ECONOMIC ANALYSIS OF ALLOCATING FORESTS AND FOREST LANDS: TOTAL ECONOMIC VALUATION APPROACH

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LIST OF ACRONYMS

ASLO	-	Adequately stocked logged-over
ANR	-	Assisted Natural Regeneration
BCDA	-	Bases Conversion Development Authority
BCA	-	Benefit Cost Analysis
BT	-	Benefits Transfer
CADC	-	Certificate of Ancestral Domain Claim
CBFMA	-	Community-based Forest Management Agreement
DATICOR	-	Davao Timber Corporation
DENR	-	Department of Environment and Natural Resources
ESP	-	Environmental Service Payments
FLDC	-	Filipinas Loggers Development Corporation
FLMA	-	Forest Land Management Agreement
FLUP	-	Forest Land Use Plan
IC	-	Indigenous Community
IPRA	-	Indigenous People's Right Act
IFMA	-	Industrial Forest Management Agreement
LGU	-	Local Government Unit
LBW	-	Logom-Baobo Watershed
LMTII	-	Luzon Mahogany Timber Industries, Inc.
MKLW	-	Mananga-Kotkot-Lusaran Watershed
MCA	-	Multi-Criteria Analysis
NIPAS	-	National Integrated Protected Areas
NIA	-	National Irrigation Administration
NPV	-	Net Present Value
NGO	-	Non-government organizations
PLA	-	Pasture Lease Areas
PO	-	People's Organization
PA	-	Protected Area
RUPES	-	Rewarding the Upland Poor for Environmental Services
SBW	-	Sapang Bato Watershed
SPLC	-	Sirawai Plywood and Lumber Corporation
SIFMA	-	Socialized Industrial Forest Management Agreement
SPDA	-	Southern Philippine Development Authority
TIPI	-	Timber Industries of the Philippines
TLA	-	Timber License Agreement
TEV	-	Total Economic Valuation
NRMP	-	Natural Resources Management Program
GOLD	-	Governance and Local Democracy Project

Economic Analysis of Allocating Forests and Forest Lands (Total Economic Valuation Approach)

by Herminia A. Francisco

1.0 INTRODUCTION

Conventional wisdom tells us that open-access properties virtually belong to no one. As such, there is a tendency for these resources to be exploited in a non-sustainable manner. Everyone works on the premise that 'if I don't use the resource now, others will'—the classic tragedy-of-the-commons mentality.

Most State-owned resources are virtually open-access resources. They are so, because of the inability of the government to protect and manage these resources. This situation is due in part to the limited resources available to the Department of Environment and Natural Resources (DENR) and the physical challenge in monitoring many inaccessible sites of the country's natural wealth. Difficulty of access, however, is less of a problem to the communities surrounding the forest resources, especially in areas that have been paved open by commercial logging operations. It is thus quite common to find most of the country's forestlands occupied/cultivated by upland dwellers, many of which have no legal claims to speak of over the land that they cultivate.

The high population of upland migrants, no doubt, has contributed to the rapid rate of deforestation that has taken place in the country. Today, a big part of the uplands has been converted into settlements and agricultural lands. Whatever remains of the forest resources are under stress from the demands of communities within and adjoining forestlands, in support of their livelihood requirements. However, the open access nature of these forest resources makes them vulnerable to natural resource depletion. It is against this backdrop that the government had explored alternative schemes to manage the country's natural resources, mostly in terms of its forest resources and its coastal environs.

A critical component of any management schemes in the forest lands has to do with land tenure security or use-rights recognition. This emphasis recognizes that there exists a positive relationship between land tenure and natural resource management. Specifically, it posits that resource users will most likely invest in managing the resources if they are convinced that they will be able to reap the benefits from such an investment. This is because the lack of well-defined user rights is recognized as an important constraint to the adoption of conservation practices and technologies that can alleviate poverty and reduce environmental degradation. It is also a known fact that many natural resource management practices require long-term investments. Hence, farmers or communities will only make these investments if they are assured to reap the benefits of their investment.

However, in contrast to privatization wherein complete control is transferred to the party to whom the property right is bestowed, the government can only assign user rights over the resource to certain interest groups; the State still retains ownership over them. The interest groups could either be the local government units (LGU) under whose jurisdiction the natural resource belongs, the non-government organizations (NGOs), who have taken upon themselves to champion the protection and management of the natural resources in behalf of society, the Indigenous Community (IC), whose special rights over many of these natural resources are recognized and protected by law under the Indigenous People's Right Act (IPRA), the community themselves,

who are directly benefiting from the natural resources and stand to lose with their depletion, or the private sector, who have their own business interests to protect, within the limits set by law on the manner of natural resource use.

The assignment of user rights over a specified enclosed natural resource area such as a forest is thus viewed as one strategy to encourage investment in natural resource conservation. This strategy is attractive because the State still retains 'ownership' over said resources. Ultimately, society benefits from such a strategy as it is expected to result in the rehabilitation of degraded forestlands and the sustainable utilization of the forest resources derived from there.

There is also a renewed clamor now to increased public sector (local communities and the local government units) participation in natural resources management decisions, in addition to the legal recognition of their land and resource rights. There are many natural resource management practices where groups of farmers working together are needed. The absence of an effective collective action at the local level is thus one other constraint to adoption of some necessary natural resource management practices. Increased public participation in policy decisions and development plans is expected to broaden the local support base for any efforts to manage the country's forest resources.

User right security and public participation are key pillars to the USAID-DENR EcoGovernance project. One of the key questions that this project hopes to address is: how much benefit will society realize from the various types of resource allocation instruments (property rights) and from their combinations in a given forestland? This study was conducted to provide an answer to this question as a guide to resource managers and other decision makers involved in forest management.

2.0 OBJECTIVES AND SIGNIFICANCE OF THE STUDY

This paper was written to look at the economics of forestry projects under alternative user right arrangements—also referred to as the allocation instruments in this paper. A sample of forestry projects under the following allocation instruments were analyzed: 7 projects under Community-based Forest Management Agreement (CBFMA), 3 projects under Industrial Forest Management Agreement (IFMA), 2 sites with certificate of ancestral domain claim (CADC); and, 2 projects under Co-management arrangement between DENR, LGU, and Community' and 1 site under Protected Area (PA) status. Together, the 15 forestry projects were analyzed in terms of their economic viability using total economic valuation principle.

Specifically, the tasks undertaken in this study are as follows:

- Compilation and recalculation of economic analysis of 15 forestry projects, under different allocation instruments (using 2002 prices)
- Literature search on indirect use and non-use values of forest resources and services for benefit transfer use in the economic analysis of the 15 forestry projects
- Calculation of the total economic value of forest resources in all study sites to capture both the use and non-use values of the forests
- Conduct of 2 case studies on Economic analysis of forestlands to different user groups (the Lower Magat Forest Reserve and the Wao Forestlands). Two alternative approaches of implementing the economic analysis calculation were illustrated.

Economic consideration is one of the three main objectives in resource allocation decisions, the two others being social and environmental. For any allocation arrangement to be attractive to any target user group there is a need to establish that it is economically viable.

Economics plays an important role in allocating resources to their best alternative uses. In a perfectly competitive market setting (characterized by many buyers, many sellers, perfect information, and free mobility of resources), markets are expected to allocate scarce resources to where they could yield the highest value. Since these characteristics are difficult to satisfy, markets often fail to achieve optimal allocation of natural and environmental resources. In fact, this failure of the market is more of the rule than the exception when dealing with environmental goods and services. This is for the simple reason that most environmental commodities do not enter into the markets. There are therefore no market prices to speak of for these environmental goods and services.

The difficulty of pricing environmental goods and services stems from several factors: a) the public good characteristic of most environmental services (i.e., non-rivalry—ones consumption does not diminish the amount left for others to consume, and non-excludability—it is difficult to exclude those who do not want to 'pay' for the service, even in the presence of relevant prices); b) the absence of clearly defined property rights over these resources; and the c) absence of sufficient information to properly quantify and valuate forestry resources.

Admittedly, the public good characteristic of environmental good makes assignment of property rights difficult but not impossible. The assignment of user rights discussed earlier—which takes a major leap in the 90s, is part of the property right reform found necessary for resource pricing to materialize. Significant progress on data constraints was also achieved in the 90s but more efforts toward this direction are still wanting.

The insufficiency of data to value environmental services results in the general practice of limiting economic analysis to inclusion of marketed goods and services. In many cases, economic analysis is made distinct from financial analysis only in terms of the discount rate used and the shadow pricing of certain products (inputs and outputs). Site-specific information on values of environmental services is not easy to obtain. Doing valuation studies to generate such information could also be very costly and could take time.

Despite these limitations however, there are now better ways to get around the problem. In particular, the practice of using values derived in another site to the study site is already a common practice in the economics literature, particularly in the area of environmental economics. Such a practice is termed as **benefits transfer.** This procedure pertains to the process of adopting values derived in another site to your area of study, after some adjustments are carried out. The adjustments often required include: a) adjustment to reflect differences in purchasing power in the two sites; b) adjustment for differences in foreign currency used, and c) adjustment for differences in prices over time. The details of these three adjustments are discussed in the next section and are shown in mathematical form in Appendix A.

3.0 ANALYTICAL FRAMEWORK

3.1 TOTAL ECONOMIC VALUE AND PROPERTY RIGHTS

The principle of total economic valuation recognizes that a given natural resource, say a forest or a coastal ecosystem, has economic values that go beyond use values (Figure 1). Use values could either be direct or indirect. The former entails actual interaction with the resource, mostly in terms of consumptive goods and services like for food, wood, fodder, industrial products, genetic resources, medicinal plants, and recreation, among others. Indirect uses pertain mostly to ecological services provided by natural resource ecosystems such as watershed protection, flood

control, erosion control, windbreak, carbon sequestration, and as gene pool. These are life-support services of nature that are often recognized only when the flow of these services become impaired. Because these services partake the characteristic of public goods (i.e., non-rivalry and non-excludability), pricing them remains a major challenge.

Over the last decade, the efforts to quantify and monetize said environmental services are on the rise. In fact, there is now a growing school of thought that providers of these services (those who protect and conserve the forests) must be rewarded for what they are doing (in cash, in-kind, or both). This thought is built-in in the call for Environmental Service Payments (ESP)—as advocated in the on-going project of ICRAF and IFAD—Rewarding the Upland Poor for Environmental Services (RUPES).

In addition to these use values, natural resources are important for reasons not necessarily connected with use of the resource or the commodities derived from there. These reasons include concern for one-self (wanting to keep the resource protected to keep one's *option to use* the resource open in the future); concern for family members yet to come (wanting to *bequest* future generation with the chance to avail of the services offered by the natural resource); and concern for humanity as a whole (wanting to protect the natural resource so that humanity will benefit from its *existence* now and in the future). Option value, bequest value and existence value are the so-called *non-use values* of most natural ecosystems. Several studies have already been conducted to assess how much people are actually willing to pay for these non-use values, using contingent valuation methodology or choice modeling studies. Still, more studies on this topic are needed, particularly in natural resource-endowed developing countries, like the Philippines.

As depicted in Figure 1, the different types of economic values vary in prominence under the various land use rights. Direct use values for instance are the main (if not, sole) focus in the case of the IFMA and SIFMA. To CBFMA holders, direct use values take central focus as well but concern for indirect uses of the resource, such as watershed function, erosion control, and biodiversity are likewise recognized and appropriately considered in the land use plan. To CADC holders, direct and indirect uses are also important. To this group, however, non-use values, particularly, bequest value to members of their tribe is quite important, along with the religious/spiritual values of the resource. In the case of critical watersheds and other protected areas—which are often subjected to co-management by LGU, DENR and the People's Organization (PO), the indirect uses and non-use values could take more prominence than direct use values.

A complete economic analysis (taken from society's perspective) takes these non-use economic values as equally important. Admittedly, however, what matters most to local people are the direct use values and to some extent, the indirect use values. This paper attempted to present how the economic analysis results of forestry projects will change if the total economic valuation principle is adopted.

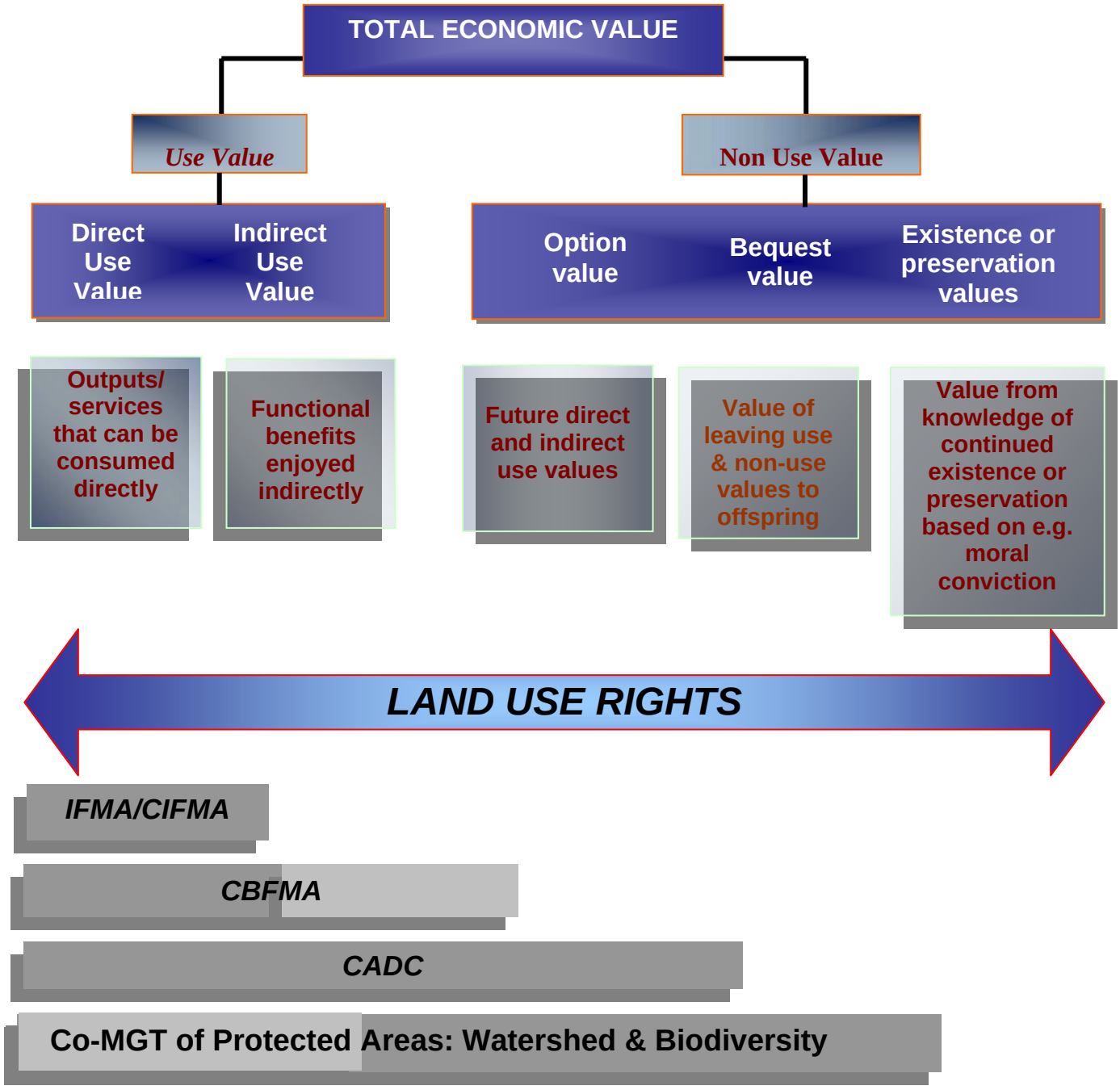

Figure 1. Total Economic Value and Land Use Rights

3.2 ECONOMIC ANALYSIS ANALYTICS

The basic analytical tool to use in analyzing the economics of alternative land uses and those of alternative allocation instruments is that of Benefit Cost Analysis (BCA). This tool computes the present value of stream of benefits and costs of a project and then compares them to arrive at the Net Present Value (NPV). The NPV is the difference between the present (discounted) value of benefits and the present (discounted) value of costs. A positive NPV indicates that the project is beneficial since gains exceed the costs. The calculation uses a discount factor to bring the stream of benefits and costs to their value at the present. Discounting recognizes that there is 'time value of money'; as such, it would be incorrect to simply add benefits and costs occurring at different years. One needs to make these figures comparable and this is done through discounting. Once discounted, the numbers could now be compared.

$$NPV = \sum_{t=0}^{n} \frac{B_t}{(1+r)^t} - \sum_{t=0}^{n} \frac{C_t}{(1+r)^t}$$

where: B_t = benefit at time t
C_t = cost at time t
NPV = net present value
n = life span of the project
$1/(1+r)^t$ = discount factor

Economic analysis could be undertaken at different levels as shown in Figure 2. Level 1 analysis pertains to benefit cost analysis of the various land uses under a given land allocation/user rights scheme. The computational analysis will yield an answer to the economic question: What is the economic return of allocating XX hectares to the various land uses, as indicated in the resource management plan? This question boils down to ascertaining the profitability of a given land area to be subjected to varying land uses. It is needed to assess the efficiency in the use of the resources employed in the production activities. Level 2 analysis asks: What is the economic return from a given land area that is allocated to various user rights' groups? This is the question posed by resource managers, faced with the task of allocating a given land to various user groups, employing different allocation instruments. Level 3 is simply an extension of Level 2 analysis. It asks: If the current allocation of land to the various user groups could be feasibly (legally) changed, what will be the economic returns in the alternative allocation arrangements?

