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AILEG Analysis and Investment for Low-Emission Growth

ASSESSMENT OF REDD+ AND FORESTRY DATA AND IN THE PHILIPPINES

THE AILEG PROJECT

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ACRONYMS

A&D	Alienable and Disposable
ADB	Asian Development Bank
ADSDPP	Ancestral Domain Sustainable Development and Protection Plan
AGB	Aboveground Biomass
AILEG	Analysis and Investment for Low-Emission Growth
BAU	Business as Usual
B+ WISER	Biodiversity and Watersheds Improved for Stronger Economy and Ecosystem Resilience
CAR	Cordillera Autonomous Region
CBFMA	Community-Based Forest Management Agreement
CDA	Choices, Decisions, and Actions
CCC	Climate Change Commission
CDP	Comprehensive Development Plan
CENRO	Community Environment and Natural Resources Officer
COP	Conference of the Parties
DBH	Diameter at Breast Height
DA	Department of Agriculture
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
EC-LEDS	Enhancing Capacity for Low Emission Development Strategies
EDC	Energy Development Corporation
EO	Executive Order
ERDB	Ecosystems Research and Development Bureau
ENRM	Environment and Natural Resources Management
EIS	Environmental Impact Systems
EPA	U.S. Environmental Protection Agency
ESSC	Environmental Science for Social Change
FAO	Food and Agriculture Organization of the United Nations
FFI	Flora and Fauna International
FMB	Forest Management Bureau of the Department of Environment and Natural Resources
FRA	Forest Resources Assessment (UN Food and Agriculture Organization)
FRI	Forest Resource Inventory
GHG	Greenhouse gas
GIS	Geographic information systems
GEF	Global Environmental Facility
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit*/ German International Cooperation Agency
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit (German Agency for Technical Cooperation)
GL-AFOLU	Guidelines for National Greenhouse Gas Inventories for Agriculture, Forestry, and Other Land Uses
GOFC-GOLD	Global Observation of Forest Cover and Land Dynamics
GPG	Good Practice Guidance
GPH	Government of the Republic of the Philippines
INREM	Integrated Natural Resources and Environmental Management
JICA	Japan International Cooperation Agency
IFMA	Integrated Forest Management Agreement

IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPRA	Indigenous Peoples Right Act
LEAD	Low-Emission Asia Development
LGU	Local Government Unit
LFRMU	Land and Forest Resource Management Units
LUCF	Land Use, Land Use Change and Forestry
MAI	Mean Annual Increment
MC	Memorandum Circular
MOU	Memorandum of Understanding
MRV	Measurement, Reporting, and Verification
NAMRIA	National Mapping and Resource Information Authority
NAMRIA/LRD	National Mapping and Resources Information Authority/Land Resources Division
NCIP	National Council for Indigenous Peoples
NFSCC	National Framework Strategy on Climate Change
NGO	Non-Governmental Organization
NGP	National Greening Program
NIA	National Irrigation Administration
NMRC	National Multi-Stakeholders REDD+ Council
PA	Protected Areas
PAP	Program, Activities, and Projects
PAWB	Protected Areas and Wildlife Bureau
PDP	Provincial Development Plan
PENRO	Provincial Environment and Natural Resource Officer
PNRPS	Philippine National REDD+ Strategy
PD	Presidential Decree
PP	Presidential Proclamation
PWPA	Philippines Wood Products Association
RAA	Responsibility, Accountability, and Authority
REDD	Reducing Emissions from Deforestation and Degradation
REDD+	Reducing Emissions from Deforestation and Degradation plus fostering conservation, sustainable management of forests, and enhancement of forest carbon stocks
REL/RL	Reference Emission Level/Reference Level
SIFMA	Socialized Industrial Forest Management Agreement
TAP	Transparency, Accountability, and Participation
TWG	Technical Working Group
UPLB	University of the Philippines at Los Banos
UNEP	United Nations Environmental Program
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WB	World Bank
VOB	Volume over Bark
WISE	Women's Initiatives for Society, Culture and Environment

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The AILEG Forestry Data and REDD+ Assessment Report was prepared by AILEG Consultant Dr. Ernie Guiang, with contributions from AILEG Consultant Dr. Guillermo and Ms. Lindsay Kohlhoff, AILEG Climate Change Analyst. The report also benefitted from detailed review by Mr. Agoncillo, Mr. Vinluan, and Dr. Eric Hyman, Enterprise Development Officer/Capacity-Building E3/EP, and Mr. Olaf Zerbock, Forestry and Climate Change Specialist E3/FAB/F, all of USAID ; Ms. Beth Lebow, Asia-Pacific Program Specialist at the United States Forest Service (USFS) and Ms. Atty Alett Nunez, USFS Local Liaison Officer for Partnership for Sustainable Forest Management Project (a partnership between the USFS and DENR-FMB); and Ms. Felicidad Narvaez, AILEG Country Coordinator, who provided invaluable assistance in facilitating meetings during the AILEG trips to the Philippines.

1. EXECUTIVE SUMMARY

The U.S. Government (USG) - supported Enhancing Capacity for Low Emission Development Strategies (EC-LEDS) in partnership with the Philippine Climate Change Commission (CCC) and through the Analysis and Investment for Low-Emission Growth (AILEG) Project has supported the *Forestry Data and REDD+ Assessment Task "to help the Philippines move towards a more robust forestry data collection system to support GHG inventories and other data needed to advance REDD+ schemes in the country."*

This in-depth assessment is a follow up to the recently completed scoping and review of REDD+ and forestry data in the Philippines. It is also a part of USAID's initial recommendations for assisting the improvement of land use change and forestry emissions estimates (USAID/LEDS 2011) in the Philippines. The assessment of REDD+ and forestry data was consistent with the requirements of the Inter-Governmental Panel on Climate Change (IPCC) for estimating activity data and emissions factors; the Philippines National REDD+ Strategy; entities with responsibility, accountability, and authority (RAA) in managing and regulating land use change and forestry and the resiliency of ecosystems and communities in the watershed-dominated landscape of the Philippines. The assessment team reviewed available forestry statistics, local compilation of forest carbon estimates, land and forest cover data, results of national inventories, and related studies. The assessment focused on what can be done to:

- Set up or establish Reference Emission Levels or Reference Levels (REL/RL); and
- Design or develop a Measurement, Reporting, and Verification (MRV) for REDD+ in the Philippines.

Key findings and recommendations were initially discussed during a multi-sectoral and inter-agency stakeholders' meeting on June 21, 2013 and were validated in a meeting with several members of the REDD+ National Technical Working Group (TWG) on August 7, 2013.

The assessment showed that opportunities remain for improving the existing forestry data in the Philippines for REDD+ program planning and implementation. The 1988 and 2003 land and forest cover data are not comparable because of differences in land and forest type classification and definitions. Issues continue to affect the 2003 land and forest cover data due to the inadequacy of ground validation and funding constraints for completing the clear image processing. At this point, however, estimates for land and forest area changes (activity data) and deforestation rates may be carried out from the 2003 and 2010 land and forest cover maps to partly estimate historical forest carbon emissions. The newly-released 2010 land and forest cover from the National Mapping and Resource Information Authority (NAMRIA) allow comparison of 2003 and 2010 land and forest cover.

For estimating "emission factors," the National Forest Inventory (NFI)/Forest Resource Assessment (FRA) data in 2002-2004, IPCC default values and locally-generated carbon stock estimates of natural forests and some planted species are available for use. There is a paucity of data on harvesting rates from the remaining natural forests (closed and open canopy forests) to meet the demand for roundwood and fuelwood. Data on removals from planted forests in and outside the forest lands are reported in the Philippines Forestry Statistics (DENR/FMB 2011).

Available forestry data are not disaggregated by governance-designated entities (such as DENR, NCIP, DOE, and DA) or the institutions with responsibility, accountability, and authority (RAA) to manage, assist, and regulate the activities of various land and forest resource management units (LFRMUs). Extensive land and forest resources are now largely under the RAA of DENR (forest lands, protected areas, and mineral lands), National Council for Indigenous Peoples (NCIP) (those in ancestral domains),

or other agencies such as DOE and DA (energy and watershed reservations). Available forestry data are only disaggregated by province, but not by key watershed-ecosystem and by governance-designated entity. The DENR in Region 11 has found it useful to have disaggregated land and forest cover by province, city or municipality, and by LFRMU.

Despite the technical inadequacies and limited disaggregation of REDD+-related forestry data in the Philippines, the assessment recommends the piloting of REDD+ at the sub-national level (province) starting with the ongoing donor-funded REDD+ projects (e.g., the USAID-funded B+WISER, GiZ-supported Climate-relevant Modernization of Forest policy and piloting of REDD+ in the Philippines, and the FFI initiatives in Quezon and Palawan provinces). The sub-national approach to REDD+ planning and implementation is consistent with the Philippines National REDD+ Strategy (PNRPS).

The sub-national pilots will plan and implement REDD+ activities – estimating RL and RELs, developing and refining MRVs; facilitating adoption of the target emission reduction including governance-based strategies to achieve the targets; developing prototype LFRMU-based REDD+ forestry database systems that are linked at the provincial, regional, and national levels; refining and/or improving allometric tables based on forest inventories at the national and sub-national forest inventories; and establishing a Provincial REDD+ Council as a governance body at each pilot site.

The assessment recommends the immediate creation of the National Multi-Stakeholders REDD+ Council (NMRC) as the CCC governance body to oversee, coordinate, and provide direction for all REDD+ initiatives in the Philippines. DENR should take the lead in coordinating, managing, and ensuring accuracy, consistency, transparency, and timeliness of reported emission reductions for the consideration and endorsement of NMRC to the CCC. DENR/FMB may improve its Forest Information System to start the process of setting up a REDD+ Registry, especially of participating LFRMUs local government units, and other entities. The assessment also recommends that the CCC (through the NMRC and participation of DENR, NCIP, DOE, DA, NGOs, and other agencies) develop and implement short-, medium-, and long-term capacity development and technical assistance support to ensure that the Philippines' commitment to the UNFCCC in reducing forest carbon emissions is achieved.

2. BACKGROUND

In November 2011, a Memorandum of Understanding (MOU) was signed between the U.S. Government (USG) and the Philippine Climate Change Commission (CCC) to further cooperate under the Enhancing Capacity for Low Emission Development Strategies (EC-LEDS) program with the goal being to support LEDS development in the Philippines. Three priority areas of cooperation were outlined in the MOU:

1. GHG Inventories;
2. Analytical Tools for Decision Making; and
3. Measurable Implementation Progress.

To help define a work plan, the EC-LEDS partnership held a workshop on January 25-26, 2012 with participants from Government of Philippines (GPH) agencies, such as CCC, National Economic and Development Agency (NEDA), Department of Energy (DOE), Department of Transportation and Communications (DOTC), Department of Environment and Natural Resources (DENR), Forest Management Bureau (FMB), and the National Mapping and Resource Information Authority (NAMRIA). Several USG agencies also participated -- US Agency for International Development (USAID), State Department, US Department of Agriculture (USDA), US Environmental Protection Agency (EPA), and the US Department of Energy (DOE). The work plan included a monitoring system for implementing the EC-LEDS program. The workshop fostered further understanding of LEDS development and GPH institutional arrangements to facilitate GPH interagency coordination around LEDS.

The EC-LEDS program includes the Analysis and Investment for Low-Emission Growth (AILEG) Project which was largely conceived to focus on analytical decision making. AILEG's primary component is to provide support for the data assessment of both the energy and forestry sectors. As a signatory to UNFCCC global climate change agreements, the Philippines set voluntary emissions reduction targets, many of which are expected to come from the forestry sector. However, the country has long struggled to address the continuing loss of forests and biodiversity. The Philippines stands to benefit greatly from the forestry data assessment as it moves to improve policy and management of these critical resources. Its participation with the international initiatives on Reducing Emissions from Deforestation and Degradation plus fostering conservation, sustainable management of forests, and enhancement of forest carbon stocks (REDD+) is a step forward, with the added benefit of sustainable management of forests, conservation and enhancement of carbon stocks, biodiversity conservation, and sustainable supply of ecosystems goods and services.

This assessment serves to inform the Government of the Philippines (GPH) and USAID as they jointly formulate programs for REDD+ assistance including those that will improve forestry data generation, storage, management, analysis, and reporting for REDD+ implementation. Specifically, the AILEG *Forestry Data and REDD+ Assessment Task aims "to help the Philippines move towards a more robust forestry data collection system to support GHG inventories and other data needed to advance REDD+ schemes in the country."* The task included an initial scoping report and in-depth assessment of forestry data and REDD+ programs in the Philippines. AILEG completed the initial scoping work in March 2013.

This in-depth assessment of forestry data in the Philippines is part of USAID's initial recommendations for assisting the improvement of LUCF emissions estimates (USAID/LEDS 2011). The assessment at the national and local levels in view of REDD+ requirements focused on what can be done or should be carried out to:

- Set up or establish Reference Emission Levels or Reference Levels (REL/RL); and

- Design or develop a Measurement, Reporting, and Verification (MRV) for REDD+ in the Philippines.

This assessment report builds on the AILEG's scoping work of forestry data and REDD+ programs in the Philippines. It presents the findings of the data assessment along with recommendations in view of REDD+ requirements, needs of the Philippines National REDD+ Strategy (PNRPS 2011), mandates of forestry-related institutions, and climate change-resiliency issues in the country's highly diverse and watershed-dominated landscapes. The assessment confined itself with available forestry data, reports, and maps; with responses and suggestions of key officials and staff from the government, NGOs, and the private sector during the roundtable discussion and workshops on June 21, 2013; and with observations and reactions from DENR field staff, land and forest managers during field visits in Region 11 (Davao) and Region 6 (Western Visayas/Iloilo). The assessment focused on what can be done with available data, what should be done to improve the data's REDD+'s compliance, and actions to move toward the use of country-specific data (Tier 2) for estimating carbon emissions in the forestry sector.

3. LENSES IN ASSESSING THE FORESTRY DATA

To be compliant, Reduced Emissions from Deforestation and Degradation Plus (REDD+) and other forestry data of the Philippines have to meet the technical requirements, guidelines, and standards of Intergovernmental Panel on Climate Change (IPCC). Due to the complex governance configuration of institutions with a mandate to protect, regulate, manage, and develop forests in forest lands and protected areas as part of the public domains and those in ancestral domains, the Philippines REDD+ and forestry data have to respond to the information and analytical needs of the entities managing these resources, including the Climate Change Commission (CCC), Department of Environment and Natural Resources (DENR), National Commission on Indigenous Peoples (NCIP), as a basis for oversight, planning, implementation, monitoring, dissemination, and reporting on greenhouse gas (GHG) emissions to the UNFCCC.

The principles of transparency, completeness, consistency, comparability, and accuracy are integral to the IPCC and CCC data requirements (Meridian Institute 2011). These principles apply for generating and managing high quality and reliable forestry data as the basis for estimating and reporting on the net carbon emissions, including those from REDD+ implementation. These principles are the key to setting up the country's forestry data for planning and implementation of individual and collective efforts in support of the Philippines National REDD+ Strategy (PNRPS).

An assessment of the forestry data has to consider the current governance configuration of those with responsibility, accountability, and authority (RAA) for the protection, conservation, management, and development of forests, land uses, and lands of the public domains. The principal agencies that have the RAA for more than 15 million hectares of public domain lands, including ancestral lands are the DENR, NCIP, Department of Energy (DOE) for geothermal resources and watersheds, Department of Agriculture for watersheds (DA), and other recipients of civil and military reservations such as Mt. Makiling under the University of the Philippines at Los Banos (UPLB). At least 4.3 million hectares, about 28% of the 15 million hectares, are now under the RAA of ancestral domain title holders. Although some of these areas overlap with forest lands and protected areas, NCIP has the mandate to oversee the management and development of these communally titled areas. Policies, institutions, programs, regulations, and controls with respect REDD+ are not housed in one national agency.

In managing forests and REDD+ activities, local governments (provinces, cities, and municipalities) play a critical role in enforcing local ordinances and supporting land and forest resource management units (LRFMUs) within their political jurisdictions. This reliance on local governance is supposed to help ensure quality, accuracy, precision, consistency, and timeliness of forestry data. However, this reliance on local entities presents challenges to managing forests on a national scale because data updating, management, dissemination, and retrieval differ across governance-designated entities. Even within a governance-designated entity, processes and policies have to provide incentives for LFRMUs to minimize leakages from their land uses change and forestry (LUCF) practices at the lowest levels in the local governance system.

