

Economic Instruments for the Sustainable Management of Natural Resources

A Case Study on the Philippines' Forestry Sector



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PREFACE

With the recent acceleration of global trade, countries throughout the world have benefited from more investment, industrial development, employment and income growth. Recognising that the benefits of trade can strongly contribute to the improvement of basic living standards, many of the world's developing countries and countries with economies in transition, have sought to actively participate in the global trading regime. For most of these countries, efficient and effective participation in the global economy has required substantial economic restructuring at home. Thus, in recent years, national governments have implemented structural adjustment programmes to stabilise and reorient their economies in order to face the challenges of development. This included in the first instance the restructuring of economies to increase foreign exchange earnings through enhanced trade and trade liberalisation as embodied in the set of agreements of the World Trade Organisation (WTO).

National experiences with structural adjustment programmes have been mixed. Nevertheless, trade liberalisation elements of restructuring programmes have facilitated the rapid growth of targeted export markets, and succeeded in attracting much needed foreign investment to fuel continued economic growth. Recently, however, many undesirable effects of rapid increases in trade have emerged. Affected countries find that inadequately managed economic activities, supporting, or supported by, growing trade, often result in serious environmental degradation. Air, water and soil pollution, and unrestrained natural resource exploitation, grow to levels that jeopardise the viability of the economic activities they support. Trade thereby becomes unsustainable.

The United Nations Environment Programme (UNEP) believes that the potential for negative impacts of trade on the environment can be minimised, if not avoided entirely, by integrating environmental considerations - that complement rather than inhibit trade - into development planning. Over the past two years, UNEP has worked closely with six countries - Bangladesh, Chile, India, Philippines, Romania and Uganda - on comprehensive projects to identify the impacts of trade liberalisation on national environmental resources and the use of economic instruments to sustainably manage these impacts.

These projects have encompassed new action-oriented research on unique trade-related environmental problems and their social and economic implications in diverse sectors and varied country settings. Importantly, projects have involved multi-stakeholder participation in numerous consultations to accurately identify the dynamics of environmental degradation, and to develop innovative and widely acceptable national response strategies. Each study concludes by recommending a set of practical measures - comprising ready-to-apply command and control measures and economic instruments designed to meet national conditions - that promise to effectively halt trade-related environmental degradation, and in turn, ensure that the country's trade remains robust yet sustainable over the long-term. But the projects do not end with published studies, the final component of each country project involves a pilot implementation of proposed measures undertaken by national authorities in collaboration with each project's national team and UNEP.

This report on the Philippines' forestry sector, is one in a series of UNEP publications presenting country studies implemented under a first phase of "Capacity Building for Integrating Environmental Considerations into Development Planning and Decision-making" projects funded by the Ministry of Foreign Affairs of the Government of the Netherlands and the European Commission. Other projects in the first round examine the shrimp farming industry in Bangladesh, the

Chilean mining sector, the automotive industry in India, the Romanian water sector, and the Ugandan fisheries sector.

As we approach the WTO's Third Ministerial Meeting in Seattle, which may mark the launch of the next round of trade negotiations, this report provides a valuable source of information and knowledge on the Philippines' experience with the environmental impacts of trade liberalisation and the development of measures to address these impacts and promote sustainable trade and environmental policies.

The complex trade-environment dynamics and innovative strategies to manage emerging environmental problems of the Philippines' forestry sector are presented and discussed in detail in this report. The insights that this, and other reports in the series provide, make the series an extremely valuable resource for policy-makers and sectoral practitioners aiming to effectively address the emerging environmental impacts of trade in their own countries.

ACKNOWLEDGEMENTS

The preparation of this country report on the Philippines' forestry sector has been made possible by the cooperation and commitment of many individuals and organisations.