These various levels of analysis are guides to resource managers in deciding what is the best economical use of the limited forest lands under consideration. Note, however, that not everything can be decided on economic basis alone. Equally important concerns are the social acceptability of a given allocation decision, as well as the legality of such a decision. These other concerns though are something that resource managers should incorporate in the decision-making analysis—most probably in the context of multi-criteria analysis (MCA). Specifically, MCA treats economics as just one of the objectives that are important to the different interest groups who have a stake on how resources are allocated. Other concerns such as social concerns, environmental impacts, distributional/equity effects, and others do come into the decision framework as well. Oftentimes, though, the importance of each of these objectives would vary depending on who the stakeholders are. Hence, some kind of consensus building process and ranking of objectives may be needed to decide on the most acceptable allocation decision.

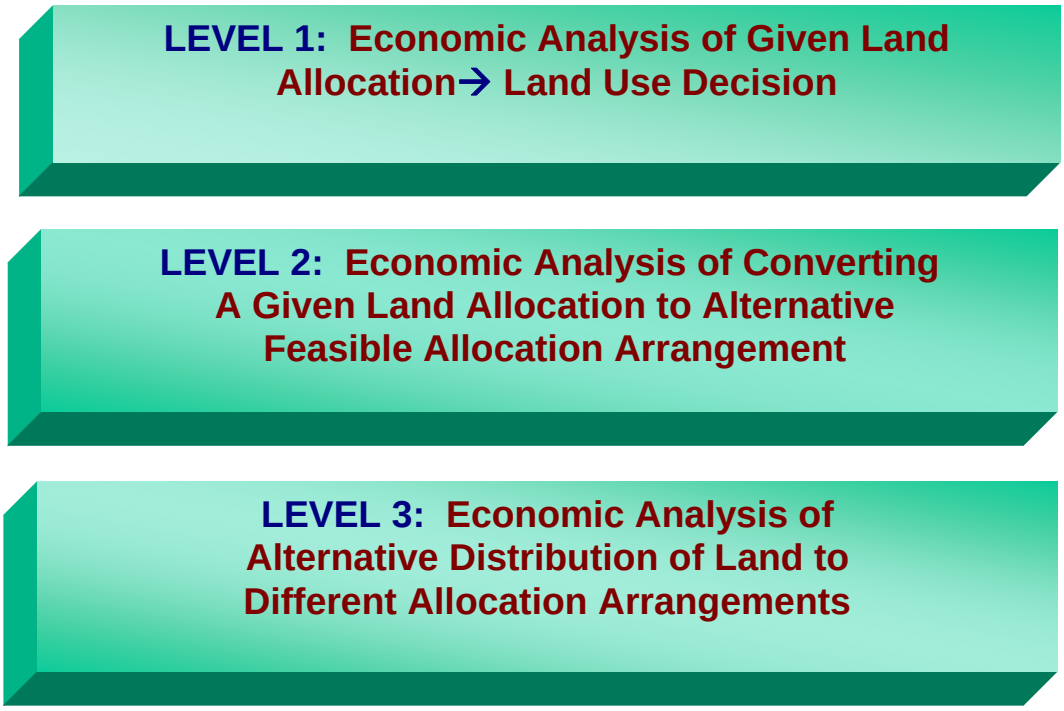

Figure 2. Level of Analysis: Land Allocation Decisions

3.3 BENEFITS TRANSFER AND ECONOMIC ANALYSIS

The total economic valuation principle discussed in section 3.1 calls for the inclusion of relevant economic values, beyond direct use values, in economic analysis, Specifically, a more comprehensive BCA should incorporate the indirect use values or functions of the forest ecosystem, as well as other non-use values. The indirect use functions mostly refer to ecological services such as watershed function, biodiversity value, and carbon sequestration. The non-use values, as explained earlier, include option, bequest, and existence values. For IFMA and SIFMA areas, where use values are dominant, the limited focus of past economic analysis may have been justified, but still incomplete. However, for other user groups where a significant proportion of the land areas is set aside for protection purposes—to preserve indirect use values and those of non-use values, excluding these values in economic analysis would seriously underestimate the net benefits (social welfare impacts) of the land allocation option being analyzed.

The decision not to incorporate the non-traditional economic values in economic analysis, as mentioned, was largely due to the absence of such information. Most of these values are neither tangible nor observed in the markets. Nor are these values readily observable in terms of behavior of beneficiaries so their measurement is not easy. Furthermore, methodological progress in the measurement and monetization of said values have only developed in the last decade. As such, the inclusion of these values in economic analysis have been limited to their being listed under the general category of 'non-quantifiable benefits'.

As indicated earlier, however, some progress were made in the last decade to generate information on indirect use and non-use values of forest and coastal ecosystems. Research studies on tropical forest ecosystems, however, were limited in a few countries as shown in Table 1. These few studies, nonetheless, could serve as our basis for the benefits transfer (BT) procedure mentioned earlier.

Specifically, BT entails adopting the environmental values generated in a foreign country, after certain adjustments, to the study sites. These adjustments may entail the use of local socio-economic and biophysical information, where values transferred are in the form of functional relationships (e.g., willingness to pay function, dose-response function, travel cost function, production function, etc). Where unit values (e.g., value per hectare of forestland) are used, adjustments often include: foreign exchange adjustment, adjustment for purchasing power parity to reflect differences in economic position of the two countries, and price adjustments (using consumer price index) to account the differences in prices over time as shown in Appendix A.

Tables 1a to 1c show the unit values of indirect use and non-use values of tropical forest ecosystem in some parts of the world. The literature search did not yield much information. Nonetheless, one could start with these numbers. Following the procedures given in Appendix A, the values generated from the literature search were subjected to adjustments for income differences across countries (using ratio of Gross Domestic Products), price variations over time (using consumer price index as deflator) and for domestic exchange rate (using USD1=₱53). The values obtained from the literature are mostly in terms of per hectare per year. Since most of the forestry projects analyzed in the paper have a life span of 25 years and used discount rates of 12% and 15% to arrive at the NPV, the per hectare values were converted to NPV also with the same life span and discount rates. The results of the three adjustments and the NPV calculations are shown in the last two columns—as adjusted BT figures to Philippine condition using 2002 prices on per year and discounted over 25 years, respectively.

Table 1a. Indirect Use Values based on Literature Search & BT values to Philippine Conditions.

Uses	Country	Amount (USD)	BT Values (P-2002 prices)	BT Values (NPV/ha for 25 years)	
				12%	15%
Indirect Uses					
Watershed protection					
▪ protection to onshore and offshore fisheries (Ruiteenbeek 1989)	Korup & Cameroon Park	54/ha/yr with benefits to accrue in 2010 &beyond	₱13,901 /ha/yr	₱109,027	₱89,858
▪ flood control (Ruiteenbeek 1989)	Korup & Cameroon Park	2.3/ha/yr	₱ 592 /ha/ yr	₱ 4,643	₱ 3,827
▪ Soil fertility maintenance (Ruiteenbeek 1989)	Korup & Cameroon Park	8/ha/yr	₱ 2,059 /ha/yr	₱ 16,149	₱ 13,310
▪ watershed protection over 90 years at 6% discount rate (NPV and 90 years) (Bann 1997)	Tapean Forest, Cambodia	USD75.59/ ha	₱ 20,359/ha @6%	₱ 9,631	₱ 7,938
▪ Watershed protection for hydroelectricity generation (average net benefit of forest protection) (Jesdapipat & Kiratikarnkul 1998)	Thailand	THB 66.62 per year per rai	₱ 53.4/rai/yr or ₱ 333.75/ha/yr	₱ 2,618	₱ 2,157

Uses	Country	Amount (USD)	BT Values (P-2002 prices)	BT Values (NPV/ha for 25 years)	
				12%	15%
Biodiversity Value					
Medicinal Plants ((Ruiteenbeek 1989)	Cameroon	0.2-0.70 /ha/yr	₱ 51.5-180.2/ha/yr	₱404-1,413	₱ 333-1,165
Biodiversity (NPV @6% & 90 years) (Bann 1997)	Tapean Forest, Cambodia	USD511/ha	₱137,270/ha at 6%	₱68,470	₱ 56,431
Value of carbon sequestration (Lasco 1997)					
▪ protection forest (PhP)	Phil	398-1,590/ha/yr	₱ 545-2,178/ha/yr	₱ 4,275-17,082	₱ 3,523-14,079
▪ tree plantations (PhP)	Phil	1,140-4,558/ha/yr	₱ 1562-6,244/ha/yr	₱ 12,251-48,973	₱ 10,097-40,362
▪ agroforestry farms (PhP)	Phil	610-2,438/ha/yr	₱ 836-3,340/ha/yr	₱ 6,557-12,196	₱ 5,404-21,590
Carbon storage (NPV @6% discount rate over 90 years) (Bann 1997)	Tapean Forest, Cambodia	USD6.86/ha	₱1,843/ha@ 6%	₱ 872	₱ 719
Direct Use Values (often not included)					
Tourism and recreation (Ruiteenbeek 1989)	Korup National Part, Cameroon	19/ha	₱ 489/ha	₱ 3,835	₱ 3,161
Recreational Benefits (Rosales 2000)	Sohoton, Samar Island, Phil	PhP2,041/ha in NPV	₱ 2,243/ha	₱ 17,592	₱ 14,499

Table 1b. Non-use Values for Tropical Forest Ecosystem, Selected Countries and Year & BT values to Philippine Conditions.

Non-use Values	Country	USD	BT Values (2002 prices)	BT Values (NPV over 25 years)	
				12%	15%
Existence value (Rosales & Francisco 2000)	Samar Island, Philippines	₱ 8000/ha in NPV	₱ 8,791/ha	₱8791	₱7245

Table 1c. Estimates of Non-timber Forest Products, Selected Countries and Year & BT values to Philippine conditions.

Non-timber Products	Country	Amount (USD)	BT Values	BT Values NPV for 25 years	
				12%	15%
-nuts and rubber (Schwartzman 1989)	Brazil	5/ha/year	PhP189/ha/yr	₱ 1,482	₱ 1,222
-latex and fruit (Pinedo-Vasquez et al 1992)	Peru	20/ha/year	PhP968/ha/yr	₱ 7,592	₱ 6,257
-medicinal plants (Balick and Mendelsohn 1992)	Belize	36 – 162/ha/year	PhP1659-7,466/ha/yr	₱ 13,012-58,557	₱ 10,724-48,261
-rattan and bamboo (Kumari 1994)	Malaysia Kalimantan	48/ha/year	PhP1,131/ha/yr	₱ 8,871	₱ 7,311
-fruit and medicine (Grimes et al 1993)	Ecuador	63-147/3-ha primary forest	PhP4,583-10,694/3-ha primary forest	₱ 35,945-83,874	₱ 29,625-69,128
Wildlife in one km2 (Kumari 1994)	Malaysia	8	PhP188/km2	₱ 147.45	₱ 121.53
Non-timber forest products (aggregate)NPV—over 90 years (Bann 1997)	Tapean Forest, Cambodia	USD748/ha @6% discount rate	PhP200,935/ha@6%,	₱ 95,059	₱ 78,346

These BT values could be used in adjusting economic analysis results that consider only direct use values. Note that one could decide which of the values to use, based on the perceived close resemblance of the site to the country. For this paper, the values generated in the Philippines are the first choice, followed by those derived in other Southeast Asian countries. In particular, the specific BT values that were used in the paper are as shown in Table 2.

Table 2. Benefits Transfer Values used in Economic Analysis Re-estimation for Selected Forestry Projects in the Philippines, 2002.

Economic Value	Source (country)	NPV (12%)	NPV (15%)
Watershed Protection	Bann (1997)-Cambodia	₱ 9,631	₱ 7,939
Biodiversity Value	Bann (1997)-Cambodia	₱ 68,470	₱ 56,431
Carbon Sequestration: ▪ forest Protection ▪ tree plantation ▪ agroforestry	Lasco (1997)-Philippines	 ₱ 10,679 ₱ 30,612 ₱ 9,377	 ₱ 8,801 ₱ 25,230 ₱ 13,497
Existence Value	Rosales & Francisco (2000)	₱ 8,791	₱ 7,245
Recreational Benefits	Rosales (2000)	₱ 17,592	₱ 14,499

Economic Value	Source (country)	NPV (12%)	NPV (15%)
Wildlife	Kumari (1994)-Malaysia	₱ 147	₱ 122
Rattan and bamboo	Kumari (1994)-Malaysia	₱ 8,871	₱ 7,311

4.0 ECONOMIC ANALYSIS RESULTS

This section discusses the results of the three-level economic analyses depicted in Figure 2. It also presents results of efforts to incorporate indirect use values and non-use values in economic analysis of the various allocation rights—a principle referred to as total economic valuation—in this report.

4.1 ECONOMIC ANALYSIS OF SELECTED FORESTRY PROJECTS (FOCUS ON USE VALUE ONLY)

Level 1 analysis was based on data generated from selected forestry projects in the Philippines, representing the various allocation right instruments. As indicated earlier, most economic analysis done of forestry projects focused only on the USE values of the forest resources. Given our total economic valuation framework, this use-values focus of forestry projects is considered a partial analysis since INDIRECT and NON-USE VALUES are not considered. Note that not all the forestry projects have economic analysis results. Where these are available, adjustments for price differences using consumer price index to express them in 2002 prices were carried out. Where no economic analysis results were found, NPVs were estimated anew based on proposed land uses with DENR costing as the basis (Table 3). The details in terms of area allocation to the various land uses for each site are given in Appendix B. The NPVs given are before tax and payments for government share. The paper assumes that the sharing arrangement would depend on the final negotiations of the various parties involved in resource management and hence could only be determined at a latter date.