The assessment of the forestry data for REDD+ compliance has to fit the context of the watershed-ecosystems in the country and reflect the interests of local stakeholders, private sector, concerned national agencies, and civil society. An integrated ecosystems management (IEM) approach is part of national policy in the Philippines Development Plan of 2011-2016 (PDP 2011), the Philippines National

REDD+ Strategy (PNRPS), and the CCC's National Climate Change Strategy. In fact, the DA, Department of Agrarian Reform (DAR,) and DENR issued Memorandum Circular 01 in 1999 to integrate sustainable development initiatives based on ridge to reef watershed divides, which is inherently an IEM approach.

Most REDD+ efforts in the Philippines are expected to be implemented in watersheds or highly diverse areas that represent entry points for REDD+ initiatives linked with eco-benefits. These data should be linked with economically valuable forest ecosystems goods and services and the contribution to reduced damages from climate change-related disasters. As part of an IEM strategy, REDD+ will make it easier to attribute benefits of reduced emissions within an ecosystem, especially over a ridge to reef landscape. For example, REDD+ can be linked with improved forest cover in a sub-watershed that improves water flow regulation in flash floods (CIFOR and FAO 2008, Walpole 2005). One hectare of a managed mangrove provides US$500 to US$1,550 per year from fisheries and wood production (FISH 2007). The "Plus" of REDD is better appreciated at the local level when directly or indirectly explained in relation to reduction of natural disasters, climate change adaptation of communities and their livelihoods, ecotourism-based biodiversity conservation, and supply of water for irrigation, domestic, use, energy generation, and recreation. These are the socio-economic values of REDD+ that have to be communicated to communities and Local Governance Units (LGUs) in order to get their buy-in and participation.

4. IPCC AND PNRPS FORESTRY DATA REQUIREMENTS

In response to the increasing threats of climate change in this highly vulnerable archipelago, the Philippines enacted the Climate Change Act in 2009 (RA 9729). The CCA created a Climate Change Commission (CCC) that formulated the National Framework Strategy on Climate Change for 2010-2022. This framework strategy includes the Philippines National REDD+ Strategy (PNRPS) which is consistent with the UNFCCC's Three-Phase REDD+ Implementation Strategy summarized below.

Phase 1: REDD+ Readiness (development of national strategies and design of action plans, policies, measures, organization of the REDD+ process, and initial capacity building);
Phase 2: Implementation of REDD+ strategy (pilots, policies, measures, and action plans); and
Phase 3: Implementation of performance-based actions (e.g. through payment schemes for verified reduction and removals).

The Philippines is one of the 195 signatory parties to the UNFCCC. It is also a signatory to the Kyoto Protocol in 1998, although it has no specified commitment for emission reductions. The PNPRS embodies one of the country's climate change mitigation and adaptation measures. A nested (from sub-national to national), scaling-up approach to REDD- has been adopted. Thus, the CCC has started to invest in the improvement of the country's readiness for REDD+ planning and implementation through the DENR and other national agencies with donor support. Particularly important are measures to improve governance systems, policies, incentives, safeguards, databases, and procedures. The PNPRS will build on existing data sets, ongoing activities, and relevant policies. Major focus has been on strengthening capacities, increasing REDD+ awareness and understanding, improving governance, and promoting national and sub-national initiatives.

Fully operationalizing the PNRPS from the sub-national to national levels, and scaling it up in 3-5 years, will require good data on estimating net reduction of carbon emissions from the Land Use Change and Forestry (LUCF). The data system needed to do so requires the input and "buy-in" of provinces, cities, and municipalities with the active engagement of various LRFMUs. Aggregation of forestry data is more accurate and precise if the process starts from ground-validated changes in each of the LRFMUs at the sub-national level.

The IPCC requirements and needs for planning and implementation of the PNRPS will necessitate development of a forestry database to set Reference Level/Reference Emission Level (RL and REL) and for developing and implementing Monitoring, Reporting, Verification (MRV) plans at the sub-national level. The annex of the UNCCC's Conference of the Parties Decision 2/CP.13 states that reference levels (RL) "…should be based on historical emissions, taking into account national circumstances." Secondary data sets such as threats and drivers of deforestation, population dynamics and distribution, road networks, socio-economic development, commodity prices may be factored into the process of setting up RL AND REL (Petrova, et. al, 2010; The UN-REDD Asia-Pacific; Meridian, 2011).

The Reference Level (RL) serves as the "business as usual" (BAU) baseline for measuring the effect of REDD+ interventions. The Reference Emission Level (REL) is the crediting level (Petrova, et. al 2010). REL is the benchmark for performances of REDD+ interventions. Actual levels are periodically monitored and financial incentives reward emissions below that level. These financial incentives require sound data from a robust, and functional MRV system that generates accurate "periodic carbon

emissions from different pools" for reporting purposes. The reported data on carbon emissions are verifiable on the ground. Under the REDD+, financial incentives for reduced emissions are tied up with accurate repeated measures of emission factors resulting from a national inventory of key carbon stocks.

The RL is estimated from historical emissions and adjusted for national circumstances under a business as usual (BAU) perspective (no REDD+ implementation). An REL is a projection based on the country's intentional LUCF strategies, governance and management of carbon stocks, incentives for increasing carbon densities in under- stocked forests, reforestation and afforestation, socio-economic trends, and policies that affect directly or indirectly impact LUCF over the coming years.

The RL and RELs are estimates using technically sound methodologies (mainly of activity data and emission factors). However, the RL and RELs at the sub-national and national levels go through a consensus-driven, political adoption process. Agreements may lead to a sub-national or national policy change. . This consensus-driven process reflects the need for buy-in from those will commit to have the RAAs reduce net emissions from LUCF. Over time, RELs may be re-calculated and re-negotiated following the availability of more accurate and precise forestry data. Negotiations will also take into account the effectiveness of REDD+-related strategies as lessons learned and new approaches become available. Formal adoption of RELs at the sub-national and national levels constitutes commitments for reducing net carbon emissions from LUCF.

The forestry database must adequately substantiate determinations of the RL/RLs from sound activity data and emission factors as basis for estimating emissions and removals, both for the RL and projected REL over the coming years. As Meridian Institute (2011) stated, "Activity data for REDD+ activities refer to the area change data, expressed in hectares per year. Emission factors refer to the Greenhouse Gas (GHG) emissions or removals per unit area (e.g., tons of CO_2 emitted per hectare of deforestation)." Based on the IPCC framework, Meridian (2011) also recommended calculating emissions and removals from activity data and emission factors for each of the following:

1. Forests converted to other lands (deforestation)– based on the sum of carbon transitions from forest to other land uses using stock-change approach;
2. Forest remaining as forests (degradation, conservation, enhancement of carbon stocks in existing forests, and sustainable management of forests) – based on periodic carbon inventories using a stock-change approach or from the difference between gains (forest growth) and losses (timber or fuel wood removals); and
3. Other lands converted to forest (afforestation and reforestation) – based on the sum of carbon transitions from other land uses to forests using stock-change approach.

Table 1 shows various approaches to estimating activity data for calculating changes in carbon stocks. The three tiers for emission factors indicate the level of accuracy and precision of emission factors for the carbon estimates. Tier level ranges from one to three as the accuracy and precision of activity data and emission factors increase. Tier 1 is based on non-spatial country statistics and the IPCC's default emission factors. Tier 2 uses national statistical data on activities and country-specific emission factors. Tier 3 relies on remote sensing data on activities and a national inventory of key carbon stocks and more accurate activity data. At Tier 3, performance-based payments for reduced net carbon emissions are based on agreements on the RL and REL.

Table 1.IPCC framework's Three Approaches and Three Tiers for Estimating Emissions from Data

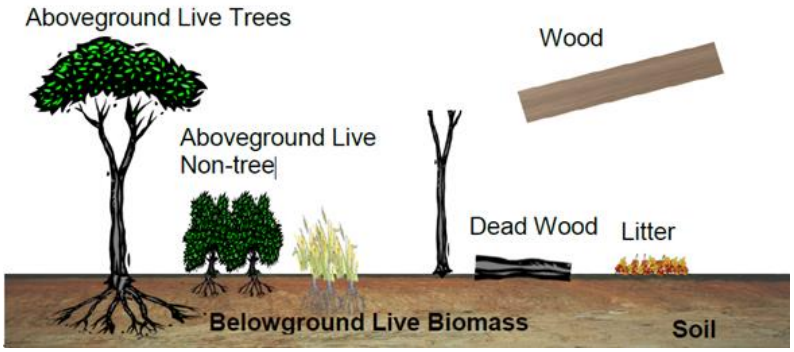
Approach for Activity Data: Area Change	Tiers for Emission Factors: Change in Carbon Stocks
1. Non-spatial country statistics -on net change in forest area (e.g. FAO)	Tier 1. IPCC default values at a continental scale- high uncertainty
2. Based on maps, surveys, and other national statistical data	Tier 2. Country-specific data for key factors – medium to low uncertainty
3. Spatially specific data from interpretation of remote sensing	Tier 3. National inventory of key carbon stocks, repeated measurements or modeling - medium to low uncertainty

Source: (Winrock, 2009)

RL and REL are estimated at the sub-national or national levels. After they RL and REL are formally adopted, MRVs may be formulated. This process ensures that each of the governance-designated entities in a province are committed to reduce emissions in their respective areas. MRVs should be 1) technically-sound, accurate, and precise in measuring periodic activity data and emission factors from various carbon pools (Figure 1), 2) supported with the technical, governance, institutional, and financial strategies to achieve the targeted "net emission reductions" (the difference in projected carbon emissions with RL/BAU and REL), and 3) formally adopted or legitimized by a REDD+ governance body at the sub-national or national level. The following items are required an IPCC-compliant REDD+ MRV system, (Petrova, et. al. 2010; Meridian 2011):

1. Estimates of GHG emissions related to forests by source, removals by sinks, forest carbon stocks, and changes in area of forest;
2. A national REDD+ implementation strategy or plan that includes a nested, scaling up approach from the sub-national to the national level;
3. Systematic and repeated measurements of all relevant forest-related carbon stock changes (Figure 1);
4. National estimation and reporting of carbon emissions and removals consistent with IPCC Good Practice Guidelines (GPG) for transparency, consistency, comparability, completeness, and accuracy; and
5. Investment in capacity development for establishing and maintaining national forest carbon monitoring system in the long term.

Figure 1. Terrestrial Carbon Pool



Source: Winrock/LEAF 2012

In summary, REDD+-compliant and PNRPS-responsive forestry data at the sub-national and national levels should provide information on activities and changes in carbon stocks in existing forests as well as deforested and reforested lands. The availability of accurate and precise country-specific data will determine the tier level for the estimates of carbon stock changes.

5. AVAILABLE FORESTRY DATA FOR REL AND MRV IN THE PHILIPPINES

Under the AILEG Project, Abt previously conducted a scoping and review of forestry data and REDD+ in the Philippines (USAID/AILEG 2013). That report discussed the technical aspects of REDD+ implementation and IPCC requirements for setting up REL/RELs and developing appropriate MRV systems. It listed the data needs for REDD+ implementation and available forestry data for estimating activity data and emission factors. The AILEG scoping report on REDD+ discussed the sources of forestry statistics and inventories, especially those relevant for estimating historical changes in forest areas and emission factors from results of national forest inventories (Annex 1).

Historically, the national forestry statistics have been prepared for different purposes and end-users. Part 1 of this study covered forest resources, forest activities, and forest cover data by region and province (FMB/DENR 2011). Data on forest cover derive from the collaborative work of the FMB and NAMRIA, especially in acquiring and combining Landsat images for interpretation, mapping, and statistics. The national forestry statistics provide information on forest resource use and trade, prices of forest products, holders of forest permits, forest revenues, and accomplishments of the Forest Management Bureau (FMB) (FMB/DENR 2011).

DENR/FMB maintains various REDD+-related forestry databases, although most of these need regular updating from the DENR field units (Caancan, et. al. 2013). These databases are useful for randomly sampling or aggregating activity data and emission factors at the LRFMU level. In addition , the Forest Economics Division manages the Forest Information System (FIS), which FIS contains data on resource users in forest lands under Industrial Forest Management Agreements (IFMAs), Community-Based Forest Management Agreements (CBFMAs), and Socialized Industrial Forest Management Agreements (SIFMAs). The Reforestation Division maintains a database of reforestation projects and the National Greening Program (NGP). The Natural Forest Management Division maintains the national forest resources inventory data, transport permits, wood processing plants, and wood confiscation records.

DENR/PAWB maintains and manages forestry data in protected areas (PAs). Annex 2 contains a sample table showing forest classification data in Cordillera Administrative Region (CAR) from Protected Area and Wildlife Bureau (PAWB). The forest cover and land use types have been disaggregated by region and protected area (PA). There are also ongoing efforts to put each of the protected areas in NAMRIA's environment and natural resources (ENR) database. Protected Area-based activity data may be estimated based on the 2003 and the 2010 land and forest cover data sets, which used similar forest type classifications and definition (Annex 3). Changes in each forest type in a protected area by region were calculated using the initial and unofficial NAMRIA 2010 land and forest cover. In protected areas, the Cordillera region, the area of closed canopy of broadleaved forests declined by38% and coniferous forests by 68% (Annex 2). Emission factors from the 2002-2004 FRI data can be used to estimate the REL (BAU) for each protected area.

The NCIP is responsible for compiling and managing information on the holders of certificates of ancestral domain titles (CADTs). However, land and forest cover in these domains have not been fully included in a central database, except for those with completed ancestral domain sustainable development and protection plans (ADSDPP). There are now 4.3 million hectares in CADT areas

(Annex 4). A significant amount of forests (approximately 10.3%) and non-forest areas are located in the ancestral lands. Moreover, most CADT areas overlap with protected areas, CBFMAs, mineral lands, and alienable and disposable lands. Together with Protected Areas, CADTs are emerging as major Land and Forest Resource Management Units for addressing REDD+ in the Philippines.

To build a comprehensive forestry database, DENR Region 11 has developed a GIS-based integration of all LFRMUs based on the 2003 land and forest cover (Annex 5). However, the Land and forest cover in each LFRMU, need to be ground-validated and updated. The Region 11 forestry database provides a good model for governance-oriented REDD+ implementation since land and forest cover data are broken down by LFRMU, city or municipality, and province. To provide support to the LFRMUs Concerned DENR Community and Environment and Natural Resources Offices (CENROs) and Provincial Environment and Natural Resources Offices (PENROs) can use the LFRMU data to design collaborative efforts with the NCIP and reservation holders, in partnership with the Local Government Units (LGUs). This information is also helpful for efforts to enforce forestry rules, especially curbing illegal forest extraction in closed and open canopy natural forests to reduce carbon leakages at the LGU and LFRMU levels. Using the 2003 and 2010 land and forest cover data, regions may generate land and forest cover data per LFRMU, by LGU, and province to estimate changes in land and forest cover between 2003 and 2010.

6. DATA ON FOREST COVER, FOREST INVENTORY AND CARBON STUDIES

For REDD+ purposes, the redefined forest classifications in the 2003 land and forest cover data (FRA 2010) are currently in use (DENR MC 2005). These forest classifications were also adopted by NAMRIA for interpretation of the 2010 land and forest cover imageries.

In 2002-2004, the FAO-assisted National Forest Resource Assessment (FRA) carried out a Forest Resource Inventory (FRI) using the redefined forest classification and definitions validate the 2003 land and forest cover data from NAMRIA. Calibrations were done against the 1988 Forest Management Bureau (FMB) - Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) Forest Resource Inventory (FRI) Project and the 2002-2004 FRI because the forest classification and definitions differed for the two inventories. The calibrated results showed that the area of closed canopy forests and other wooded lands did not decline between 1988 and 2003, except for the category of "other lands" which decreased (Annex 6).

Another categorization of land and forest cover types produced a different result. Using the USAID EcoGov Project categories of land and forest cover types from 2005 (Annex 6) and the 1988 and 2003 data on land and forest cover, there was a major decrease in closed canopy forest cover and an increase in marginal lands, mangrove forests, and built up areas (Annex 7). A comparison of the 1988 and 2003 land and forest cover for Mindanao (Annex 8) showed a major decrease in closed and open canopy forests, cultivated areas, and marshlands.