The Philippines' national team - the author of this report - is to be commended for taking the lead in project execution. Led by Herminia Francisco of the University of the Philippines at Los Baños, the team - with members coming from an array of research institutions, non-governmental organisations and national agencies - worked tirelessly to organise national workshops, gather field data, analyse economic and environmental trends, develop policy recommendations, and report on their activities and research results. Additionally, a National Steering Committee was established to ensure the project remained relevant and on-track, and local citizens' groups helped identify emerging environmental problems, elucidate their causes, and elaborate policy responses.

The work of a varied set of national team members, supplemented with inputs from a wide group of national constituents that participated in consultations, was essential in ensuring that diverse cultural and social perspectives were integrated into the project. Indeed, all of these national actors are to be thanked for their genuine interest and commitment in the project, and for the valuable contributions they made to the project's success. In addition, national authorities are to be thanked for their steadfast support of the project's objectives.

The Economics and Trade Unit (ETU), Division of Technology, Industry and Economics (DTIE) of the United Nations Environment Programme (UNEP), was responsible for the overall coordination and management of all six country projects. Through a joint UNEP-UNCTAD (United Nations Conference on Trade and Development) collaboration, René Vossenaar and Veena Jha provided technical guidance and assistance to the national teams on various aspects of their research. International expert meetings further provided a forum for project implementation review by national teams and representatives of relevant international and United Nations organisations. Additionally, critical reviews of draft reports were provided by Theodore Panayotou of the Harvard Institute of International Development and Konrad von Moltke of the Institute of Environmental Studies of Vrije University.

Once the national team had completed their final report, Eugenia Nuñez, Desiree Leon and Rahila Mughal of UNEP worked closely with an external editor, Robert Hamwey, to process the report for publication.

Finally, it must be recognised that like so many international environmental research projects, funding from interested sponsor governments is the key to their existence. UNEP is indebted to the Ministry of Foreign Affairs of the Government of the Netherlands who generously provided the financing that made this project possible.

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Executive Summary

A Synthesis of Findings, Recommendations, and Implementation Experiences

1.0 Project Overview

Proper pricing of natural resources is a key component of the Philippine Strategy for Sustainable Development (PSSD) that was formulated in the late 1980s. The government initiated several programmes on environmental management since then, mostly with support from external donors. Late last year, it created, through Executive Order 406, the Philippine Economic, Environmental and Natural Resources Accounting (PEENRA) system with the Department of Environment and Natural Resources (DENR) and the National Statistics Coordination Board (NSCB) of the National Economic Development Authority (NEDA) as its lead agencies. Through the PEENRA, it is hoped that the country can begin to operationalise proper pricing of natural and environmental resources. Key personnel of DENR and NSCB-NEDA have received training on resource valuation and management under various environment management initiatives since the early 1990s.

The DENR has also mandated its various agencies and bureaus to explore how economic instruments or market-based instruments (MBIs) can be used aid in the management of the natural resources under their jurisdiction. The resources concerned include forestland, grasslands, foreshore areas, river systems, and recreational sites in protected areas of the country, among others. Efforts are currently underway to carry out this task. Support provided by the United Nations Environment Programme (UNEP) and the Economy Environment Program for Southeast Asia (EEPSEA) is consistent with the policy thrust of the government and has come at an appropriate time.

This study reports on the outcomes of a collaborative undertaking—between UNEP, the Resources, Economics, Environment Center for Studies (REECS), the University of the Philippines Los Baños (UPLB) and the Economy and Environment Program for Southeast Asia (EEPSEA)—to design MBIs for the Makiling Forest Reserve (MFR). Located about 100 km South of Manila, the MFR is one watershed among more than 400 watersheds in the Philippines.

In 1998, the Watershed Management Programme for the country was reformulated with assistance from DANIDA. It explicitly identified the potential for using MBIs to manage the country's watersheds as a key strategy. Our efforts in the MFR offer a good learning opportunity for the pilot testing of this new national strategy.