Table 3. Net Present Value (NPV) of Selected Forestry Projects by Tenurial Arrangement: *(Direct Use Value Only)*

Tenurial Instrument	Net Present Value (2002 prices)		
	Discount Rate	*For Total Area*	*Per Hectare*
CBFM			**58,556**
Sapang Bato Watershed, Clark	12%	181,401,254	84,216
Field Reservation 1997 (2,154 ha)	15%	110,609,183	51,351
Mananga-Kotkot-Lusaran	12%	177,377,411	31,184
Watershed, Cebu 1996 (5,688 ha)	15%	189,429,925	30,943
Logum Baobo Watershed,	12%	96,349,833	34,608
Campostela Valley 2003 (2,784)	15%	61,736,184	22,175
Saug Watershed, Davao	12%	53,875,456	13,716
Del Norte 1996 (3,928 ha)	15%	10,865,962	2,766

Tenurial Instrument	Net Present Value (2002 prices)		
	Discount Rate	*For Total Area*	*Per Hectare*
Ubay, Mabini & Alicia Watershed Subproject, Bohol,1997 (1,312 ha)	12% 15%	310,810,003 210,516,497	236,898 160,455
Itogon Watershed, Benguet, 1996 (4,218 ha)	12% 15%	356,493,469 222,390,408	84,517 52,724
CAMAR Multipurpose Cooperative (1,000 hectares)	12% 15%	58,287,884 39,648,046	58,288 39,648
IFMA			**59,229**
Luzon Mahogany Timber Industries, Isabela (10,754 ha)	12% 15%	336,627,075 242,204,152	31,303 22,522
Toplite Lumber, Dipaculao Aurora (6,121.81 ha)	12% 15%	185,166,188 132,600,947	30,247 21,660
Sirawai Plywood and Lumber Corp., Zamboanga Del Norte, 2001 (14,202 ha)	12% 15%	1,318,915,036 815,187,325	92,868 57,399
CADC			**65,273**
Ilongot Livelihood Assn.*, 2002 (25-ha utilization of natural forest)	12% 15%	1,098,643 865,528	43,946 34,621
Lake Sebu	12% 15%	2,391,827,233 1,547,581,430	65,288 42,243
CO-MANAGEMENT			**86,934**
Maasin Watershed, Iloilo, 1995 (2,685 ha)	12% 15%	183,116,908 110,951,930	68.200 41,322
Lower Magat Forest Reserve (24,251 ha)	12% 15%	2,158,525,126 1,452,556,284	89,008 59,897
PROTECTED AREAS			**29,715**
Mt. Kanlaon Natural Park	12% 15%	789,151,308 517,493,619	29,715 19,486

**activities based on annual workplan only*

There are 15 forestry projects included in the analysis. Attempts were made to include more but the absence of economic analysis data in many reports obtained precludes increasing the number of sample cases. As one can see, NPV of CBFM site on a per hectare basis varies substantially with values ranging from ₱13,716 in the Saug watershed in Davao del Norte to as high as ₱236,898 in Ubay, Mabini, Alicia Watershed in Bohol per hectare over a 25-year project

duration, using a 12% discount rate. Given the big range in these values, it seems more correct to take the mid point value—which is ₱125,307, considering that one is talking of a 25-year rotation period for these forestry projects. The weighted average NPV per hectare, however, was lower at ₱58,556 per hectare.

In the case of the IFMA site, the weighted average NPV per hectare that was estimated is ₱59,229/ha. For the three sample IFMA sites, the NPV per hectare ranges from ₱30,247 to ₱92,868/ha with the mid-point value of ₱61,558/ha. One would expect that IFMA sites would yield the highest direct use values in all forestry projects. It is of course possible that the higher cost of operation of these industrial firms may dampen profit. But it is also reasonable to assume that the IFMA applicants who prepared the economic analysis as part of their application presented very conservative results for fear of taxation and other forest charges. In the case of the CBFM sites, the economic analysis was prepared for the community, most likely by DENR staff with assistance from local consultants. It is thus reasonable to look at the IFMA values to be on the low side or seriously underestimated.

For the two co-management sites, represented by Mainit Watershed and the Lower Magat Forest Reserve—the NPV per hectare averaged ₱86,934 per hectare. In the case of the two CADC site, the weighted average NPV is ₱65,273 per hectare. This relatively higher value was based on resource utilization permits from natural forests—which does not require much investment on the part of the farmers. For the Mt. Kanlaon protected area, the NPV was estimated at P29,715 per hectare. This low use value per hectare is not surprising since Mt. Kanlaon puts priority on indirect and non-use values like biodiversity conservation.

4.2 TOTAL ECONOMIC VALUATION IN SELECTED FORESTRY PROJECTS

Using the BT values that were estimated for the Philippine conditions (Tables 1 & 2), total economic valuation (TEV) was carried out for the selected forestry projects listed in Table 3. Specifically, the value of indirect uses (ecological function) such as watershed function, biodiversity value, and carbon sequestration value was estimated. Finally, the non-use values, represented mostly by existence value, was also calculated for the sample forestry projects. In the application of these values, watershed function value was assumed to be 30-100% of the BT value, depending on the land use (e.g. natural forest got a value of 100% while for plantation forest, a value of 30% was assigned). Biodiversity value ranged from 10% to 70% of the given BT value, with Mt. Kanlaon getting the highest due to the nature of this project. The carbon sequestration value given in Lasco (1997) for the Philippines was taken as is. Non-use values on the other hand, were applied only for natural forest. The results are shown in Table 4, with the total economic value in NPV terms, estimated for 25 years and using a discount rate of 12%. The more detailed estimation of TEV was shown in Appendix Table 1—if one is interested in the site-specific forestry project valuation.

In the CBFM project sites, the direct use values account for 65% of the TEV, with proportion ranging from 30.67% in Saug watershed to 89.64% for the Ubay, Mabini, Alicia watershed. Of the indirect use values, carbon sequestration function is the biggest at 19% of TEV, followed by watershed function (7%), biodiversity value (6%) and the least is existence value of 3%. All together, the indirect use and non-use values for CBFM sites averaged ₱28,552/ha in NPV terms. This value should be added to the mid-point value of ₱125,307/ha that is believed to be a more realistic value of returns from CBFM forestry projects with a 25-year project duration.

In the IFMA sites, the inclusion of indirect use and non-use values increased TEV by 44% from the weighted average NPV of ₱59,229/ha to ₱85,392/ha. The use values account for 69% of TEV, watershed function is 4%, biodiversity value is 8%, and carbon sequestration is 18%. For the CADC site, the TEV was computed to be ₱95,448 weighted average per hectare. Of this amount, direct use values still dominate at ₱65,273 (68%). Most of these values were obtained from the natural forest through resource utilization permits.

In the case of the Protected Area, the inclusion of the indirect use and non-use values increases the NPV per hectare from ₱29,715 per hectare to ₱64,842. For this particular land allocation instrument, the indirect and non-use values dominate at 54% of the TEV. This amounts to ₱35,127 per hectare. Of the indirect use values, biodiversity value takes the highest share of 36% of the TEV. Watershed function and carbon sequestration values account to 7-8% each. The high value appropriated by biodiversity is expected since the area is protected for biodiversity conservation. In the co-managed forestry projects, the TEV is the highest, with a weighted average of P104,368/ha. Of this amount, direct use values dominate at 83%.

In all forestry project sites, one could see the dominance of use values in TEV with indirect use and non-use values representing 17% to 54% of direct use values. This information provides an insight on the relative magnitude of the components of TEV.

Table 5 presents a summary of the weighted average TEV, direct use values and indirect and non-use values for the 15 forestry projects analyzed in the paper. As one can see, the highest TEV is realizable from co-management scheme, followed by CADC and CBFM. The higher return from the CADC areas was due to the resource utilization activities in natural forests that enable the communities to realize more returns with low cost. The protected area has the least TEV of ₱64,842/ha. The breakdown of the various components of the total economic value is best presented graphically (Figure 3). As shown in the graph, across all allocation instruments, direct use values dominate. The share differs ranging from 46% in Protected area to 83% in the Co-management arrangement. Is it interesting to note that the IFMA site obtained a direct use values share (69%) that is close to the shares obtained from CBFM and CADC sites. One normally would expect that the more business/commercial IFMA sites would have higher share for direct use values. However, as shown in the analysis—plantation forest is quite effective in carbon sequestration compared to natural forest or even Agroforestry projects.

Figure 3. Breakdown of Total Economic Value to its Various Components

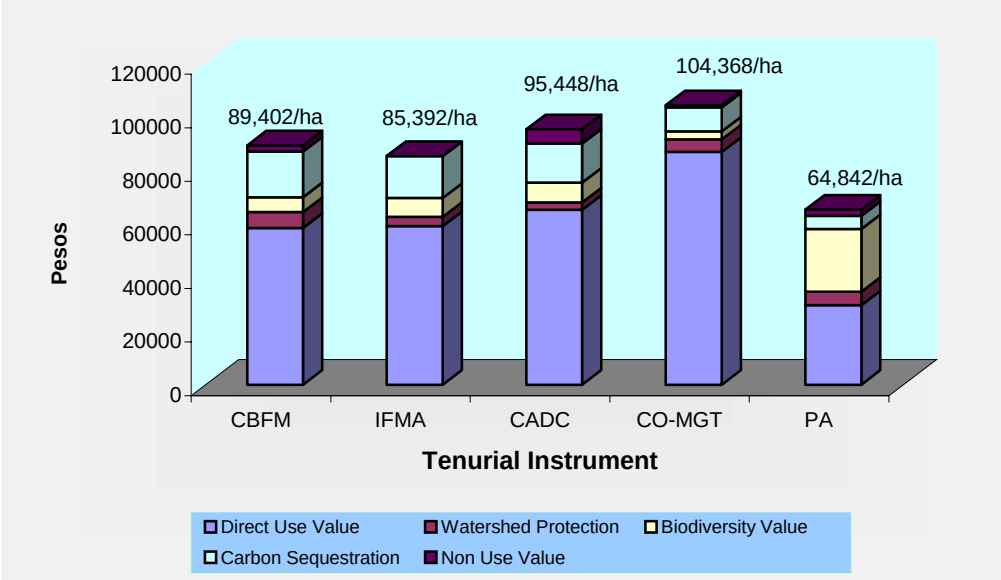

Table 4. Adjusted NPVs (with incorporation of other economic values), Selected Forestry Projects, Philippines.

Project Area	Total area (ha)	Direct Use Values	Indirect Use Values			Non-Use Values	TOTAL ECONOMIC VALUE
			Watershed Protection Value	Biodiversity Value	Carbon Sequestration		
CBFM							
Mananga-Kotkot-Lusaran Watershed	5,688	177,377,411 (44.18)	64,500,733.20 (16.06)	60,739,737 (15.13)	58,247,551 (14.55)	40,461,600 (10.08)	401,507,032.20 ***P70,588/ha***
Saug Watershed	3,928	53,875,456 (30.67)	12,637,798.20 (7.19)	4,868,217 (2.77)	104,288,715 (59.37)	0	175,670,186.20 ***P44,723/ha***
Logum-Baobo Watershed	2,784	96,349,833 (63.63)	12,630,093.40 (8.34)	16,816,232 (11.10)	25,636,718 (16.93)	0	151,432,876.40 ***P54,394/ha***
Itogon Watershed	4,218	356,493,469 (74.34)	15,624,371.30 (3.26)	18,918,261 (3.94)	88,524,925 (18.46)	0	479,561,026.30 ***P113,694/ha***
Ubay-Mabini, Alicia Watershed	1,312	310,810,003 (89.64)	4,985,005.60 (1.44)	4,245,140 (1.22)	26,691,124 (7.70)	0	346,731,272.60 ***P264,277/ha***
Sapang-Bato Watershed	2,154	181,401,254 (75.48)	7,879,121.10 (3.28)	6,039,054 (2.51)	45,004,914 (18.73)	0	240,324,343.10 ***P111,571/ha***
CAMAR Multipurpose Coop	1,000	58,287,884 (64.96)	6,803,338.40 (7.58)	5,265,343 (5.87)	11,456,231 (12.77)	7,916,400 (8.82)	89,729,196.40 **P89,729.20**
AVERAGE (% share)		***58,556*** ***65%***	**5,932** **7%**	**5,544** **6%**	**17,076** **19%**	**2,295** **3%**	***89,402*** ***100%***
IFMA							
Luzon Mahogany Timber Industries	10,754	336,627,075 (52.37)	43,233,559 (6.73)	115,056,988 (17.90)	147,807,885.50 (23.00)	0	642,725,507.50 ***P59,766/ha***

Project Area	Total area (ha)	Direct Use Values	Indirect Use Values			Non-Use Values	TOTAL ECONOMIC VALUE
			Watershed Protection Value	Biodiversity Value	Carbon Sequestration		
Toplite Lumber	6,121.81	185,166,188 (56.16)	6,994,995.30 (2.20)	0	126,216,125.22 (39.64)	0	318,377,308.52 ***P52,007/ha***
Sirawai Plywood Lumber Corp.	14202	1,318,915,036 (77.92)	58,498,694 (3.46)	101,773,808 (6.01)	213,509,179 (12.61)	0	1,692,696,717 ***P119,187/ha***
AVERAGE (% share)		**59,229 69%**	**3,499 4%**	**6,977 8%**	**15,688 18%**	**0 0**	***85,392 100%***
CADC							
Ilongot Livelihood Association	25-ha utilization Natural Forest	1,098,643 (76.63)	28,893 (2.02)	0	306,120 (21.35)	0	1,433,656 ***P57,346***
Lake Sebu	36,635	2,391,827,233 (68.38)	102,425,685 (2.93)	273,229,535 (7.81)	534,327,165 (15.28)	195,881,920 (5.60)	3,497,728,173 **P95,475/ha**
***AVERAGE* (in % share)**		**65,274 68%**	**2,795 3%**	**7,453 8%**	**14,584 15%**	**5,343 6%**	**95,448 100.00**
CO-MGT							
Maasin Watershed	2,685	183,116,908 (74.12)	12,903,614 (5.22)	7,969,908 (3.23)	43,057,428 (17.43)	0	247,047,858 ***P92,010/ha***
Lower Magat Forest Reserve	24,251	2,158,525,126 (84.18)	112,022,977 (4.37)	74,050,305 (2.89)	197,756,364 (7.71)	21,845,635 (0.85)	2,564,200,407 ***P105,736/ha***
AVERAGE (in % share)		**86,934 83%**	**4,638 4%**	**3,045 3%**	**8,940 9%**	**811 1%**	**104,368 100.00**
PROTECTED AREAS: Mt. Kanlaon		789,151,308 (46%)	132,925,959 (8%)	621,165,318 (36%)	114,159,950 (7%)	64,646,465 (4%)	1,722,048,999 ***P64,842/ha*** 100%

Table 5. Summary of Economic Values per hectare for the 15 Forestry Projects by Tenurial Arrangements (weighted average).