Due to the different definitions, inadequacy of ground validation of the 2003 land cover and forest type, and comparability of the calibrated data, the estimated changes in land cover and forest types between 1988 and 2003 are problematic as a basis for determining activity data and historical emissions. [1] However, the 2003 land and forest cover data can be compared with the 2010 land and forest cover data because the Landsat imagery interpretations used the same forest classification and definitions. This will allow initial estimates of activity data.

Table 2 contains estimates for above-ground woody biomass in various types of forests in 2002-2004 FRI data may be used in estimating biomass stocks (FAO 2005). The Forest Resource Assessment (FRA) in 2010 used the IPCC default values and guidelines from the FAO National Forest Assessment (NFA). The FRA data may be used as a benchmark for project or sub-national level forest inventories for estimating carbon estimates. A Deutsche Gesellschaft für Internationale Zusammenarbeit (GiZ) project in Leyte found that the calibrated FRA result of 195 m^3/ha of bole volume in natural broad-leafed forests is higher compared with the average bole volume of 180 m^3/ha ((Ignacio 2013, FAO 2010). [2] The GiZ Project also reported that the average above-ground tree biomass in Leyte island was 255 cubic meter per ha (equivalent to 127.4 tons of carbon/ha) ad tree carbon accounted for 96.7% of all forest carbon.

[1] FMB stated that the 2002-2004 NFI work provided adequate ground validation of the 2003 land and forest cover from NAMRIA.

[2] "Bole" refers to the "stem or trunk of a tree of size sufficient to yield lumber, veneer or poles" (FMB and ITTO, 2006)

Table 2. Aboveground Woody Biomass by Land Use From the 2003-2004 National Forest Inventory (tons/ha)

Land Use	Volume Over Bark (VOB) (m^3/ha)	Above-Ground (tons/ha)
1. Forest	174.22	240.93
2. Other wooded land	21.99	86.67
3. Other lands	20.01	82.72
4. Inland water	4.99	41.66

Source: (NFA 2005)

The ongoing REDD+ pilots of Flora and Fauna International (FFI) in General Nakar, Quezon, and Victoria-Anepahan Mountain Range, Palawan will also be excellent sources of carbon emission estimates. These pilots used stratified systematic sampling based on forest cover, elevation, rainfall, and temperature and soil types (De Alban and Monzon 2013).

Lasco and Pulhin (2003) estimated carbon stock and mean annual increments (MAI) per hectare of different forest types. This compilation has been useful in estimating net carbon stock changes (Tables 3 and 4). The forest classification in these tables was based on the 1988 forest types.[3] This could explain why the average carbon estimates per hectare in natural forests (protection and secondary forests) were almost double the estimates from the GiZ Project in Leyte and the 2002-2004 FRI/FRA data (FAO 2005). With the Lasco and Pulhin (2003) estimates, it is necessary to recategorize the forest types, especially for estimating carbon changes based on the activity data that were derived from the 2003-2010 land and forest cover. Camacho et.al. (2011) estimated tree biomass and carbon stock of a community-managed mangrove forest in Bohol, Philippines. They found that 40-year old mangrove plantations had the largest carbon density (at least 370 tons/ha), followed by 15-year old mangrove plantations which had a density of 208 tons/ha, and natural stand with a density of 145 tons/ha.

Table 3. Above Ground Biomass and Carbon Density of Forest and Land Cover in the Philippines

Philippine Forest Ecosystem	Carbon Content, %	Biomass, t/ha	Carbon, t/ha	Location	Average carbon ton/ha
A. Protection Forests					
1. Old growth	50.0	370-520	165-260		212.5
2. Mossy	45.0	408.5	183.3	Makiling	183.3
3. Pine	48.8	184.6	90.1	Baguio	90.1
4. Sub-marginal			0.0		
5. Mangrove	44.0	401.8	176.8	Quezon	176.8
B. Secondary Forest					214.28
	45.0	672.8	305.5	Makiling	
	45.0	262.0	117.9	Mindanao	
	44.0	547.0	240.7	Makiling	
	44.7	446.0	199.4	Leyte	

[3] In the 1988 data, forest was defined as "land with an area of more than 1.0 hectare and tree crown cover (or equivalent stocking level) of more than 10 percent." In 2003, forest was defined as "a land area of more than 0.5 hectares with tree crown cover (or equivalent stocking level) of more than 10 percent" (FAO/FRA 2010).

	44.5	465.9	207.9		
C. Brushlands	45.1	63.8	29.0	Leyte	29.0
D. Tree Plantations-(mean)	45.0	132.3	59.0		59.0
E. Grasslands (mean)	42.9	28.5	12.1		12.1
F. Agroforestry-mean		102.8	45.4		45.4

Source: (Lasco and Pulhin 2003)

Table 4. Mean Annual Increment of Above-Ground Biomass and Carbon in the Philippines

Philippine Forest Ecosystem	Age(Years)	Biomass mean annual increments MAI) ((t/ha)	Carbon mean annual increments (MAI) (t/ha)	Location	Average
A. Protection Forests	Rd	ND	ND		
B. Secondary Forests	Rd	2.1	0.9	Leyte	
	Rd	4.9	1.19	Mindanao	
Mean		3.5	1.1		1.1
C. Brushlands		9.5	4.3	Leyte	4.3
D. Tree Plantations (mean)		9.1	4.2		4.2
E. Grasslands(mean)		ND	ND		
F. Agroforestry (mean)		10.6	5.3	Cebu	5.3

Source: (Lasco and Pulhin 2003)

Data for Estimating RL and REL and MRV at the Sub-National Level

Table 5 summarizes available forestry data in the Philippines for estimating the RL and REL and setting up an MRV plan at the sub-national and national levels. A close examination of the available forestry data in view of REDD+ requirements reveals that there are gaps that will have to be intentionally addressed by upcoming projects and activities.

The 2002-2004 FRI studies concluded that the Philippines has the initial forestry data to estimate country-specific carbon stocks from above ground biomass. There is, however, a paucity of carbon estimates from the other pools – below ground, litter, deadwood, and soil. The FRA (2010) used IPCC default values for estimating carbon stocks from the other pools. Estimating below ground biomass for even a few samples is tedious and destructive. Allometric equations, which describe the relationship of one part of a plant to another part of a plant, were calculated based on DBH measurements from forest inventories may be generated to reflect geographic variability, rainfall, forest types, and elevation. The allometric equations may be correlated with randomly sampled trees during the conduct of forest inventories to determine carbon from below ground biomass, litter, and soil. In the absence of estimates from the other pools, IPCC default values or estimates from other Asian countries with similar agro-climatic conditions may be used, such as (below ground biomass estimates of mangroves in Malaysia and Indonesia(Komiya, Ong and Poungparn 2007).

For Tier 1, and possibly Tier 2, estimates of carbon factors, the 2002-2004 FRI data may be used at the province level. These estimates may be further refined as new information becomes available, especially from the ongoing pilots (GiZ in Leyte, FFI in General Nakar, Quezon and Palawan) that with forest inventory activities to develop an MRV system. The national FRI system only had a 0.0026% intensity and may have to consider the use of stratified sampling (FAO 2005). Based on an initial assessment, this sampling intensity will not result in accurate measures of emission factors. An analysis of sampling variances from previous national forest inventories may help in determining the sampling sizes. It could

also be the basis for increasing intensity of samples to meet the requirements of Tier 3 carbon factor estimates (Coroza, et.al. 2013; Concepcion, et.al, 2013; USFS 2013). To allow for repeated measures of sampling units or tracts over time, especially for biodiversity, LRFMUs must be encouraged to protect the areas where sampling units were set up. Modification of the FRA forest resource inventory will require additional resources from the government, donors, or REDD+ implementers.

Available forestry statistics are incomplete on the removals from the various forest types and LFRMUs. The Philippines has a ban on removals of timber from all natural forests. Holders of community and industrial forest management agreements have been adversely affected by this ban and wood processors have had difficulty to source their raw material requirements. LFRMUs are expected to protect and manage the remaining natural forests within their jurisdictions. Illegal harvesting and encroachment are common in most LFRMUs with extensive natural forests, especially those in protected areas, ancestral domains, and community forestry areas. Communities have foregone revenues and depend on volunteers to protect and manage their tenured areas. Communities need additional resources to conserve their remaining natural forests.

The policy only allows harvesting from planted forests to meet increasing demand for round wood and woodfuels. Forest plantations outside the government's past reforestation areas, including those in private lands, have responded to the demand. The Philippines Wood Products Association (PWPA 2013) estimated the demand for industrial wood at2.0 million cubic meters and woodfuels at 40 million cubic meters annually. At least 0.74 million cubic meters of round wood have come from forest plantations in country. Imports only supplied 0.56 million cubic meters of roundwood, leaving 0.7 million cubic meters from unaccounted sources. Woodfuel consumption has come from local sources. To reduce this leakage, changes may be needed in enforcement ability, policies, technical assistance, financing and incentives for LFRMUs and tree farm and forest plantation development and protection.

Table 5. Summary of available forestry data and information in the Philippines

REDD+ Requirement	Available Forestry Data and Information	Comments/Remarks
1. Definitions of forest types and land cover	2003 definitions of different land cover/forest type used by National Forest Assessment in 2002-2004 (Mendoza, et. al. 2010; FRA 2010) and NAMRIA forest cover in 2003 (Annex 1)	• The same definitions of land cover/forest type were used for the NAMRIA forest cover mapping in 2010 • The 1988 definitions are significantly different from the 2003 definitions (FRA 2010, DENR/FMB 1988) • The different forest types and land cover fall under the categories of: 1) forests converted to other uses, 2) forests remaining as forest, and 3) other land uses converted to forests.
2. Definitions of pools and greenhouse gases	FRA 2010 estimated carbon stocks of different forest types and cover (above and below ground biomass, litter, deadwood, and soils) using stock volume data from the NFI (FRA 2010) and IPCC default values. Other country-specific estimates may be used (Lasco and Pulhin, 2003) Camacho et. al. 2011 and Ignacio 2013).	• More accurate estimates of carbon stocks (above and below ground, litter, deadwood, and soils) are needed for the various land cover and forest types in each region • Allometric equations for estimating carbon stocks using data on DBH from previous national forest inventories need modification. Ongoing REDD+ pilots (GiZ Project in Leyte and f FFI in General Nakar, Quezon and Palawan) may also develop allometric equations based on the results of their forest inventories.
3. Time period for emission estimates	• Land and forest cover maps in 2003 (FMB 2003) and 2010 (near completion by NAMRIA) used the	• The 2010 land and forest cover map is not yet officially released pending the completion of several provinces. It is expected to be released before the

	same forest classification types and definitions. However, inadequate ground validation B and clear image processing documentation affect the validity of the 2003 land and forest cover data (Santos 2013). • Land and forest cover in 1998 based on 1987 SPOT images and RP-GTZ FRI Project • The Mindanao Mapping Project in 2004 t used different definitions of forest types and land uses that could be calibrated with the 1988 and 2003 forest cover maps (EcoGov Project 2005)	end of 2013. Definitions of forest types and land cover are significantly different between the 1988 and 2033 forest cover maps. The Mindanao Mapping Project of the EcoGov Project in 2004 used different definitions for calibrating the 1988 and 2003 forest types and land cover. • Although three time periods are ideal for determining emission estimates (especially activity data), the 1988 definitions of forest types and land cover are not comparable to those for 2003 and 2010; , even with calibration (FRA 2010, EcoGov 2005). • Due to issues with the 2003 land and forest data, they can only be compared to the 2010 data for the purpose of initial estimates of historical carbon emissions over of the seven-year period.
4. Estimation of carbon stocks	• Initial activity data by types of land cover and forest type will be determined from the 2003 and 2010 land and forest cover data (when the 2010 map is available) • Use of the National Forest Inventory system to revisit 70+ tracts of the 2002-2004 FAO-FMB FRA tracts for carrying out the forest inventory for revising allometric tables may improve estimates of carbon stocks. • Carbon stock estimates of different forest types and land cover have been done by Lasco and Pulhin (2003) and the GiZ Project in Southern Leyte IPCC default values can be used for other carbon pools – below ground, litter, deadwood, and soils	• NAMRIA's ground validation of the 2010 forest cover work is expected to improve estimates of changes in forest types and land cover in selected locations. • Improvements are needed in national and region-specific allometric equations for estimating carbon stocks. • Issues have been raised on stratification, sampling intensity, sample size, replicability of measurements in sampling plots, inclusion of other forest types, and biodiversity measures in the 2002-2004 NFI/FRA (Corosa, 2013).
5. Estimation of forest area converted to other land uses	• Activity data estimates comparing forest types and land cover from the 2003 and 2010 NAMRIA satellite imagery maps. • Forest conversion to other land uses may be estimated from completed or approved municipal forest land use plans, Protected Area Management Plans, and River Basin Master Plans. This approach was used by the GiZ Project in Leyte for DENR regions 2, 6, 7, 8, 9, 11 and 12, where FLUPs have been completed.	• The Mindanao Mapping Project (EcoGov Project 2005) funded by USAID may be used in Mindanao to triangulate forest cover changes in closed and open canopy forests, other wooded lands, and plantations on Mindanao.
6. Establishment of trends in forest conversion	• Trends in forest conversion may be estimated from the 2003 and 2010 forest cover map, especially in regions with extensive forest cover -- Regions 2, 3, CAR, 4b, 8, and 13. Urbanization, encroachments, high value agriculture, and woodfuel	• Trends in forest conversion vary by region and province. • Forest conversions have been major in areas of access road construction. For example, the Marikina-Infanta Highway in Rizal and Quezon provinces has exposed the remaining highly diverse natural forests in the Southern Sierra

	demand are threatening remaining forests in Regions 4a, 3, 11, 12, 6, and 10. Threats from approved FLUPs need to be confirmed through ground validation by DENR field units with local government units and civil society groups (ADMU 2011).	Madre range. Otehr examples include the improved access road from Nueva Ecija to Aurora Province and the road from Nueva Vizcaya to Benguet.
7. Estimation ng of forest degradation	• Activity data estimates from the 2003 and 2010 changes in forest types, especially the reduction of closed canopy forests transitioning into open canopy and other wood lands categories	• Only 20% of tenured areas have formally approved forest management plans (FRA 2010). Most protected areas (PAs) are underfunded (Molinyawe 2012). Only a small proportion of the 4.3 million hectares of Certificate of Ancestral Domain Titles or Claims (CADTs/Cs) have approved ancestral domain sustainable development plan (ADSDPPs) and are under effective management (Botengan and Quicho 2013). As a result, forest degradation is continuing in LRFMUs that may be considered "de-facto open access." The extent of degraded forests in each LRFMU is difficult to determine from land and forest cover maps. Ground validation is needed in each LRFMU.
8. Estimation of emission factors for forest degradation	• Use of the stock volume estimates of the National Forest Inventory (NFI) data from 2002-2004 combined with sub-national inventories carried out by the GiZ Project in Southern Leyte, Lasco and Pulhin (2003), IPCC default values, and other sub-national inventories (Forests and Fauna International work in Quezon and Palawan provinces) (Corosa 2013).	• Emission factors for degradation of forests remaining as forest may be extrapolated from the NFI data at the national level and local inventories, and default values at the sub-national level.

Source: Adapted from Meridian, 2011.

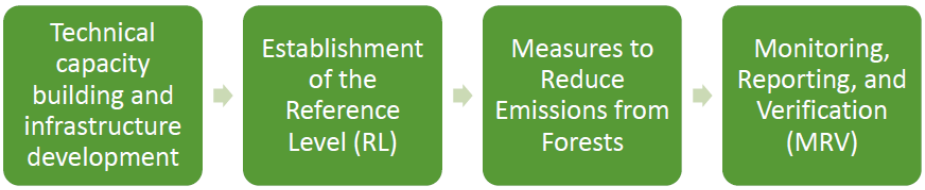
The most useful forestry data for REDD+ implementation comes from the 2003 and 2010 land and forest cover data (despite issues with the 2003 data), the carbon stock estimates of the National Forest Inventory (NFI) from 2002-2004, and REDD+- studies. These limited data offer opportunities to estimate activity data and emission factors of different forest types and land cover based on consistent definitions. The 2002-2004 (FAO 2005) may be used for estimating carbon stock changes as well as results of studies (Lasco and Pulhin 2003, Camacho, et. al. 2013, and Delaney 1999), estimates from the GiZ Project on REDD+ in Southern Leyte, and measurements of other ongoing projects, such as those of FFI in Quezon and Palawan and Conservation International-Philippines in Quirino (Corosa 2013, Ignacio 2013).