The UPLB is the legal body mandated to protect and manage the MFR. The right to manage the MFR was granted to the UPLB in 1989 through the Republic Act 6967, primarily because of its role as a laboratory of the College of Forestry and Natural Resources. As UPLB is found at the foot of the MFR, management functions can be carried out real-time and in-situ. It works closely with people's organisations (POs) within and around the area in undertaking this task.

The MFR's rich biodiversity makes it a challenging site to manage. The Reserve is also endowed with rich natural resources having more than 50 per cent of its area still covered with forests and with soil that is suited to the cultivation of fruit and annual crops that command higher prices in the nearby markets.

2.0 The Resources of the Makiling Forest Reserve

The MFR has a rich endowment of natural resources and is fairly accessible compared to other forest resources of the country. It is therefore not surprising that the area is now home to about 245 households and is being cultivated by about 1,000 farmer-claimants. The UPLB has some forest guards but they have not controlled the encroachment of migrants into the area. The MFR is also open to forest products gatherers, though their access is being controlled by the forest guards to some extent.

There are several natural resources in the MFR. Foremost of these is its watershed ecosystem that supplies water to the various water users within and downstream of the watershed. There are five water districts and several water cooperatives that tap water for piped-in delivery to domestic, institutional, and commercial water users. The commercial and institutional water users, however, are also dependent on groundwater resources through private deep wells. Recently, inadequate water quantity and poor water quality have been reported in some areas. This was partly attributed to the relatively growing proportion of degraded lands in the MFR that require rehabilitation.

The MFR is also rich in biodiversity, particularly of plant species that makes the area an attractive recreational site. There are also other attractions such as the hot bubbling mudspring, the Peak 2 Area that attracts hikers, the Makiling Botanical Gardens (MBG) and the Pook ni Maria Makiling. These sites are not properly maintained owing to a limited maintenance budget allocated by the government. While the MBG charges an entrance fee, and collects user charges for the use of its swimming facilities, these revenues are not only insufficient to cover maintenance, but also they can not be used to finance much needed site improvements. On the basis of the recommendations made by the research team, the entrance fee for MBG has been increased to twice its previous level in order to finance some needed site improvements. However, it is difficult to charge local users for the maintenance of the MFR for global benefits of biodiversity preservation and eco-tourism. Hence, the project packaged proposals for biodiversity and eco-tourism development for the MFR seek funding support from international organisations such as the Global Environment Facility (GEF). These proposals are outlined in Appendix C and E of this project report.

Land use as a factor of production for local farmers is currently exploited without farmers paying any rent. In the past, UPLB has been unable to persuade MFR land claimants of their need to pay rent, whose gross proceeds could at least cover resource management costs. Over the last few years, however, the UPLB has instructed relevant authorities to develop an acceptable accreditation scheme in consultation with farmers to promote self-management activities. In the near future, it is expected that discussions between the University and the various people's organisations will advance to the level of defining more meaningful collaboration towards the protection and management of the Makiling watershed.

The MFR is also rich with non-timber forest products that are being accessed not only by those living within the MFR but also by collectors from adjoining communities. These products consist of seeds, flowers and even rare orchids, fruits and nuts among other plant derivatives. While the collection of these products is not yet taking place on a massive scale, it is now being recognised that their harvesting, under judicious control, need not be detrimental. Moreover, it can provide a source of income to the University to support its various activities in the MFR. No definite actions, however, can be made without an inventory of the non-timber resources in the area. Thus, an inventory is recommended and proposed in Appendix D.

3.0 The Project Findings: Synthesis

The research team assessed the feasibility of developing MBIs for the various MFR resources. The team comprised five task forces to assess the following: MBIs for water resources, MBIs for recreation and eco-tourism, MBIs for land resources, MBIs for minor forest products,

and community and public relations. The last group supported the activities of the other task forces. The various task forces conducted consultation meetings with various identified resource users on May 27 and July 24, 1998. They also conducted and analysed case studies—relying heavily on data generated by research in the area over the past few years.