Tenurial	Total	Direct Use Value		Indirect & Non-
Arrangement	Economic Value	Mean	Mid-pt	Use Value
IFMA	85,392	59,229	61,558	26,163
CBFM	89,402	58,556	125,307	28,552
CO-MANAGEMENT	104,368	86,934	78,604	17,434
CADC	95,448	65,273	54,617	30,175
PROTECTED AREA	64,842	29,715	29,715	35,127

4.3 ECONOMIC ANALYSIS OF FOREST LAND USE FOR A GIVEN LGU: THE CASE OF LOWER MAGAT FOREST RESERVE AND THE WAO MUNICIPALITY

This case analysis was undertaken to demonstrate how one might perform Levels 2 & 3 economic analyses. At this stage, the perspective taken is broader in the sense that the resource manager is now concerned with how open access forestlands within the LGU jurisdiction (in partnership with DENR and the local communities) could be allocated to the various user groups. This concern is likely to be a major challenge to most LGUs as they begin to gain control in managing their own natural resources. Such an expectation is consistent with the decentralization policy of the country as embodied in the Local Government Code of 1991. Over the last few years, assistance (e.g. Eco-Governance Project of DENR with funding from USAID) to build-up the capacity of the LGUs to respond to this challenge is on the rise. This section demonstrates how one LGU might go about confronting this challenge.

In the case of the Lower Magat Forest Reserve, one starts with the economic analysis results based on the proposed land allocation to varying land uses and user groups. The economic analysis made use of the DENR per unit cost estimates or the so-called, DENR costing. It then computes for the share of the various user groups to the total land area and NPV. Given the data on the share to land area and NPV, the resource managers could decide how they may want to reallocate the forest lands to the various user groups--assuming that existing land uses adopted by each user group remain the same.

Another approach was demonstrated in the case of the Wao forestlands. Instead of implementing the standard economic analysis for a proposed forestry project a short-cut approach was taken. Specifically, the per hectare values per land use allocation instrument obtained for the 15 sample forestry projects were used to estimate NPV for the project area. Note that this approach has a serious limitation in the sense that NPV in general is dependent on the land uses that will be adopted by the user group and not, on the land allocation rights per se. To test how close the results of this short-cut approach would approximate the results using the DENR costing, an economic analysis for Wao forestland using the latter approach was also carried out.

Note that the economic analysis being discussed in this section refers to DIRECT USE VALUES only. The analysis could be extended to cover indirect and non-use values but since DENR cost estimates relied only on direct use values—the analysis was likewise limited to this component of the TEV. The discrepancy in the results of using the short-cut (per unit cost estimates obtained from the 15 cases) and the traditional-longer economic analysis calculations was evaluated for the Wao watershed.

4.3.1 The Case of the Lower Magat Forest Reserve

The area of interest here is the 24,251-hectare forestland at the Lower Magat Forest Reserve. These areas cover the municipality of Diadi and barangays Baretbet and Villaros of the municipality of Bagabag in the province of Nueva Viscaya. This area is subjected to the pioneering approach of LGU-DENR co-management of natural resources. This decision was reached after a series of consultation workshops with the various stakeholders under the auspices of NRMP and GOLD projects.

The Indicative Plan for the Lower Magat Forest Reserve specified that the most pressing issue brought out during the series of consultations centered on the property rights issues over the forestlands. This situation was triggered by the occupancy problem on expired Pasture Lease Areas (PLAs). Compounding the problem is the reluctance of the previous PLA holders to give up control in the area. In fact, they wanted to avail of a new tenurial arrangement over these cancelled areas, such as that of the SIFMA. The area under contention was the 2,576 hectares, which was previously covered by 10 expired PLAs. In addition, it was noted that past efforts of the government met limited success due to the government's ineffective use of budget and major logistical problems. The lack of effective government control had resulted to the de facto control of the area by the communities who have gained access to these lands.

Given the critical role that the Reserve plays in supporting a major infrastructure—Magat Dam, the decision to place the area under co-management is significant. Of the 24,251 Forest Reserve, the Indicative Plan speaks of 18,892 hectare-open access forest land that are virtually already under the control of the local communities. The objective of the Plan is to provide land tenure instruments to local communities to motivate long-term investments in resource management. At the time the Plan was written, 5,359 hectares of the Reserve were already awarded as follows: 1,097 ha under CSC, 1,708 ha under CFMA, 2,155 under PLA with TFLA of 225 ha and AFLA of 174 hectares. Table 6 presents the preferred land uses as per the Indicative Plan.

Table 6. Total Economic Value for Indicative Land Uses for the Lower Magat Forest Reserve, NPV, 12% discount rate, 25 years (Proposed Allocation).

Land Use	Area	Direct Use Values	Indirect Use Value & Non-use value	Total Economic Value
Production Areas:				
Plantation/Orchards (IFMA/SIFMA)	7,273	1,804,586,142 (248,121)	146,343,670 (20,122)	1,950,929,812 (268,243)
CBFM	4,983	316,498,595 (63,516)	50,602,365 (10,155)	367,100,960 (73,761)
Silvi-Pasture (PLA)	2,155	17,737,349 (8,231)	6,226,442 (2,889)	23,963,791 (11,120)
Protection Areas:				
Rehab of Degraded Protection Areas (Co-mgt)	6,235	-----	63,316,425 (10,155)	63,316,425 (10,155)
Managed Natural Forest (co-mgt)	2,485	-----	94,334,825 (37,962)	94,334,825 (37,962)
Nature-based Tourism (co-mgt)	1,120	19,703,040 (17,592)	23,005,920 (20,541)	42,708,960 (38,133)
TOTAL	24,251	2,158,525,126 (P89,008/ha)	383,855,227 (P15,827/ha)	2,542,380,352 (P104,835/ha)

Table 6 also presents the results of the economic analysis done for the project site (as per the indicative plan) following the total economic valuation principle. The direct use values were estimated using the standard costing data of DENR forestry projects, adjusted to 2002 prices. The data were supplemented with information available for the other forestry projects.

The economic analysis results show an NPV per hectare (25 years, 12%) of P89,008 per hectare (with direct use values alone) and ₱104,835 per hectare (inclusive of all economic values). Figures in parenthesis are NPV on a per hectare basis. From the figures given in Table 6, one could estimate the NPV before taxes and charges to the various user groups. For the Lower Magat Forest Reserve for instance, the following sharing of benefits from the 24,251 hectare-forestland could be read from the economic results data. The user groups that benefit the most from the Lower Magat Forest Reserve are the IFMA/SIFMA Holders. They have use rights over 30% of the land area but they account for 84% of the Direct Use Values and 77% of the Total Economic Value (Table 7). The Co-Management of LGU, DENR, and Community may have control over the bigger proportion of land area (41%) but since most of the economic values translate into indirect use values and non-use values—their total share to TEV is only 8%. The CBFM holders control 21% of the land area and get 15% of the Direct Use Values and 14% of the TEV.

In this particular instance, the resource managers may decide to reallocate some of IFMA areas to CBFM holders or place them under co-management. If the land uses in those reallocated areas will be retained—then, this action will constitute a more equitable sharing of benefits from the Lower Magat Forest Reserve. Note that since the assumption is that the existing land uses will stay, then, the total NPV from the project area remains the same as well. However, shares of the various user groups will change. If the various user groups will alter the given land uses—then, the total NPV from the forestlands will also change. It will increase, if the land uses to be selected are those that yield higher NPV per hectare. Resource managers, though, may decide to retain land uses that give lower direct use values but generate higher non-use and indirect use values, such as protected area—to benefit other members of society.

Table 7. Sharing of Benefits from the Lower Magat Forest Reserve to Various User Groups

User Group	Area	Direct Use Values	Indirect Use and Non-use Values	Total Economic Value
IFMA/SIFMA: Plantation/orchards	7,273 (30%)	1,804,586,142 (84%)	146,343,670 (38%)	1,950,929,812 (77%)
CBFM	4,983 (21%)	316,498,595 (15%)	50,602,365 (13%)	367,100,960 (14%)
Co-Mgt:				
Protection Areas	6,235	-	63,316,425	63,316,425
Natural Forest	2,485	-	94,334,825	94,334,825
Nature-based Tourism	1,120	19,703,040	23,005,920	42,708,960
Sub-total	9,840 (41%)	19,703,040 (1%)	180,657,170 (47%)	200,360,210 (8%)
PLA: silvi-pasture	2,155 (9%)	17,737,349 (1%)	6,226,442 (2%)	23,963,791 (1%)
TOTAL	24,251	2,158,525,126	383,855,227	2,542,380,352

4.3.2 The Case of the WAO LGU

A large part of the forestlands of Wao have already been occupied, degraded and denuded. The several flash floods experienced in the area during rainy season and the dry periods during summer months were blamed on this condition. The 20-year operation of the Timber Industries of the Philippines (TIPI) is said to have made access to logged-over areas easier for those occupants. In 1996, it was estimated that 32% of timberland has already been converted to agriculture.

To address the situation, the LGU then embarked on massive tree planting activities in the watershed, with wide support from various sectors. In addition, a massive information campaign was launched to avert further encroachment into the forestland. There were also major efforts to push for the closure of TIPI, which was then recognized as the major facilitator for upland migration. Despite these efforts, migration into forestland continued. The problem was compounded by the unclear jurisdiction over the area by the Southern Philippine Development Authority (SPDA) and the low level initiatives by DENR (FLUP for Wao, 2003). The LGU has recently sought the assistance of the EcoGovernance Project—hence; a Forest Land Use Plan (FLUP) for Wao was formulated.

The Plan is expected to bring in a more systematic approach to forest management—with the LGU working closely with SPDA/DENR-ARMM. The goal is to allocate land to various user groups—in a way that is socially acceptable, environmentally sound, and economically efficient.

The basic allocation strategy is to recognize existing forest occupants so that they may be encouraged to make long-term investment in forest management. It is also imperative to protect critical areas through the involvement of the local communities as social fences and the designation of specific areas for community activities such as communal forest and community watersheds. The salient components of the FLUP are given in Table 8 below.

Table 8. Recommended Allocation for Timberlands in the Municipality of Wao.

Sub-watershed	Land Area	Proposed Allocation Mode	User Right Holder
Balatin	8090.98	CBFM, Community Forestry	Community DENR/LGU/Community
Kapigis	5,740.50	CBMA, Community Forestry	Community DENR/LGU/Community
Gamot	3,727.28	CBFMA	Community
Maradugao A	1,741.02	CBFMA	Community
Kalaga	10,496.20	Protected Area Communal Forest	DENR/LGU DENR/LGU
Kalawaig	2,064.80	CLOA	Individuals-DAR
Maradugao B	3,008.04	CLOA	Individuals-DAR

Cf: FLUP (2003)

Note that some of these timberlands are already allocated. The FLUP speaks of the land area of interest being that of the 19,819.63 hectares of 'open-access' unallocated forestlands in this municipality. Based on the Plan, one could initially assume the following allocation goals reflected in Table 9 below:

Table 9. Proposed Land Use (Land Allocation) for the Wao Forestlands.

Proposed Land Use (land allocation)	Percent Share	Area (hectares)
Protected Areas	20%	4,000.00
Community Watershed	8%	1,500.00
Communal Forests: Rattan collection	10%	2,000.00
CBFM (Agroforestry)	62%	12,319.63
TOTAL	100%	19,819.63

Using the per hectare NPV from the forestry projects under the various allocation instrument given in Table 5, the NPV for the unallocated forestlands of Wao was estimated. In the calculation, the higher per unit values (mid-point/mean) were used—based on the general tendency of most economic analysis estimation to be on the conservative side. As noted earlier also, the NPV comparison will be limited to DIRECT USE VALUES only. In this illustrative example, one merely wants to show how one can use per hectare NPV per allocation right to come up with the total NPV for the unallocated, open-access forestlands and how results of such a calculation would compare with results using the DENR costing.

The results in Table 10 indicate that the Wao forestlands could generate direct use values worth P1.96 Billion over a 25-year planning period and using a 12% discount rate, at 2002 prices. On a per hectare basis, this translates to P99,110 hectare. A different allocation of land to various user groups will result in different NPV. Giving more lands to the higher-earning user group--the community- through the CBFM instrument or through co-management will result in the highest NPV as these two land allocation instruments were associated with higher returns from the lands. Going back to Table 8—if one would use weighted average values—the co-management scheme is far superior than the other allocation instruments.

Table 10. NPV of the Proposed Land Allocation for the Wao Forestlands (Based on the use of DENR Costing)

Proposed Land Allocation	Area (hectares)	NPV Direct Use Value	NPV Per hectare
Protected Areas	4,000.00	118,859,933	29,715
Community Watershed: (co-mgt)	1,500.00	130,401,000	86,934
Communal Forests (Co-mgt)	2,000.00	173,867,999	86,934
CBFM (Agroforestry)	12,319.63	1,543,735,877	125,307
TOTAL	9,819.63	1,966,864,808	99,238

How will the results of the NPV calculation differ when the NPV was calculated using DENR costing, given proposed land uses for WAO? Table 11 summarizes the results of the economic analysis that were generated based on direct use values of the forestlands. Specifically, it was assumed that there would be rattan extraction in the communal natural forest. The agroforestry system is a mixed planting of mango, ipil-ipil and corn. The community watershed will be planted with a mix of plantation species and high-value crops, with bamboo planted in riverbanks.

Interestingly, the results of the economic analysis based on assumed land uses for the Wao forestland and that based on per hectare NPV per allocation instrument yielded results that are not too far apart from each other. As seen, the NPV for the proposed land uses is ₱1.81 billion, with a per hectare NPV of ₱91,509 per hectare. The results of the calculation based on the short-cut approach resulted in an NPV for the project area of ₱1.96B and a per hectare NPV of ₱99,238—a difference of merely 8%!

Table 11. NPV of the Proposed Allocation for the WAO forestlands (direct use value only) based on Weighted Average NPVs per Land Allocation, 2000 prices.

Proposed Land Use (land allocation)	Percent Share	Area (ha)	Estimated Net Present Values	
			12%	15%
Protected Areas	20%	4,000.00	-	-
Community Watershed	8%	1,500.00	46,350,554.99	28,924,379.99
Communal Forests	10%	2,000.00	45,708,959.84	37,672,359.87
CBFM (Agroforestry)	62%	12,319.63	1,721,605,975.84	1,209,885,390.96
TOTAL	100%	19,819.63	1,813,665,490.67	1,276,482,130.82
NPV per hectare			**91,508.54**	64,404.94

5.0 SUMMARY AND CONCLUSIONS

There are three main tasks carried out in this paper. One is to obtain the NPV estimates for selected forestry projects under different allocation instruments. There were 15 forestry projects evaluated for the purpose, with 7 under CBFM, 3 under IFMA, 2 under Co-management, 2 under CADC and 1 Protected area. The limited number of samples was largely a result of the limited cases with economic analysis information. In some of these cases, the economic analysis was constructed based only on land use information and had to rely on cost estimates of DENR. Since the various economic analyses were undertaken at different time periods, adjustments were made to bring them all to 2002 price levels.

The economic analysis undertaken in the various forestry projects analyzed have focused on the direct use values of the forest resources in the given forestlands. As pointed in the paper, in addition to direct use values (consisting largely of consumptive goods and services derived from the forest), the forest also provides indirect use values (mostly in terms of ecological services like watershed function, carbon sequestration and biodiversity value) and non-use values (option, bequest and existence) to society. Data constraints on these other values have led to the general practice of including only the direct use values in economic analysis. This type of analysis corresponds to the Level 1 analysis presented in Figure 2 of this paper.

The second task is an attempt to extend the economic analysis to incorporate other economic values in the forests—particularly, indirect use values and non-use values. For this purpose, the

study relied on the BT approach. This refers to the practice of using values generated in other study areas (mostly, other countries) to one's study site. The procedure requires three types of adjustments before one can use the transfer values: a) adjustment for differences in income, b) adjustment for differences in foreign currency, and c) adjustment for price differences.

