level of GHG emissions produced by that country. Reducing GHG emissions requires international efforts.

Asia, including Indonesia, is vulnerable to many expected impacts from climate change. A rise in sea level will impact many of Asia’s largest coastal cities, such as Jakarta, Bangkok, and Manila, and may change Indonesia’s national boundaries as small islands are submerged. Tens of millions of people in Asia may have to be resettled, including large portions of Java’s coastal population. Parts of many countries in Asia, including Indonesia, are already suffering from shortages of water, as well as land degradation and desertification, which will be further exacerbated by climate change.

Climate change processes and linkages are extremely complicated, and a simplified overview is presented in Figure 1. In Indonesia, this is further complicated by the “El Niño – Southern Oscillation” (ENSO) which leads to extreme weather events on a cyclical basis. Extremely warm Pacific Ocean currents are referred to as the El Niño, with very cold currents called La Niña. Changes in atmospheric pressure in the southern hemisphere (the Southern Oscillation) is linked with these events, and taken together are referred to as ENSO. Droughts, major forest fires, and haze become more frequent in Indonesia during El Niño periods, and floods are more common during La Niña’s. The ENSO cycle has become shorter (decreasing from four years between events to three years) with more severe impacts and on a larger scale (UNDP, 2007). The frequency in El Niño events is positively correlated with global warming. In addition, tropical cyclones in the eastern south Indian Ocean (January to April) and the eastern Pacific

Ocean (May to December) can result in severe storms, with heavy rainfall and strong winds (UNDP, 2007). Brown clouds (airborne particulate matter from pollution emissions) are masking climate change impacts in some areas, reflecting warming sun rays and cooling large cities (Tran, 2008; Ramanathan et al., 2008). Halting emission of pollutants would result in the clearing of these clouds within approximately two weeks. This would most likely lead to a significant increase in temperature, as the dimming impact of brown clouds is estimated at between 15 to 50%.

Figure 1. Climate Change Processes and Linkages



1.1 Climate Change and Development in Indonesia

Given the Agency’s mission of economic development and poverty reduction, USAID needs to incorporate the changing climate conditions and trends into its assistance strategies, to maximize the lasting legacy of US assistance for economic growth, human well-being, and environmental sustainability over the long term.

1.1.1 Land Use and Land Use Change as a Significant Emissions Source

Emissions from land use change and deforestation account for as much as 30% of annual global greenhouse gas emissions globally, with deforestation alone accounting for 20-

25% of the those annual emissions. A significant proportion of global deforestation is occurring in the Asia region, with Indonesia having recently leapfrogged Brazil as the leading source of emissions resulting from deforestation. Indonesia has been identified as the world's third-largest emitter of GHGs contributing to climate change due to its high deforestation rate, particularly in carbon-rich peat forests (World Bank et al., 2007). Approximately 80% of Indonesia's GHG emissions are from the forestry sector.

Indonesia's forest land contains 22.5 million ha of peat forest and vast quantities of carbon, both above (trees and plants) and below ground (peat and root systems). Peat forest is primarily located in Sumatra, Kalimantan, and Papua. This constitutes 12% of Indonesia's land area and 83% of all peat lands in Southeast Asia. As these forests are cleared and drained, this carbon is released into the atmosphere as carbon dioxide (CO₂). Current total peat land CO₂ emissions of 2,000 million metric tons per year (Mt/y) simply from the decomposition of drained peat lands equal almost 8% of global emissions from fossil fuel burning. Over 90% of these emissions originate from Indonesia (Hooijer, *et al.* 2006).

Fires in peat lands drastically increase peat land emissions. A study of CO₂ emissions due to peat fires in Indonesia in 1997 estimated emissions ranging from 3,000-9,000 Mt/y from that one event alone, equal to 15-40% of fossil fuel emissions in that year (Page *et al.* 2002). Peat forest fires and coal seam fires are particularly problematic, as fires travel underground, leaving standing dead wood that serves as fuel in future fires.

As recently as 1950, some 150 million ha (84%) of Indonesia was covered in natural forest, mostly primary forest (GFW/FWI 2002). At present, although some 70% of the country's land area is legally classified as "forest land", forest cover has declined precipitously. As of 2005, approximately 90 million ha remained in primary or secondary forest. Forest cover has been lost due to conversion for agriculture and plantations, illegal and large scale logging, fires, mining, and infrastructure development.

In 2002-2003, it is estimated that approximately 50 million cubic meters of timber was harvested illegally (Casson, et al., 2007). Lowland dipterocarp forest in Sumatra and Kalimantan are most affected, and represent over 90% of the forest cover lost since 2000. Loss of forest cover, riparian buffers, and mangroves significantly increase regional and local vulnerability to climate variability and climate change, and increase carbon emissions.

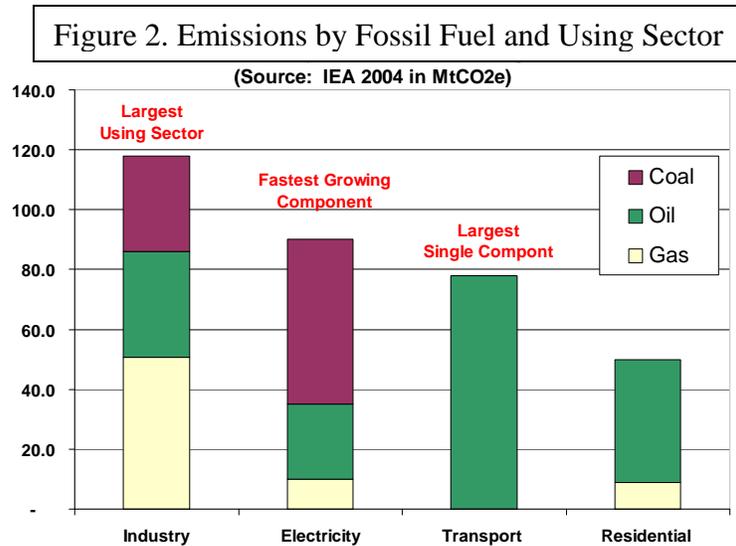
Methane emissions from flooded rice paddies are a significant GHG emission source in Asia, including Indonesia. Methane emissions have approximately a 20-fold greater global warming impact than carbon dioxide (CO₂). It has been estimated that approximately 20% of global methane emissions originate from flooded rice paddies (USDA-ARS, 2000). Changes in cultivars and flooding regimes can significantly reduce emissions.

1.1.2 Energy Growth and Climate Change

Energy-related fossil fuel emissions in Indonesia are rapidly on the rise. While at present, more than 80% of Indonesia's GHG emissions are from the forestry and land-use sector, fossil fuel emissions are growing rapidly and represent a large concern for the future.

Emissions from fossil fuel combustion are growing at approximately 6 %/year, a rate which will cause a doubling of these emissions in about 12 years. By 2030, fossil fuel GHG emissions in Indonesia could be four times higher than present, on par with today's total emissions from land use and forestry. Thus, if these projections hold, fossil fuel emissions growth has the potential to offset any gains made through controlling Indonesia's deforestation rate. Current GOI investment plans are focused on massive increases in coal fired power generation. Long lock in periods are typical of these types of investments, thus high level of growth in GHG emissions from fossil fuel in the industrial sector could continue for many years.

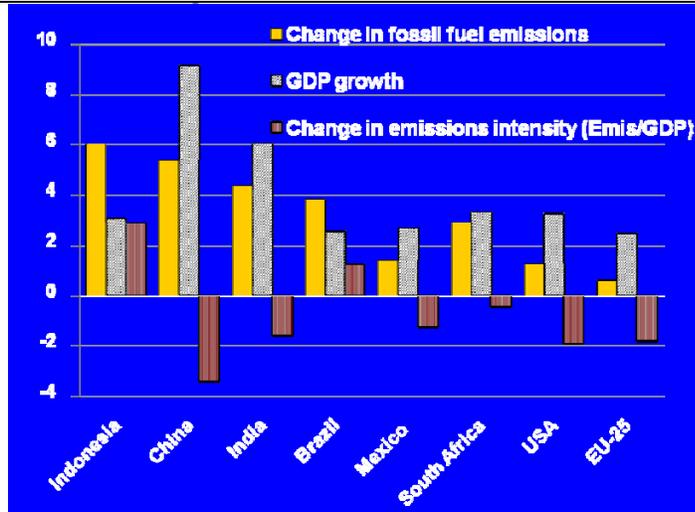
Oil is currently the largest source of fossil fuel emissions, followed by coal. Emissions from coal, however, have been growing the most rapidly for any fuel type for the last decade. The fast rise of coal emissions is due to increasing coal use for electric power generation. On a sectoral level (see Figure 2), industrial activities are the largest source of fossil fuel emissions. This is mainly due to the expansion of coal-fired generating capacity in recent decades. Emissions from the transportation sector, the largest user of liquid fuel, grew steadily but slower than the industrial sector. The residential sector is not a large user of coal or gas. Hence emissions from this sector are relatively small and due mainly to combustion of kerosene for home cooking.



Indonesia's GHG emissions intensity, a measure of the level of emissions per unit of economic activity, is comparable to the world average, and still below the average for developing countries. In most countries, GDP has been growing faster than fossil fuel emissions, so emissions intensity has declined over time. However, Indonesia's GHG emissions intensity is increasing steadily, implying increasingly inefficient use of energy

and/or a shift to fuels with higher levels of emissions (e.g., oil to coal). For Indonesia, the predominant reason behind the significant increase in GHG emission intensity is the increasing role of coal in the electric generating sector.

Figure 3. Average Annual Growth Rates 1994 – 2004.



Source: International Energy Agency (2007) [<http://www.iea.org/>]

The GOI and PLN plan to fast-track coal-fired generation expansion dominates the discussion of future electricity supply and future potential GHG emissions. The fast-track power program seeks to bring an initial 10,000 Megawatts (MW) of new baseload power on-line by 2011 with an additional 10,000 MW soon thereafter. The initial 10,000 MW plan is entirely coal-based, while the plans for the second 10,000 MW call for a mix of 30% cleaner coal and 70% renewables (mostly geothermal).

1.1.3 Impacts of Climate Change on Development Assistance

Climate change is projected to not only increase temperatures, but also increase the intensity of the hydrologic cycle and change seasonal precipitation patterns, leading to more intense flooding and greater incidence of drought and heat waves. Climate change has the potential to significantly disrupt food production, modify or disrupt fisheries, expand the range of human diseases and crop pests, result in population shifts in response to rising sea levels, and lead to greater conflict over natural resources. All of these potential consequences will negatively impact foreign assistance efforts in Indonesia.

Indonesia is highly vulnerable to climate change impacts, with large numbers of poor people reliant on natural resources for their livelihoods. The total product of coastal and marine economic activities in Indonesia is estimated at 15% of GDP, providing employment for some 28.5 million people and approximately 60% of the average Indonesian's animal protein intake (World Bank 2004). The Indonesian population of 227.8 million is distributed unevenly, with approximately 54% concentrated on the low-lying island of Java. It has been estimated that 96% of Indonesians live within 100 km of the coast (EarthTrends/WRI, 2003). Projected rising sea levels will have an enormous impact on Indonesia's low-lying coastal areas (see Figure 4).