Results of the assessments revealed a high potential for using MBIs to finance the various activities identified in the Mount Makiling Conservation and Development Program. This programme was formulated based on strategies identified in the MFR Master Plan that was adopted in 1996 by UPLB through consultations with various concerned parties. The University has been seeking external funding to carry out the various activities defined in the programme and is convinced if initial funds are provided, that MFR management can be sustained by MBI revenue streams. The active involvement of the Dean of the College of Forestry and Natural Resources in this project, and the close coordination of the research team with the Vice Chancellor for Community Affairs and the Chancellor of the University, attest to the importance attached by the top management to this undertaking.

The MBIs for water resources task force discovered that a majority of the domestic water users are willing to pay for watershed management on top of the current water fees that they pay. A recent study by Cruz, et al. (1998) showed that 68 per cent of the domestic users interviewed are willing to pay (WTP) from P1.07/m³ to P1.45/m³. The WTP value in economics is used as a measure of the benefit derived by consumers from the good or the service being consumed. On the cost side, the group also estimated how much it would cost to undertake watershed protection and management activities in the area – at a level that ensures a sustainable flow of goods and services derived from the watershed.

In present value terms, at a 10 per cent discount rate, the five-year investment will be about P 95,879,640 (US\$ 2,591,342) which translates to an annualised value of P 25,292,808 (US\$ 683,589). Assuming that all water users are willing to contribute to meet this investment requirement, then one needs to pay P 0.52 per cu. m of water. For the distribution of this cost, 38 per cent of the watershed protection bill will be shouldered by the five water districts, and 22 per cent by institutional users like the UPLB and the International Rice Research Institute (IRRI). A significant proportion (38 per cent) of water use is by the households who are currently not connected to the water districts or those who rely on groundwater pumps. It is expected that local government units – who are greatly concerned with MFR watershed resources management to ensure a sustained flow of water in their areas of jurisdiction –will charge domestic users appropriately.

One of the critical issues in the proposed watershed conservation and protection fee is equity, particularly as this may mean charging household water users beyond what they are currently paying. Given an average water usage of 30 cu. m per month, a household may have to pay P5.60 per month or P 187.20 per annum. This amount represents a less than 5 per cent increase in their current water bill. It is of course possible that the water districts will be convinced to share part of what they are currently collecting from water users—through a production assessment fee of P1.00 per cu. m. The fee charged to water users covers environmental costs – which include watershed protection and management efforts. The message should resound clearly that everyone should be responsible in ensuring sustained water resources, but differentiated payment schemes may be agreed upon in the proposed Memorandum of Agreement between the University and individual user groups.

The study done by the MBIs task force on recreation and eco-tourism showed that the current entrance fee for the MBG can potentially be increased by 2-3 times. This increase is consistent with how much people are willing to pay, while still being competitive with the prices charged by privately run recreational facilities in the area. The University began implementing this increased fee in 1998 as a result of the study team's recommendation. It is here recommended that users of other MFR recreational facilities—where no fees are currently levied: the Mud Springs, Peak 2, and Flat Rocks—should also be charged for the recreational benefits they enjoy.