In addition to the NAMRIA data, the GiZ Project and FFI pilots were able to access more recent coverage of Landsat images in estimating activity data. These projects are also carrying out forest inventories that could be useful for REDD+ MRV requirements and assessing biodiversity. Initial estimates of activity data and emission factors in Southern Leyte, Palawan, and Quezon combined with default values, NFI data (FRA 2010), and Lasco and Pulhin (2003) may be useful in estimating RLs for Southern Leyte, Palawan, and Quezon.

There are technical guides for determining initial RLs/RELs using available forestry data in the Philippines (IPCC 2003, GOFC-GOLD 2012, Meridian 2011, Petrova, et.al. 2010, Winrock 2009, UN-REDD

Programme in Asia and the Pacific, Climate Focus and Forest Trends 2011, Winrock/LEAF 2012, Harvey, et.al. 2010). Figure 2 shows how a national REDD+ program may be developed. The guides may help in estimating RL and REL at the sub-national level. The methods in the guides may be followed by estimation of country-specific activity data and emission factors from different land and forest covers, estimate the baseline RL, and even set targets for carbon reduction.

Figure 2. Steps for national REDD+ program development



Source: (Winrock/LEAF 2012)

7. GOVERNANCE OF REDD+ PROGRAMS

Environmental governance refers to the means by which society determines and acts on goals and priorities, including the formal and informal rules that affect decision-making processes, decisions, and human behavior (IUCN). These are also the rules, practices, policies, and institutions that shape humans interactions with the environment (UNEP).

In the Philippines, the governance of REDD+ programs is affected by customs and traditions of communities and (a) statutory issuances -- the 1987 Constitution, laws, orders, Presidential Decrees (PDs), Presidential Proclamations (PPs), Executive Orders (EOs), and Department Administrative Orders (DAOs); (b) . This governance

1. Defines responsibility, accountability, authority (RAAs) for planning and implementation of REDD+ programs, including the generation, updating, management, storage, analysis, reporting, analysis, and dissemination of forestry data; and
2. Guides choices, decisions, actions (CDAs) of governance-designated entities s to plan, implement, monitor, evaluate, finance, and report on REDD+ activities.

The major statutes governing the REDD+ programs are the: 1) Climate Change Act for overall direction, oversight, coordination, monitoring, evaluation, and reporting to international bodies, 2) specific ENR and land laws and policies that cover land use change and forestry, 3) the Local Government Code, and (4) Indigenous Peoples Right Act (IPRA) . Table 6 shows the various laws, policies, rules, and regulations that may y affect choices, decisions, and REDD+ actions.

The Climate Change Commission (CCC) is the lead agency in this area. It can confirm DENR as the lead for the National Multi-Stakeholder REDD-plus Council (NMRC) -- the primary implementation and coordinating body on REDD-plus in the Philippines. The membership of NMRC will come from the Climate Change Office, Forest Management Bureau (FMB), Protected Areas and Wildlife Bureau (PAWB), and Ecosystems Research and Development Bureau (ERDB) within DENR, as well as NAMRIA, NCIP, and DOE.

The NMRC may use the National REDD+ Strategy (PNRPS) to guide planning and implementation. Good governance in REDD+ programs implies transparent, accountable, and participatory (TAP) processes in making choices, decisions, and actions (CDAs). These principles apply in generating, managing, updating, and reporting land and forest cover data, results of national forest inventories, determination of RL and REL, adoption of C reduction targets, and reporting results of MRVs.

Before 1987, all forest lands were under the responsibility, accountability and authority of DENR. The 1987 Constitution split management responsibilities for different land categories environment and natural resources. Table 6 summarizes the legal authority for different types of public domain land--alienable and disposable lands (A&D), forest/timber lands, national parks/protected areas, and mineral lands. Ancestral land claims and titles may be awarded to indigenous populations under the Indigenous People's Right Act (IPRA) of 1997. These ancestral lands may be found in A&D lands, forest/timber lands, protected areas/national parks, or mineral lands. In the Philippines, REDD+ covers forests and land cover in the public domain–publicly-held A&D areas that have not yet been alienated, timber/forest lands, national parks and other protected areas, and, and mineral lands. Agriculture may be carried out in the alienated lands.

Table 6. Governance of the Environment and Natural Resources (and Lands of Public Domain

Agricultural	Timber or Forestlands	Protected Areas (Including Initial Component and Coastal Areas)	Mineral Lands
• The Public Land Act • Comprehensive Agrarian Reform Law • Agricultural and Fisheries Modernization Act • Fisheries Code	• Revised Forestry Code • Executive Order (EO) on Community-Based Forestry Management • EO on Sustainable Forest Management • Forest Charges Law • Electricity Power Industry Reform Act • EO Banning Logging in Natural Forests • EO on the National Greening Program	• The National Integrated Protected Area Systems Act • Specific laws covering protected areas • Wildlife Act • International Commitments • Electricity Power Industry Reform Act • Joint Memo Circular between DENR-Department of Agrarian Reform and National Council on Indigenous Peoples • EO on the National Greening Program	• Mining Act • Small Scale Mining Act
Indigenous Peoples Right Act (IPRA Law)			
Cross Cutting Laws – EO on the Creation of DENR, Local Government Code, Climate Change Act, Environmental Impact System, Disaster Risk and Reduction Management Law, Ecological Solid Waste Management Act, Biofuels and Renewable Energy Act, Clean Water Act, Clean Air Act			

Source: ENRMP 2013

The change of governance configuration over land and forests over the years has resulted in the designation of several national agencies with RAAs over these areas. The key players are now the DENR, National Commission on Indigenous Peoples (NCIP), Department of Energy with the Energy Development Corporation (EDC) for the geothermal reservations and various watersheds of hydro-electric generation, and Department of Agriculture/National Irrigation Administration (NIA) for the watersheds of national irrigation systems. These agencies have to collaborate and support the LGUs in assisting the various LFRMUs to reduce emissions at the provincial, city or municipal, and land and resource management unit levels.

The total land area of the Philippines is roughly 30 million hectares. There are 15 million ha of public domain land. There are over 14 million ha of agricultural land (47% of the total area). Table 7 lists the entities responsible for governance of these lands-. The dominant governance-designated entities for REDD+ are 1) DENR for protected areas and watershed reservations in collaboration with DOE and 2) NIA for holders of community forestry tenure and ancestral domain titles or certificates, and forest lands under co-production management agreements with the private sector. These areas have the most remaining natural forests (closed and open canopy) and areas open for reforestation or agroforestry.

Table 7. Governance-Designated Entities for REDD+

Allocation of Lands in the Philippines	Governance-Designated Land and Forest Resource Management Units (LFRMUs)	Percent of Public Domain Land
1. Protected areas and reservations	DENR and other government agencies (DOE, DA/NIA, local water utilities)	26% (over 4million ha
2. Civil and military reserves	Military, public universities, export processing zones	2%
3. Local government units (LGUs)	Communal forests, communal watersheds and co-managed forestlands with local government units	Minimal
4. Community forestry and ancestral domains	Communities with community-based forest management agreements (CBFMAs), IPs with certificate of ancestral domain titles (CADTs) and recognition of ancestral domain claims	35% (over 5.5 million ha)
5. Industrial forest lands	Private tenure holders in forest lands (industrial forest management agreements, socialized industrial forest management agreements, other tenure systems)	10% (over1.5 million ha)

6. Unallocated lands of the public domain	DENR (as the de-facto agency with RAA)	19% (over 3 million ha) of 15 million ha of land of the public domains
7. Unclassified lands of the public domain	DENR (as the de-facto agency with RAA)	8% (over 1 million ha)
8. Agricultural lands (which may be alienated)	Holders of private land titles	

Source: Extrapolated from DENR/FMB (2011).

The public domain lands (including ancestral lands) are under the political jurisdiction of a city, municipality, or province. Forests and the public domain lands are also under the RAA of various land and forest management units (LFRMUs), except for areas not covered by any tenure, protected areas, ancestral domain claims, or reservations. Programs and investments in these areas are covered by the EIA law, EO 192, Clean Water Act, Clean Air Act, Biofuels and Renewable Energy Act, and Ecological Solid Waste Management Act. Although emissions from existing forests, carbon stock enhancement in degraded areas, and carbon sequestration occur at the LFRMU level, the net reduced emissions are the RAA of the local, provincial, and national agencies. Emission reduction is under the oversight, guidance, technical support, and enforcement measures of the local government unit, DENR field units, NCIP regional offices, DOE, and DA/NIA.

NAMRIA, attached to DENR, created under DENR Department Administrative Order (DAO) 31, is the national mapping agency. It has an important role in Landsat images and remote sensing and serving as a repository of various land and forest cover data useful for REDD+ implementation.

CCC has the key mandate for REDD+ under the Climate Change Act. It should accelerate creation of National REDD+ Multi-Stakeholders Council (NRMC) and a provincial REDD+ oversight body in each of the sub-national pilots to improve and monitor governance systems. REDD+ oversight bodies at the sub-national level will oversee and coordinate implementation with the DENR, NCIP, and DOE as ensure that sub-national RLs, RELs, and MRVs are developed, adopted, and implemented based on sound, disaggregated forestry data that are REDD+-compliant.

The CCC has to rely on DENR, and NCIP, DOE, and Department of Interior and Local Governments (DILG), and LGUs in supporting LFRMU REDD+ initiatives. Currently, DENR with NAMRIA and DOE are farthest along in generating and managing REDD+-compliant data (Corosa 2013). As a young organization, NCIP needs a lot of capacity development support to improve its "readiness" to incorporate and embed REDD+ in the protection, conservation, management, and development of the ancestral domain areas (Annex 3).

The CCC needs to take a strategic leadership role in REDD+ implementation through the NMRC, especially in coordination, data generation and management, and support to the DENR and NCIP. The DENR and NCIP have critical implementation roles in the remaining forests, degraded forests, and non-forested areas in public domain lands. The CCC should involve the Department of Agriculture (DA) in REDD+ implementation since its commodity road map for crops has direct and indirect impact on agricultural expansion in forests.

In CADT areas, the DENR's main regulatory role in ancestral domains is only in issuing resource use rights. LGUs play a crucial role as they have the power to enforce zoning regimes within their boundaries. The participation and buy-in of LGUs are needed to prevent conversion of forests into other uses, promote greening and rehabilitation of degraded areas, and secure communal forests and sub-watersheds. LGUs can also choose to invest their public funds in roads or other development projects that may accelerate forest conversion or provide incentives for REDD+ (e.g., livelihoods for the marginalized upland communities).

A sustainable system that can generate and manage forestry data based on the subsidiarity principle can help ensure that the national REDD+ program is based on sound, robust, verifiable, transparent, and consistent information. Figure 3 shows the design for a functional REDD+-compliant forestry data system in the Philippines. Figure 4 illustrates how the data will facilitate CCC reporting to the UNFCCC.

Forestry data generation, storage, updating, initial analysis, management, use, and dissemination should start at the LFRMU level, with support from field units of the DENR, NCIP, and LGUs. This process is not yet well established.

Availability of the forest and land cover maps for 2003 and 2010 will help improve the land and forest cover database of LFRMUs that have digitized, boundaries combined with ground validation. At the DENR field unit level, these data can guide the planning and programming of support for enforcement, protection, and conservation efforts and allocation of NGP resources to priority sites. A database will also help identify overlaps in tenured areas among various LFRMUs.

Figure 3. A Governance-Oriented REDD+-Compliant Forestry Data in the Philippines

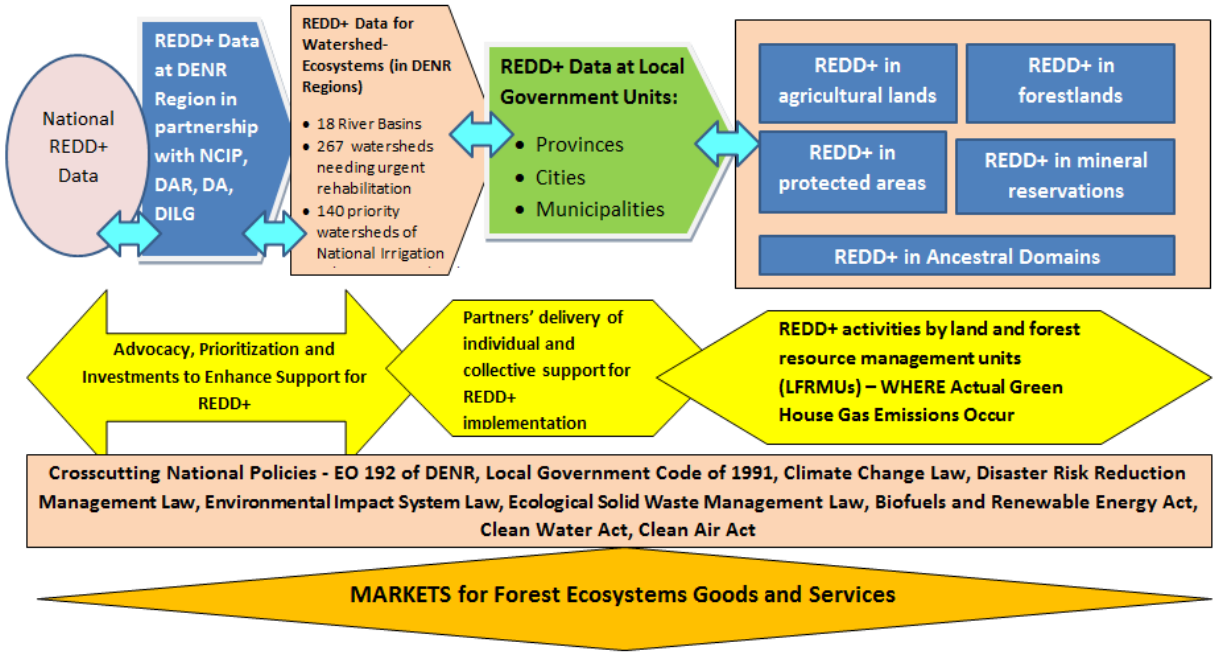
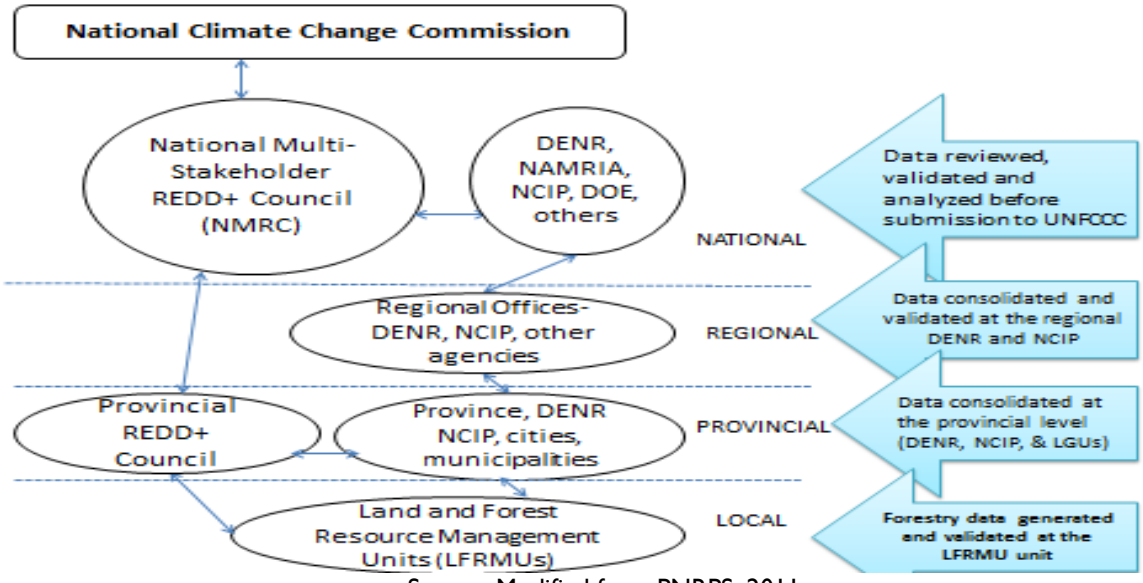


Figure 4. Land and Forest Resource Management Unit Forestry Data in Support of REDD+ Implementation



Source: Modified from PNRPS, 2011.