Figure 4. Indonesia's susceptibility to 1 meter sea level rise.



The potential impacts of climate change on USAID objective areas include:

Climate Change and Peace and Security. Climate change may act as a threat multiplier, reducing living standards, and fostering instability. Indonesia has a history of violent civil conflict amongst different ethnic groups, religious groups, and political groups; natural resources often play a key role. Land tenure and natural resource access and governance are already major conflict sources within Indonesia. Potential displacement from customary lands by rising sea levels, or changes in suitability and productiveness of agricultural land, will exacerbate problems.

Climate Change and Governing Justly and Democratically. Climate change may disrupt efforts to strengthen civil society and decrease participation in governance by marginalized groups, as resources are diverted to increased disaster response and poverty alleviation. Poor spatial planning and conflicting laws/regulation/policies, combined with the lack of enforcement of environmental regulations, continues to put people at increased risk.

Climate Change and Investing in People. Climate change could significantly burden the already strained public health services in Indonesia. Vector-borne diseases, such as malaria and dengue fever, are projected to increase as warmer temperatures facilitate vector range expansion and speed up virus replication. In large cities in Java, the incidence of dengue has increased consistently from 1992 – 2005 (Indonesia Country Report, 2007). Cholera epidemics are occurring with greater frequency in Asia. Crop failure leads to population displacement, with large movements of people resulting in waterborne disease epidemics. Situations that create highly mobile populations also contribute to the spread of HIV/AIDS, according to a recent FAO report. Crop failures and reduced productivity in both the fisheries and agricultural sectors negatively impact nutrition, and can lead to malnutrition. Crop failures can also lead to higher mortality rates, particularly in infants and children.

Climate Change and Economic Growth. Climate change can impact economic growth both in the short term and over the long term. Climate events can be of such extreme magnitude that they undercut an economy's foundation. High year-to-year rainfall variability in agriculturally based economies may prevent sustained economic growth (see Figure 3). Changing rainfall patterns are projected to reduce Indonesia's rice production by as much as 11% in East Java and Bali (Naylor, et al. 2007). Fisheries production are probably already dropping through loss of critical habitats; i.e., 90 to 95% of coral reefs at 25 m were degraded through bleaching events in the 1997 El Niño event. During El Niño years eight reservoirs in Java produced electricity below normal capacities (Mulyani, 2008), increasing electrical generation costs. Decreased productivity and higher costs increase debt burdens and the number of impoverished people.

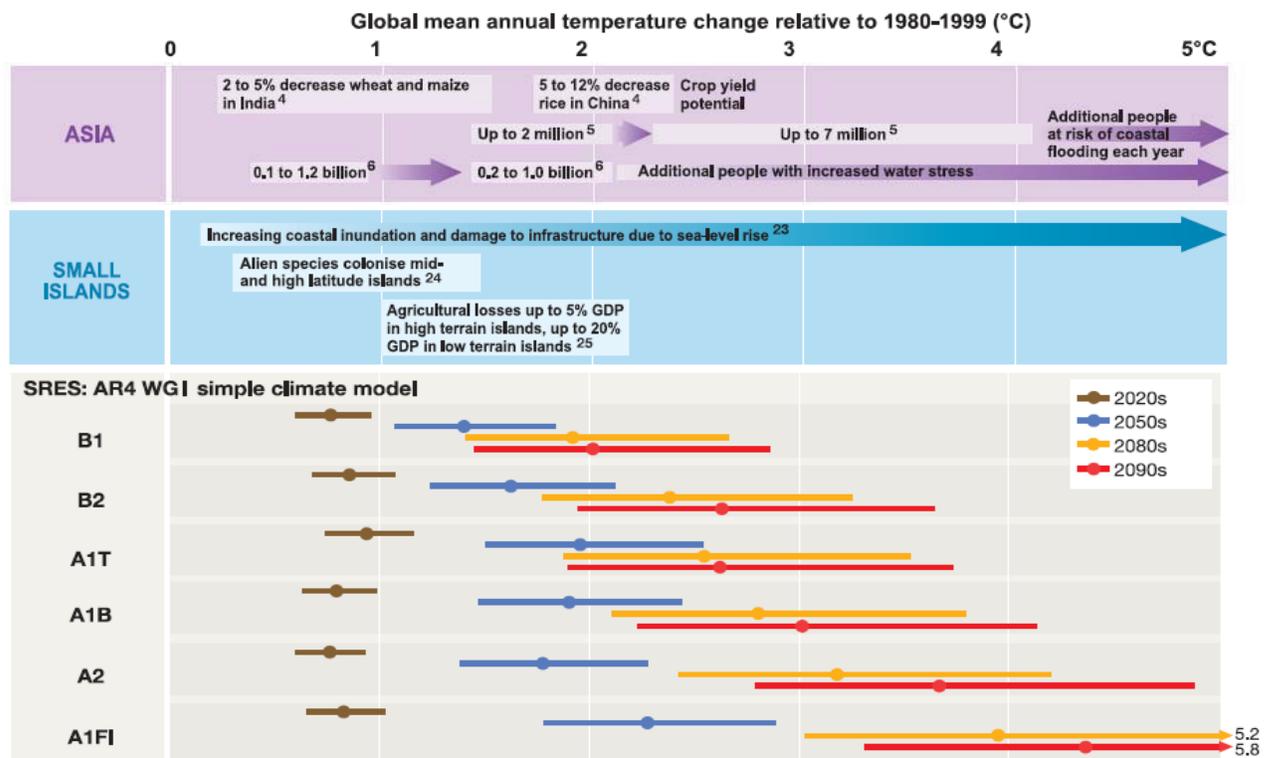
Long-term economic growth could be affected as soil degradation from wind and water erosion is projected to increase substantially with climate change. Natural and managed systems could become more vulnerable to invasive species, and water resources could be

compromised by shifts in rainfall patterns. Indonesia's rich natural resource base, particularly its biologically diverse forests and coral reefs, is at risk.

It is estimated that responding to climate change impacts will cost at least 5%, and as much as 20% or more, of the world economy (IPCC, 2007; see Figure 5), and Asia's developing economies and large populations of rural and urban poor, including Indonesia's, would carry a disproportionately large share of those costs (Stern, 2006). The total product of coastal and marine economic activities in Indonesia is currently estimated at 15% of GDP, providing employment for some 28.5 million people. GDP may fall significantly with climate change and rising sea levels, putting millions at risk of job loss and lowered food security.

Climate Change and Humanitarian Assistance. Environmental refugees from Asia are projected to be 75-125 million, potentially resulting in substantial humanitarian crises. In Indonesia, there were over 1,400 disasters from 2003-2005; 34% of these were due to flooding and 16% were landslides following heavy rains (Mulyani, 2008). Regions of greatest concern in Indonesia include: semi-arid regions (such as Nusa Tenggara), areas with existing potable water scarcity (e.g. Jakarta and Samarinda in East Kalimantan), small islands, and much of the coastal area.

Figure 5. Examples of regional impacts projected with changes to average surface temperature in the 21st century.



Source: IPCC 2007b.

1.1.4 Potential Adaptation Responses in Development Assistance

A number of potential adaptation responses have been identified by USAID objective area (USAID, 2007). Some of the most pertinent are listed by objective below, plus additional responses specific to Indonesia.

Climate Change and Peace and Security. The risk of conflict due to displacement and lower living standards may be reduced through strengthened institutional capacity to respond to extreme climate events, increased support for safety net and insurance programs, and increased capacity in conflict resolution. Resolution of land tenure issues, with set-asides for potentially displaced individuals and agricultural activities in spatial planning, would help directly address potential conflicts.

Climate Change and Governing Justly and Democratically. Providing opportunities for civil society to address their vulnerability, and jointly identifying appropriate adaptations will strengthen civil society, including marginalized groups. Improved spatial planning, a clear legal and policy framework, and law enforcement will reduce risk.

Climate Change and Investing in People. Increased primary and preventive care (e.g. mosquito nets, covered water containers, immunization, and education) will help reduce rates of infection from expanding vector-borne and other diseases. Providing technical assistance, increased access to new and appropriate cultivars and methodologies, and improved water efficiency will help reduce crop failure, increase productivity, and reduce malnutrition and mortality.

Climate Change and Economic Growth. Improved spatial planning, appropriate land use and infrastructure development, combined with sustainable forestry practices, will reduce risks from landslides, floods, etc. that have negative economic impacts. Diversification of livelihoods and carbon trading may reduce debt burdens and levels of poverty. Increased water efficiency, rain water harvesting, drip agriculture, flood and drought-tolerant cultivars, and sustainable extraction levels from aquifers can help assure sufficient water to maintain agricultural production. Crop insurance can reduce risks from reduced productivity and crop failures. Afforestation/reforestation and sustainable forestry/land use will reduce fire risk (particularly in peat soils), improve soil quality, water infiltration, increase aquifer recharge and help insure sufficient water flow for hydropower and micro-hydro for energy. This will also reduce sedimentation impacts on damaged coral reefs and help improve fisheries production. Building seawalls, coral reef rehabilitation, and beach nourishment will help protect fisheries and coastal areas. Enforcement of CITES, sanitary/phytosanitary measures, bilge-water dumping, and other regulations will help reduce risk of invasive species. Creation/maintenance of biological corridors will provide dispersal opportunities as species' ranges are affected by climate change, reducing the risk of extinctions.

Climate Change and Humanitarian Assistance. Disaster planning and response at all levels of government, and widely disseminated information and access to early warning systems, will reduce humanitarian and economic impacts. Improved spatial planning, appropriate land use and infrastructure development, combined with sustainable forestry

practices will reduce risks from landslides, floods, etc. during severe storms. Increased water efficiency, rain water harvesting, drip agriculture and drought-tolerant cultivars, and sustainable extraction levels from aquifers can help address decreased water availability. Insurance, municipal bonds, and other financial risk-sharing mechanism can be used to finance relief and reconstruction.

1.1.5 Tipping Points

If global average temperatures continue to rise due to GHG emissions, climate change may result in sudden and dramatic changes to some of the Earth's major geophysical elements. Exceeding thresholds, or "tipping points", may result in unexpected rapid transitions in climate (as observed in the geological record) to a new stable condition, or to abrupt changes in the climate regime, such as disappearance of glaciers, shifts in ocean circulation, ocean acidification leading to large-scale losses of coral reef ecosystems as a result of increasing atmospheric CO₂, and rapid sea-level rise resulting from melting of terrestrial ice in polar regions.