5-YEAR INVESTMENT PROGRAM FOR MFR CONSERVATION AND DEVELOPMENT

STRATEGIES/ ACTIVITIES	INVESTMENT COST					PV (₱)	PV (US\$)
	Year 1	Year 2	Year 3	Year 4	Year 5	R = 10 per cent	r = 10 per cent
I. People-oriented forestry							
A. Accreditation and tenure	412,000	335,500	369,505	332,750	366,025	929,091	25,111
B. Agroforestry farm develop- ment		550,000	605,000	200,000	200,000	1,500,000	40,541
C. Livelihood development	200,000	385,000	350,000			1,023,747	27,669
SUB-TOTAL	612,000	1,270,500	1,324,050	532,750	566,025	3,316,474	89,634
II. Natural resources and biodi- versity conservation and protection							
A. Natural resources develop- ment	2,825,000	2,502,500	2,389,750	2,229,425	2,761,439	9,669,182	261,329
B. Botanical gardens, parks and recreation development	6,282,000	5,506,200	5,858,820	4,082,702	4,460,972	20,221,759	546,534
C. Forest protection and law enforcement	2,031,350	1,592,949	806,087	722,258	550,743	4,604,073	124,434
SUB-TOTAL	11,138,350	9,601,649	9,054,657	7,034,385	7,773,154	34,495,014	932,298
III. Support services							
A. Research and demonstra- tion	5,420,000	3,850,000	2,722,500	998,250	1,098,075	11,518,182	311,302
B. Development communica- tion and community rela- tions	2,060,000	891,000	980,100	146,410	161,051	3,545,455	95,823
SUB-TOTAL	7,480,000	4,741,000	3,702,600	1,144,660	1,259,126	15,063,636	407,125
IV. Program management	8,402,699	5,852,699	5,852,699	5,852,699	5,852,699	24,504,516	662,284
V. Capital outlay	20,350,000					18,500,000	500,000
GRAND TOTAL	47,983,049	21,465,848	19,934,006	14,564,494	15,451,004	95,879,640	2,591,342

In the case of land resource, there is a consensus that farmers, just like other resource users, should be made to pay for their use of the land. Rents for the use of the land are positive and of high value owing to the locational advantage and inherent productivity of the MFR. It is unrealistic to assume that all of the estimated rents for MFR farms can be collected through taxes—but even if only 10 per cent of this rent were collected through taxes, this amount would provide a sizeable source of revenue to finance conservation efforts at the farm and watershed levels. The high rent estimates can also be used as basis to appeal to farmers that they can very well afford to invest in soil conservation efforts given the very high level of profits they enjoy. The case study in the final output provides information on both rent estimates and the financial requirements for soil conservation investments.

Of the various resource sectors, land resources are admittedly the most difficult to apply MBIs to. Furthermore, given the long history of dispute between the University and the farmer-cultivators/claimants in the area, MBIs will not be readily accepted by farmers. This study proposes, however, that land resources cannot be set aside in the implementation of MBIs for the MFR even though farmers will be expected to play an active role in undertaking the watershed

protection and restoration efforts. Monetary compensation for their efforts, however, can be used to offset the rent charges that may be levied on them. Choice of a mechanism for rent collection will be part of the on-going consultations and discussions being conducted by the University with the various people's organisations.

Regarding the fees imposed on the collection of minor forest products in the MFR, the University has long been allowing the sale of minor forest products from the MFR except in some periods when it is temporarily suspended. These products are extracted directly from the forest on a "permit" basis or they are seedling products produced in nurseries.

The University issues two types of permits namely: 1) permits to gather minor forest products; and, 2) permits to transport them. Each permit has corresponding user fees or charges. These forest fees/charges are used to regulate the harvest of minor forest products and represent means of indirectly controlling adverse environmental impacts. It was admitted, however, that there is a need to review the basis for these fees and/or to come up with new estimates that reflect the true economic value of the resource use. The revenue generated from permit sales is not sufficient to pay even the cost of monitoring the use of minor forest products in the MFR. It is recognised that the University can authorise increased permit fees and maintain monitoring activities to ensure compliance.

The team identified the institutional structure to best govern MBI implementation. There is a need to create an MFR Conservation and Development Program (MCDP) Management Council. The MCDP will evaluate projects in the MFR, oversee their implementation and ensure that funds are used for intended purposes. The council will be composed of the various stakeholders or interest groups in the MFR. The UPLB Foundation, Inc. (UPLBFI) will handle the financial administration of funds generated for MBI implementation and subsequent revenues deriving therefrom. This foundation is a non-governmental organisation that handles financial transactions of the University for a fee. During the consultation meetings resource users felt that an organisation outside of the government could best ensure judicious use of funds and more efficient and effective financial transactions.