Since available land and forest cover data are only disaggregated by province and not governance-designated entity, they do not support REDD+ strategies at the LFRMU level, where carbon emissions occur. Due to the large area of forests in ancestral domains, protected areas, community-based forestry, and various energy and watershed reservations in different LGUs, forestry data should be disaggregated by both LGU and LFRMU. The establishment of LFRMU-based processes for collecting, updating, managing, analyzing, and reporting forestry data will be a major step toward REDD+ implementation.

A governance-oriented REDD+ database may be started with available data from DENR (FMB and PAWB), NCIP, and NAMRIA. The NFI/FRA work in 2002-2004 and data emerging from the implementation of donor-funded REDD+ pilots could be re-configured toward a LFRMU-based system.

The FMB has started its LFRMU-based Forestry Information System (FIS). However, the FIS only covers tenured areas in forest lands. It has not received adequate support for updating tenure-based data that could be useful for REDD+. LFRMU-based REDD+ forestry data can help in monitor land and forest cover data and facilitating ground validation of satellite imagery. The system will also be important in monitoring the permanence of stored carbon and occurrence of leakages under different incentive, support, and enforcement structures.

DENR's Region 11 has initiated the development of its forestry database by province, municipality, city, and by LFRMU (Annex 5). This region has even identified and delineated the overlaps between the CADT/CADC areas with PAs, watershed reservations, CBFMAs, and IFMAs. However, the forest and land cover types under each of the LFRMUs have not yet been updated or verified through ground validation, reconnaissance surveys, and consultations with forest/resource managers. Region 11 still has to update its forest information system (FIS) that incorporates data on NGP-supported rehabilitation, agro-forestry, and reforestation activities, including approved removals and land use change within the LFRMUs. With minimal improvement, DENR Region 11's forest database may help facilitate REDD+ implementation in Davao del Sur, North Cotabato, Davao Oriental, and Davao City. As Davao City

expands, the adjoining provinces with the remaining natural forests will be under increasing threats for conversion to other land uses.

DENR and Negros Occidental have supported the piloting of integrated ecosystems approach in Bago River Watershed with support from the World Bank/Environment and Natural Resources Project of the Global Environmental Facility (WB/ENRMP/GEF). This project produced a forestry database that could be used to demonstrate the benefits of REDD+ implementation in a watershed that supports over 15,000 hectares of irrigated rice lands, provides ideal agro-climatic conditions for growing high value cash and perennial crops, enhances ecotourism and biodiversity conservation in two protected areas, mangroves and bird sanctuary.

Region-wide and watershed-based forestry databases in DENR Region 11 and Negros Occidental, demonstrate local initiatives in partnership with LGUs, NGOs, donors, and the LFRMUs. These forestry databases can help anchor MRV plans with the actual sources of carbon emissions, the LFRMUs, and those governance-designated units that could provide support for REDD+ implementation including the alignment of NGP investments, priorities for conservation and protection, and formulating other ENR related programs.

REDD+ for Climate Change Resiliency in Highly Diverse Watershed-Dominated Landscapes

Over 70% of the national land area is contains diverse, watershed-dominated landscapes. There are 18 major river basins 140 priority watersheds, and 267 critical watersheds that support major facilities for irrigation, domestic water supply, energy generation, recreation, and water transport systems (PDP 2011; NCI 2012). Increased implementation of REDD+ projects with robust data collection may encourage local stakeholder buy-in I because of the potential benefits of the information. Improved forestry data are useful in planning and managing integrated management of watersheds, ecosystems, and land resources. Benefits from REDD+ activities should be weighed against the loss of forest cover from deforestation and degradation in sub-watersheds where the effects of landslides and flooding downstream are most damaging. REDD+-compliant forestry data should also include information on the additional benefits of biodiversity conservation, sustainable fisheries in mangroves and coastal areas, ecotourism, generation of local revenues from natural resources, and poverty alleviation. Given the inter-dependence of the various ecosystems over a ridge to reef landscape, REDD+ projects as stated in the PNRPS should be linked with the planning and implementation of integrated ecosystem management strategies. Furthermore, co-benefits should be incorporated in planning processes and explained to local stakeholders to help ensure buy-in and contribute to the sustainable supply of ecosystems services, biodiversity conservation, resiliency of ecosystems and communities, and disaster risk reduction.

REDD+ programs that are not linked to integrated ecosystem management of watersheds might not serve the interests of local stakeholders. Communities, local government units, and the private sector will not immediately adopt REDD+ as a strategy. REDD+ will need to be communicated as an important means to "mitigate and reduce the risks from natural disasters, sustain livelihoods that are based on highly diverse ecosystems, ensure water supply for domestic use and irrigation, and open opportunities for generating local revenues from user's fee systems." Communicating this message and substantiating it with data are not currently being done by DENR and NCIP. To link REDD+ with climate change resiliency of ecosystems and communities and their livelihoods, estimates of initial RL and REL are needed for the 27 provinces highly vulnerable to the impacts of climate change, especially for landslides and flooding (USAID/ADMU 2011). Research will also be important to understand the dynamics of resiliency investments over the short term and long term.

The provinces that have major jurisdiction over the 140 priority watersheds should participate in discussion on the more than 1.5 million hectares of irrigated rice lands (NIA 2011). The RL and REL vary with land use change and forest policies and actions affecting watershed management, biodiversity, ecotourism, and reduction of risks and damages from natural disasters. The RL can also inform DENR, local government units, and donors about priority investments for protection, rehabilitation, reforestation, agroforestry, enforcement, and social safety nets for marginalized communities.

Watershed-based RL and REL could help DENR align its National Greening Program (NGP) to leverage co-financing for REDD+ activities with LGUs, private sector, non-government organizations, and donors to accelerate investments in reforestation, rehabilitation of degraded areas through assisted natural regeneration, agroforestry, fuel wood establishment, and tree farming. For example, the NGP could partner with the LGUs, NGOs, private sector, and community tenure holders (LRFMUs) to establish tree farms and woodfuel lots in grasslands and brush lands. With the RL and REL, the LGUs, DENR, NGOs, private sector, and the LRFMUs can formulate and jointly adopt REDD+ strategies to achieve the target emission reductions s.

Some current opportunities to develop REDD+ forestry data exist for integrated ecosystems management (IEM) planning and implementation. The GIZ Project in Southern Leyte has started aligning its REDD+ program with IEM at the watershed level. The USAID-supported B+WISER Project will use an IEM approach h in working with DENR and LGUs to conserve biodiversity, implement REDD+ activities, improve environmental governance, improve resiliency of ecosystems and communities, and work with LGUs on land use planning for climate adaptation. The Japan International Cooperation Agency (JICA)-funded Forest Management Project (FMP) of DENR and the Asian Development Bank (ADB)-supported Integrated Natural Resources and Environmental Management (INREM) Project are supporting reforestation, rehabilitation, livelihoods, and infrastructure to increase the resiliency of watersheds and nearby communities.

8. KEY FINDINGS AND RECOMMENDATIONS

KEY FINDINGS AND ISSUES WITH AVAILABLE FORESTRY DATA

Some forestry data are available for starting REDD+ planning and implementation, but there are gaps and inadequacies in forest and land cover data at the national and sub-national levels. Deforestation rates have been estimated for policy advocacy, curbing illegal logging, and setting priorities for forest protection investments (Walpole 2010, ESSC 1999, Kummer 1992).

Recently, the Technical Working Group (TWG) on MRV under the UN-REDD+ Program in the Philippines discussed issues with the NAMRIA 2003 land and forest cover data, sampling intensity of the national forest inventory system, and development and implementation of MRVs because of their dependence on Landsat images or remote-sensing for "activity data" and national forest inventories for "emission factors."

For the existing forestry database in the Philippines to be REDD+ compliant, major improvements are needed to meet the rigorous requirements of the IPCC and PNRPS. The forestry data will also need to be reconfigured to meet the needs of governance-designated institutions at the national and local levels to guide policies and programs of the LFRMUs. To interest the province, city or municipality, LFRMUs, and the private sector, the REDD+-compliant forestry data will have to be linked to on- and off-site benefits.

Changes in Land and Forest Cover

The recently-released 2010 data from NAMRIA allow comparisons of changes in land and forest cover between 2003 and 2010.

NAMRIA used the same land and forest cover types and definitions for interpretation, processing, and ground validation in 2003 and 2010. Nevertheless, there are issues with the 2003 data due to inadequate ground validation and funding constraints for completion of the clear image processing (Santos 2013). Despite these issues, it is still possible to compare the 2003 and 2010 data. Forest carbon emissions can be estimated from the land and forest area changes (activity data) and deforestation rates over the seven-year period. However, the 1988 land and forest cover data cannot be compared with the 2003 and 2010 data unless calibrated to correct for differences in definitions. FMB used the 2002-2004 NFI data to validate the 2003 land and forest cover. With allowance for lower level of accuracy, historical emissions over a period of seven years could still be estimated and used as starting points for the RL and REL for REDD+ programs.

Estimating Emission Factors and the National Forest Inventory System

Emission factors can be estimated from the 2002-2004 NFI/FRA data, IPCC default values, and carbon stock estimates of natural forests and some planted species. However, there are insufficient data on the supply and demand for roundwood and wood fuels by region and province. Data on harvesting rates (removals) for roundwood and woodfuels, especially from natural forests are incomplete and do not disaggregate legal and illegal removals. Removals from planted forests within and outside forest lands are reported in the Philippines Forestry Statistics (DENR/FMB 2011).

Corosa et.al. (2013) reviewed the pros and cons of different techniques and designs for pilot MRV systems for REDD+. The accuracy of allometric tables and equations for estimating carbon pools in different forest types and land cover in the Philippines needs improvement. Current carbon stock estimates have been based on above ground stock volume using 2002-2004 NFI/FRA data and IPCC default values (NFA 2005). Allometric equations can be improved through forest inventories of ongoing pilots or at the national level. They allometric equations should reflect the variability of carbon pools in different biogeographic regions and ecosystems.

An initial review and evaluation of sampling methods used for the 2002-2004 NFI/FRA date revealed that the importance of to improving accuracy and reducing variances (USFS 2013, Branthomme, et. al 2002).Technical improvements in the use of remote sensing data can allow modification of the sampling design in the national forest inventory system to increase the accuracy of estimating emission factors and activities. The Philippines could move toward Tier 3 estimates of emission factors by using stratified sampling for national and sub-national forest inventories may be sharpened with use of stratification of land and forest cover in order to capture variability and improve accuracy of estimates.

Ongoing Pilot Projects for Improving Capacity for REDD+ Planning and Implementation

The Philippines has the technical, institutional, and legal capacity at the provincial, regional, and national levels to plan and implement REDD+ programs. NAMRI and DENR, and other national and regional public and private institutions have been involved in most of the key components of REDD+ planning and implementation, especially land and forest cover mapping and the national forest inventory. Further capacity development is needed in database generation and management, estimating RLs and RELs, setting target emission reductions at the sub-national level, developing a MRV system, arriving at consensus of the target reduction emission, developing strategies to meet the target, strengthening local governance to provide oversight, implement safeguards and incentives.

Several ongoing REDD+ projects are focused on strengthening local and national capacities to plan and implement REDD+. the REDD+ projects of GiZ in Southern Leyte, FFI in General Nakar, Quezon and Palawan, and the USAID-supported Biodiversity and Watersheds Improved for Stronger Economy and Ecosystem Resilience (B+WISER) Project. The UN-REDD office in the Philippines has focused its recent efforts on improving REDD+ readiness. Several orientation, training, and assessment activities were carried out with the REDD+ Technical Working Group. These efforts will continue generating "lessons learned" on estimating activity data and designing and conducting forest inventories for MRV systems at the sub-national level. Pilots are supporting 1) procurement, interpretation, and analysis of satellite images on forest and land cove, 2) improved forest inventory systems with stratification for more robust sampling and linking to remote sensing, and 3) consolidation and reporting of MRV results (Corosa 2012 and 2013, USFS 2013).

These pilots are expected to identify issues in financing procurement, interpretation, and processing of to remote sensing data, periodic national forest inventories, and the participation of LFRMUs, biodiversity measurement of, and ground validation of land and forest cover down to the LFRMU level. The pilots may also generate lessons for improving REDD+ databases, forest inventories, and MRV systems and replication and scaling up of REDD+ implementation at the sub-national level.

Disaggregation of Land and Forest Cover and National Forest Inventory Data

Available forestry data are not currently disaggregated by governance-designated entity at the national, regional, provincial, watershed, and LFRMU levels. As a result, the data are inadequate for oversight, management, support, and enforcement of agreements on emission reductions at the sub-national level because it is difficult to pinpoint responsibility, accountability, and authority (RAA) for emission

reductions. Disaggregation of REDD+-related forestry data by province, DENR field unit, and LFRMU is needed, especially on land and forest cover, forestry inventories, carbon emissions, removals by source, and investments. Disaggregated data can facilitate estimations of RLs and RELs, emission reduction targets, MRV design, and establishment of local REDD+ governance bodies and planning and implementation at the sub-national level.

Disaggregation of LFRMU areas under the RAA of the Forest Management Bureau (FMB), Protected Areas and Wildlife Bureau (PAWB), and National Commission on Indigenous Peoples (NCIP) will help facilitate database development and management and REDD+ implementation at the sub-national and national levels. The NCIP has not yet completed compiling forest and land cover data on the 4.3 million CADTs under its mandate. To do this, NCIP needs a capacity support in organizing a REDD+ compliant forestry database. Through the FMB, PAWB, ERDB, and NAMRIA support, the DENR can move forward on data disaggregation and updating to make its forestry database REDD+ compliant.

To date, there has been limited experience in disaggregating forestry data at the province and LFRMU levels. Subsidiarity in reporting data on changes in land and forest cover, deforestation and removal rates, and inventory results is not the usual practice. Forest management has only become a major activity in LFRMUs with protected areas, ancestral domains, community forestry, and energy or watershed reservations over the last 15-20 years. The governance of land and forest resources has been changed from a single agency, the FMB, to include the PAWB, NCIP, DOE, and DA/NIA.

Existing d land and forest cover data are not disaggregated by watershed- basin, sub-basin, or sub-watershed, or island groups and key biodiversity areas. The available forestry data on watersheds are fragmented as they resulted from various donor-funded initiatives. The FMB only includes land and forest cover data in characterizing watersheds. The available forestry data are not linked to local stakeholders – the LGUs, LFRMUs, private sector, and downstream communities benefiting from forest goods and services. This poses a challenge for improving the REDD+-compliant forest database in the Philippines. Effective participation of local stakeholders in REDD+ depends on the ability to understand and obtain the benefits over the short-, medium-, and long-term.

RECOMMENDATIONS

The CCC needs to improve its guidelines for oversight, coordination, collaboration, data generation and management. It will also need to define responsibilities, accountability, planning and implementation arrangements, and reporting systems for REDD+ at the national and sub-national levels with the NRMRC and the not yet formally created provincial REDD+ Councils. The roles of CCC vis-à-vis DENR (FMB and PAWB), NCIP, DA, DILG, and DOE should be clarified. The members of the CCC can issue a resolution or order on an inter-agency and multi-sectoral approach to REDD+.

The responsibility, accountability, and authority (RAA) of provinces, DENR and NCIP field unit, cities and municipalities in piloting REDD+ at the sub-national level should be clarified and formalized through joint issuance of a CCC administrative order or circular. Otherwise, the REDD+ pilots at the sub-national level will simply be the efforts of the "coalition of the willing." A joint CCC, DILG, and DENR circular may be issued designating DENR regional offices to partner with the provincial government in REDD+. Other governance arrangements may be tested during the pilot phase.

Existing Forestry Data and REDD+ Pilots at the Sub-National Level

Existing forestry data can starting points for moving forward with REDD+ implementation in the Philippines, despite the data gaps and issues. The 2003 and 2010 land and forest cover data can be combined with 2002-2004 NFI results to estimate initial RLs and RELs and develop MRVs at the sub-national level. These estimates can be substantiated by ongoing donor- and NGO-supported projects. However, an institutional mechanism for replication and scaling up the lessons learned and incorporating them into national policies remains to be established.