Such drastic and rapid changes would have profound impacts in Indonesia where millions of people are reliant on the coasts and rivers for water, livelihoods, and sustenance. Most suggested tipping points relate to loss of glaciers and snow cover. However, development pressures in Indonesia, in particular changes to the river systems due to planned dams, increased water demands, and increased effluents in the rivers, are likely to permanently change the river system from historic conditions. Likewise, unexpected tipping points relating to global sea-level rise would immediately threaten Indonesian coastal cities and communities, while sudden changes in precipitation patterns would hamper Indonesia's agricultural production and create new risks of flood or drought.

1.2 New Sources of Funds

There are many climate change-related funding mechanisms available to support emissions reductions and adaptation, and new significant funds are being created in response to the improved understanding of climate change and the increased political momentum of the last few years. Some funds are directly related to the UNFCCC and implemented by the Global Environment Facility, but new funding sources are still emerging as foundations and businesses address climate change and development. The economic crisis beginning in 2007 in the US and spreading to Asia in 2008 may have a negative impact on funding availability, as both donors and the private sector have fewer funds to invest.

The US, United Kingdom (UK), and Japan are leading creation of a new Clean Technology Fund to be operated by the World Bank. More than \$US6.1 Billion has been pledged by developed countries, including \$2 billion over 3 years from the U.S. The US contribution was proposed by the Bush administration to begin with \$400 million in FY09 but that contribution and mechanism may or may not be supported by Congress and the new Administration.

The new Adaptation Fund under the UNFCCC, funded through a 2% levy on project based emission credits under the CDM, is projected to grow to over \$300 million per year by 2012. This fund will support proposals from developing country governments and

nongovernmental entities to implement adaptation projects. Indonesia, as a signatory to the Kyoto Protocol and a developing nation vulnerable to climate change impacts, will be eligible to apply.

The Clean Development Mechanism (CDM) under the Kyoto Protocol to the UNFCCC is expected to provide hundreds of millions of dollars for projects to reduce emissions in developing countries to offset emissions in the developed countries. So far most of the projects are going to China, India, and Brazil. US policy does not support use of USG funds to implement projects under the Kyoto Protocol, but as projects funded through the APP, Methane-to-Markets Partnership, and other development assistance help to reduce or avoid emissions, many cooperators have been selling those reductions to international GHG markets, including the CDM, as well as to the voluntary market.

There is growing interest from charitable foundations to support or undertake activities to address climate change in the developing world. A consortium of US-based foundations is jointly developing a funding strategy to address climate change (California Environmental Associates, 2007); the Rockefeller and Ford Foundations are interested in adaptation and livelihoods, and the William J. Clinton Foundation is providing funding for energy efficiency in cities and beginning to address forest-related aspects of climate change. Private sector interest in social responsibility is driving voluntary markets for carbon credits/offsets, renewable energy investments, and forest conservation. Voluntary carbon markets have grown to \$70 billion over the last two years. The growing interest of the private sector in climate and development offers many opportunities for new partnerships and USAID Global Development Alliances (GDAs).

The World Bank Forest Carbon Partnership Facility has established two funds: one fund for “readiness” to help developing countries improve their capacity to monitor and manage forests and related changes in emissions, and one fund for ex-post payments for emissions reductions in the forest sector. Indonesia has great hopes for significant funding transfers from the negotiations on Reducing Emissions from Deforestation and Forest Degradation in developing countries (the “REDD mechanism”), but the scope and extent of the issue require complex negotiations which may not be fully resolved in the next year.

A number of donors are providing assistance in the forest and biodiversity sector on an order of magnitude greater than USAID. Australia plans to invest a total of A\$200 million over five years, including an A\$30 million REDD pilot study in Central Kalimantan. Norway is providing 35 million for the UN REDD Quick Start program, and may invest further depending upon the outcome. GTZ has a strong commitment to REDD, and plans to spend approximately 77 million in technical cooperation. As of November 2008, many donors are also in the design phase, and have not yet finalized funding levels, specific sites, and implementing partners. However, almost all donors have activities planned to address carbon emissions from the forestry sector, primarily through policy support or pilot demonstrations of the REDD mechanism, with sale of carbon units financing avoided forest deforestation/degradation, or through satellite forest monitoring and information systems to support carbon accounting needs for REDD.

1.3 Government of Indonesia Commitment and Priorities

Indonesia achieved global visibility as host of the UNFCCC COP-13 process in 2007, obtaining formal recognition of the contribution of deforestation to GHG emissions and the need to reduce deforestation and degradation. In the wake of the Bali negotiations, the GOI has become a leading voice in the UNFCCC process among developing countries as negotiations on the Bali Plan of Action move forward toward a new global climate change agreement in Copenhagen in 2009. The GOI has also demonstrated leadership in the global Finance Ministers' dialogue process initiated in Bali in 2007, where finance issues involving climate change have taken on greater predominance. In December 2007, the GOI produced a National Action Plan Addressing Climate Change and is currently working on preparing its Second National Communication to the UNFCCC. GOI priorities for actions are summarized in Tables 1 and 2. In June 2008, the GOI published its Development Planning Response to Climate Change ("Yellow Book"), outlining plans to integrate mitigation and adaptation into the national planning and budgeting process. In July 2008, the president established a National Council on Climate Change (NCCC), with representation from 15 GOI Ministries. The NCCC is chaired by the President, while the Coordinating Minister for People's Welfare and the Coordinating Minister for Economics act as vice chairs. The tasks of the NCCC are (i) to formulate national policy, strategy, program and action in controlling climate change, (ii) coordinate related actions covering adaptation, mitigation, technology transfer and funding, (iii) formulate regulatory policy on mechanism and procedure for carbon trading, (iv) monitor and evaluate policy implementation on climate change control, and (v) strengthen Indonesia position to encourage developed countries to take more responsibilities in climate change control. The NCCC will serve as the focal point for climate change affairs in Indonesia, and the process of transfer from the previous focal point, which is the Ministry of Environment, is currently in progress.

Since May 2007, the Ministry of Finance (MFin) has led an inter-ministerial working group that developed analyses and capacity on climate change and low carbon issues. Technical inputs and engagement across a wide range of agencies stimulated interest in the GOI in policies and instruments that can be used to deal with climate change issues. This dialogue process has advanced the work on low carbon options by increasing demand, interest, and capacity for conducting the analysis, interpreting the results, and shaping effective policies. MFin led GOI collaboration with the World Bank on the development of a "Low Carbon Development Options" study that evaluated and developed strategic options to address climate change mitigation issues without compromising development objectives.

The MFin has initiated the establishment of an Indonesia Clean Technology Fund, an equity enhancement fund for clean technology projects in Indonesia. The fund plans to raise \$225 million in private capital to be complemented by \$25 million from the GOI. The fund would target medium and small scale clean technology investments through mezzanine (unsecured debt without collateral with right of conversion for lender to an equity stake if there is a default) or project equity financing, with the hope of linking to larger international clean technology investment vehicles such as the World Bank's Clean Technology Fund.

Indonesia has mobilized an intensive national process on reducing emissions from deforestation and forest degradation (REDD), including the NCCC and the Indonesia Forest Climate Alliance (IFCA). The objective of IFCA is to support piloting REDD approaches, build a national framework for long-term implementation, and to inform outstanding methodological issues (e.g. determining an emissions reference baseline, monitoring, permanence, “leakage”, determining who has a right to sell carbon, and developing a payment distribution system).

IFCA has conceptualized their overall approach as “building a REDD value chain”:

Emissions → *Strategies to* → *Monitoring* → *REDD markets* → *Payment*
Baseline *reduce emissions* *and financing* *distribution*

Table 1. Some GOI Mitigation Priorities from the Environment Sector per the National Action Plan on Climate Change (based on MoE, 2007)

Sector	GOI Mitigation Priority
Land Use Change	Reduce Emission and increase carbon absorption capacities <ul style="list-style-type: none"> • Forest and Land Rehabilitation • Management of protected forest • Management of conservation forest
	Implementation of Incentive Mechanism <ul style="list-style-type: none"> • Development of incentive program for REDD
	Policy <ul style="list-style-type: none"> • Spatial Plans (Review, implement, monitor) • Poverty Alleviation for forest edge communities (formulate incentives, implement pilot projects) • Law Enforcement (forest fires, illegal logging)
Energy	Energy diversification <ul style="list-style-type: none"> • GHG inventory and developing incentives for reduced emissions • Mapping overlap between geothermal and protected areas • Increased use of renewable energy and biofuel
	Energy conservation <ul style="list-style-type: none"> • Energy audits and management
	Implementation of clean technology <ul style="list-style-type: none"> • Pollution prevention and control • Increase CDM projects • Raise awareness
Marine and Fisheries	Increase carbon absorption <ul style="list-style-type: none"> • Mangrove and coastal vegetation planting • Coral reef rehabilitation • Increase marine protected areas

Table 2. Some GOI Adaptation Priorities from the Environment Sector per the National Action Plan on Climate Change (based on MoE, 2007)

Sector	GOI Adaptation Priority
Marine and Fisheries	Mangrove planting Increase understanding of tsunami early warning system Implement Integrated Coastal Management
Forestry	Protection of forest ecosystems
Biodiversity	Biodiversity inventory
Cross Sector	Law enforcement Awareness and capacity building Monitoring climate change and develop early warning system

The Government of Indonesia has identified several areas in which it would like *foreign donor* assistance (MoE, 2007). GOI suggested areas of cooperation with foreign donors which appear to align with USAID Indonesia Water and Environment team (W&E) goals and objectives include:

Mitigation

- Technology to control forest fires;
- Sustainable use of peat lands;
- Integrated tree planting programs;
- Poverty alleviation through the Toward Indonesia Green (MIH) program); and
- REDD as a positive incentive for avoided deforestation.

Adaptation

- Development of technology and institutional systems that can use climate information (including forecasting) in an effective way to manage the present and future climate risk of droughts and floods;
- LULUCF sector recovery and reconstruction technology;
- Peat land, mangrove and coral reef monitoring;
- Improve the capacity of central and local government, legislative bodies, and private and community sectors through climate change training and education programs;
- REDD as a positive incentive to maintain forest cover and reduce climate change impacts; and
- The Coral Triangle Initiative

2. Strategic Approach

2.1 Purpose

USAID Indonesia’s Water and Environment Team (W&E) is evaluating its current and future portfolio for opportunities to incorporate appropriate and feasible climate change activities that support substantial aspects of the GOI Action Plan and are in line with Congressional direction on climate change activities associated with development activities. These activities include:

- Forest conservation and biodiversity programs that sequester or avoid carbon emissions;

- Activities to help developing countries assess their vulnerability and adapt to climate variability and change;
- Programs that reduce greenhouse gas emissions by promoting energy efficiency and clean energy technologies;
- Research to ensure that climate change science addresses information needed for global development challenges; and
- Activities to help meet countries' responsibilities under the Framework Convention on Climate Change.

This document is intended to help USAID Indonesia W&E ensure that it can meet new GCC earmark requirements if GCC funds are secured. This document should only be viewed as a starting point for analysis and not USAID Indonesia's strategy per se.

The new GCC criteria (as of November 2008) are: 1) programs should explicitly address GCC issues (ideally with a GCC Objective), 2) programs should use GCC indicators, and 3) in the case of adaptation, programs should conduct a vulnerability and adaptation analysis.