The task of undertaking BT starts with an extensive literature search on the different studies that may have included valuation of environmental services. This process took time but the Internet search was rewarding. Once the values were obtained, per unit values were subjected to the three adjustments mentioned earlier. Finally, the NPV per hectare for these environmental services were estimated, over the same life span as the forestry projects using the same discount rate. The study then estimated the TEV for the 15 forestry projects that were evaluated. The results showed that direct use values still dominate the TEV of forestlands, with values ranging from 46% for Protected areas to 83% in Co-management sites and the average, being 60%. Consistent with expectations, the indirect and non-use values predominate in the Protected Area sites.

Information on the indirect use values and non-use values could be useful in determining the benefits to society of forest protection efforts. They could also come in handy in the future, when a mechanism for charging off-site beneficiaries of forest protection efforts can be developed as a means to encourage further investment in resource conservation.

The third task focused on undertaking Levels 2 and 3 economic analyses. Level 2 analysis pertains to the task of generating per hectare NPV per land allocation instrument. This process is not difficult once one has the NPV estimates for the various forestry projects under the different allocation instruments. The process though of linking the NPV to the allocation instrument, rather than the land use, assumes that the proposed land uses for the various forestry projects evaluated will stay the same, regardless of who manages them. With this assumption the paper generated the per hectare NPV for areas under IFMA, CBFM, CADC, Co-management, and protected area. These values were used in the economic analysis of the Wao LGU for the level 3 analysis.

Specifically, level 3 analysis calculates the NPV for a given 'open access' forestland using the per hectare unit values derived from levels 1 and 2 analyses. This approach was illustrated in the case of the Wao Watershed. Using the per hectare NPV per allocation instrument—the total NPV for the unallocated forestlands of Wao was estimated. The results yielded an NPV of P1.96B for the 19,558 forestland or an NPV of P99,100 per hectare. To test the robustness of the results, level 1 analysis (economic analysis using DENR costing) was also carried out for Wao. The results reveal that economic estimates would only be different from the short-cut approach by less than 10%. This seems to show that one can in fact use the NPV per hectare per allocation instrument in determining economic analysis of alternative allocation arrangements. Still, increased confidence in the values can be generated with increased number of forestry projects analyzed in level 1 and 2 analyses, as more time may permit.

6.0 REFERENCES

Asian Development Bank. 1996. Economic Valuation of Environmental Impacts: A Workbook. Environment Division. ADB, Manila, Philippines

Bann, Camille. 1998. The Economic Valuation of Tropical Forest Land Use Options: A Manual for Researchers. Economy and Environment for Southeast Asia. Research Report.

Delos Angeles, MS; SR Francisco; HA Francisco.2001. Economic Analysis of Land Use Allocation for the Samar Island Forest Reserve, SAMBIO Technical Report.

Dixon, JA and PB Sherman. 1990. Economics of Protected Areas: A New Look at Benefits and Costs. Earthscan Publications: London.

Jesdapipat, Sitanon and Siriporn Kiratikarnkul. 1998. Surrogate Pricing for Water: The Case of the Micro Hydro-electricity Cooperatives in Northern Thailand. EEPSEA Research Report Series, 1.

Kumari, K. 199. Sustainable Forest Management in Peninsular Malaysia: Towards a Total Economic Valuation Approach, PhD Thesis. University of East Anglia, Norwich, UK.

Lasco, Rodel. 1997. "Management of Philippine Tropical Forests: Implications to Global Warming". Paper presented at the 8th Global Warming Conference. Columbia University, New York, USA.

Pearce, DW and D. Moran.1994. The Economic Value of Biodiversity. IUCN.Easthscan Publication Ltd. London.

Rosales, Rina.2000. Recreation Value of Sohoton Park, Samar Island Forest Reserve.SAMBIO Technical Report.

Rosales, R. and H. Francisco. 2000. Non-Use Values for Samar Island Forest Reserve. SAMBIO Technical Report.

Ruitenbeek, J. 1988. Social Cost Benefit Analysis of the Korup Project, Cameroon. World Wide Fund for Nature and the Republic of Cameroon.

CFP-Camar Multipurpose Cooperative Approved CFMA.1996. Integrated Annual Operations Plan. USAID-DAI-GOLD Project.

Ancestral Domain Management Plan (ADMP) of the T'boli and Ubo Tribes of Lake Sebu, South Cotabato. 1997.

Appendix Table 1. Detailed Total Economic Value Calculations, 15 Forestry Projects,2002

Project Area	Area (ha)	Direct UseValues	Indirect Use Values			Non Use Value	Total Value
			Watershed Protection	Biodiversity Value	Carbon Sequestration	Existence Value	
CBFM							
		44.18	16.06	15.13	14.55	10.08	100.00
Mananga-Kotkot-Lusaran Watershed	5688	177,377,411.00	64,500,733.20	60,739,737.00	58,427,551.00	40,461,600.00	401,507,032.20
Protection Forest:	3506						70,588.44
Strict protection	2300		54,781,128.00	47,244,300.00	24,561,700.00	40,461,600.00	
Riparian	1206						
Production Forest	607		1,753,805.10		18,581,484.00		
Agroforestry	1179		5,677,474.50	8,072,613.00	11,055,483.00		
Enrichment Planting	396		2,288,325.60	5,422,824.00	4,228,884.00		
		30.67	7.19	2.77	59.37	0.00	100.00
Saug Watershed Subproject	3928	53,875,456.00	12,637,798.20	4,868,217.00	$ 104,288,715.00	0.00	175,670,186.20
Reforestation	3189		9,213,977.70		97,621,668.00		44,722.55
Agroforestry	711		3,423,820.50	4,868,217.00	6,667,047.00		
Bamboo	28						
		63.63	8.34	11.10	16.93	0.00	100.00
Logum-Baobo Watershed	2784	96,349,833.00	12,630,093.40	16,816,232.00	25,636,718.00	0.00	151,432,876.40
Agroforestry	2456		11,826,868.00	16,816,232.00	23,029,912.00	0.00	54,393.99
Bamboo	50						
Falcata-Durian Plantation	278		803,225.40		2,606,806.00		
		74.34	3.26	3.94	18.46	0.00	100.00
Itogon Watershed	4218	356,493,469.00	15,624,371.30	18,918,261.00	88,524,925.00		479,561,026.30
Reforestation	2352		6,795,633.60		71,999,424.00		113,693.94
Agroforestry	439		2,114,004.50	3,005,833.00	4,116,503.00		
ANR (Enrichment Planting)	1162		6,714,733.20	15,912,428.00	12,408,998.00		
Streambank Rehabilitation	178		514,295.40				
Erosion Control	87		251,369.10				

Appendix Table 1 (cont…)

Project Area	Area (ha)	Direct UseValues	Indirect Use Values			Non Use Value Existence Value	Total Value
			Watershed Protection	Biodiversity Value	Carbon Sequestration		
		89.64	1.44	1.22	7.70	0.00	100.00
Ubay, Mabini, Alicia Watershed subproject	1312	310,810,003.00	4,985,005.60	4,245,140.00	26,691,124.00	0.00	346,731,272.60
Reforestation	682		1,970,502.60		20,877,384.00		264,276.88
Agroforestry	620		2,985,610.00	4,245,140.00	5,813,740.00		
Riverbank Protection	10		28,893.00				
		75.48	3.28	2.51	18.73	0.00	100.00
Sapang Bato Watershed	2154	181,401,254.00	7,879,121.10	6,039,054.00	45,004,914.00	0.00	240,324,343.10
Reforestation	1200		3,467,160.00		36,734,400.00		111,571.19
Agroforestry	882		4,247,271.00	6,039,054.00	8,270,514.00		
Bamboo (buho)	15						
Greenbelt (Banana)	24		69,343.20				
Roadside Planting	33		95,346.90				
		64.96	7.58	5.87	12.77	8.82	100.00
CFP CAMAR Multipurpose Coop	1000	58,287,884.00	6,803,338.40	5,265,343.00	11,456,231.00	7,916,400.00	89,729,196.40
Plantation Forest	64		184,915.20		1,959,168.00		89,729.20
Natural Production Forest	312		1,502,436.00	4,272,528.00	3,331,848.00		
Agroforestry	145		698,247.50	992,815.00	1,359,665.00		
Brushland areas (ANR)	29		83,789.70				
Protection Forest:	450		4,333,950.00		4,805,550.00	7,916,400.00	
AVERAGE		**58,556**	**5,932**	**5,544**	**17,076**	**2,295**	**89,402**
(% share)		**65%**	**7%**	**6%**	**19%**	**3%**	**100%**

Appendix Table 1 (cont…)

Project Area	Area (ha)	Direct UseValues	Indirect Use Values			Non Use Value Existence Value	Total Value
			Watershed Protection	Biodiversity Value	Carbon Sequestration		
IFMA		52.37	6.73	17.90	23.00	0.00	100.00
Luzon Mahogany Timber Industries, Inc.	10754	336,627,075.00	43,233,559.00	115,056,988.00	147,807,885.50	0.00	642,725,507.50
Plantation Development	2352		6,795,633.60		71,999,424.00		59,766.18
Timber production (ASLO)	5297		25,507,703.50	72,537,118.00	28,283,331.50		
Enrichment Planting	225		1,083,487.50	3,081,150.00	3,443,850.00		
Timber Stand Improvement	2880		16,642,368.00	39,438,720.00	44,081,280.00		
		58.16	2.20	0.00	39.64	0.00	100.00
Toplite Lumber	6121.81	185,166,188.00	6,994,995.30	0.00	126,216,125.22	0.00	318,377,308.52
Plantation Establishment	3700.81		10,692,750.33		113,289,195.72		52,007.05
Timber Production	2421		6,994,995.30		12,926,929.50		
		77.92	3.46	6.01	12.61	0.00	100.00
Sirawai Plywood and Lumber Corporation	14202	1,318,915,036.00	58,498,694.00	101,773,808.00	213,509,179.00	0.00	1,692,696,717.00
Timber Production (ASLO)	7432		35,788,796.00	101,773,808.00	39,683,164.00		119,187.21
Tree Plantation	5135		14,836,555.50		157,192,620.00		
Mix Fruit Plantation	635		3,057,842.50		5,954,395.00		
Rubber	1000		4,815,500.00		10,679,000.00		
AVERAGE		**59,229**	**3,499**	**6,977**	**15,688**	**0**	
(% share)		**69%**	**4%**	**8%**	**18%**	**0%**	**100%**
CADC		76.63	2.02		21.35		100.00
Ilongot	25	1,098,643.00	28,893.00		306,120.00		1,433,656.00
Plantation Establishment	10		28,893.00		306,120.00		57,346.24
Timber Utilization	15						

Appendix Table 1 (cont…)

Project Area	Area (ha)	Direct UseValues	Indirect Use Values			Non Use Value Existence Value	Total Value
			Watershed Protection	Biodiversity Value	Carbon Sequestration		
		68.38	2.93	7.81	15.28	5.60	100.00
Lake Sebu	36635	2,391,827,233.00	102,425,685.00	273,229,535.00	534,327,165.00	195,881,920.00	3,497,728,173.00
Agriculture (rice & corn)	4000						95,475.04
Agroforestry	6000		28,893,000.00	41,082,000.00	56,262,000.00		
Natural forest Management	1,000		4,815,500.00	13,694,000.00	10,679,000.00	8,791,000.00	
Existing plantation	1000		2,889,300.00		10,679,000.00		
Reforestation	14,000		40,450,200.00		428,568,000.00		
Community forest reserves	2635		25,377,685.00	54,125,535.00	28,139,165.00	46,354,920.00	
Traditional hunting grounds	8000			164,328,000.00		140,736,000.00	
AVERAGE		**65,273**	**2,795**	**7,453**	**14,584**	**5,343**	**95,448**
(% share)		**68%**	**3%**	**8%**	**15%**	**6%**	**100%**
Co Managed		74.12	5.22	3.23	17.43	0.00	100.00
Maasin Watershed	2685	183,116,908.00	12,903,613.80	7,969,908.00	43,057,428.00	0.00	247,047,857.80
Reforestation	1050		5,056,275.00		32,142,600.00		92,010.38
Agroforestry	1164		7,847,338.80	7,969,908.00	10,914,828.00		
Bamboo Plantation	300						
Rattan	111						
Riverbank Protection	60		173,358.00				
		89,007.67					

Appendix Table 1 (cont…)

Project Area	Area (ha)	Direct UseValues	Indirect Use Values			Non Use Value Existence Value	Total Value
			Watershed Protection	Biodiversity Value	Carbon Sequestration		
		84.18	4.37	2.89	7.71	0.85	100.00
Lower Magat Forest Reserve	24251	2,158,525,126.00	112,022,976.50	74,050,305.00	197,756,364.00	21,845,635.00	2,564,200,406.50
Protection Forest							105,735.86
Rehab of degraded areas	6235		30,024,642.50		33,291,782.50		
Managed Natural Forest	2,485		16,753,124.50	51,044,385.00	26,537,315.00	21,845,635.00	
Production Forest		2,138,822,086.00					
Plantation/orchard	7,273		35,023,131.50		111,320,538.00		
CBFM	4,983		23,995,636.50		26,606,728.50		
Silvi-pasture	2,155		6,226,441.50				
Nature-based Tourism	1,120	19,703,040.00		23,005,920.00			
AVERAGE		**86,934**	**4,638**	**3,045**	**8,940**	**811**	**104,368**
(% share)		**83%**	**4%**	**3%**	**9%**	**1%**	**100%**
Protected Area		789,151,307.71	132,925,959.25	621,165,317.60	114,159,950.21	64,646,464.61	1,722,048,999.38
Mt. Kanlaon	26557.6	758,921,742.67					64,842.04
Strict Protection Zone	7353.71	29,714.71	70,823,581.01	503,508,523.70	23,559,080.73	64,646,464.61	118.22
Restoration Zone	7168.51		20,711,975.94		21,944,242.81		
Multiple Use Zone	10317		24,840,780.83		50,306,153.44		
Recreational Zone	1718.37	30,229,565.04	16,549,621.47	117,656,793.90	18,350,473.23		

Appendices

APPENDIX A

ADJUSTMENTS OF BENEFIT TRANSFER ESTIMATES *

To facilitate the unit transfer of benefit estimates, adjustments should be done to account for the differences in income, price level, preferences, culture, substitution, and social characteristics between the original and the project site. This is also undertaken to offset their influences. However, external factors such as climate, lifestyle, and resource base may also affect the results of the valuation exercise and could cause uncertainties. Thus, the adjustments can only make the transferred values more realistic. It is not possible to remove entirely the biases or errors associated with the benefits transfer analysis.

The original context underwent three stages of adjustments. The first one involves adjustments in GDP (PPP) for transnational transfer. This entails multiplying the original context values with the GDP (PPP) of the transfer/context country for the current year. The result is then divided with the GDP (PPP) of the original context/country for the current year. This is shown below:

$$A_{1i} = \frac{X^0_{i,OC}\left(GDP^t_{TC}\right)}{GDP^t_{OC}},$$

Where $A_{1i}n$ =i^{th} original context value after the first adjustment
$X^0_{i,OC}$ = i^{th} initial original context value
GDP^t_{TC} = GDP (PPP) of the transfer/context country for the current year; and
GDP^t_{OC} = GDP (PPP) of the original/context country for the current year.

This approach is taken from the 1996 ADB Workbook for environmental valuation. It implies that people always spend the same proportion of their disposable income on environmental impacts. This assumption states that environmental services are neither a necessity nor a luxury good since poor and rich people tend to spend their disposable income on both of these goods, respectively.