The CCC should, promote replication of REDD+ pilots at the sub-national level through the NMRCRL AND REL. This could start with the ongoing projects of GIZ in Southern Leyte, FFI in Palawan and Quezon province, and B+WISER. Other pilots may also be targeted consistent with CCC and PNRPS action plans. The pilots may carry out the following activities:

1. **Estimate initial RL** based on 2003 and 2010 land and forest cover activity data (for estimating historical forest carbon emissions);
2. **Determine RELs with REDD implementation**;
3. , **Estimate feasible target emission reductions** for 5 years from the RLs and RELs and **2002-2004 NFI carbon stock estimates** and default values;
4. **Establish provincial REDD+ councils** for each pilot through the CCC**;**
5. **Assess current programs and formulate future programs** to achieve the forest C reduction target;
6. **Modify** target emission reductions, if necessary;
7. **Agree on the MRV methods** for comparability with other pilots;
8. **Create the Provincial REDD+ Councils**
9. **Facilitate adoption of target emission reductions** with proposed MRV method and strategies of the Provincial REDD+ Council;
10. **Facilitate preparation of work and financial plans by each governance-designated unit and LRFRMU** responsible for emission reduction targets;
11. **Develop and pilot test governance-based REDD+ database generation, updating, analysis, and management** at various levels (LFRMU, city or municipality, province, DENR, NCIP, watershed, region);
12. **Accredit third party certifiers** of achieved emission reductions at the sub-national level or regional level; and
13. **Document lessons learned and refine approaches**, as needed.

The GiZ Project in Southern Leyte, FFI initiatives in Quezon and Palawan, and some of the sites of USAID-funded B+WISER can demonstrate the process of setting up RLs and RELs. Lessons learned from these pilot can improve the technical requirements and governance processes of REDD+ and the generation, updating, analysis, and management of forestry data by the LFRMUs, LGUs, DENR field units, NCIP, NAMRIA, and DENR bureaus.

Support for Pilot Sub-National REDD+ Initiatives

To facilitate the sub-national piloting of REDD+ implementation and the local buy-in of LGUs and LFRMUs, the National Multi-Stakeholder REDD+ Council (NMRC) should be created to lead and facilitate orientation, discussion, and adoption of the RL and REL and targeted emission reductions. Donor -support should be requested for creating the NMRC, facilitating agreement for collaborative implementation in the pilots, and conducting o orientations and training. The NMRC may designate the DENR to take the lead on pilot activities.

The pilots may be directed to develop cost-effective, IPPC-compliant methods to meet technical requirements. These pilots can also improve the efficiency and effectiveness of REDD+-related processes may be made effective and efficient over time. Capacity development is needed for estimating RLs, RELs, (and target emission reductions; facilitating a common understanding of REDD+ implementation; consensus building among stakeholders; and adopting the target as the basis of formulating plans and programs for activities that will reduce emissions over time.

To maximize joint learning and capacity development, the DENR and NCIP field units and LGUs can jointly implement the donor-funded pilots in assisting, capacitating, and directing the LFRMUs to reduce their emissions. This will allow the LGUs, and DENR and NCIP field units can participate in developing, setting-up, collecting, updating, analyzing, managing, and uploading consolidated REDD+-compliant forest data (figure 3 and 4).

Collaborative efforts are needed in formalization of stakeholders' commitments through MOAs (e.g., between CCC, DENR, NCIP, provincial governor, cities, municipalities, and other concerned national agencies that have the RAAs to ensure effective oversight and support for RED+ implementation.

The pilots may help the provinces drafting and advocating a unified provincial ordinance for adopting the RL AND REL emission reduction targets and the MRV system. They can assist the provincial REDD+ Councils as the appropriate local governance bodies for coordinating and facilitating REDD+ implementation at the sub-national level. The pilots may help the Council advocate for the emission reduction targets with the MRV plan incorporated in the Provincial Development Plan (PDP), LGUs comprehensive development plans (CDPs), DENR's Programs, Activities, and Projects (PAPs), and LFRMUs operational plans.

In addition, the pilots can advocate for the approved RLs and RELs, MRV system, and policies and providing support and incentives for the LFRMUs. The local DENR, NCIP, other national agencies, LGUs, and private sector may need to incorporate the target emission reductions in their plan to the LFRMUs. REDD+ baseline and target emission reductions may be considered in programming NGP activities within the DENR. This would include– not just in the massive efforts to reforest, rehabilitate, and establish commodity road maps but also to protect and conserve and restore remaining natural forests with LFRMUs. REDD+ implementation should encourage the active participation of ENR enterprises and industries to provide support for livelihoods, reduction of risks and damages from landslides and flooding, and investments to increase ecotourism activities and coastal fisheries.

Forestry Data Improvement

Philippines REDD+ forestry data should continue to need improvements and refinements. Existing and proposed REDD+ pilots at the sub-national level can assist in developing and updating the database system in generating estimates of RL and REL, reduction emission targets, and MRVs especially from available land and forest cover data, forest inventories, and ground validation results.

1. Seek the active participation of LFRMUs and LGUs in addition to the DENR field unit LGUs in the ground validation of future land and forest cover data. Preparation for this kind of approach should be considered for the next 2014-2015 assessment of land and forest cover. The participation of LGUs and LFRMUs will help provide a local context in setting up the 100 validation points per province that used by NAMRIA for the 2010 land and forest cover. Estimates.

2. NAMRIA may explore the cost and capacity requirements of transitioning to remote sensing for estimating future land and forest cover more accurately and improving the links between changes in land and forest cover with national forest inventories. National or sub-national forest inventories should incorporate stratified sampling to improve homogeneity of the sampling area, increase sampling intensity based on acceptable variance, and make arrangements (if possible) with LFRMUs or LGUs to allow repeated measures of the sampling units.

3. Development of allometric equations based on DBH (from forest inventories) and destructive sampling of below ground biomass at several sites and determining carbon stock of other pools (litter, deadwood, and soil).

4. DENR and NAMRIA should continue expanding their data generation and management systems and disaggregate land and forest cover data by major basins and sub-watersheds, protected areas, cities, and municipalities. The 2003 and 2010 land and forest cover data are already disaggregated by province. The DENR regions and NCIP field units should develop the capacity for disaggregating the data by LFRMUs. In future national forest inventories, FMB should plan to disaggregate volume and carbon stock estimates by province.

<u>Forestry Data Management</u>

Governance-based REDD+ implementation at the provincial level requires sound management of forestry data to facilitate agreements on implementation arrangements, build consensus on emission reduction, and MRV activities. A sound data management system can support analysis of new or updated targets activity data and emission factor estimates RL and REL. The sub-national pilots are expected to d improve forestry data management of for greater accuracy in estimates and reporting.

High complexity of managing forests and land uses in ancestral lands and lands of the public domain requires national data managed by DENR (with approvals from the CCC/NMRA) with the active participation of NAMRIA, NCIP, DOE, and DA/NIA. A disaggregated, governance-oriented database system will have to be set up for management, decision making, and reporting purposes (figures 3 and 4). REDD+ forestry data for the regions and provinces should be disaggregated by governance-designated entity (DENR NCIP and other national agencies with RAAs on reservations) to delineate the institutions and LGUs that will help LFRMUs reduce their emissions.

The CCC (through the NMRC) should ask DENR, NCIP, and provincial governments to develop and maintain existing forestry databases. REDD+ data) should be disaggregated as listed below:

1. By Governance-Designated Agency (DENR/FMB, DENR/PAWB, NCIP, and other agencies),
2. By DENR region and PENRO,

3. By province city and municipality),
4. By major basin, watershed, and protected areas (as basis for local buy-in and eco-benefits of local stakeholders), and
5. By LFRMU in each province and region.

The generation, updating, analysis, and management of disaggregated REDD+-compliant forestry data will continue to require capacity building, hardware, training, and policy support for the CCC, DENR, NCIP, and the field units involved in the sub-national REDD+ pilots.

At the national level, DENR should coordinate a central REDD+ forestry database (with the support of CCC through a resolution of the NRMC) with the active participation of the NCIP, DOE, and DA/NIA. This central database should include periodic land and forest cover data from NAMRIA, the results of national forest inventories, REDD+ registry, reports and updates of REDD+ sub-national pilots, analysis and reports to the provincial REDD+ Councils, and minutes and decisions of the NMRC. It should also contain all the reports of the reviews and recommendations of NMRC to CCC.

Disaggregation of the land and forest cover data and national forest inventory results by governance-designated entity, major watershed-ecosystem, by province, and LFRMU will help make REDD+ implementation relevant at the local and national levels. The Philippines has good potential to can link REDD+ to biodiversity conservation, sustainable forest management, tree farming, payments for ecosystems services, reduced risks from natural disasters, and improved resiliency of communities. The country does not have huge emissions from land use and forestry, but has a good ability to demonstrate innovative models, practices, approaches and processes.

Within DENR, PAWB should set up a centralized system for REDD+ data on all tenured forest lands for all PAs and FMB. However, FMB should coordinate this process because of its existing infrastructure and capacity. Its current FIS can serve as the starting point for establishing a REDD+ registry that would eventually include LFRMUs. The FMB can build its FIS into a REDD+ registry for all participating LFRMUs in the sub-national pilots. This can be expanded to eventually include the PAs, CADTs, and reservations.

The establishment and expansion of existing databases into a centralized REDD+ forestry data will require capacity development support for the NCIP and DENR field units and central offices (PAWB, and FMB). Through NMRC, the CCC should seek donor support to develop the REDD+ forestry database for each governance-designated entity as well as the centralized system. Technical assistance s A governance-oriented, LFRMU-based, and REDD+ compliant forestry data system will have to be set up in the DENR and NCIP field units, each province, and region for consolidation and analysis. Each region will need to upload its summarized REDD+ forestry data to the national level central database.

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10. ANNEXES

ANNEX 1. SOURCES OF FORESTRY STATISTICS AND INVENTORIES (USAID/AILEG PROJECT, 2013)

National Forestry Statistics: National forestry statistics have been published by the Forest Management Bureau since the 1960s. Many of these statistics were based on simple linear projections and extrapolations from the 1965-1969 inventory. In the 1980s, more complex projection models were used to generate forestry statistics based on the 1988 RP-German forest inventory. From 1998 onward, FMB stopped making projections to generate forestry statistics, although annual forestry statistics continued to be produced with the caveat that the data published were from 1998.

First National Forest Inventory: The first national inventory was done in 1965-1969. Documentation for this inventory is scanty. The inventory apparently used 1:15,000 scale aerial photographs, which allowed detailed mapping of the different forest categories and segregation into several levels. The inventory included only forestlands, not A&D lands. The sampling design and specific definition of forests used for this inventory are not known.

Second National Forest Inventory: From 1979 to 1983, FAO initiated efforts to conduct a national inventory in the Philippines. Regions 10 and 11 were inventoried using systematically distributed clusters of strip samples. This effort was later continued in 1983 by the RP-German Forest Resource Inventory Project adopting a two-stage inventory design using aerial photographs and satellite images. The project produced stand and stock data of the forest from 1983 to 1988, using forest inventory data collected. The inventory included both forestlands and A&D lands.

This inventory was used as the basis for submitting a national forest cover report to the Global Forest Resources Assessment of FAO for 1990, 1995, and 2000 using simple extrapolation procedures as recommended by FAO.

The forest definition used in this inventory is a little different from the one used in the third national inventory described below. The threshold definitions of forests for canopy cover and heights of vegetation are similar. The difference is mainly in the minimum area to be considered forest: 1 hectare for the RP-German project and 0.5 hectare for the FRA inventory.

Third National Forest Inventory: This is the 2003 FRA inventory mentioned in Section 5. In this inventory, FMB assumed the responsibility of re-defining the national FRI forest classifications, taking into consideration international standards. It essentially adopted the FAO categories used by the Philippines/FAO-assisted National FRA Project. Forest in this inventory was defined as referring to lands with an area of more than 0.5 hectare and tree crown (or equivalent stocking level) of more than 10 percent, and where trees should be able to reach a minimum height of 5 m at maturity in situ. Efforts were made to reconcile the results of the second and third inventories. The inventories yielded different estimates of forest cover because of the differences in the definition of forests, and also the classification or categories of land use. To provide a common estimate of forest cover, the two forest inventories were reconciled.

Similarly, NAMRIA and FMB have embarked on an entirely new joint undertaking, with NAMRIA acquiring and combining remotely sensed data, particularly 2000–2003 Landsat ETM images for the country. NAMRIA was tasked to undertake image interpretation, mapping, and statistics generation. To assess accuracy of the mapping process conducted by NAMRIA, the forest inventory plots of FMB's FRA

project were overlaid with the land cover maps. This was done by comparing map interpretation with the results of the FRA field sample plots established in various regions of the country. The level of accuracy of the image interpretation was tested and found to be 91 percent. Combining the 2003 FRA estimates with the NAMRIA forest cover maps allowed FMB to make its forest inventory estimate spatial (i.e., the estimates can now be mapped in addition to providing tabular estimates).

Other Forestry Data Compilation: ESSC, in partnership with, and with funding from, the Philippine Tropical Forest Conservation Fund, initially agreed to perform an analysis of Philippine forest cover. One objective of this activity was to generate data providing an acceptable and relatively accurate identification of upland cover for the Philippines for the period 2000–2002. ESSC analyzed remotely sensed data using Landsat ETM+ (2000–2002). In the process, ESSC identified and defined the upland cover of the Philippines based on readily available Landsat satellite imagery for the period 2000–2002; produced a comprehensive documentation of the process undertaken to arrive at the output; and developed map outputs and the estimated forest cover estimates for 2002 (ESSC 2002).

ESSC's estimate for 2002 was about 21.7 percent forest cover, while FMB-DENR's estimate for the same year was at 24.4 percent forest cover. This reflects both a slowing down in the rate of deforestation and a diversification in forest degradation. For FMB-DENR, both primary and secondary (closed and open canopy) forest had slightly declined since 1987, while pine forest--along with plantations--had significantly increased to close the gap. The results also show that forest cover had not changed greatly in the last 20 to 25 years, but the type of forest did, particularly in the southern parts of the country (e.g., Cotabato, Davao, Maguindano, Davao del Sur, Basilan, and Zamboanga).

ANNEX 2. DEFINITIONS OF FOREST TYPES AND LAND COVER

National class	Definition
Total area	Total area (of country), including area under inland water bodies, but excluding offshore territorial waters.
Forest	Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares (ha).
Broadleaved forest	Forest with predominance (more than 75 percent of tree crown cover) of trees of broadleaved species.
Coniferous forest	Forest with predominance (more than 75 percent of tree crown cover) of trees of coniferous species.
Bamboo/palms formations	Forest on which more than 75% of the crown cover consists of tree species other than coniferous or broadleaved species (e.g. tree-form species of the bamboo, palm and fern families).
Mixed forest	Forest in which neither coniferous, nor broadleaved, nor palms, bamboos, account for more than 75 percent of the tree crown cover.
Open forest (10-<40%)	Formations where trees form a discontinuous layer covering between 10 to 40 percent of ground. This forest usually includes a continuous grass layer allowing grazing activities and the spreading of fires. (Examples are the different types of «cerrado» and «chaco» in Latin America, wooded savannas and woodlands in Africa).
Closed forest (≥ 40%)	Natural forest where trees in the various storeys and undergrowth cover 40 percent of the ground. These formations do not; have a continuous dense grass layer. They are either managed or unmanaged forests primary or in an advanced state of reconstitution and may have been logged-over one or more times, having kept their characteristics of forest stands, possibly with modified structure and composition. Typical examples of tropical closed forest formations include tropical rain forest and mangrove forest .
Forest plantation	Forest stands established by planting or/and seeding in the process of afforestation or reforestation. They are either of introduced species (all planted stands), or intensively managed stands of indigenous species, which meet all the following criteria: one or two species at plantation, even age class, regular spacing.
Open broad-leaved forest plantation (10-<40%)	Forest plantation where the crown cover is between 10 and 40 percent of the area.
Closed broad-leaved forest plantation (≥ 40%)	Forest plantation where the crown cover is above or 40 percent of the area.
Other wooded land	Land either with a crown cover (or equivalent stocking level) of 5-10 percent of trees able to reach a height of 5 m at maturity *in situ*; or a crown cover (or equivalent stocking level) of more than 10 percent of trees not able to reach a height of 5 m at maturity *in situ* (e.g. dwarf or stunted trees); or with shrub or bush cover of more than 10 percent.
Shrubs	Refers to vegetation types where the dominant woody elements are shrubs i.e. woody perennial plants, generally of more than 0.5 m and less than 5 m in height on maturity and without a definite crown. The height limits for trees and shrubs should be interpreted with flexibility, particularly the minimum tree and maximum shrub height, which may vary between 5 and 7 meters approximately.
Fallow	It encompasses forest fallow where the woody vegetation is under 5 m. Height. It refers to woody vegetation deriving from the clearing of natural forest for shifting agriculture. It is part of a forest fallow consisting of a mosaic of various reconstitution phases. The vegetation does not reach a height of 5 m.
Wooded grasslands (5-<10%)	Land where the trees cover between 5 to 10 percent of the area and their height may reach 5 m at maturity.
Other land	Land not classified as forest or other wooded land, as described above. Including cultivated land, grasslands and pastures, built-up areas, barren land etc.
Inland water	Area occupied by major rivers, lakes and reservoirs.