2.2 GCC Focus Sectors

USAID Indonesia W&E, based on the FAA 118/119, will primarily focus its limited biodiversity funds on efforts in Sumatra, Kalimantan, and Papua, in order to conserve tropical forests. Large blocks of lowland forests, particularly peat swamps, due to their high carbon content, are a primary target for both mitigation and adaptation activities. This analysis focuses on the existing and potential future USAID Indonesia W&E program priorities: Forests, Marine, Freshwater, and Energy. Protection and sustainable use of forests, marine, and freshwater ecosystems conserves biodiversity. Currently funds are only available from biodiversity (including orangutan habitat conservation) and water for the poor earmarks. Inclusion of specific sectors and activities will depend on funding availability, plus other on-going analyses.

2.3 Analytical Approach

This document builds upon previous work by Barber and Melnyk (2008), Haeni, et al. (2008), Breed, et al. (2008), Smith (2008), CIFOR/ICRAF (2008), interviews, and a 2 day workshop. The threat analysis from the FAA 118-119 report (USAID Indonesia, 2008) identified climate change as a major direct threat to biodiversity and tropical forests. Activity recommendations are based on the following underlying assumptions, core objectives, and criteria. Annex 1 shows how suggested major activities presented in section 3 address the core objectives and criteria.

2.3.1 Underlying Assumptions

- Natural resources management is a central pillar for Indonesia's sustainable economic development, security and stability; climate change threatens to undermine its foundation. USAID W&E needs to address the threat of climate change throughout its environment programming.
- Energy demand in Indonesia is growing. Perverse policies need to be addressed in order to move towards sustainable clean energy and reduce potential GHG emission levels.

- GCC is a cross-cutting issue, affecting other sectors besides natural resources. As such it should be included in the design and implementation of health, water and sanitation, agriculture, economic growth, and governance activities. USAID Indonesia W&E will encourage consideration of GCC issues by other Mission teams and USG partners.
- While the USAID Indonesia W&E approach to GCC needs to be conceptually comprehensive, the choice of specific activities to address GCC issues will need to be selective, focused, and catalytic.
- Transforming natural resources management in Indonesia requires a multi-stakeholder approach. USAID needs to engage with not only central government agencies and NGOs, but also with provincial and *kabupaten* (district) governments, and the private sector. These are significant stakeholders with whom there are considerable new opportunities for productive engagement while keeping the focus on improving community livelihoods.
- Design of activities to address GCC issues should draw on the lessons learned from past and present activities, and build on current programs where possible.
- A GCC framework should provide a coordinating umbrella for activities by USAID Indonesia W&E and other USG agency programs related to natural resources management.
- USAID Indonesia W&E's activities should take account of and maximize synergies with other bilateral donor efforts and the work of multilateral agencies where USG has a major voice, such as the World Bank, Asian Development Bank, and Global Environment Facility during the design phase.

2.3.2 Core Objectives

- Reduction in emissions contributing to global climate change;
- Mitigation and adaptation measures incorporated in natural resources sectors;
- Provide support and encouragement for consideration of GCC factors by other teams;
- Conservation and sustainable use of forest and coral reef ecosystems and biodiversity;
- Conservation and sustainable use of water resources;
- Strengthening governance and civil society as they relate to natural resources;
- Improving the livelihoods of local communities including indigenous peoples who depend on natural resources; and
- Strengthening the role of the private sector in sustainable natural resources management.

2.3.3 Criteria for Suggested Programs/Activities

Choice of the priority initiatives discussed below was made taking the following criteria into account:

- Potential of interventions to achieve multiple benefits (e.g. climate change mitigation, biodiversity conservation, and protection of watersheds);
- Potential of intervention to have significant impact on reducing emissions or increasing adaptation;
- Conservation value and level of threat to the ecosystem or natural resources in question (per FAA 118/119);
- Potential to forge partnerships with the private sector and civil society;

- Complementarity and leverage with other donors’ activities;
- Potential to build on existing USAID activities;
- The extent to which the policy and institutional environment (both national and local) is conducive to effective action;
- Integration and mainstreaming opportunities to incorporate both mitigation and adaptation; and
- Sustainability considerations.

2.4 USAID GCC Performance Monitoring and Reporting Requirements

Under the Economic Growth Program Area in the Foreign Assistance Framework, the Program Elements for Clean Productive Environment (CPE, 4.8.2), Natural Resources and Biodiversity (NRB, 4.8.1), and Modern Energy Services (MES, 4.4.1) include a number of relevant common performance indicators for USAID Indonesia W&E programs addressing climate change. Indicators that specifically or closely address climate change-related issues are provided in Table 3 below.

Table 3. Foreign Assistance Framework GCC Indicators

Indicator	Thematic Area
Number of laws, policies, agreements, or regulations addressing climate change proposed, adopted, or implemented as a result of USG assistance (CPE)	CE, FLU, CCRE, FWRE, ICCS
Number of people receiving USG supported training in global climate change including framework convention on climate change, greenhouse gas inventories, mitigation, and adaptation analysis (CPE)	CE, FLU, CCRE, FWRE, ICCS
Number of people with increased adaptive capacity to cope with impacts of climate variability and change as a result of USG assistance (CPE)	CCRE, FWRE, ICCS
Energy saved as a result of USG assistance (MES)	CE
Dollars saved from prevention, mitigation or reduction of pollution, including greenhouse gasses, as a result of USG assistance (CPE)	CE
Energy and materials savings due to improved practices as a percentage of overall country’s consumption (CPE)	CE
Quantity of greenhouse gas emissions, measured in metric tons CO ₂ equivalent, reduced or sequestered as a result of USG assistance (CPE)	CE, FLU
Quantity of greenhouse gas emissions, measured in metric tons of CO ₂ equivalent, reduced or sequestered as a result of USG assistance in natural resources management, agriculture, and/or biodiversity sectors (NRB)	CE, FLU

CE = Clean Energy; FLU = Forests and Land Use Change; CCRE = Coasts and Coral Reef Ecosystems; FWRE = Freshwater Resources and Ecosystems; ICCS = Integrative Climate Change Services Initiatives

3. USAID Indonesia W&E GCC Assessments, Opportunities, and Suggested Programs/Activities for Consideration

Based on the USAID Indonesia W&E GCC focus sectors identified above (forests, marine, freshwater, and energy), plus the underlying assumptions, core objectives, and strategy criteria, each of these sectors was assessed with respect to their current status and

likely climate change impacts. Opportunities for USAID Indonesia W&E within each sector are identified, and brief program ideas/activities are suggested for consideration for each sector. The activities described below are intended as a menu from which USAID W&E may select from based on funding levels and other considerations. It should be noted that funding levels may vary considerably based on implementing mechanism used (e.g., a grant versus a contract), and whether projects are stand alone or combined, thus reducing costs.

It should be noted that if specific adaptation programs are to be implemented using GCC funds, that USAID Indonesia W&E will need to conduct a participatory vulnerability and adaptation analysis. Guidelines are provided in the USAID manual entitled Adapting to Climate Variability and Change: A Guidance Manual for Development Planning (USAID, 2007).

3.1 Forests and Land Use

3.1.1 Assessment

Indonesia's 93.9 million ha of forests (MoF, 2008) are among the most extensive, complex, diverse, and valuable in the world, serving as a global atmospheric filter and a carbon sink. Indonesia's forests account for about 10% of the world's remaining forests. It is important to note that approximately 29.3% of the National Forest Estate is currently not covered with trees; instead millions of hectares are used for agricultural land, mining operations, and villages. Additionally, millions of hectares of land outside of the National Forest Estate are forested and/or are managed as agroforestry systems. The MoF estimates that for 2000 -2005, a total of 5.45 million ha was deforested with an average of 1.09 million ha lost per year (range 635 thousand ha to 1.91 million ha per year).

Illegal extraction, overharvesting, and poor management practices are degrading extensive forest areas, making them more vulnerable to fire and an easy target for conversion, and resulting in increased carbon emissions. As a result of weak governance, timber is harvested illegally for commercial purposes, particularly pulp and paper, with significant overcapacity in this sector helping to drive the demand. Total industrial demand (approximately 60 million m³ per year) exceeds sustainable yield (approximately 11- 13 million m³ per year) (World Bank, 2006). Reclassification of forest land (from forest to non-forest) for oil palm is becoming increasingly common. As of 2006, approximately 6.6 million ha were planted in oil palm, primarily located in Kalimantan and Sumatra, with large areas planned for Papua. Current practices in the production of oil palm for biofuel make its use a net greenhouse gas emitter and do not contribute to the mitigation of climate change (Reijnders and Huijbregts, 2006).

Total emissions from the agricultural sector was 96.42 million tons of CO₂ in 2005, with 61.78 million tons of CO₂ (62%) coming from rice fields (MoE, 2007). Agricultural productivity and land suitability are being impacted by climate change. Decreasing and changing rain patterns have reduced the number of rice crops harvested per year from three down to two. Agricultural lands are being degraded through climate change processes, such as erosion, desertification, and saltwater intrusion. Farmers require

assistance in adopting adaptive strategies to insure their livelihoods and reduce pressure for forest conversion.

3.1.2 Opportunities

Changes in forestry and land use management may be cheaper or easier than some industrial/energy sector actions. These management changes would contribute substantial other benefits as well, such as: a) increased sustainability of agricultural and forest-related activities, thus ensuring reliable revenue streams; b) potentially reduced negative climate change impacts in the future; c) increased resilience of forests and agricultural fields to current climate change impacts; d) increased adaptation by communities; and e) improved conservation of biodiversity.

USAID support for activities which address sustainable forest and land management would be a “triple win”, meeting climate change, forestry and biodiversity objectives in Indonesia. There is demonstrated interest by the GOI in addressing forestry issues and climate change. The governors of Aceh, Papua, and Papua Barat have committed to slowing deforestation, making specific commitments (e.g. a logging moratorium in Aceh), but are calling on the national government and the international community to support them through carbon financing mechanisms and the transfer of technology. The Governors of Aceh, Papua, and the State of California recently signed the first state-to-state, sub-national agreement focused on reducing emissions from deforestation and land degradation (REDD) programs. A number of donors including Australia, Germany, the UK and Norway, have already committed to supporting Indonesia’s REDD pilot efforts.

There are a number of issues with REDD, including ownership of carbon credits, given unresolved land tenure issues. Legal guidelines for developing REDD projects and the distribution of revenue streams have still not been finalized by the GOI. At present, private investors are wary, as substantial claims on potential revenue streams are already being proposed by the central government (30%) and others. Some international banks are reducing or eliminating their carbon trading branches given the current economic downturn and are particularly wary of Indonesia’s carbon markets (WSJ, 2008). It might be prudent to “hedge” USAID’s bets by exploring a number of alternative potential revenue streams, including other types of “payment for environmental services”.