The second approach is the price Index Adjustment for time factor. This is computed by multiplying the GDP (PPP) adjusted value by the ratio of the current price index of the transfer/context country using the study date as the base year. This is expressed in the following equation:

$$A_{2i} = A_{1i}\left(\frac{CPI'_{TC,0}}{CPI'^0_{TC,0}}\right),$$

Where A_{21} = i^{th} original context value after second adjustment;
A_{1i} = i^{th} original context value after first adjustment;
$CPI'_{TC,0}$ = CPI of the transfer/context country for the current year, using the study date as base year, and
GDP'_{OC} = CPI of the transfer/context country for the initial year/study date, using the study date as base year.

This adjustment was used to remove the impact of time differences, which normally occurs between the primary study and the transfer exercise. Time differences affect development level, income levels, consumption preferences and environmental quality, although price indicator is the only measurable index. The adjustment was carried out with reference to the study/survey time rather than the time of publication due to the time lag of these activities.

* Taken from Saplaco (2000), "Valuasia: Benefits Transfer for Southeast Asia"

The third adjustment done is on the standard currency, which necessitates multiplying the transferred values with the exchange rate of the transfer context to the original context at the current year. This adjustment is necessary to express the transferred values to the original context using the currency of the transfer context. This is shown below:

$$A_{3i} = A_{2i} e^{t}_{TC,OC},$$

Where A_{31} = i^{th} original context value after third adjustment
A_{21} = i^{th} original context value after second adjustment; and
$e^{t}_{TC,OC}$ = currency ratio of the transfer context to the original context at the current year.

In summary, the original context underwent the following adjustments:

$$X^{t}_{i,TC} = X^{0}_{i,OC}\left(\frac{GDP^{t}_{TC}}{GDP^{t}_{OC}}\right)\left(\frac{CPI^{tt}_{TC,0}}{CPI^{0}_{TC,0}}\right)e^{t}_{TC,OC},$$

Where $X^{t}_{i,OC}$ = i^{th} transferred value;
$X^{0}_{i,OC}$ = i^{th} original context value;
GDP^{t}_{TC} = GDP (PPP) of the transfer/context country for the current year; and
GDP^{t}_{OC} = GDP (PPP) of the original/context country for the current year.
$CPI^{tt}_{TC,0}$ = CPI of the transfer/context country for the current year, using The study date as base year, and
GDP^{t}_{OC} = CPI of the transfer/context country for the initial year/study date, using the study date as base year.

The above adjustments required the GDP (PPP), Price Index, and exchange rates across the Southeast Asian region and other countries of original potential contexts. The data were obtained from year-end issues of Asia week, Far Eastern Economic Review, Asian Development Bank Publication, and other sources.

Transfer Considerations*:

1. Select your literature. These are your potential "original contexts". Consider that the expected environmental changes should be the same/similar in amount and kind in the primary studies. If possible, locations and populations similar to those of the transfer context should be used, since economic values reflect preferences that may vary with socioeconomic and other characteristics. Moreover, carefully take into account cultural differences across studies, which include fundamental values and beliefs of the researchers and the study population. Finally, assess the technical quality of the primary study. If possible, use up-to-date and/or recent studies for your transfer exercise.
2. Adjust your values. (See above.) Include other adjustments as deemed necessary. You may also want to use a functional transfer exercise to reinforce your study. This is possible if the parameters are reported in the primary study and corresponding data are available in the transfer context/project area. Modify functions to better fit the area being analyzed.
3. Calculate values per unit of time by multiplying the values with the number of affected individuals to obtain total values for the impact per unit of time. If the impacts vary with time, they should be measured/estimated for each future time period in which the effects are expected to continue.
4. Calculate total discounted value. First, identify the time period wherein the impacts are expected to occur, since costs and benefits from the project may occur at different points or periods in time. Then, compute the total discounted annual damages and benefits using the recommended discount rate, which, together with the impact values, should account for inflation, as stated in the same terms.

**Adapted from "Asian Development Bank 1996: Economic Evaluation of Environmental Impacts. A Workbook."*

APPENDIX B

SITE PROFILE:
SOCIOECONOMIC AND ENVIRONMENTAL PROFILE WITH FOCUS ON LAND USE

1. Luzon Mahogany Timber Industries Inc
IFMA 2001-02, Dinapigue, Isabela, 2001

LAND USE	AREA (hectares)
Plantation Development (Bagras, mangium, gmelina, narra, mahogany)	2,352
Timber Production (ASLO)	5,297
Enrichment Planting	225
Timber Stand Improvement	2,880
TOTAL	**10,754**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
At 12% discount rate	336,627,074.80	31,302.50
At 15% discount rate	242,204,151.76	22,522.24

In January 2001, a 25-year lease agreement was granted to the Luzon Mahogany Timber Industries, Inc (LMTII) to sustainably manage the IFMA area. The IFMA area has a topography that varies from flat to very steep slopes. More than half of the total land area is categorized as rolling, 4% is flat and 2%, very steep. Since the IFMA area was under several concession companies[1], access is mostly through the logging roads constructed by the then Pacific Timber Export Corporation.

Of the total area granted to LMTII, about 8,634 ha were designated as the project area, whereas the remaining was classified as buffer zones (Table 1). A review of vegetation and forest cover records show that no logging operation has been undertaken over the last eight years. A concurrent inventory of forest resources indicate that the IFMA area is primarily composed of the Dipterocarp forest type—32% common hardwoods, 62% construction and furniture species, 3% lesser used species, and 3% premium species.

[1] The concession firms include Monte Alto timber Resources Corporation (MATRC) and Consolidated Logging and Lumber Mills, Incorporated (CLLMI) whose licenses were either expired or cancelled some years ago.

Table 1. Classification of vegetative cover.

Classification	*Land Area (ha)*
Old growth forest	264.00
Adequately stocked residual forest	5,297.00
Mossy/protection forest	503.00
Degraded areas (inadequately stocked residual forests)	224.00
Brushland	2,292.00
Openland	54.00
Buffer zone (1 km wide)	2,326.40
TOTAL	10,960.40

At present, the IFMA area is subject to several plantation development strategies towards a more sustainable forest resource management that is specified in the 25-year Comprehensive Management and Development Plan of LMTII. The strategies indicated the adoption of a wide array of plantation species, silviculture, natural forest management, infrastructure development, and seed procurement among others.

It is stipulated under the leasing agreement that open and denuded lands, brush lands, and degraded areas should be converted into productive areas to sustainably provide raw materials, *e.g.,* quality saw logs for forest-based and related industries. In addition, IFMA predetermines the appropriate land use allocation of the area. The leaseholders are tasked to recommend and allocate some portion suited for agricultural and industrial uses, which, eventually, would trigger the generation of employment opportunities for the inhabitants. It is therefore expected that 25 years hence, with continuous adoption of appropriate measures, a sustainable land and resource use system will be established in the area.

2. Toplite Lumber

IFMA no. 2002-02, Dipaculao, Aurora, 2002

LAND USE	AREA (hectares)
Plantation Establishment (gmelina, falcate, mangium, mahogany, narra, mango)	3,700.81
Timber Production (residual forest)	2,421.00
TOTAL	**6,121.81**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
At 12% discount rate	185,166,187.90	30,246.97
At 15% discount rate	132,600,947.37	21,660.42

The current IFMA area was once part of the logging concession of the Filipinas Loggers Development Corporation (FLDC) in the province of Aurora. From its original area of 9,000 hectares, the project site was reduced to 8,630 hectares. The reduction was mainly due to the exclusion of some portions of alienable lands as well as those areas allocated for watershed, ISF projects, and resettlement. Currently, Toplite Lumber is the holder of the IFMA contract.

Like other mountainous areas, the topography of the project site ranges from flat to rolling with an estimated elevation of 1,200 at the most. The area is drained by the rivers of Dipaningdingan, Ngas, Baul, Bulos and Diluma, Timpolisan, Diapalan, Mangrad and Diadwan. Falling under the 4th climatic type, which is characterized by an even annual distribution of rainfall, the project area is ideal for tree plantation.

The most established communities inside and nearby the project site are mainly the Ilongots and Bungkalots. The total population of these communities is estimated to be a little above 2000. Farming, fishing, furniture making from wood and rattan, trade, and commerce and employment in the government are among the main income sources of the residents. Despite the decline in logging, the forest still plays a significant part in the improvement and stabilization of the socioeconomic conditions of the locality.

Infrastructure-wise, in terms of length of roads, bridges, and culverts, the area was formerly one of the most developed sites among the industrial forests in the country. However, these infrastructure and utilities are no longer usable. The network of footpaths and trails as well as the wooden house that serves as a lodging place for forest guards and reforestation personnel are the only remaining serviceable infrastructure in the area.

Generally, the project area is a mixture of mossy and dipterocarp forest. The mossy forests are characterized by stunted trees with epiphytes/moss growing on its stems and branches. The relative percentage distribution of vegetative cover is shown below (Table 2).

Table 2. Distribution of land resources

Classification	*Land Area* (in hectares)
Second growth (residual forests)[2]	5,581.00
Old growth forests	1,229.19
Mossy forests	905.00
Open land	400.07
Brushland	514.74
TOTAL	8,630.00

The community members, at present, are confronted with a number of challenges, which include land ownership problems, decline in natural resources, and lack of capital for livelihood projects among many others. Local government and other concerned agencies are working closely together to address these issues.

[2] Degraded area amounts to 3,161 hectares. Only 2,420 remain to be productive.

3. Sirawai Plywood and Lumber Corporation (IFMA)

IFMA 21-A, Sirawai, Siocon, and Sibuco, Zamboanga del Norte. 2001

LAND USE	AREA (hectares)
Timber Production (ASLO)	7,432
Tree Plantation	
Open area	1,300
ISLO (conversion)	3,835
Mix Fruit Plantation (mango and durian)	635
Rubber	1,000
TOTAL	**14,202**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	1,318,915,035.92	92,868.26
at 15% discount rate	815,187,325.17	57,399.47

The project site, covering about 16,167 hectares, is situated at the east of Siocon and Panabutan Bay. It lies northeast of Sibuco Bay and is demarcated by the Lituban river at its northernmost tip. The area is a consolidation of concession areas previously managed by the Santa Clara Lumber Co., Inc, Basilan Timber Inc, Curuan Timber Corporation and Zamboanga Products Inc. At present, the Sirawai Plywood and Lumber Corp (SPLC) is the leaseholder to the area.

The project area is in general a mixture of gentle, rolling, and moderately steep terrain with elevation not exceeding 1,000 meters above sea level. Like any other forested areas in the country, the site is composed of mountain residual soils of the Oxisols Order. This gives the area a relatively high capacity to support plantation development.

Adequately stocked logged-over (ASLO) residual forest is the major vegetative cover sprawling the area. A large portion is also composed of degraded residual natural forest (ISLO), Agroforest, and brushland. In addition, the area has established forest and fruit tree plantations (Table 3). These vegetative cover serves as a sanctuary for endemic wildlife species and as a buffer zone to the community.

Table 3. Land use and vegetative cover of the project area

Vegetative Cover	*Land Area* (in hectares)
Adequately-stocked logged-over (ASLO) forest	7,432
Inadequately-stocked logged-over (ASLO) forest	6,725
Brushland	345
Forest tree plantation (generally Gmelina)	1,300
TOTAL	16,167

The current leaseholder—SPLC, modified the existing land use in the project site into production natural forest[3] (46%), protection or buffer zone forest (10%), mix forest tree plantation[4] (32%), rubber tree plantation (6%) and mix fruit tree plantation[5] (6%) (Table 4).

Table 4. Present land use and vegetative cover of the project area

Vegetative Cover	*Land Area* (in ha)
Production natural forest	7,432
Protection or buffer zone forest	1,600
Mix forest tree plantation	5,135
Rubber tree plantation	1,000
Mix fruit tree plantation	1,000
TOTAL	16,167

At present, the greatest challenge that stakeholders face is the sustainable use of the entire project area.

4. Logum-Baobo Watershed

Veruela, Agusan del Sur and Laak, Compostela Valley
Southern Philippines Irrigation Sector Project, Watershed Sub-Component, 2003

LAND USE	**AREA (hectares)**
Agroforestry *(high value agroforestry with natural vegetation strip)*	2,456
Bamboo	50
Falcata-Durian Plantation	278
TOTAL	**2,784**

[3] SPLC adopted a silvicultural system in order to keep the production natural forest intact.
[4] The forest tree plantation is composed, mainly, of Gmelina and mangium. Besides its relatively short biological and economic time rotation, these trees were chosen above the other for its higher degree of adaptability to a wide range of site conditions.
[5] Due to the growing demand and easy marketability of durian and mango, good varieties and strains of these fruits were used in the fruit plantation development.

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	96,349,833.22	34,608.42
at 15% discount rate	61,736,183.98	22,175.35

Sprawling within the towns of Veruela, Laak and Asuncion is the Logom-Baobo Watershed (LBW) area. The site is approximately 21,003 hectares and covers 14 barangays[6] with a combined population of 22,071 from 3,709 households. Agricultural plains and mountains with moderately to steeply sloping terrain characterize the watershed area. Elevation ranges from 30 to 627 meters above sea level. A large portion of the flat (arable) lands has been developed into irrigated rice fields.

The existing vegetative cover in LBW includes 9,921.55 hectares of second growth forests and 11,081.73 hectares of cropland. Forest areas, which remained intact after the expiration of the Timber License Agreements (TLA), were considered second growth forests[7]. Croplands, on the other hand, are those utilized for multiple cropping[8] and corn cultivation.

Several multiple-use management projects are presently implemented at LBW. Management interventions were designed to be socially, economically and most importantly, environmentally sound. With the current direction of the projects and programs in the area, it is expected that the forest component of LBW would remain ecologically stable while continuously providing economic benefits to forest occupants.

5. Sapang Bato Watershed (CBFM)

Clark Field Military Reservation, Pampanga Forestry Sector Project, 1997

LAND USE	AREA (hectares)
Reforestation	
Narra	400
Mangium	300
Eucalpytus	300
Teak	200
Agroforestry	
Mango	482
Cashew	400
(rice/corn/kakawate)	
Bamboo (buho)	15
Greenbelt (banana)	24
Roadside planting	
Mango	16.5
Jackfruit/Banana	16.5
TOTAL	**2,154**

[6] Six of the barangays are under the political and administrative jurisdiction of Veruela and seven are under Laak, whereas one is under the jurisdiction of the municipality of Asuncion.

[7] Second growth forests in LBW are dominated by commercial timber species, which includes Red Lawaan, White Lawaan, Mayapis, Bagtikan and Tanguile among others.

[8] Short-term crops include corn, vegetables and rice.

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	181,401,253.85	84,216.00
at 15% discount rate	110,609,182.53	51,350.59

Prior to 1990, the city of Angeles in the province of Pampanga is known for the US-Military Reservation (Clark Air Base). When the US troops left the country, the former airbase with a total land area of 29,213 hectares was converted to a special economic zone, which is then subdivided into industrial zones and conservation areas. Part of the conservation areas is the Sapang Bato Watershed (SBW) Sub Project. The project was initiated in recognition of the area's vital role in the provision of water to the growing population and businesses in the area.

With approximately 2,247 hectares of grassland, the Sapang Bato Watershed is endowed with favorable topography for reforestation purposes. With elevation ranging from 300-700 meters above sea level, SBW is generally characterized by rolling to moderately steep terrain. According to the 1992 census, the area has a total population of 2,593 residents comprising 568 households[9]. SBW is drained by the Calawang, Kawayan and Urok Creeks.

It is interesting to note that the project area is generally open land dominated by talahib, cogon, samon-samon, wild bananas, alibangbang, tanglad and centrosema. A few forest species, which include banaba, antipolo, alagaw, mango, guava, kakawate and banana, are also sparse in the area. It can be observed that as the slope escalates, the hectareage in SBW increases (Table 5).