Source: Mendoza, et. al. 2010

ANNEX 3. FOREST CLASSIFICATION IN PROTECTED AREAS

Cordillera Administrative Region	2010			Cordillera Administrative Region	2003			Difference
Forest Types		**Forest Types**		**Forest Types**				
Closed forest, broadleaved			7,066	Closed forest, broadleaved			11,576	(4,509)
	Balbalasang-Balbalan	4,871			Balbalasang-Balbalan	7,990		-
	Mt. Pulag NP	1,972			Mt. Pulag NP	2,975		-
	Upper Agno River Basin RR	224			Upper Agno River Basin RR	611		-
Closed forest, coniferous			3,656	Closed forest, coniferous			11,541	(7,886)
	Balbalasang-Balbalan	126			Balbalasang-Balbalan	5,927		-
	Lower Agno	38			Lower Agno	128		-
	Mt. Pulag NP	1,258						-
	Upper Agno River Basin RR	2,234			Mt. Pulag NP	1,731		-
					Upper Agno River Basin RR	3,571		-
Closed forest, mixed			2,314	Closed forest, mixed			528	1,786
	Balbalasang-Balbalan	2,304						-
	Upper Agno River Basin RR	10			Upper Agno River Basin RR	528		-
Forest plantation, broadleaved			527	Forest plantation, broadleaved			6,854	(6,327)
	Lower Agno	527			Lower Agno	3,493		-
					Mt. Data NP	0		-
					Upper Agno River Basin RR	3,360		-
Inland water			3,168	Inland water			1,377	1,791
	Balbalasang-Balbalan	73						-
	Lower Agno	1,606			Lower Agno	355		-
	Mt. Data NP	15						-
	Mt. Pulag NP	31						-
	Upper Agno River Basin RR	1,444			Upper Agno River Basin RR	1,022		-
Open forest, broadleaved			19,024	Open forest, broadleaved			10,442	8,582
	Balbalasang-Balbalan	6,565			Balbalasang-Balbalan	943		-
	Lower Agno	2,188			Lower Agno	1,695		-
	Mt. Data NP	34						-
	Mt. Pulag NP	5,472			Mt. Pulag NP	4,333		-
	Upper Agno River Basin RR	4,765			Upper Agno River Basin RR	3,471		-
Open forest, coniferous			49,356	Open forest, coniferous			43,151	6,205
	Balbalasang-Balbalan	4,113			Balbalasang-Balbalan	3,123		-
	Lower Agno	9,491			Lower Agno	9,401		-
	Mt. Data NP	551			Mt. Data NP	708		-
	Mt. Pulag NP	2,162			Mt. Pulag NP	1,266		-
	Upper Agno River Basin RR	33,039			Upper Agno River Basin RR	28,654		-
Open forest, mixed			2,876	Open forest, mixed			2,291	585

	Balbalasang-Balbalan	775						-
	Cassmata Hill NP	50						-
	Lower Agno	1,963			Lower Agno	1,800		-
	Upper Agno River Basin RR	88			Upper Agno River Basin RR	491		-
Other land, built-up area			1,222	Other land, built-up area			2,901	(1,679)
	Balbalasang-Balbalan	4						-
	Cassmata Hill NP	3			Cassmata Hill NP	0		-
	Lower Agno	718			Lower Agno	665		-
	Mt. Data NP	30			Mt. Data NP	152		-
	Mt. Pulag NP	69			Mt. Pulag NP	139		-
	Upper Agno River Basin RR	398			Upper Agno River Basin RR	1,945		-
Other land, cultivated, annual crop			17,842	Other land, cultivated, annual crop			10,606	7,236
	Balbalasang-Balbalan	845			Balbalasang-Balbalan	119		-
	Cassmata Hill NP	3			Cassmata Hill NP	6		-
	Lower Agno	102			Lower Agno	415		-
	Mt. Data NP	2,249			Mt. Data NP	166		-
	Mt. Pulag NP	669			Mt. Pulag NP	109		-
	Upper Agno River Basin RR	13,974			Upper Agno River Basin RR	9,792		-
Other land, natural, barren land			821	Other land, natural, barren land			580	241
	Balbalasang-Balbalan	33			Lower Agno	528		-
	Lower Agno	506			Upper Agno River Basin RR	52		-
	Upper Agno River Basin RR	281						-
Other land, natural, grassland			10,443	Other land, natural, grassland			4,279	6,164
	Balbalasang-Balbalan	453						-
	Lower Agno	4,436			Lower Agno	2,027		-
	Mt. Data NP	37						-
	Mt. Pulag NP	348						-
	Upper Agno River Basin RR	5,170			Upper Agno River Basin RR	2,252		-
Other wooded land, fallow			48					48
	Balbalasang-Balbalan	48						-
Other wooded land, shrubs			6,067	Other wooded land, shrubs			19,373	(13,306)
	Balbalasang-Balbalan	2,195			Balbalasang-Balbalan	4,311		-
					Cassmata Hill NP	49		-
	Lower Agno	1,722			Lower Agno	3,753		-
	Mt. Data NP	678			Mt. Data NP	2,495		-
	Mt. Pulag NP	103			Mt. Pulag NP	2,345		-
	Upper Agno River Basin RR	1,368			Upper Agno River Basin RR	6,420		-
Other wooded land, wooded grassland			33,938	Other wooded land, wooded grassland			32,869	1,069

Source: Based on 2003 and on Initial and Unofficial NAMRIA 2010 Land and Forest Cover Data in Cordillera Administrative (DENR/PAWB 2013) Region (CAR)

ANNEX 4. ANCESTRAL DOMAIN AREAS IN THE PHILIPPINES (HECTARES)

REGION	CADT		CADT Area		CADT IP Population		ADSDPP		ADSDPP Area		AD IP Population		ADSDPP With CADT	
	No	%	Ha	%	No	%	No	%	Ha	%	No	%	No	%
CAR	20	12.7	340,999.8	7.9	266,610	29.0	28	32.2	546,678	28.4	299,785	45.8	17	33.3
I	6	3.8	37,365.1	0.9	27,075	10.5	4	4.6	35,902	1.9	9,551	1.5	3	5.9
II	11	7.0	970,969.6	22.6	53,238	5.8	10	11.5	277,985	14.4	44,851	6.9	3	5.9
III	12	7.6	133,559.5	3.1	19,594	2.1	10	11.5	60,517	3.1	19,408	3.0	5	9.8
IV-A	21	13.3	865,159.7	20.1	69,938	7.6	2	2.3	6,145	0.3	3,013	0.5	2	3.9
IV-B	8	5.1	41,787.5	1.0	21,811	2.4	3	3.4	19,208	1.0	12,122	1.9	2	3.9
V	5	3.2	20,399.3	0.5	7,625	0.8	2	2.3	10,407	0.5	5,230	0.8	2	3.9
VI	11	7.0	142,853.2	3.3	41,760	4.5	4	4.6	115,497	6.0	57,705	8.8	1	2.0
VII	16	10.1	242,986.2	5.6	57,315	6.2	7	8.0	149,954	7.8	35,631	5.4	5	9.8
VIII	14	8.9	634,363.2	14.7	131,516	14.3	9	10.3	476,599	24.8	123,535	18.9	5	9.8
IX	14	8.9	377,584.7	8.8	148,826	16.2	2	2.3	49,387	2.6	20,529	3.1	2	3.9
X	20	12.7	496,437.1	11.5	73,187	8.0	6	6.9	176,936	9.2	23,211	3.5	4	7.8
XI	158	100.0	4,304,464.9	100.0	918,495	100.0	87	100.0	1,925,221	100.0	654,571	100.0	51	100.0

Source: National Commission on Indigenous Peoples data as of 2012. Botengan and Quicho 2013

ANNEX 5. TENURE AND VEGETATIVE COVER OF REGION XI

LOCATION	Type of Tenure	Vegetative Land Cover (GIS-generated)						TOTAL
		Closed Canopy Forest	Open Canopy Forest	Brushland/ Grassland	Cultivated	Forest Plantation (broadleaved)	Mangrove	
PROVINCE OF DAVAO ORIENTAL								
A. Municipality of Boston							-	
1. Boston Mandaya Tribe	CBFMA	488	1,639	1,377	142			3,646
2. Boston Mandaya Cultural Community	CADT	3,459	10,538	5,183	8			19,189
B. Municipality of Cateel								-
1. CFP-Taytayan Multi-Purpose Coop.	CBFMA	72	101	525	295			993
2. Caidjan farmers Assn Developers	CBFMA		9	67				75
3. La Fortuna Mahogany, Inc.	IFMA	25	3,355	168	350			3,898
4. Aliwagwag Protected Landscape	NIPAS	4,958	3,246	3,008	235			11,447
C. Municipality of Baganga								-
1. Campawan Upland Farmers Assn	CBFMA			38	24			62
2. Campawan Agro-Forestry Dvt.	CBFMA	2,295	653	956	241			4,145
3. Mandaya Tribal Council of Mahan-ub	CBFMA	2,036	2,902	1	11			4,950
4. Binondo Upland Farmers Coop	CBFMA	1,317	1,568	1,249	48			4,182
5. Mandaya Tribe	CADT	7	707	199	928			1,841
6. La Fortuna Mahogany, Inc.	IFMA	155	666	1,569				2,391
7. North Camarines Lumber Company, Inc.	IFMA	489	52		46			586
8. William Te	IFMA	2	194	6	123			324
9. Benito Mesina	IFMA		43	188	96			328
10. Matuguina Integrated Wood Products, Inc.	IFMA	1,913	4,090	2,212	4,337			12,553
11. Baganga Protected Landscape	NIPAS						1,614	1,614
D. Municipality of Caraga								-
1. Lamiawan Forest Developers Multi-Purpose Coop	CBFMA	346	849	826	870			2,890
2. Bantulinao Palma Gil Farmers Assn	CBFMA	71	44	78	126			318
3. Palma Gil Tree Planters Assn	CBFMA				446			446
4. Sobrecarey Mandaya Community Assn, Inc	CBFMA		735	1,816				2,551
5. Malibago Tree Planters Coop	CBFMA			43	12			54
6. Caningag Multi-Purpose Farmers Coop	CBFMA	51	243		9			303
7. Mandaya Tribe	CADT	1,341	4,790	6,533	49			12,712
8. Matuguina Integrated Wood Products, Inc.	IFMA	1,702	3,347	4,005	6,091			15,145
9. Asian Evergreen Development Inc.	IFMA	198	4,514	2,502	81			7,294
10. Mt. Tagub-Kampalili Protected Landscape	NIPAS	1,789	6,367	4,434	420			13,010
11. Civil Reservation	CR		1,105	21				1,126
E. Municipality of Manay								-
1. Capasnan Developers Coop	CBFMA			67	245			311
2. Bactinan Tree Planters Assn	CBFMA			24				24
3. Abon Tree Planters Assn	CBFMA			1	85			86
4. Topsfield Inc.	IFMA	735	4,311	859	24			5,929

5. Calfolks, Incorporated	IFMA			348	1,743			2,091
6. Elmo G. Dayanghirang	IFMA			60	46			106
7. Mt. Tagub-Kampalili Protected Landscape	NIPAS	203	2,424	2,282	137			5,046
F. Municipality of Tarragona								-
1. Ugbo Tarragona Multi-Purpose Coop.	CBFMA	115	254	33	2,072			2,474
2. Limot MandayaTribal Multi-Purpose Coop.	CBFMA	1,710	2,246	1,936	150			6,044
3. Kadayawan ng Mandaya sa Tarragona	CBFMA			171	86			257
G. City of Mati								-
1. Cabuaya Community Forest Multi-Purpose Coop.	CBFMA	678	690	2,440	902			4,709
2. Macambol Community Cooperative	CBFMA	423	583					1,007
3. Asia Pulp & Paper Industry Manufacturers, Inc.	IFMA	3,368		741				4,109
4. Mount Hamiguitan Range Wildlife Sanctuary	NIPAS	1,053	4					1,057
5. Key Biodiversity Area / Critical Habitat	NIPAS	1,686	244	855	8			2,793
6. Mati Protected Landscape	Proc Wshed				857			857
H. Municipality of Governor Generoso								-
1. Evergreen Tree Planters Assn of Tandang Sora	CBFMA	835	2,281					3,116
2. Oregon Farmers Multi-Purpose Coop	CBFMA	473	282	2,241	54			3,050
3. Mount Hamiguitan Range Wildlife Sanctuary	NIPAS	722	879	209				1,810
4. Key Biodiversity Area / Critical Habitat	NIPAS	894	1,462	1,182	9			3,547
5. MHRWS expanded Buffer Zone	NIPAS	895		5,080	99			6,073
H. Municipality of San Idiro								-
1. Nagkahiusang Kristohanong Mag-uuma sa Maputi Multi-Purpose Coop.	CBFMA	584		363	15			962
2. Nagkahiusang Mag-uuma sa Talisay Coop	CBFMA	23		268	37			329
3. Siete Altares Farmers Association	CBFMA	131		316				447
4. Mount Hamiguitan Range Wildlife Sanctuary	NIPAS	3,434	430	411				4,275
5. MHRWS expanded Buffer Zone	NIPAS	255		2,270	527			3,052
I. Municipality of Lupon								-
1. CFP- CAMAR Multi-Purpose Cooperative	CBFMA		880		109			989
2. Kauswagan Pinaragan Haguimitan Planters Assn	CBFMA		1,117	666	126			1,910
3. Don Mariano Marcos Farmers Cooperative	CBFMA		733	220	0			953
4. Cambagui-ng Reforestation Project Farmers Assn, Inc.	CBFMA	54			149			202
J. Municipality of Banay-banay								-
1. Pintatagan Lumad-Mansaka Forest Resources Development Coop	CBFMA	2,211	963	273				3,447
2. Maputi-Piso Cabangkalan Forest Resources Assn. Inc.	CBFMA	84		580	99			763
3. Webenson Velarde	IFMA	1,194	577					1,771
4. Superior Timber & Construction Corp.	IFMA	1,264	2,671		119			4,053
5. Lupon, Banaybanay Muti-Purpose Cooperative	IFMA	390	166	348				904
6. Wilbur G. Guinez	IFMA	665		297				962
7. Kadel Altiso	IFMA	220		232	1			453