Many oil palm companies are beginning to respond to criticism and are seeking ways to develop plantations in more environmentally sustainable ways. The Roundtable on Sustainable Palm Oil (RSPO) has finalized a set of Principles and Criteria, guidelines on certification, and has begun certifying plantations. RSPO demonstrates that there are significant opportunities to influence private sector investments in Indonesia’s oil palm sector, both through keeping up the pressure for more sustainable practices, and providing industry with the technical guidance it requires in this regard.

Market pressure for legally and sustainably produced timber is continuing to grow. These pressures are coming largely from traders in and consumers of timber in the EU, Japan, and the US. Indonesia has responded by developing (with USAID support) a “legality standard” for its timber exports. New efforts through the Voluntary Partnership

Agreement and proposed “Due Diligence” legislation for the EU, in coordination with the revision to the USG Lacey Act, may add new impetus for market led reform.

Forests degraded by non-sustainable forestry practices are more vulnerable to fire invasion, with peat forests the most vulnerable when they are degraded. A new Presidential decree is being issued regarding peat land, and the MoE has developed a National Action Plan for Fire and would like support. The MoE is responsible for enforcement, prevention, monitoring and coordination of response to fires. There is regional pressure to control haze impacts, and international pressure to reduce GHG emissions. This provides an opportunity to USAID to support the GOI in focusing on prevention, as opposed to suppression (which is often ineffective – particularly in large scale fires).

3.1.3 Suggested Programs for Consideration

USAID Indonesia W&E has two major site-based activities (the Environmental Services Program [ESP] and the Orangutan Conservation Services Program [OCSP]) that can serve as models for future work in Kalimantan, Sumatra, and Papua. Both activities have components that serve adaptation or mitigation purposes. Successful components of the ESP and OCSP projects should be built upon for site-based activities in follow-on task orders and designs. Components of these two projects could be combined into a single project to reduce management units if necessary.

One of OCSP’s main objectives is conserving forest and reducing deforestation, Indonesia’s largest emission source, making it an ideal mitigation program. As many orangutans live in peat swamp areas, a focus on this habitat type would conserve large amounts of carbon, in addition to biodiversity. Landscape planning underway incorporates provisions for climate change adaptation. These links could be made explicit in terms of activity designs, site selection, and monitoring requirements in the next iteration. Reforestation and sustainable agricultural practices implemented under ESP reduce GHG emissions, thus serving a mitigation function. Payment for Environmental Services (PES) (including voluntary and REDD carbon credits) and CSR funds could provide a sustainable revenue stream for site-based projects longer term.

A. Site based activities in Papua, Kalimantan, and Sumatra (SITE)

Estimated Cost: \$7.5 to 30 million (\$0.5 to 2 million per island per year)

Estimated Time Period: 5 years

Non-sustainable activities that are contributing to increased emissions in the forestry sector need to be reduced. There are specific locations that are crucial to potential emissions reduction, conservation of high levels of biodiversity, and the maintenance of livelihoods, and that would benefit from “on the ground” activities that address direct threats. Underlying causes of deforestation and degradation identified in the FAA 118/119 will be addressed in coordination with Activity 3.5.3C below regarding enabling environments. Impoverished communities adjacent to forests in Papua, Kalimantan and Sumatra require some direct assistance to adapt to climate change. Specific activities might include the following:

1. Develop a small-grants program for sustainable forest management in park buffer zones to address both mitigation and adaptation needs. Tie grant receipt to participation in an on-going support program run through the Regional Service Provider (see below) that improves organizational and technical capacity, with grant monies delivered in tranches contingent upon performance.
2. Promote reclamation of lowland forests, particularly peat lands, and upland watersheds by communities through technical assistance, provision of seedlings, and training to mitigate carbon emissions and assist in adaptation. This could use the Civilian Conservation Corps as a model, with environmental revenue streams from CSR, Voluntary Carbon Credit, or other PES payments providing start up costs. Native species that provide economic benefits (such as fruit crops) should be used in peat land and upland watersheds, with payments tied to performance and seedling survival.
3. Much of the alang alang grassland is located within the forest estate, and there is currently no incentive for replanting as the land is controlled by the MoF. Changes in policy that release these areas by the MoF and eliminate the creation of new HTIs would conserve existing forest, improve carbon absorption, and increase livelihood opportunities, thus helping communities adapt. It should be noted that alang alang reclamation is labor intensive and soil quality is generally poor. Communities often burn alang alang grasslands to improve hunting (new grass growth attracts deer) or for preparation of agricultural lands as this method is fast, cheap, and improves soil fertility through nutrient release. Community payments (see number 2 above) could provide an incentive for non-fire based reclamation of alang alang grasslands following MoF policy changes. Initial planting of pulp fiber alternatives, such as kenaf, might help reduce pressure on the forest estate through quickly generated income revenues. Kenaf is a fast-growing nitrogen fixer and would also improve soils. The techniques and methodologies for alang alang reclamation have been tested and are well known by ICRAF.
4. Promote the establishment of alternate conservation financing mechanisms for parks, protected areas, and restoration concessions, e.g. dive tags, DFNS, PES (including carbon credits), and trust funds (e.g., the TFCA for Sumatra if successfully negotiated), as well as microcredit for sustainable economic alternatives in ecologically important areas. In order to increase financial sustainability, demonstrate how to “bundle” different types of PES as currently being implemented by RMDA. This would provide a financial incentive to reduce emissions, thus contributing to mitigation.
5. Identify and incorporate adaptation measures into forestry management to improve resilience. This may include re-evaluations of sustainable yields for harvesting plans, and might consider reduced extraction rates, and longer harvesting cycles.
6. Analyze how predicted climate changes will impact threatened and key species (such as orangutans) and implement adaptation measures.
7. Incorporation of carbon accounting as a project monitoring tool and to report on USAID’s standard GCC CO₂ indicator.
8. Participate in national REDD processes to help insure that biodiversity is a key consideration in the choice of pilot activity locations and in their implementation.

This could be done through a part time advisor to the Ministries who also participate in the field site implementation.

B. The Regional Service Provider (RSP)

Estimated Cost: \$7.5 to 30 million (\$0.5 to 2 million per island per year)

Estimated Time Period: 5 years

Establish three regional service providers, one each in Sumatra, Kalimantan, and Papua, to raise local capacity for sustainable forest management, land use planning, watershed protection, and sustainable financing (e.g., PES, including voluntary carbon market or REDD). The center should provide technical support and analyses, training, capacity building, and develop a business model to become sustainable by the end of the project. If possible, build upon existing capacity (such as a university or technical institute).

Sample activities might include:

1. Provide technical and organizational management assistance to local government, NGOs, and user groups in business skills for microenterprise, monitoring and evaluation, carbon accounting, budgeting, reporting, financial plans, project development and project cycle management, strategic planning, environmental monitoring, increasing environmental resilience, sustainable forest management, and environmental knowledge, etc. based on needs assessment and specific requests. The regional service providers would assist with both mitigation and adaptation needs.
2. Provide technical assistance to re-evaluate protected area boundaries to make sure that they contain viable populations, connecting corridors, and would continue to protect biodiversity and forests given potential shifts in species range and distribution due to climate change. This is necessary to increase adaptation options for species.
3. Conduct mapping studies of climate impacts on biodiversity to provide the information needed by decision makers to accomplish activity 2 above. This study would be modeled after the Central America study just completed by CATHALAC and NASA as part of the SERVIR project (see 3.5.3A below).
4. Increase the capacity of officials and institutions to deal with technical and policy issues, such as REDD and the Indonesian National Scheme. Provide overseas graduate training for key or promising officials so that they fully understand mitigation and adaptation issues and options. Provide training on the Lacey Act and how that will affect trade in timber, to increase GOI capacity to make Indonesia more attractive as a legal source of wood and wood products.
5. Train police, attorneys, and judges concerning natural resource and environmental issues in collaboration with other USG partners and other donors. This would help improve law enforcement and governance, and ultimately reduce emissions from illegal logging and forest conversion thus contributing to mitigation. Help them understand the Lacey Act provisions and how they relate to Indonesia's laws and law enforcement.
6. Help governments, private sector, and local communities understand existing legal regulations and frameworks, and remove barriers to sustainable forest management funded through carbon market schemes (voluntary or REDD). In cooperation with partners and colleagues, take existing pilot REDD and voluntary projects being developed as the basis for in-depth hands-on scenario development. Bring together all the major players involved in project development from central and local government,

private sector, NGO and communities, involved in obtaining legal permissions and implementing to figure out the regulatory and procedural barriers. Develop a schematic that would guide organizations through the process, and identify the legal or procedural blocks that must be dealt with by government. This would help leverage significant sources of funding for mitigation of carbon emissions from the forestry sector.

C. Private Sector Sustainability Facility (PSSF)

Estimated Cost: \$10 to 15 million

Estimated Time Period: 5 years

Private sector investments in natural resources sectors such as forestry, plantation crops and fisheries dwarf both development assistance and government budgets, and are often the driving force determining the pace and nature of natural resource use. A cross-cutting Private Sector Sustainability Facility (PSSF) would be aimed specifically at influencing and mobilizing key private sector actors towards responsible and sustainable investments activities, linking their investments to reductions in emissions and conservation in the natural resources sectors and sites where USAID works. The proposed PSSF should have a small core staff of long-term experts and project managers, with a roster of short term technical experts on call, to support the corporate and investment community in adjusting business practices to reduce GHG emissions and conserve the environment. PSSF technical assistance should be in exchange for specific corporate commitments to follow certain guidelines relevant for their sector (e.g. RSPO guidelines for oil palm, timber certification for timber production) or make good on specific commitments (e.g. setting aside an area of high conservation value forest) that would help mitigate GHG emissions.

Some areas where the PSSF might provide technical assistance include assisting firms to:

1. Take advantage of innovative financial incentives that the government may put in place to reduce carbon emissions from deforestation (or other sources) such as the “Low Carbon Growth” proposals of Indonesia’s Ministry of Finance.
2. Institute corporate social responsibility and environmental sustainability policies and practices in industries such as oil palm and timber that reduces emissions.
3. Link with markets for certified or otherwise environmentally-friendly products (e.g. wood products, fisheries) to increase incentives to reduce emissions.
4. Assist firms in understanding the Lacey Act and in developing chains of custody to reduce illegal activities contributing to emissions.
5. For banks and other investment houses, actively provide objective information on the natural resource sector to assist them in avoiding investments that cause environmental destruction and increase emissions.
6. Come together with other firms operating in their sector or locality to strategically maximize forest conservation impacts; for example, in a specific geographic region bringing together various oil palm companies to collectively set aside contiguous blocks of high conservation value forests that reduces emissions.
7. Promote the use of GHG Protocols for voluntary emissions accounting and actions. In addition to other industrial sectors such as power generation and transportation, WRI could focus some of their work on Indonesia’s oil palm sector. They would work directly with oil palm associations and companies, the Roundtable on Sustainable

Palm Oil, the government of Indonesia, and traders and purchasers of oil palm. Given the recent EU decision that biofuel imports must be sustainably produced, we anticipate that at least some oil palm companies will be motivated to be involved. Once the protocols are developed, the Mission could fund a larger initiative to reach out to the industry country-wide and support mainstreaming of these protocols.