To conclude, the important role that watershed protection and conservation fees can play in the management of the MFR is recognised by key stakeholders. The high rate of turn-out and active involvement of participants during the consultation meetings attest to their positive attitudes and wide acceptance of the rationale for sustainable water resources management. This proactive stakeholder attitude is also the result of an on-going Environment Department policy initiative that promotes the adoption of MBIs in the various resource sectors of the country. Admittedly, the primary motivation for this initiative is the need to raise funds for resource management, though it will also achieve resource use efficiency through full cost pricing. The group wants to emphasise that the imposition of a watershed conservation and protection fee should never be viewed as a revenue-generating activity yielding profits to certain groups of people. It is anchored on the basic premise that it is in everyone's interest to manage the resources that provide water—a basic necessity—both to current and future end-users. In the long term, water demand will be reduced through pricing reforms, requiring higher water use payments, thus reducing wasteful water consumption practices.

4.0 The Process: Capacity Building for Integrating Environmental Considerations in Development Planning and Decision-making

This project was undertaken through an initiative of the United Nations Environment Programme (UNEP) in collaboration with the Resources, Environment, and Economics Center for Studies (REECS), the University of the Philippines Los Baños (UPLB), and the Economy, Environment Program for Southeast Asia (EEPSEA). The UPLB, as the projects implementing body, readily supported the project as the concept of using economic instruments in managing the coun-

try's natural resources has already been widely accepted in the Philippines. The prospect of initiating something of this nature in one of the country's watersheds has tremendous appeal to those in the University as it offers them the opportunity to be directly involved in MFR resource planning and decision-making. Furthermore, experience from this pilot project is highly valued by the Environment Department and by various non-governmental and local governmental units as they expect to implement MBIs in other watersheds as well.

The project team, composed of 24 members, was divided into five task forces: MBIs for water, MBIs for land, MBIs for recreation and eco-tourism, MBIs for non-timber resources, and a team to take charge of institutional matters. Many team members were from the various units of the University. The other collaborating organisations provided technical support and expertise during meetings. The major activities of the project comprised of research, consultation meetings and a series of informal meetings with various organisations/stakeholders involved.

4.1 Research Component

The various MBI teams were expected to identify a price for their assigned resource commodity or—given insufficient information and/or resources to conduct new studies—to propose a set of activities to estimate such a price. In some instances, simple research projects were undertaken to supplement existing data sets.

The team compiled, analysed, and in some cases validated, MFR resource pricing studies produced by graduate and undergraduate students of resource economics at the University. Some of the team members were also involved in an earlier study to estimate the profitability of various farming systems in the MFR area. The data sets from the study were used to estimate economic rent for MFR land resources. When the project was initiated, the Forestry Development Center (FDC), one of the participating organisations from UPLB, was also about to conclude research on households' willingness to pay for watershed protection activity in the MFR. The results of this research were used by the MBIs for water task force to come up with a price range for a watershed protection fee.

The project also initiated a survey of current water consumption by various users around the MFR: household water users, commercial consumers and institutional users. The data were used to estimate an appropriate fee/charge (per cubic metre) for watershed protection and to assess the share of costs for watershed conservation borne by the different user groups. The recreation and eco-tourism team also prepared several eco-tourism development scenarios for the MFR and estimated costs for required development activities.

4.2 Consultation Meetings

The research team conducted four consultation meetings with various users of the studied resources. The consultation meetings were designed to solicit participation from the different stakeholders, including:

- communities as represented by people's organisations,
- local government units, recreational users and eco-tourists,
- commercial water users such as resort owners and the local industries,
- water district agencies,
- government institutions,
- the University,
- the Laguna Lake Development Authority (LLDA),
- the Department of Environment and Natural Resources (DENR),
- the National Water Resources Board (NWRB),

- private organisations
- Tourism Association of Laguna, and,
- the Laguna Chamber of Commerce and Industries.