8. Mt. Tagub-Kampalili Protected Landscape	NIPAS	1,781	3,742	1,313	878			7,714
PROVINCE OF COMPOSTELA VALLEY								-
A. Municipality of Monkayo								-
1. Awao Forestland Management Agreement Beneficiaries	CBFMA		94	2,665	27			2,787
2. Mandaya, Manobo, Mangguangan & DibabawonTribe	CADT	594	8,999	19,855	703			30,150
B. Municipality of Montevista								-
1. Laglagaan Indigenous Integrated Development Multi-Purpose Coop	CBFMA			196				196
2. Canidkid Upland Farmers Association	CBFMA			818	247			1,064
3. Dalesan Montevista Watershed Multi-Purpose Cooperative	CBFMA			3,176	20			3,196
3. Dibabawon and Mangguangan Tribe	CADT			7,929	2,270			10,198
C. Municipality of Compostela								-
1. Ngan-Panansalan Pagsabangan Forest Resources Development Coop.		1,954	6,596	7,558	104			16,211
2. Mandaya-Mansaka Tribe	CADT	3,388	7,313	5,206	1,797	13		17,718
D. Municipality of New Bataan								-
1. Peoples Upland & Countryside Cooperative	CBFMA	3,120	7,056	2,365	119			12,660
2. Community Forest Consumers Cooperative	CBFMA		66	841	33			940
3. Upper Magangit Farmers Multi-Purpose Cooperative	CBFMA			748	511			1,259
4. Magangit Farmers Multi-Purpose Cooperative	CBFMA			700	76			776
5. Camanlangan Tree Growers Association	CBFMA		876	1,218	45			2,139
6. Mandaya-Mansaka Tribe	CADT	1,574	18,899	9,766	6,627			36,866
7. Andap Watershed	Proc Wshed	1,892	1,840	2,109	2,298			8,140
E. Municipality of Maragusan								-
1. Pamintaran Agro-Forestry Development Cooperative	CBFMA			510	88			597
2. Mansaka Tribe	CADT	3,801	5,143	10,991	12,147			32,081
3. Mt. Tagub-Kampalili Protected Landscape	NIPAS	2,064	597	5,846	2,296			10,803
F. Municipality of Nabunturan								-
1. San Isidro, Mambing, Bayabas Multi-Purpose Coop.	CBFMA			2,228				2,228
2. San Roque Multi-Purpose Cooperative	CBFMA			357				357
3. Nabunturan Tribal Multi-Purpose Cooperative	CBFMA		796	669	130			1,595
4. Nabunturan Assn of Barangay Tribal Council (Mansaka Tribe)	CADT	3,170		2,669	935			6,774
5. Mainit Protected Landscape	NIPAS		72	807	574			1,453
G. Municipality of Laak								-
1. San Antonio, Candiis, Conception & Kidawa-Forest Resources Dvt. Coop.	CBFMA	170	1,986	7,900	1,092			11,147
2. Longanapan Upland Farmers Association	CBFMA			760	807			1,567
3. Kilagding Upland Farmers Association	CBFMA		20	99	826			945
4. Kibaguio Upland Farmers Association	CBFMA		817	101	573			1,491
5. Dibabawon Tribe	CADT	844	7,633	35,406	5,134			49,017
6. UP Mindanao	Land Grant	408	234	2,076	24			2,743
7. BSP Reservation	CR			725	4,430			5,155

H. Municipality of Mawab								-
1. Conception Greenland Development Association	CBFMA			24	511			535
2. Mawab Municipal Tribal Council (Mansaka Tribe)	CADT			1,119	3,767			4,886
I. Municipality of Maco								-
1. Manipongol Tribal Multi-Purpose Cooperative	CBFMA		784	1,685				2,468
2. Mansaka Tribe	CADT	37	1,524	22,008	6,504			30,072
J. Municipality of Mabini								-
1. Tribal Multi-Purpose Cooperative	CBFMA	1,556	663	6,129	211			8,560
2. Mandaya Bisaya Kagarungan Cooperative	CBFMA			2,942	351			3,294
3. Mabini Mansaka Ancestral Domain Tribal Council of Elders, Leaders Assn	CADT	2,567	4,267	16,409	1,050			24,293
K. Municipality of Pantukan								-
1. Binogsayan Community Multi-Purpose Coop.	CBFMA	1,360	264	1,331	185			3,140
2. Davao Agricultural & Reforestation Dev't Cooperative	CBFMA	146	871	842				1,859
3. Pantukan Mansaka Pagkakaisa Association	CBFMA	1,671	717	11				2,400
4. Araibo Forest Management Multi-Purpose Cooperative	CBFMA	2,334	2,043	403	554			5,334
5. Las Arenas Farmers Multi-Purpose Cooperative	CBFMA		1,903	1,195	292			3,390
6. RYC Enterprises	IFMA		755	560				1,315
7. Pantukan Federation of MansakaTribal Council	CADT	7,157	12,341	16,004	9,746			45,248
8. Mt. Tagub-Kampalili Protected Landscape	NIPAS	846	1,013	662	41			2,562
PROVINCE OF DAVAO DEL NORTE								-
A. City of Tagum								-
- no tenure-								-
B. Municipality of Kapalong								-
1. Association of Mandaya, Ata, Dibabawon, Omayamon, Inc.	CBFMA	3,100	1,060	10,776	268			15,203
2. Suaon Upland Reforestation Association Inc.	CBFMA			607		93		700
3. C. Alcantara & Sons, Incorporated	IFMA		549	7,613	177			8,338
4. Ata-Manobo Indigenous Cultural Community	CADT	3,350	6,454	50,538	2,492	94		62,928
5. Dibabawon Tribe	CADT	518		2,853				3,371
C. Municipality of Talaingod								-
1. C. Alcantara & Sons, Incorporated	IFMA	235	2,574	8,567				11,376
2. Ata-Manobo Indigenous Cultural Community	CADT	11,843	6,953	30,881	582	19		50,279
3. Ata-Manobo Tribe (CADT of Davao City)	CADT	44	631	9,766				10,441
D. Municipality of San Isidro Labrador								-
1. Ata-Manobo Indigenous Cultural Community	CADT		813	1,648				2,461
2. GSP Reservation	CR			2,512	2,220			4,732
E. Municipality of Asuncion								-
1. Camansa Community Forestland Farmers Assn. Inc.	CBFMA			2,948	97			3,045
2. Dibabawon Tribe	CADT			6,178	2,421			8,599
3. Dibabawon and Mangguangan Tribe	CADT		106	4,114	1,561			5,782
4. GSP Reservation	CR			202	1,065			1,267
F. Municipality of New Corella								-

1. Cabidianan Multi-Purpose Cooperative	CBFMA			593				593
2. Santa Fe, New Corella Planters Ass'n., Inc.	CBFMA			732				732
3. Del Monte Farmers Cooperative	CBFMA			637				637
4. El Salvador Farmers Tree Planters Industrial Coop	CBFMA			1,485				1,485
5. Dibabawon and Mangguangan Tribe	CADT			1,767				1,767
G. City of Panabo								-
- no tenure-								-
H. Municipality of Santo Tomas								-
1. Ata-Manobo Indigenous Cultural Community	CADT			1,068	96			1,164
2. Ata-Manobo Tribe (CADT of Davao City)	CADT			2,275	4	16		2,296
I. Municipality of Dujali								-
- no tenure-								-
J. Municipality of Carmen								-
- no tenure-								-
K. Island Garden City of Samal								-
1. Sama Tribe	CADT			644	364			1,008
CITY OF DAVAO								-
A. Davao City East								-
1. Tagbao Farmers Association	CBFMA		555	3,123				3,677
2. Malakiba Peoples Improvement Cooperative	CBFMA			770		122		892
2. Ata-Manobo Tribe	CADT	2,536	10,470	61,494	429	122		75,051
B. Davao City West								-
1. Patag Environmental Development and Management Coop	CBFMA			160				160
2. Kaupyianan sa Matigsalog Association	CBFMA	14		458		225		697
3. Marilog Community Based Multi-Purpose Coop	CBFMA	210	15	1,570		6		1,802
4. Nagkahiusang Lumad sa Mag-uuma sa Brgy. Gumitan	CBFMA		63	1,605				1,667
5. Marilog district CFP Farmers Assn. Inc.	CBFMA	214	211	777				1,202
6. Upper Kibalang Agroforestry Farmers Association	CBFMA			989				989
7. Kibalang Balikatan sa Kaunlaran ng Pagkakaisa	CBFMA			1,181				1,181
8. Magwawa, Panipasan, Laho (MAPALA) Greenviewers Farmers Ass., Inc.	CBFMA			1,146				1,146
9. Banuayan Farmers Association	CBFMA			994				994
10.Banus, Ballah, Licosan Farmers Multi-Purpose Cooperative	CBFMA		764	540	161			1,465
11.Mt. Tipolog Bantay Kinaiyahan Farmers Association	CBFMA			691	9			699
12. SURICO Incorporated	IFMA	364	133	23				520
13. Davao Kasanag Foundation, Inc.	IFMA			1,026		36		1,062
14. Davao ESP Resources, Inc.	IFMA			189	291			480
15. Malagos Protected Landscape	Proc Wshed			225				225
16.Mount Apo Natural Park	NIPAS	3,527	4,393	207	1,047			9,174
17. UP Mindanao	Land Grant	373	242	3,457	29			4,102
18. Ovu-Manuvu Tribe	CADT	2,602	6,658	21,171	6,215			36,646
19.Matigsalug-Manobo Tribe	CADT	1,304	2,497	20,653	525	1,281		26,260

20.Unified Bagobo-Tagabawa Ancestral Domain Claim	CADT	795	1,791	120	56			2,763
21.Bagobo-Klata Tribe	CADT	2,929	1,904	334	432			5,598
22.DA Livestock Stockfarm & Research Area	Land Grant			496				496
PROVINCE OF DAVAO DEL SUR								-
C. Municipality of Santa Cruz								-
1. Unified Bagobo-Tagabawa Ancestral Domain Claim	CADT	21	6,359	1,526	3,716			11,623
2. Mount Apo Natural Park	NIPAS	21	6,305	1,643	4,317			12,286
D. City of Digos								-
1. Unified Bagobo-Tagabawa Ancestral Domain Claim	CADT	325	2,485	8,383	4,646			15,839
2. Mount Apo Natural Park	NIPAS	325	2,520	8,880	5,859			17,583
E. Municipality of Bansalan								-
1. Unified Bagobo-Tagabawa Ancestral Domain Claim	CADT	1,196	2,465	3,089	3,356			10,105
2. Mount Apo Natural Park	NIPAS	1,290	2,621	3,191	4,873			11,975
F. Municipality of Magsaysay								-
1. Upper Bala Upland Farmers & Workers Association	CBFMA		541	184	1,610			2,335
2. Balnate Agroforestry Farmers Association	CBFMA			429	64			493
3. Tagaytay Upland Farmers & Workers Association	CBFMA			1,616				1,616
4. B'laan Tribe	CADT			1,429	139			1,568
G. Municipality of Matan-ao								-
1. Dongan Pekong Farmers Development Association	CBFMA		158	1,104	1,247			2,509
2. B'laan Tribe	CADT	560	1,197	5,417	2,047			9,221
H. Municipality of Hagonoy								-
- no tenure-								-
I. Municipality of Padada								-
- no tenure-								-
J. Municipality of Sulop								-
- no tenure-								-
K. Municipality of Kiblawan								-
1. San Juan Multi-purpose Cooperative	CBFMA		5	536				542
2. Cogon Bacaca Barangay Tanod Multi-Purpose Cooperative	CBFMA		80	605	4			689
3. Pasig Agrarian Reform beneficiaries & Upland Farmers Multi-Purpose Coop	CBFMA			265	21			286
4. Balasiao Integrated Social Forestry Association, Incorporated	CBFMA			809	16			824
5. Bagong Negros Integrated Social Forestry Association	CBFMA			623				623
6. Bunot Multi-purpose Cooperative	CBFMA			546				546
7. Tacub & Lapayan Multi-Purpose Cooperative	CBFMA		567	1,519				2,085
8. Lamsaging Farmers Association	CBFMA		32	416				449
9. B'laan Tribe	CADT	3,855	3,157	14,088	5,579			26,680
L. Municipality of Malalag								-
1. Pitu Farmers Multi-Purpose Cooperative	CBFMA		116	759	2			878
M. Municipality of Santa Maria								-
1. United Tree Farmers of Pongpong & Kidadan Coop	CBFMA			967	830	60		1,857

2. Buca Farmers Multi-Purpose Cooperative	CBFMA			1,072	105	11		1,188
3. San Antonio Upland Farmers Ass'n	CBFMA			596				596
N. Municipality of Malita								-
1. Sangay Multi-Purpose Cooperative	CBFMA			1,015	973			1,988
2. Kibalatong Multi-Purpose Cooperative	CBFMA			165	428			593
3. Bitu, Landugan Tree Farmers Multi-Purpose Cooperative	CBFMA			337	600			937
4. Malita United Tribal Ancestral Domain	CADT	6,427	9,629	23,632	3,332			43,019
O. Municipality of Don Marcelino								-
1. Malita United Tribal Ancestral Domain	CADT	683	2,112	1,023				3,817
P. Municipality of Jose Abad Santos								-
- no tenure-								-

Source: Based on 2003 Land and Forest Cover (GIS generated in DENR/Region 11, 2013)

ANNEX 6. GIS-GENERATED ESTIMATES OF NATIONAL LAND AND FOREST COVER (1987 AND 2002)

Land Cover Classes	1987 Area (hectares)	2002 Area (hectares)	Difference (hectares)
Built-up area	142,672	303,980	161,308
Closed forest	2,717,846	2,479,053	-238,793
Coral reef	373,741	-	
Cultivated cropland	19,406,662	11,172,219	-8,234,443
Inland water or marshland	628,360	695,979	67,619
Mangrove forest	164,315	288,946	124,632
Marginal land	1,817,734	10,243,377	8,425,643
Open forest	4,177,901	4,219,397	41,497
Unclassified	542,156	-	
Plantation forest	-	192,016	
Grand Total	***29,971,386***	***29,594,968***	-376,418

Source: Based on the EcoGov Project Categories (USAID/EcoGov Project 2005)

ANNEX 7. LAND AND FOREST COVER CATEGORIES IN 1988 AND 2003

ECOGOV Proposed Categories	Code to be used	1987-1988 Land Cover/Land Use Mapping Categories	Codes used
Closed Canopy Forest	**Fdc**	Pine Mossy Closed canopy (mossy may also be included)	**Fp** **Fy** **Fdc**
Open Canopy Forest	**Fdo**	Open canopy	**Fdo**
Tree plantation and perennial crops	**P**	Coconut plantations Other plantations	**Ipc** **Ipo**
Brush land	**Br**	Cultivated area mixed with brush land and grassland	**Ec**
Cultivated area	**C**	Cultivated and other open areas in forest Crop land mixed with coconut plantations Crop land mixed with other plantations	**Fire Symbol** **Imc** **Imo**
Open areas	**O**	Eroded area Quarry Other barren land	**Ne** **Nq** **No**
Built-up area	**Bu**	Built-up area	**B**
Mangrove	**M**	Mangrove vegetation	**Fm**
Fishponds	**Fp**	Fishpond derived from mangrove Other fishpond	**Ifm** **Ifo**
Coral reefs	**Cr**	Coral reef	**C**
Marshland	**Ms**	Marshy area and swamp	**M**
Grassland	**G**	Grassland	**Eg**
Sea grass	**Sg**		
Lake (To be included in the basemap)	**L**	Lake	**L**
Rivers (To be included in the basemap)	**R**	Riverbeds	**Nr**
Saltbed	**S**		

Source: USAID/EcoGov Project 2005

ANNEX 8. ESTIMATED LAND AND FOREST COVER IN MINDANAO (HECTARES)

DAI Category (SSC Equivalent Code)	2004 MMSE Stats (HA)	1988 SSC Stats (HA)	Difference (SSC_MMSE)
Closed Canopy Forest (Fp, Fy, Fdc)	578263	985,400	(407,137)
Open Canopy Forest (Fdo)	1572946	1,823,900	(250,954)
Mangrove Vegetation (Fm)	116375	46,200	70,175
Cultivated area mixed with brushland and grassland (Ec)	2748339	3,213,700	(465,361)
Cultivated area (Fire symbol, Ic, Im, Imc, Imo)	2397272	3,012,800	(615,528)
Tree plantations and perennial crops (Ip, Ipc, Ipo)	1524111	271,000	1,253,111
Fishponds (Ifm, Ifo)	52460	39,400	13,060
Open Areas (Ne, Nq, No)	5164	2,700	2,464
Grassland (Eg)	832471	327,400	505,071
Built-up Area (B)	63503	24,200	39,303
Marshland (M)	89705	99,100	(9,395)
Lake (L)	70691	62,400	8,291
Rivers (Nr)		3,300	(3,300)
Saltbed	180	-	180
			-
Not classified	126	278,700	(278,574)
Coral Reefs ©	169769	65,100	104,669
		-	
Total	10,221,376	10,255,300	(33,924)

Source: USAID/EcoGov Project 2005