3.2 Coasts and Coral Reefs

3.2.1 Assessment

Indonesia has some 5.8 million km² of marine area and its fisheries are highly diverse. Approximately two-thirds of the 108,920 km long Indonesian coastline, is protected by coral reefs totaling 2,0731,840 ha (MoE, 2007). All types of reefs are present in Indonesia, including fringing reefs, which are the most common, barrier reefs and patch reefs.

Indonesia's coral reefs constitute the majority of the "coral triangle", an area including the Philippines, Solomon Islands, Timor Leste, Malaysia, Indonesia and Papua New Guinea that has the highest coral diversity on Earth. Indonesia has about 15% of the world's coral reefs (Tomascik, et al., 1997), and lies at the center of the world's diversity of corals (Veron, 1993), mollusks (Paulay, 1997) and reef fish (Randall, 1997). These coral reefs form the ecological basis for one of the world's largest marine fisheries, including spawning and nursery grounds that support one of the largest tuna fisheries on Earth.

Indonesia's coral reefs have suffered extensive degradation over the past 30-40 years. A survey conducted in 2000 concluded that less than 30% of coral reefs remained in good condition (World Bank, 2004), while a 2002 study warned that 86% were under either high or medium levels of threat, with fully 46% highly threatened. Cesar et al., (1997) modeled the economic effects of reef degradation in Indonesia and estimated that the loss to the fishery sector from reef degradation and over fishing to be \$410,000 per km². Extrapolations from studies suggest that Indonesia has already lost 40% of its reef fisheries resource, yielding an estimated economic loss of \$30 billion over 25 years.

Climate change, with increasing sea temperatures and risk of coral bleaching, are threatening coral reef ecosystems. Nearly half of the CO₂ emissions from fossil fuel burning have been absorbed by the surface ocean, thus acting as a large "sink" for carbon sequestration. This absorption of CO₂ is decreasing surface pH and increasing acidity (Caldeira and Wickett, 2003). It is predicted that continued acidification could reduce CO₂ uptake capacity, creating a positive feedback loop that accelerates the accumulation of atmospheric CO₂ (Orr et al., 2005). Increased ocean acidity has potential major negative impacts on some shell/skeleton-forming organisms (e.g. corals, shellfish, some plankton, sea urchins) (IPPC, 2007).

3.2.2 Opportunities

In mid-2007, Indonesian President Yudhoyono launched a six-nation political initiative to cooperate in conserving the coral triangle, and wrote to President Bush and other world leaders seeking their support. Presidents Bush and Yudhoyono discussed the Coral

Triangle Initiative (CTI) during the September 2007 APEC Leaders' Summit, and in December 2007, the US announced some \$3.75 million in support for activities under the initiative. This is in addition to the \$2 million USAID contributed to the management of two key coral triangle sites in Indonesia during 2004-2008. Thus there is a good basis upon which to expand USAID work on coral reef conservation.

Additional opportunities arise from the US role as co-chair (with Mexico) of the International Coral Reef Initiative during 2008-2009. It is also worth noting that the US has an interest in and leverage with the World Bank which manages the huge COREMAP program in Indonesia (which has activities in priority CTI sites). USAID Indonesia can play a key role in catalyzing synergies and leverage among these various sources of US political and financial support for CTI activities and sites in Indonesia, along with its own direct financial support.

3.2.3 Suggested Programs for Consideration

A. Coral Triangle Initiative (CTI)

Estimated Cost: \$2.5 to 10 million

Estimated Time Period: 5 years

The Coral Triangle Initiative is a new multilateral partnership to safeguard the region's marine and coastal biological resources. The Initiative has five regional goals:

- Goal # 1: Priority seascapes designated and effectively managed.
- Goal # 2: Ecosystem approach to management of fisheries (EAFM) and other marine resources fully applied.
- Goal # 3: Marine Protected Areas (MPA) established and effectively managed.
- Goal # 4: Climate change adaptation measures achieved.
- Goal # 5: Threatened species status improved.

USAID Indonesia is buying into the RDMA mechanism to address threats to the coral reefs and marine/coastal areas located within the Coral Triangle. Support for the regional initiative will be limited to those efforts that overlap with USAID Indonesia priorities. Specific adaptation activities might include:

1. Provide technical assistance in the development and facilitation of a National Action Plan for the Coral Triangle Initiative, building upon lessons learned from the CRMP project and NGO conservation efforts.
2. Provide technical support to DKP and local districts with respect to implementation of Law No. 27, 2007 regarding Coastal Zone and Small Island Management.
3. Develop appropriate policies, plans, regulatory guidelines and support the execution of improved ecosystems-based fisheries and a strengthened marine protected areas network in Indonesia
4. Provide technical support and capacity building to DKP to strengthen enforcement of legal regulations, and ensure that harvest levels are sustainable given potentially reduced productivity due to climate change.
5. Incorporate adaptation measures identified in the National Action Plan in the coastal/marine sector to improve resilience. These measures might include mapping vulnerability to climate change, protect multiple habitat examples to

minimize risk, conserve areas that are inherently resilient as refuges for reseeded, maintain ecological connectivity, such as source/sink linkages, and reduce major non-climate stressors that decrease capacity to endure climate change impacts.

B. Assisting Coastal Communities Adapt to Climate Change (ACCACC)

Estimated Cost: \$5 to 20 million

Estimated Time Period: 5 years

Coastal communities are at increased risks from severe storms and the loss of livelihoods from decreased fisheries production. It is likely that sustainable yields will decrease in the future due to climate change. Specific activities that may help communities adapt to climate change impacts, and reduce incentives for over-harvesting in the fisheries sector might include:

1. Provide training and build capacity in other economic sectors for community members.
2. Help fishermen cooperatives assess sustainable yield, and set catch limits to ensure sustainability.
3. Provide weather forecasting information to reduce risks to fishing fleets from severe storms and red tides (see Indonesia Visualization and Monitoring System below).
4. Help communities establish integrated seawater irrigation systems in severely degraded coastal areas. The Seawater Foundation has done successful long-term pilots in Mexico and Africa, that combines planting mangrove species, salt tolerant plants such as *Salicornia bigelovii* (high in protein and vegetable oil), cultivated shrimp, fish, and bivalves all irrigated inland by seawater channels (http://www.seawaterfoundation.org/sea_about.html), plus seagrass farms offshore. Mangrove trees serve as a buffer during severe storms and increase native fisheries productivity. The integrated system increases local income and food security. In addition to these adaptation functions, the system helps mitigate climate change by increasing carbon sequestration, thus qualifying for carbon credits (afforestation/reforestation). *Salicornia bigelovii* can be used in the production of biofuels, providing another potential revenue stream.

3.3 Freshwater Resources and Ecosystems

3.3.1 Assessment

Indonesia contains 6% of the world's fresh water reserves, and 21% of the reserves found in Asia (MoE, 2006). Indonesia has 843 lakes, 736 ponds, 1,341 reservoirs, and numerous rivers, streams, springs, and aquifers, all dependent upon rain water recharge. Changing rainfall patterns due to climate change already appears to be affecting water abundance and quality.

Human water needs as of 2004 were approximately 435.7 thousand cubic meters for drinking water and 170.4 billion cubic meters for food crops (MoE, 2007). These needs are growing, even as freshwater sources are being lost. Water resources are being destroyed through forest conversion and land degradation. As of 2005, 62 river basins were classified as critical by the Ministry of Environment. Much of the above ground water is contaminated, with only 2.9% of samples taken from 30 rivers meeting GOI quality standards. None of the five lakes that were tested met water quality standards (MoE, 2006). Heavy demands on ground water as a clean water source by individuals

and industry has caused land subsidence and /or salt water intrusion in a number of Indonesian cities, including Jakarta and Samarinda.

3.3.2 Opportunities

The GOI is concerned about water quality and abundance, and have developed several programs to address this sector. This includes the “Toward Green Indonesia Program” initiated by the Ministry of Environment, designed to improve river water quality, decrease flooding and land slide risk, reduce coastal erosion, and improve energy and water conservation, and the “Model Conservation Villages” initiated by the Ministry of Forestry. They recognize that access to sufficient freshwater is becoming problematic and is exacerbated by climate change.

USAID has a successful program (the Environmental Services Program [ESP]) that could serve as the foundation for new adaptation activities. ESP promotes water conservation among users and improved watershed functioning upstream, both of which are essential adaptations to a likely future of decreased rainfall, variability in monsoon timing and intensity, and more extreme weather events. In fact, farmers are reporting that in the past five years the start of the monsoon was delayed by 3-4 months and was unreliable. In addition, daily low intensity rain had been replaced by periods without rain followed by intense deluges. In Java, farmers are only obtaining two rice harvests compared to three harvests previously. Effective forest and land conservation / rehabilitation helps increase absorption, stabilizes water flow, and improves water quality.

3.3.3 Suggested Programs for Consideration

A. Adaptation to Increased Drought and Flooding risk through Improved Environmental Management (AIDF)

Estimated Cost: \$2.5 to 10 million

Estimated Time Period: 5 years

Assist poor communities in areas adjacent to freshwater bodies and forests adapt to increased risks from drought and flooding due to climate change through improved environmental management of agricultural lands and forests. Specific adaptation activities might include:

1. Analysis of historical rainfall patterns in watersheds of interest. Indonesian Agriculture offices keep daily rain records and the Dutch probably also had very detailed record keeping. This would be done by pulling together the data from paper archives around the country and doing simple trend analyses over the past 100 years. This would be combined with a review of modeling studies on predicted future climate changes in Indonesia.
2. Environmental education of project staff in the concepts of vulnerability and adaptation so they can speak knowledgeably and train others. Development of “messages” on vulnerability and adaptation for watershed users to make sure a consistent picture is being conveyed by staff that is realistic, accurate and action-oriented. Integration of discussions of climate changes into field activities by asking farmers what weather changes they have observed, how they have already adapted, and what future adaptations might be necessary. Integration of sophisticated discussion of climate adaptation into trainings for government officials. Integration

of adaptation as an explicit topic in planning meetings with government officials based on analysis of the historical climate changes and predicted future changes.