In these meetings, different stakeholders aired their concerns regarding MBI rationale, objectives and implementation procedures.

The first consultation meeting was held on May 27, 1998 at UPLB, and was attended by 40 water users from government organisations (UPLB, DENR), private institutions (Tourism Association of Laguna, Laguna Properties Holdings, Inc., Foundation for Philippine Environment, IRRI, water districts, resort owners, and industries), and people's organisations (water cooperatives). The second consultation meeting was held on July 24, 1998 with other MFR resource users such as recreational users and eco-tourists (26 participants), farmers (28 participants), and users of non-timber forest products particularly plant/seed materials (15 participants).

Both consultation meetings had two parts: Part 1 consisted of paper presentations to provide background knowledge and information on the topics, and Part 2 consisted of parallel workshops and plenary sessions to examine topics in detail.

During the first two meetings, participants recognised the important role that MBIs can play in the management of the MFR. However, it was emphasised that institutional water users such as UPLB and IRRI should be charged a watershed protection fee. The identified water users included the domestic users (households), commercial users (resort owners, water cooperatives, industries) and institutional users (UPLB, IRRI and others not serviced by the local water district).

Following the consultation meetings, a forum on water use policies was held. It was designed to clarify policies/guidelines concerning water extraction and use, and to elaborate mechanisms for institutional management of water use. The President of the Laguna Association of Water Districts (LAWA) presented NWRB policies that give it the authority to manage local water resources. Meanwhile, representatives of UPLB, LLDA and IRRI, the major institutional water users, were asked to give their views on these policies. Again, 60 participants from the different organisations—such as the water district agencies, local government units, DENR and resort owners—were invited to take part in the discussion.

During this forum, an institutional structure to govern MBI implementation was presented to stakeholders. The group arrived at a consensus that the revenue generated from MBIs should be managed by an independent financial organisation (not UPLB) to ensure that such funds will be plowed back to the MFR.

One of the concrete actions identified was the establishment of an MFR Watershed Management Council (MWMC) to be composed of representatives of the various stakeholder groups, with UPLB taking a lead role. The Council will evaluate projects in the MFR, oversee their implementation and ensure that funds are used for their intended purposes.

A final meeting, the National Consultation Meeting on Natural Resource Pricing in the Mount Makiling Forest Reserve, was held on June 7, 1999 at UPLB. The research teams discussed the specific recommendations of the project with regards to the pricing of water and recreation in the MFR. Various proposals for biodiversity development, eco-tourism, and non-timber resource management were presented and discussed. Furthermore, an institutional structure for fee collection was discussed. The project team presented estimates of the budget needed to undertake MFR watershed development and protection, and what users are willing and able to pay to support these activities. It was decided that the University should meet with the various sectors to come up with a Memorandum of Understanding regarding proposed fee collection schemes and fee schedules.

4.3 Support from Various Groups: Government Agencies and Non-governmental Organisations

To gain the support of various government agencies in implementing MBIs in the MFR, the latter were invited to the consultation meetings. First, in all the consultation meetings, the Chancellor of UPLB, or his representative, was present. UPLB is mandated to protect and manage the MFR. Second, the DENR—which is in charge of all natural resources in the country and whose current thrust is to promote the greater use of MBIs for natural resource management—was always represented at the meetings. Lastly, other government agencies like the National Water Resources Board and the LLDA—that is implementing the user's fee principle in the Laguna Lake—were also invited. These agencies have expressed their support of the University's projects and plans for the MFR.

The local governments from the various municipalities sourcing water from the MFR were contacted separately prior to the consultation meetings to solicit their support for the project. Representatives from the concerned local government units and members of the various non-governmental organisations were invited to all the consultation meetings.