Although the area has been damaged by volcanic eruption, it was noted that several species of flora and fauna are still present in the area. Among the species noticed were wild pigs and cats as well as monkeys, deer and wild chicken. Various species of birds and insects such as dragonflies and butterflies were also found in the area.

Table 5. Present land use and slope category

Slope Category (%)	*Land Area* (ha)
0-18	337
18-30	517
30-50	607
> 50	786
TOTAL	2,247

The average household income from farming, off-farm and non-farm activities amounts to approximately PhP36,000. Employment in various industries within the economic zone is the primary source of income of many of the residents. Farming is also an important source of income for many, especially the Aetas.

At present, various economic programs and conservation projects were implemented in the area though the administration of the Bases Conversion Development Authority (BCDA). Current programs address resource management issues as well as conflict among different stakeholders in SBW.

[9] Seventy percent of the population is Pampangos, while 15% are comprised of Aetas and Tagalogs. Pangasinenses, Ilocanos and Visayas consist 13% of the population.

6. Saug Watershed Subproject (CBFM)

Nabunturan, Montevista, and New Corella, Davao del Norte, Forestry Sector Project, 1996

LAND USE	AREA (hectares)
Reforestation (mahogany, rubber, gmelina, falcate, bagras)	3,189
Agroforestry (lanzones, durian, mango, rambutan, marang)	711
Bamboo (giant bamboo)	28
TOTAL	**3,928**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	53,875,456.14	13,715.74
at 15% discount rate	10,865,962.19	2,766.29

The Saug Watershed covers the municipalities of Nabunturan, Montevista and New Corella in Davao del Norte. The site has a total population of 5,973 from 1,135 households. Due to the relatively wet climatic condition in the area and the existing soil type (*Camansa clay loam*), plantation species and agroforestry crops are very suitable in the project site. Relative to other watershed areas, the Saug Watershed has a low elevation, which ranges from 100 to 460 meters above sea level.

Twelve major creeks that converge in the Saug River and drain in Davao Gulf transverse in the project site. The creek and river system in the area indicates that there is enough supply of water to support reforestation and nursery projects.

Dipterocarp species such as Red Lauan and Apitong are predominantly sparsed on the watershed ridges. Likewise, plantation species, which includes *Paraserianthles falcataria*, Gmelina and A. *magnium* among others, evidently grow in the site. Some species of bamboo and rattan are also growing in the site. Along with these species, bird species, which are mostly grass seed feeders, abound in the area.

At present, a large portion (66%) of the total land area is brushlands, grasslands and open lands. These areas are of no economic value to many of the residents. Only 25% of the total area is cultivated with crops such as corn, coffee, cassava, camote, vegetables and coconut. Table 6 shows that the watershed area include 495 hectares of forest plantation and 40 hectares of land covered with infrastructure facilities *i.e.* waterways, roads and settlements. It is interesting to note that the forest plantation was established through the Forest Land Management Agreement (FLMA).

Table 6. Present land uses[10]

Land Use	*Land Area* (ha)
Brushlands, grasslands, open lands	3,925
Cultivated lands	1,487
Forest plantation	495
Secondary forest, water channels, roads settlement	40
TOTAL	5,947

Similar to other watershed areas in the country, the residents of Saug are composed of residents from different ethnic backgrounds. Though most of the residents are Visayans, majority of them are migrants from different regions. Mandayan and Terori tribes also inhabit the area.?? In addition, the area has a generally low rate of educational attainment. About 60% of the total populations have only elementary level as their highest educational attainment.

On-farm activities presently rank as the primary source of income for many of the residents. In fact, PhP8,958 of the average annual income which amounts to PhP20,000, is derived from on-farm sources while PhP5,200 annually comes from off-farm sources. Off-farm activities include seasonal employment in small business enterprises around the area.

7. Mananga-Kotkot-Lusaran Watershed (CBFM)

Cebu City, Talisay, Minglanilla, Compostela, and Balamban, Cebu, 1996

LAND USE	AREA (hectares)
Protection Forest	
Strict Protection Zone *(mangium, molave, jackfruit, banana, rattan)*	2,300
Riparian Zone *(pangatuan, robles, himbabalud, bamboo, rattan)*	1,206
Production Forest	
Brushland *(molave, bagalunga, banana)*	217
Grassland *(mangium, molave, jackfruit, banana, cacao)*	214
Plantation forest *(bagalunga, banana)*	176
Agroforestry	
Diversified cropland *(molave, jackfruit, kakawate, cacao, guyabano, banana)*	905
Corn-kakawate	61
Coconut area *(cacao, guyabano)*	213
Enrichment Planting	396
TOTAL	**5,688**

[10] With the current watershed development and management strategies, the proposed land uses are as follows: reforestation areas (3,189 hectares), agroforestry (711 hectares) and bamboo plantation for stream bank stabilization (28 hectares).

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	177,377,411.29	30,058.87
at 15% discount rate	189,429,924.81	30,943.46

The site, which sprawls within 33 barangays, has approximately 22,000 hectares of watershed resources known as the Mananga-Kotkot-Lusaran Watershed (MKLW). This watershed area plays a vital role in the sustainability of water supply in Metro Cebu.

With 17,610 people from 3,839 households inhabiting the area, MKLW is characterized by rolling to rugged mountainous terrain. The area has an elevation of 80 to 800 meters above sea level. The Mananga watershed has several catchments that drain into the Mananga River while the Kotkot-Lusaran areas drain into Kotkot and Lusaran Rivers. These rivers then converge into the coasts in the towns of Cebu, Danao, Balamban, Compostela, Consolacion and Liloan.

Given the varied geologic and climatic conditions in the area, a high diversity of taxa and vegetation types were identified in the site. For one, remarkable species such as *Derris cebuensis*, *Gomphia serrata* and *Cinnamomum cebuense* among others flourish in the site. Rare trees such as the Banilad tree and the Cebu Flowerpecker are found in the area. Several animal species of high biological and economic importance are also present in MKLW.

Agricultural activities remain as the primary source of income among the site occupants. Of the average annual household income (PhP 22,561.23), 42% are from on-farm activities while combined off-farm and non-farm income amounts to 58% of the total.

Of the total area, 41% are croplands while plantation forests accounts for only 9% (Table 7). In the Mananga area, 40% is considered as alienable and disposable. Of these, about 818.75 hectares are covered with Certificates of Stewardship Contracts. In Kotkot-Lusaran area, about 2,290 hectares are classified as forest lands while a little over 5,000 hectares are classified as national park (Central Cebu National Park). The remaining lands in the Kotkot-Lusaran area are alienable and disposable lands.

At present, a number of conservation projects are undertaken in MKLW. Tenurial problems and issues on land-use practices are the foci of current development projects transpiring in the area. It was deemed that addressing these issues is the initial step in rehabilitating the watershed area.

Table 7. Existing land use and vegetative cover

Area	*Vegetative Cover*	*Land Area* (has.)
Mananga	Brushland	606.73
	Grassland	1,708.60
	Cropland	1,539.60
	Plantation forest	899.00
	Mango plantation	467.89
	Corn plantation	460.44
	Coconut plantation	1,080.07
	Banana plantation	60.67
Kotkot-Lusaran	Grassland	5,000.00
	Cropland	7,200.00
	Plantation forest	1,000.00
	Brushland	1,334.00
TOTAL		21,357.00

8. Itogon Watershed, CBFM, Benguet, 1996

LAND USE	AREA (hectares)
Reforestation	2,352
Agroforestry	439
ANR (Enrichment planting)	1,162
Streambank Rehabilitation	178
Erosion Control	87
TOTAL	**4,218**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	356,493,469.16	84,517.18
at 15% discount rate	222,390,407.61	52,724.14

Under Proclamation No. 2230 promulgated in November 1983, the Itogon watershed was declared a part of the Middle Agno River Watershed Forest Reserve. It is located 39km from Baguio City and is accessible through an all-weather national road network. It is also situated 15km from the town proper of Itogon.

The 9,263- ha land area of Itogon watershed (covering six sitios of Barangay Tinongdan and 8 sitios of Barangay Dalupirip) serves as the source of irrigation and domestic water supply for the local as well as the downstream communities, not only in Benguet but also in Pangasinan. The project aims to rehabilitate the 7,733 hectares of potentially productive watershed and to build up the local communities' capability as watershed resource managers. The project is also the primary life support of at least 530 local people in the two barangays. It is also home to indigenous ethnic groups—the Ibalois and Kankanaeys.

The Itogon watershed has a mountainous landscape with small alluvial soils, near rivers and terraces. It is characterized by rolling to moderately steep to highly steep topography. Of the 9,263.73 hectares proposed project area, about 6,485 ha (70%) are open areas and grasslands while the remaining 1,523 ha (16%) are covered with an existing second growth Benguet Pine Forest. The proposed site has a total drainage channel of 120.8 hectares made up of creeks, rivers, and other water channels. The Agno river is the major river system that drains on the proposed site before flowing down to the agricultural plains of Pangasinan and finally to the China Sea.

The proposed project site in the Municipality of Itogon covers two barangays, namely, Dalupirip and Tinongdan. Most households in the area are settled along the Agno River just below the Binga Hydroelectric Dam. At the inner portion of the barangays, some households are found

scattered along trails and gulleys, which is usually close to their farm lots. Dalupiri has a total population of 1,838 comprising of 27 households while Barangay Tinongdan has 2,696 residents with 461 households. The average household size is 6.

On the average, each household earns ₱24,574 per year. Of this, ₱9,132 comes from farm income (rice and vegetables), ₱4,125 from mango and fruits, and P3,838 from livestock. Off-farm and non-farm activities contribute ₱1,000 and ₱6,459, respectively, per year to the household gross income. Farm lot size ranges from 0.5 hectare to 5 hectares with an average of 0.90 hectare/household.

9. Ubay, Mabini and Alicia Watershed subproject, Bohol, 1997

The proposed project area lies within the municipalities of Alicia, Mabini, and Ubay in the province of Bohol. It has a total land area of 2,427.712 hectares, covering 10 barangays under three municipalities: four barangays in Ubay; four in Mabini; and two in Alicia. The site is accessible with two to three hours travel using a wheel vehicle or motorcycle. The topography of the site is moderately rolling to very steep, ranging from 18% and above. The watershed has a dendritic type of drainage system.

The Ubay-Mabini-Alicia is one of the most important watersheds in Bohol. It does not only provide water to supply the domestic needs of the nearby barangays and municipalities but it also supports the two dam structures of the National Irrigation Administration (NIA). These two dams provide irrigation to thousands of hectares of rice fields and also to the downstream agricultural farmlands. Overgrazing and rampant destruction of forest resources within the area virtually left the watershed bare with only grasses and a sparse brush vegetation to protect the soil. The dominant vegetation in the proposed site is Cogon (Imperata cylindrical) with small patches of second-growth forest along gullies, composed of several native tree species. Of the total area, 51% is classified as open grasslands. The rest are covered with other types of vegetation, which are used for various purposes. A significant portion is covered with legitimate land use activities that were not listed in the appraisal report.

LAND USE	AREA (hectares)
Reforestation	
Mahogany	200
Teak	182
Bagras	150
Mangium	150
Agroforestry	
Mango	400
Jackfruit	120
Lanzones	100
Riverbank protection	
Bamboo	10
TOTAL	**1,312**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	310,810,002.82	236,897.86
at 15% discount rate	210,516,496.86	160,454.64

Annual fires occur regularly as a result of the lack of water during the dry season. Meanwhile, excessive surface runoff during the rainy season has accelerated soil erosion especially in the steeply sloping areas.

The 10 barangays covered by the proposed project site has a total population of 14,532 with 2,422 households. Around 30% of these households live within the project site with agricultural farming as their main source of livelihood. Crops grown in the area include corn, rice, root crops, vegetables, and banana. In fact, about 60% of the average family income of ₱12,470 is derived from on-farm activities. The rest are contributed by off farm (22%) and non-farm (18%) sources. Half of the total non-farm income is generated from farms outside of the subproject site. No forest products are allowed to be collected in the area, except for a limited amount of firewood.

10. CFP-Camar Multipurpose Cooperative (CFMA)

The CFP-CAMAR Multipurpose Cooperative with CFMA 3003 covers an area of 1,000 hectares forestlands. The CFP site is located in Barangay Marayag (Carantic, Tampil, and Yaore), Lupon, and Davao Oriental. This is 35 km from Mati and 5 km from the barangay proper. The site is accessible by horses and carabaos following the existing trails and abandoned logging roads. The barangay proper though can be reached by car and public utility jeepney. The area formed part of the TLA of Davao Timber Corporation (DATICOR), which had control in the area for over 20 years.

There are 3,566 residents comprising of 594 households in barangay Marayag. Majority (72%) of the residents belong to the 20-50 years age group. The average income per family was reported to be ₱16,000 per year with expenditures a little higher than this amount.

Only 10% of the total barangay area is classified as Alienable and Disposable. The rest are forestlands. Present land use of the area consists of:

- Second Growth Dipterocarp Forest 762 hectares
- Openland/grassland 64 hectares
- Brushland 29 hectares
- Openland/cultivated 145 hectares

The major activities defined in the Forestland Management Plan include: a) Protection of the entire CFMA area; b) Forest Productivity Improvement such as Timber Stand Improvement, Assisted Natural Regeneration and Enrichment Planting; c) agroforestry; d) Plantation Establishment; e) Nursery/Seedling Production; f) alternative livelihood promotion; g) forest inventory and survey; h) harvesting and utilization of timber and non-timber forest products; i) infrastructure development; and j) information and education campaign and k) training and seminars.

The proposed land uses/developmental activities in the area are as follows:

- Plantation forest with a mixed stand of mahogany, falcate and bagras — 64 hectares
- ANR and enrichment planting in brushland areas — 29 hectares
- Timber stand improvement in production forest — 312 hectares
- Agroforestry development — 145 hectares

In addition, there will be a training of 97 upland farmers on effective methods of agriculture, orchard establishment, and forest resource management.

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	58,287,884	58,288
at 15% discount rate	39,648,046	39,648

11. Ancestral Domain for the T'boli and Ubo Tribes of Lake Sebu, South Cotabato

The ancestral domain claim covers an area of 39,852 hectares within 18 barangays consisting of: Hanoon, Lower Maculan, Upper Maculan, Halilan, Lamcade, Klube, Denlag, Lamdalag, Lake Seldon, Lake Sebu, Lake Lahit, Talisay, Bacdulong, T'konel, Lamlahak, Lamfugon, Tasiman, and Luhib.

As of the 1990 census, there are 34,350 people belonging to the indigenous community, representing a population density of 2.5 persons ? per hectare. In terms of employment, 65% are said to be underemployed and 2.6%, are unemployed. Average income was estimated at P3,000 per month.

Existing land uses are shown in the table below:

LAND USE	AREA (hectares)
Agriculture & agroforestry	10,000
Degraded forestlands	10,000
Open grasslands	5,000
Old Growth Forest	8,000
Lakes	450
TOTAL	**33,450**

The area has several waterfalls as well that could support mini-hydroelectric plants and other natural features for ecotourism.

The Land and Resource Management Plan include efforts to obtain land and resource tenure security and site development activities. The management activities to be carried out in the CADC site are as follows:

- Agricultural and Agroforestry Systems

There are currently 4,000 hectare-agricultural land and 6,000 hectare-agroforestry areas. As per the plan, rice and corn will be continuously cultivated in what they considered as active farmlands. Farmers will be assisted through training and proper use of chemical inputs to supplement indigenous inputs and practices as well as the use of modern tools in production. Bamboo and abaca will also be planted in inactive farmlands.