3. Analysis generally of how climate change will affect livelihoods of people living in the watersheds.
4. Reclamation of along along grasslands or other degraded lands to improve water absorption (reducing flooding), help increase aquifer recharge rates (reducing drought impacts), increase productivity (increasing local incomes). [This would also serve a mitigation function by reducing fire risks (reducing carbon emissions).]
5. Provide technical assistance in the agriculture sector, including selection of drought resistant cultivars which would reduce fresh water demand; or conversely, plant flood resistant cultivars in areas at high risk of flooding to ensure continued productivity.
6. Provide guidance on building rain water collection devices to reduce over-extraction from underground aquifers during extended droughts; this should help reduce the risk of land subsidence and salt water intrusion contaminating the aquifer.
7. Address methane emissions from irrigated rice production and reduce water usage. Improved management can cut emissions by 50% / ha, save 40% on water quantity use, and combined with IPM techniques and residue management, significantly reduce fertilizer and pesticide use, resulting in improved water quantity and quality for downstream human populations and biodiversity. There may be potential to use biodiversity funds by working in watersheds with downstream intact mangrove or coral ecosystems where water quantity or quality problems are major threats.
8. Provision of technical support to local governments on engineering solutions to water storage, recharge, and flood management. Reforestation on its own will not be able to capture all the rainfall in the large rainfall events. Check dams, infiltration wells, and small reservoirs may all be necessary to insure sufficient downstream water quantity. USAID would not fund the construction of this infrastructure but would provide technical support on proper siting, design, and mitigation of environmental impacts. The project would help local authorities gain funds from ADB, World Bank, central government, and local government.

3.4 Clean Energy

3.4.1 Assessment

The electricity tariff in Indonesia has been fixed since 2003 and has a dramatic impact on all aspects of clean energy development. The current tariff is not cost reflective even in the lowest cost Java-Bali network and is nearly 80% below costs in many diesel based isolated networks. Some of the negative impacts of this tariff include:

- a. A strong disincentive for PLN to connect any new customers because of their inability to recoup the cost of service in rural areas
- b. A significant strain on the fiscal space of the Indonesian government with overall electricity subsidies around 88 trillion IDR per year (2% GDP) in 2008.
- c. Inability of IPPs to obtain financing because of lenders concern about the fiscal health of PLN
- d. Disincentive for PLN to add any renewable generation technology that could increase the incremental cost of generation.
- e. Disincentive for effective DSM and energy efficiency practices (e.g. reduction in fuel subsidies led to a 9% reduction in domestic oil use in 2005).
- f. Inability of PLN to make capital investments needed to improve system efficiency.

The fast-track power program initiative (10,000 MW installed capacity by 2011, and another 10,000 MW capacity installed shortly after) will significantly increase the overall carbon intensity of the power sector and siphon off potential investments for clean energy alternatives. Little attention was paid to environmental factors such as emissions and plant efficiency in the award of contracts. As a result, domestic and international critics may question Indonesia's credibility as a 'leader' on climate change while these plans for expansion of 10,000 MW of 'dirty' domestic coal-based power generation continue to move forward.

3.4.2 Opportunities

New and potential future developments in the international global climate change community are creating significant impetus for engagement in the GCC/clean energy sector in Indonesia. The UNFCCC negotiations process is on a path to conclude a new agreement in Copenhagen in 2009, based on the roadmap agreed to in Bali in 2007. There is an increasing degree of recognition and consensus, both within and outside the formal UNFCCC negotiation process, that addressing the impending crisis of global climate change will require appropriate mitigation actions on the part of developed and developing countries alike as well as significant new financial resources for clean energy developments. During the next 25 years, the IEA (2006) estimates that investments of more than US\$6.2 trillion will be needed to build and maintain the energy supply infrastructure to satisfy projected demand in developing Asian economies (USAID/RDMA 2007). An estimated \$60 billion or more is needed to provide cleaner technology rather than least-cost equipment. This can be met, in part, through the CTF. Access, however, to the resources of the new CTF by developing countries is conditional, requiring first the development a low-carbon development plan that is integrated with country-owned sustainable development objectives and strategies. Second, within this country plan, the fund will finance only transformational actions and projects that scale-up deployment, diffusion and transfer of clean technologies and accelerate their wide scale implementation.

The MFin has become increasingly aware of the newly established and potential international financing mechanisms and sources that can be used for to finance climate-friendly investments, preparatory analyses, and incentives or seed money for innovations. The GOI has begun to consider the planning necessary, and the institutional and regulatory framework required to benefit from international funds such as the CTF.

Several of the major energy sector donors are restricted to providing loans or TA directly to national government entities. USAID's flexibility to work directly with sub-national governments, NGOs, private sector developers, and other key energy sector stakeholders provides a significant advantage to craft solutions to Indonesia's energy sector challenges. USAID has previously engaged in this sector, and had a lasting impact. is USAID is very well regarded by all major stakeholders, placing USAID in an excellent position to reengage in the sector.

The electricity tariff is a regressive subsidy with the poorest 10% of households in Indonesia receiving Rp 900 billion in 2005, while the richest 10% received Rp 1.3

trillion. Increase of the electricity tariff is a politically charged topic which has repeatedly been delayed in favor of political expediency. In 2004, plans to increase the tariff to \$0.08/kWh were scrapped as a result of the pending elections. It should be noted that electricity tariff reform is high risk, and an investment may not lead to short term tangible results. Progress would likely be incremental and slow. However, several stakeholders believe that one of the best opportunities for increasing the tariff will be during the first two years of a new administration. With elections scheduled for 2009, the time might be right for USAID to support an electricity tariff reform program.

Indonesia's geography and natural resources provide some of the most favorable conditions for renewable energy development in the world. Although Indonesia has made progress developing some of its geothermal and hydro resources, significant opportunity remains. One particular area of opportunity is to develop renewable resources to power some of the 600 mini-grids operated by PLN outside the Java-Bali network. PLN operates a total of 4700 diesel gensets comprising 44% of outer Jamali generation capacity. Development of renewable resources for these isolated grids has three advantages: 1) provides additional generation capacity in rural areas which would allow PLN to extend the grid to unserved areas, 2) provides a cheaper alternative to the currently used diesel generation allowing PLN to reduce operating costs, and 3) provides a low carbon alternative to fossil fuel based generation to meet Indonesia's growing electricity demand.

Although there is no guarantee that PLN would decide to negotiate transparently or reform past practices, several factors suggest that the time may be right for such a program. The World Bank is about to launch a rural electrification loan to PLN for grid expansion and believes this can provide a critical leverage point for the associated generation capacity to be procured competitively. The decentralization of contract authority within PLN also allows for targeting of some of the more progressive regional managers in the early stages of this program. The MFin is about to launch a clean tech fund which would provide mezzanine financing for small scale renewable projects. The presence of the MFin at the negotiation table could help to improve the transparency of PPA negotiations.

3.4.3 Suggested Programs for Consideration

A. Electricity Tariff Reform (ETR)

Estimated Cost: \$3 to 5 million

Estimated Time Period: 3 to 5 years

Electricity tariff reform is the single most important factor which could lead to accelerated clean energy development in Indonesia. Building sufficient consensus and the political will required to implement the current plans for a 30% tariff increase in 2010 would be an important first milestone for this program. Although progress would be incremental, the cost of implementing such a program is trivial compared to the benefit of addressing the myriad of clean energy development barrier detailed above. Potential activities might include USAID working "behind the scenes" to:

1. Provide technical assistance to local institutions engaged in the energy sector and tariff reform.

2. Support local institutions engaging in technical analyses, including impact analyses.
3. Support a public information campaign targeting specific stakeholders known to oppose tariff increase.

B. Increased Renewable Energy (IRE)

Estimated Cost: \$3 to 5 million

Estimated Time Period: 3 to 5 years

Renewable generation capacity could significantly reduce PLN's reliance on diesel generation to meet the power requirements of isolated grids. In addition, augmenting the generation capacity in rural areas with lower cost sources would provide an incentive for PLN to expand coverage to Indonesia's unserved populations. Success would require cooperation and support from PLN. The following activities could greatly enhance the utilization of Indonesia's abundant renewable resources:

1. Develop standard PPAs for renewable energy: PLN is currently decentralizing contractual responsibilities for small and medium IPP projects (below 10 MW) to its subsidiaries/regional units in order to be more proactive in identifying renewable project opportunities and more responsive in evaluating renewable energy IPP proposals. Unfortunately, PLN regional units and sub-national governments do not have the capacity to prepare and execute IPP transactions that would be bankable even to the domestic banking standards. USAID should consider a program to assist PLN (or local governments in case of geothermal energy) in establishing best practice models for structuring and executing renewable energy IPP transactions and develop standard bankable PPA agreement formats for small-scale power producers for select RE sources.
2. Promote Competitive Bidding for Large and Small Scale IPPs: To accelerate the utilization of renewable energy resources, the Ministry of Energy has allowed PLN to skip competitive selection of IPP project developers and instead conduct direct selection. The direct selection process diminishes competitiveness and transparency and has been shown in several countries to increase the overall price of services. Lack of transparency in sponsor selection also limits the participation from credible commercial banks and multilateral banks, who avoid risking their reputation by being involved in opaque transactions. USAID has the opportunity to assist PLN to develop a standardized application procedure for RE developers that should be implemented at PLN regional units.
3. Support Reference price for local IPPs: One barrier to the development of renewable energy resources has been PLN's unwillingness to transparently disclose its current generating costs which form the basis for PPA price negotiation. The Ministry of Energy has recently issued the local grid costs of services – a critical step in rectifying this problem. A differential pricing scheme for each district (wilayah) needs to be developed for different renewable energies (and possibly for different scales). The availability of these reference prices would also provide a foundation for the implementation of non-uniform retail electricity tariff, allowing PLN to recoup the cost of electricity services from the local consumers, and ultimately would enforce the cost recovery principle in the electricity sector.

4. Support Credit Enhancement Programs: Government support on political risk (e.g. government force-majeure events) and demand risk (risk of default in take-or-pay PPAs) are actually the most sought-after facility in Indonesian project financing and thus, their availability would accelerate the project closing and have the potential to decrease the PPA price for PLN. USAID should consider a capacity building program for the Risk Management Unit of the Ministry of Finance to evaluate and evaluate a government guarantee for renewable energy projects. If PLN prepares and executes the selection of sponsors and enters into a contractual relationship in accordance with the PPP regulation, PLN would have the opportunity to add a credit enhancement facility to the project structure, thus making the renewable energy project more bankable. USAID should also consider providing a 50% loan guarantee (DCA) to encourage domestic financing of small scale clean energy projects.
5. Develop Hybrid System Models for PLN's Diesel Generation: PLN currently owns and operates 4700 diesel gensets. The low tariff and high cost of diesel generation results in a revenue loss for each one of these systems. PLN has already piloted some wind/diesel hybrid systems and USAID should consider providing technical assistance to enable the wide scale deployment of hybrid systems which would reduce operating costs and carbon emissions.

C. The Private Financing Network (PFAN)

Estimated Cost: \$100,000 (buy-in to EGAT GCC GDA)

Estimated Time Period: 2 years

PFAN is a GDA managed by the EGAT GCC Team that helps renewable and energy efficiency project developers create “bankable” project proposals and then walk them through the process until they attain private financing. This model is already having major impact in Chile, transforming their energy sector. This would be a high profile, high impact way to help the GOI achieve its Low Carbon Growth Strategy. Activities could be coordinated with RDMA's Asia Clean Energy Business Accelerator through PFAN. Specific activities might include:

1. Develop up to 20 small (under \$50M) projects in Indonesia.
2. Set up an institution in Indonesia to foster good projects from conception to completion, including a regular marketplace that brings together project developers and financiers.

D. Linking Forests and Energy (LEF)

Estimated Cost: \$2.5 to 10 million

Estimated Time Period: 5 years

Development of institutional or household biogas systems can help reduce carbon emissions and deforestation through decreased fuel wood requirements, as well as improving indoor air quality and sanitation. Improved watershed management is a requirement for small scale hydro operation providing another opportunity for synergies between a future environment and energy program. Suggested activities might include:

1. Providing technical assistance and financing for the establishment of biogas and micro hydro systems for communities adjacent to biologically important forest blocks.

2. Train community members in the maintenance of equipment (perhaps through the Regional Service Center outlined above).
3. Link expansion and maintenance of equipment to revenue streams generated through PES, including voluntary or carbon credits, or CSR.

3.5 Cross-Cutting Climate Change Initiatives

3.5.1 Assessment

Developing countries such as Indonesia face significant hurdles for climate change mitigation and adaptation efforts, some of which stem from basic information and institutional issues that deter economic growth. Indonesia lacks readily useable environmental information, including economic data on natural resources and climate-sensitive activities such as agriculture and fishing. Indonesia has launched one satellite for communication, and is planning to develop and launch a remote sensing satellite (Hardhienata et. al, 2008). It does not currently have its own satellites for remote sensing, and has traditionally had to make important decisions affecting its populations and diverse natural resources in absence of the significant information that Earth observation can provide. As a result of these gaps, Indonesia lacks quality emissions inventories, forest monitoring data, and environmental information needed to plan mitigation activities, get access to emerging carbon markets, and respond to climate change. Indonesia lacks the ability to monitor land conversion and illegal logging, or to monitor land changes due to sea level rise. It can not forecast severe climate events in order to provide early warning to communities. Information and capacity needs have been identified as a priority at multiple workshops, UNFCCC negotiations, technical assessments, and in national reports.

3.5.2 Opportunities

The United States is playing a lead role in international efforts such as the Global Earth Observation System of Systems (GEOSS), which gives communities early warning of natural disasters, and improves decision-making for forest and land use, agriculture, coastal development, fisheries, and other economic sectors that are affected by climate variability and change. Earth observation information can provide fundamental information on forests and land use change, the main emissions source in Indonesia. USAID, in partnership with NASA, CATHALAC and others, have developed a unique system which makes Earth observation data, monitoring tools and the capability to visualize Earth information in three dimensions available through a system known as SERVIR, the Spanish acronym for Regional Visualization and Monitoring System. SERVIR operates like the hub and spokes of a wheel (www.SERVIR.net; <http://servir.nsstc.nasa.gov/>); with the SERVIR center at the hub and cooperating meteorological organization as the spokes, exchanging information and needs. SERVIR was first established by USAID and NASA in 2003 in Central America to respond to specific components of the Central America Action Plan on Climate Change and the monitoring and information needs of the USAID portfolio. It has since expanded into the Dominican Republic and expansion into Africa is on-going. There is demonstrated activity and interest by the GOI in monitoring climate change impacts and emissions. GOI is currently preparing its second National Communications as required of signatories to the UN Framework Convention on Climate Change. The

Ministry of Environment and the Ministry of Forestry are both specifically interested in web-based remote sensing monitoring. There are opportunities to build upon the new Forest Resource Information System (FRIS) and the Forest Monitoring and Assessment System (FOMAS) initiatives. Funded by the Australians, FRIS is in development, and will include a national carbon accounting system for use in REDD. Australia is establishing additional remote sensing capacity in northern Australia to provide regional high-quality, low-cost forest carbon data on request. FOMAS is funded by a consortium that includes the World Bank, WRI and others. The initiative is intended to increase transparency regarding the timber and forest sector through improved information management processes, a comprehensive disclosure policy, effective disclosure mechanisms to stakeholders, and improved decision-making processes.

3.5.3 Suggested Programs for Consideration

A. Indonesia Visualization and Monitoring System (IVMS)

Estimated Cost: \$2 to 5 million

Estimated Time Period: 5 years

IVMS would strengthen the regional information base for action on climate change, supporting both mitigation (e.g., monitoring forest cover and primary productivity as indicators of carbon) and adaptation (e.g., monitoring and predicting climate related events thus allowing for improved response) activities. Information from the IVMS would support economic development, as experienced in the Central America SERVIR project. This activity would develop and disseminate climate information and other environmental information and decision-support tools for climate resilient development. IVMS would be operated by an Indonesian institution and provide information and tools for mainstreaming adaptation into development; a “one stop shop” for environmental, climate, and development data and information to support adaptation. If the RDMA goes forward with the regional version of this activity, USAID Indonesia W&E should coordinate, and may be able to leverage RDMA funds.

IVMS would build off success of SERVIR in Central America and EGAT/NASA enhancement efforts over the last two years. IVMS would support many activities of Indonesia, including: forests and anti-deforestation monitoring, adaptation analysis and implementation; weather and disaster forecasting and monitoring, and efforts to improve transparency. Building upon existing government and NGO web-sites, IVMS would build a web-based internet portal that provides unified access to environmental information and remote sensing at the provincial and district level. The portal should provide public information access, ability to monitor and evaluate environmental assets, climate information and forecasting, and tools to make informed environmental decisions regarding resource use. Specific activities might include:

1. Develop new tools and data sets specific to Indonesia.
2. Provide training in the use of the web-based tools to local government, private sector and community leaders. (This could be done, in part, through the Regional Service Provider – see above).

B. Improving Indonesia's Adaptation and Mitigation Planning (IAMP)

Estimated Cost: \$1 to 2 million

Estimated Time Period: 2 years

Indonesia is required to develop climate change scenarios and calculate GHG emission levels and sources as inputs for their Second UNFCCC National Communication. This is a key starting point for developing specific adaptation and mitigation programs.

Indonesia does not have the necessary climate change models or the data quality, archiving, and management systems required for accurately reporting on GHG emissions.

Specific activities might include:

1. Partner with NASA, Oak Ridge National Lab, and the Indonesian Meteorological Institute, to develop updated climate models and scenarios to develop targeted adaptation plans.
2. Partner with EPA to improve GHG data quality, archiving and management systems in order to develop targeted mitigation plans.

C. Improving the Enabling Environment to Address Climate Change Impacts (EE)

Estimated Cost: \$2.5 to 5 million

Estimated Time Period: 5 years

There are a number of legal, institutional, and policy issues that must be addressed in order to make substantive progress in addressing climate change impacts. Several of these policy issues have been mentioned in the previously described activities. A policy/governance activity could be implemented as a stand alone activity (perhaps in coordination with the Democracy/Governance office), or included as a component of individual projects. Efforts should be made to coordinate with the RDMA Responsible Asian Forestry Trade program, as well as the Department of Justice and other USG / donor activities. Specific activities might include:

1. Providing support to the GOI on implementation of the Legal Timber Protection Act per INPRES No. 5 2008.
2. Provide support to the MoF in completing drafting the Timber Legality Assurance System that establishes legality standards for timber products, and on its implementation.
3. Providing support to the GOI on addressing land tenure issues.
4. Modify or eliminate policies that are barriers to implementation of energy efficiency, clean energy activities, REDD, etc.
5. Address underlying causes of deforestation and degradation identified in the FAA 118/119 in coordination with other activities chosen (i.e. the SITE, RSP, PSSF, LFE) other USAID teams, USG partners, and other donors.

3.6 Next Steps Forward

USAID Indonesia W&E will be completing identification of its Strategic Objectives and Intermediate Results during December 2008, and will be finalizing its strategy by January 2009. At that point, the Activity Design Document will be prepared, and final selection of major programs and activities will be made.

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Annex 1. Match of selected USAID major activities with Core Objectives and Criteria for Selection.

<i>Core Objectives</i>	Site	RSP	PSSF	CTI	ACC ACC	AIDF	ETR	IRE	PFAN	LFE	IVMS	IAMP	EE
Reduction in emissions contributing to global climate change	X	?	?	?	?	X	X	X	X	X	?	?	X
Climate change mitigation and adaptation incorporated in natural resources sectors	X	X	X	X	X	X	-	X	?	X	X	X	?
Conservation and sustainable use of forest and coral reef ecosystems and biodiversity	X	X	X	X	X	X	-	?	?	X	X	?	?
Conservation and sustainable use of water resources	X	X	?	X	X	X	-	?	?	X	X	?	X
Strengthening governance and civil society as they relate to natural resources	X	X	?	X	X	X	-	?	-	X	X	X	X
Improving the livelihoods of local communities including indigenous peoples who depend on natural resources	X	X	?	X	X	X	-	?	-	X	X	?	?
Strengthening the role of the private sector in sustainable natural resources management.	?	X	X	?	?	X	-	X	X	X	X	?	?
<i>Criteria</i>	Site	RSP	PSSF	CTI	ACC ACC	AIDF	ETR	IRE	PFAN	LFE	IVMS	IAMP	EE
Potential of interventions to achieve multiple benefits (e.g. climate change mitigation, biodiversity conservation and protection of watersheds)	X	X	X	X	X	X	-	?	?	X	X	X	X
Potential of intervention to have significant impact on reducing emissions or increasing adaptation;	X	X	X	X	X	X	X	X	X	X	X	X	X
Conservation value and level of threat to the ecosystem or natural resources in question (per FAA 118/119);	X	?	?	X	X	X	-	?	?	X	?	?	?
Potential to forge partnerships with the private sector and civil society	X	X	X	X	X	X	?	X	X	X	X	?	?

Criteria	Site	RSP	PSSF	CTI	ACC ACC	AIDF	ETR	IRE	PFAN	LFE	IVMS	IAMP	EE
Complementarity and leverage with other donors' activities	X	X	X	X	X	X	X	X	X	X	X	X	X
Potential to build on existing USAID activities	X	X	X	X	X	X	-	?	X	X	X	?	X
The extent to which the policy and institutional environment (both national and local) is conducive to effective action	X	X	X	X	X	X	?	?	X	X	X	X	X
Integration and mainstreaming opportunities to incorporate both mitigation and adaptation	X	X	X	X	X	X	-	?	-	X	X	X	?
Sustainability considerations	X	X	X	X	X	X	X	X	X	X	X	X	X

X = the activity directly responds to core objective and meets criteria

? = the activity indirectly responds to core objective and criteria, impact depends on final design and implementation

Site = Site based activity, RSP = Regional Service Provider, PSSF = Private Sector Sustainability Facility, CTI = Coral Triangle Initiative, ACCACC = Assisting Coastal Communities Adapt to Climate Change, AIDF = Adaptation to Increased Drought and Flooding, ETR = Electricity Tariff Reform, IRE = Increased Renewable Energy, PFAN = Private Financing Network, LFE = Linking Forests and Energy, IVMS = Indonesian Visualization and Monitoring System, IAMP = Improving Adaptation and Mitigation Planning, EE = Enabling Environment

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