With regards to the agroforestry system, crops like cassava, sweet potatoes, corn or bananas will be intercropped with fruit trees such as durian, rambutan, and lansones. There will forest trees as well like mahogany, narra, and bagras in the agroforestry system.

- Natural Forest Management

The main strategy to manage the existing natural forest is through assisted natural regeneration (ANR). The plantation forest was put up in the 1980 reforestation drive in the area. The practices of ANR entail clearing of forest from over-mature trees, defective trees, destructive vines, cogon, and others. Efforts to control fire and reduce illegal harvesting of forest products will also be made. Specifically, the natural forest management activities will take place in the 1,000-hectare production forest located in Barangay Tasiman, an area outside the designated strict protection forest. Harvesting of mature and defective trees will be carried out while enrichment planting of indigenous species and rattan will be made.

- Sustainable Management of Existing Plantation Forest

The plantation forest covers 1,000 hectares distributed in some 16 barangays. This area will be subjected to management activities such as protection of planted trees by removal of defective and over mature ones and planting of replacement species.

- Reforestation in Degraded Forestlands

The target area is 1,800 hectares over the next five years. This forms part of the 16,000 hectares degraded forestlands in the CADC. Species to be planted consist of a mixture of indigenous species and exotic species, but will include others like ? narra and mahogany. Fruit trees will be planted as well—with common species as durian, jackfruit, lansones and rambutan.

- Reforestation in Open Grasslands

Open grasslands and barren lands form part of communal lands. These areas will be subjected to afforestation activities to be carried out by interested families or clans. Outside villages may be allowed to undertake activities when there are no more takers from within the ancestral domain.

- Community Forest Reserves

The targeted areas consist of 2,635 hectares that have been considered as a traditional forest reserve. These areas will be retained as strictly protection zones following the rules under the National Integrated Protected Areas (NIPAS).

- Traditional Hunting Grounds covering around 8,000 hectares in three areas: T'konel, Lamlahak, and Lamfugon.

Cultural Landmarks, Scenic Places and Special Uses

These areas include the Lake Sebu, Lake Lahit, Lake Seloton, the Seven Falls along the Lonon River at Barangay Lamlahak, the Lamfugon wildlife sanctuary, and areas considered as sacred burial grounds and homes of deities.

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	2,391,827,233	65,288
at 15% discount rate	1,547,581,430	42,243

12. Ilongot Livelihood Association, Inc., CADC Landingan, Nagtipunan, Quirino 2002

LAND USE	AREA (hectares)
Plantation Establishment (gmelina)	10
Timber Production* (residual forest)	15
TOTAL	**25**

**Based on annual work plan only*

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	1,098,643.04	43,945.72
at 15% discount rate	865,527.70	34,621.11

The project site used to form part of the concession area under the FLDC, which covers a total area of 68,650 ha. This traverses the municipalities of Dipaculao and Dinalongan of the Quezon province, and Medalla of the Quirino province. However, on 2 July 1986, the Minister of Natural Resources cancelled the TLA.

In terms of topography, 6.11% (107 ha) of Landingan and 9.98% (640 ha) of Wasid are elevated by at least 1,000 m asl. Restricted area include those with < 50% slope, with 1,000 m asl or higher, buffer zones, and virgin forest.

A portion within the watershed area that drains towards the Conwap River, is occupied by the project. The drainage density of Landingan and Wasid is 23 m/ha and 19 m/ha, respectively. In addition, its drainage pattern is mostly characterized as dentritic.

A biodiversity survey showed 36 families of plants, 34 families of birds, 6 families of mammals and one family of amphibians. The dominant floral family in the area is Dipterocarpaceae. The site also hosts several endangered species like the cloud rat, the bleeding heart pigeon and the

Philippine deer. On one hand, abundant species utilized for food consumption include wild chicken, wild pig, fruit bats, and the common doves and pigeons.

With regards to demographic data, the project site is composed of 150 households with a total population of 775. Majority of these fall under the age bracket of 15-60 years. The area has an average household size of 5 and a population density of 1 person for every 20 hectares. A large portion (61.42%) of its residents is Ilongots. The rest (38.58%) are migrants, majority of whom are Ilocanos and Itawes.

Of the total population within the project site, 37% constitute the actual labor force. Kaingin is considered as the main income source of upland farmers in the area as most residents (50.5% in Landingan and 35.8% in Wasid) are heavily dependent on the extraction of forest product, particularly narra. Agricultural production only placed second in terms of livelihood source. In both barangays, corn and banana are the principal commercial crops grown. Other subsistence crops include rice, fruits and vegetables. Other non-farm income sources include small business enterprises and carpentry. For off-farm employment, some residents are hired as laborers in logging activities and farm work on adjacent areas. To augment their meager income, the residents in the project site are also engaged in backyard livestock raising, fishing in the Conwap River, hunting, and gathering other forest products.

The average household net income of residents for subsistence and commercial production are ₱4,625 and ₱4,317, respectively for Landingan, and ₱22,657 and ₱4,028, respectively for Wasid.

13. Maasin Watershed, Co-Management, Iloilo, 1995

LAND USE	AREA (hectares)
Reforestation	1,050
Agroforestry	1,164
Bamboo Plantation	300
Rattan	111
River Bank Protection	60
TOTAL	**2,685**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	183,116,908.00	68,200.00
at 15% discount rate	110,951,930.00	41,322.86

The Maasin watershed was declared as a watershed reserve under Proclamation No. 16, dated Feb 12, 1923. It is located in the island of Panay and is about 30 km northwest of Iloilo City. It is elevated at 100 m to 1,500 m above sea level and has a total land area of 6,738.5 hectares. Of this, 2,685 hectares has been delineated as the project site.

Barangay Daja, where a dam is located, is about 2 km away from the town proper and is the nearest and most accessible part of the watershed. Existing roads going to the northeast and southeast portion, with a length of 8 and 12 km, respectively, are passable only during dry season. However, accessibility will be enhanced with the completion of the Daja-Abay Bridge, which is two to three km away from the national highway and less than 500 m from the Municipality proper of Maasin.

Old growth forests (1,910 ha) comprised 28% of the total land area and are usually found in the mountain tops, ridges, and steep slopes at the upper portion of the watershed with elevations ranging from 900 to 1500 m asl. Species found in the watershed include lauan (Shorea concorta), bagtikan (Parashorea malaanonan) of the diprecarpaceae family, and mountain agoho (Casuarina equisitefolia). The utilization of the existing timber stock is not economical and is thus, useful only for watershed purposes.

The second growth and brushland forests are located along ravines and within the gully portions of the watershed. There are broad types of species (21 species) growing in this part which shows the areas' biodiversity richness. Grasslands account for 2,727.36 hectares, which dominate the lower and middle portions of the watershed. The species that thrive in this area are cogon (Cylindrca imperata) and talahib (Themedea triandra). There are also portions of the watershed that have been covered by contract reforestation, ANR and reforestation by civic organizations. The lack of observed positive results of the projects, was attributed not to poor planning and implementation but rather to the lack of funds needed for sustained maintenance and protection efforts.

On the other hand, 1,203.68 hectares of cultivated area are devoted to cassava, camote, corn, vegetables, banana, tobacco, bamboo, coffee, and upland and lowland rice production. These comprise patches of traditional kaingin, irrigated and terraced ricefield scattered mostly on flat, and lower to the upper mid-portion of the watershed. Soil conservation practices are rarely used.

Water discharge by the watershed comes from a stream network underlying an area of 21.04 hectares. The stream network density is 10.70 mt/ha and is made up of Tigum River and the Iganan River, which serves as a tributary river. The drainage density indicates that a stream with a length of 10.7 mt/ha drains each hectare, manifesting a relatively fair watershed drainage flow.

Water supply during dry months (December to April) is limited while it becomes excessive during the months of June to November. Nonetheless, water supply for both domestic and commercial consumers in Iloilo City and its four adjacent towns continued to increase from 5,035,699 cu m/yr in 1986 to 6,874,364 cu m/yr in 1989. Projections for 2005 indicate a 50% decline in the stream discharge of the Tigum River (11.79 million cu m/yr to 5.29 million cu m/yr). This is expected to further widen the gap between water supply and demand.

The establishment of the mahogany park by the refo administration, which is located 50 m from the dam, is a potential site for ecotourism. It is also close to the Tigum River. The site is ideal for camping and excursion activities. Mt. Inaman, which is 10 km from Barangay Dagami, is a favorite spot for mountain climbing.

Ten barangays compose the Municipality of Maasin. The communities are located on both sides of the major roads that bound the northern and southern parts of the Maasin watershed. There are 10,400 inhabitants residing within the 16 barangays, 7,311 of whom are located in the Mucipality of Maasin.

Farm income averaged P8,135 per annum, with P3,251 generated from livestock production and P1,320 from off-farm activities. The farm lot size ranges from 0.25 to 5 hectares with an average of 0.8 hectare per household. Around 60% of households occupy one to two- hectare farms while 20% have more than 2 hectares and 18% cultivating farms below one hectare. There are 43%

who maintained farms along the watershed boundaries. People close to the watershed also gather rattan and harvest fuel wood from old growth forests.

Potable water supply used to supply 65% of the population ranged from 5.03 to 6.48 million cu m/yr from 1986 to 1990. The remaining 35% does not have a potable supply of water. Meanwhile, industrial and commercial establishments were able to consume 5.035 million cu m/yr in 1986 and 6.874 million cum in 1989.

14. Magat Watershed, Co-managed, Bagabag and Diadi, Nueva Vizcaya

The Lower Magat Forest Reserve consists of 24,251 ha of forestlands and 6,547 ha of private lands, which spans the entire municipality of Diadi, and barangays of Beretbet and Villaros of the municipality of Nueva Vizcaya. More than 50% of the area is steeply sloped, with 23% (5,663 ha) of forestlands susceptible to severe erosion. The DENR, which co-manages the project site together with the provincial government of Nueva Vizcaya, is responsible for the rehabilitation and protection of the watershed area.

PROPOSED LAND USE	AREA (hectares)
Protection Areas	
Rehabilitation of Degraded Areas	6,235
Managed Natural Forest	2,485
Production Areas	
Plantation Orchard (mango)	7,273
CBFM	4,983
Silvi-Pasture	2,155
Nature-Based Tourism	1,120
TOTAL	**21,766**

Net Present Value (2002 prices)		NPV per Hectare (2002 prices)
at 12% discount rate	2,158,525,126	89,008
at 15% discount rate	1,452,556,284	59,897

The seven major sub watersheds within the reserve drain into the Magat River. Unfortunately, most of these sub watersheds are devoid of forest cover. In general, 77% of the forestlands in the Reserve are grasslands and brush lands, which are highly susceptible to forest fires. Only about 23% of 5,764 ha of forest lands consist of residual forest. Due to the nature of its vegetative cover and lack of formal tenure instruments, the reserve is mostly utilized for pasture and upland agriculture.

Settlers spread across the Municipality of Diadi totaled to 12,469, distributed within 2,559 households. It has a population density of 68 persons per square kilometer. Diadi's 18,120-ha land area is contained in four sub watersheds. Approximately 14% of its land area is devoted to agriculture. Pulse crops, vegetables, mango, and other fruit trees are commonly grown in the area, together with corn and palay. The municipality is also a major aquaculture producer, specifically that of tilapia. In addition, Diadi and Bagabag are distinctively known to host the

largest ranching activities in the province. The heads of cattle grown reached approximately 4,000, which is spread out into a 3,687-ha of pastureland.

For Bagabag, the dominant crops grown are rice and corn. Secondary crops include pineapple, citrus, luffa, tomato, and a variety of vegetables and fruit crops. In other areas of the reserve, some occupants are also engaged in charcoal making and selling cogon leaves for roofing.

15. Mount Kanlaon National Park Protected Area

Mt. Kanlaon is located at the central part of the Negros Island, traversing the provinces of Negros Oriental and Negros Occidental. It lies 2,439 m above sea level and spans an area of 24,557.6 ha or roughly 1.84% of the Islands' total area. According to the Swedish Space Corporate Satellite Survey and records taken from the DENR, the distribution of Mount Kanlaon's land area are as follows: 39.14%, cultivated land (9,612.8 ha); 46.73%, forestlands (1,040.5 ha); 4.24%, open and cogonal land (1,040.5 ha); and 6.72%, DENR reforested land (1,650.08 ha). Cultivated land area is mostly devoted to corn, rice, and vegetable production. These crops are planted at the outer fringes of the Mt. Kanlaon base.

EXISTING LAND USE	AREA (hectares)	PERCENTAGE (%) OF TOTAL
Cultivated Area (rice, corn veg)	9,612.80	39.14
Forested Area	11,475.00	46.73
Open/Cogonal	1,040.50	4.24
Reforestation Projects	1,650.08	6.72
Private Lands	481.12	1.96
Rafael Salas Nature Park	298.10	1.21
TOTAL	**24,557.60**	

PROPOSED LAND USE	AREA (hectares)
Strict Protection Zone	7,353.71
Restoration Zone (Biodiversity)	7,168.51
Multiple Use Zone	10,317.01
Recreational Zone	1,718.37
TOTAL	**26,557.60**

Net Present Value (2002 prices)		NPV per hectare (2002 prices)
at 12% discount rate	789,151,307.71	29,714.71
at 15% discount rate	517,493,619.25	19,485.71

On August 8,1934, Mount Kanlaon was declared as a National Park through Presidential Proclamation 721 due to its panoramic, historical, scientific, and aesthetic significances. To date, with the passage of RA No. 7586, a proposal is forwarded to Congress for the declaration of Mount Kanlaon as part of the Integrated Protected Area System (IPAS) under the National Park category.

Soils within the park consist of three types, namely, Guinbalaon clay, La Castellana clay foam and rough mountainous land. The first two types typically characterize steep to very severe to excessively erosive or shallow land. The steep slope and the shallow soil made the land unsuitable for seasonal vegetation.

Vegetation grown from 1,980 to 2,340 m asl is predominantly montane forest. Emergent trees are dominated by the gymnosperm Podocarpus sp. and Pandanus spp. At an elevation of 2,350 to 2,450 m. asl, ground herbs belonging to the Cyperaceae family and weeds, grow on bare rocks and gravel. At the upper elevated area beyond 1,000 m, the vegetation assumes a distinct two-story canopy layer. At approximately 1,370 to 1,980 m above sea level, the forest gradually changes and assumes a mid montane type.

Mt. Kanlaon is also considered rich in biodiversity as shown by a zoological survey done to assess its resources. It hosts 50 species distributed into 40 genera. Among the endangered plants that thrive in the Park are pitcher plant, fern, waling-waling, Mauperia and other wild orchid species. Aside from being home to some of the country's endemic species, Kanlaon also serves as a major watershed to 158,500 or one fifth of the province' total land area.

Encroachment by settlers placed the current population of the Park at 13,000 residents or 3,000 households. More than 50% of the inhabitants are native to the area while the rest are migrants from Panay, Cebu, and Negros. Only a few of the residents were able to finish elementary schooling, with a much lesser number completing secondary level.

The areas occupied by the settlers currently make up their dwellings, with the remaining area being used to support their livelihood activities. This include traditional farming, kaingin, charcoal making, livestock raising, firewood gathering, and other extractive or resource based activities such as gathering wild orchids, ferns, rattan, ara-al stones and others. Several of the residents are also employed in the fighting cock breeding farms while the rest are known to work on adjacent sugarcane plantations.

Health care is deemed inadequate and has led to the prevalence of environmentally related diseases, particularly among the children. The water is sourced from springs or rain catchment. Toilet types are mainly open field or open pit.