4.4 Synthesis

Nearly all of the meetings were well attended with wide participation. Discussions were open and lively. There was a general consensus that everyone has a responsibility to protect the MFR, but the mechanics of implementation still have to be defined across the various resource user groups. It was agreed that the next step will be to set up more specific meetings between the University (being the legally mandated body to manage the resource) and the various user groups so that a Memorandum of Understanding on the user groups' responsibility and accountability can be drafted. Efforts along this line will have to be initiated by the University through its College of Forestry and Natural Resources.

5.0 Conclusions/Lessons Learned

The basic conclusion arrived at through research in this project is that key stakeholders recognise the important role that economic instruments can play in the management of the MFR. The high level of attendance in the consultation meetings, and the active participation of those who attended, attest to the positive attitude and wide acceptance of the use of MBIs in resource management. This kind of attitude is also the result of the on-going policy initiative taken by the country's Environment Department (DENR) promoting the use of MBIs in the country's various resource sectors. The primary motivation for this initiative is the need to raise funds for resource management while achieving resource use efficiency through proper resource pricing. The results of the assessment revealed the high potential of using MBIs to generate funds required to implement the various activities identified in the MFR Master Plan.

Proper pricing of natural resources using MBIs has a direct bearing on environmental management. In the past, natural and environmental resources were not priced at all, leading to their wasteful usage that eventually translated into resource degradation and depletion. When not having to pay for the use or misuse of resources, economic agents have little or no interest to use natural and environmental resources efficiently.

The study made use of both qualitative and quantitative methodology in arriving at the proposed economic instruments for water and recreation, and eco-tourism, relying heavily on secondary data generated by previous MFR studies. Relevant documents such as the Master Plan for Mount Makiling Conservation and Development were also important sources of information, particularly on MFR investment requirements.

Except for recreation and eco-tourism, the proposed economic instruments for the resources of the MFR have not been implemented nor piloted. Hence, their impacts cannot be assessed ex-ante. However, it can be speculated that the positive impacts of charging resource users a watershed management and protection fee will ultimately provide benefits to the resource users/stakeholders themselves. As proposed, all resource users will be asked to contribute to resource management and protection costs, either on a cash or in kind basis.

A direct effect of the recommendations of the MBI task force on recreation and eco-tourism was the approval, in December 1998, of its proposed 100 per cent increase in fees for facilities use and visitor services in the Makiling Botanical Gardens. The fee increase has been in effect for several months now and its impacts have yet to be assessed.

The study proposes an institutional framework to enable financial resource management for MFR protection and conservation. The framework provides for the creation of a multi-sectoral MFR Watershed Management Council. The Council will implement the MFR Master Plan; market proposals related to MFR conservation and development; accept donations and grants for the MFR; allocate project funds; and oversee and monitor project implementation. As proposed, the UPLB Vice Chancellor for Community Affairs (OVCCA) serves as the Chair of the Council, which has as members: the UPLB College of Forestry and Natural Resources (CFNR) Dean, Makiling Center for Mountain Ecosystems (MCME) Director, UPLBFI Executive Director, and sectoral representatives. This structure is an entirely different from present institutional management structures. The proposed institutional framework opens avenues for multi-sectoral participation in MFR management planning and decision-making, with the UPLB remaining as the lead oversight organisation. As proposed, one of the duties of this multi-sectoral council is to oversee and monitor the implementation of the MFR MBI package.

The use of MBIs to operationalise proper pricing of natural and environmental resources is well supported by Executive Order 406 (series of 1998) that created the Philippine Economic, Environmental and Natural Resources Accounting (PEENRA) system, with the DENR and the National Statistics Board of the National Economic Development Authority (NEDA) as its lead agencies. The support provided by UNEP for the development of MBIs for MFR resources is thus consistent with the policy thrust of the Government.

On the part of the research team, efforts were made to draft a policy instrument in the form of an Administrative Order to be signed by the UPLB Chancellor which will provide guidelines for the imposition, collection, and administration of watershed protection and conservation fees.

The ease of implementation of MBIs, and assessments of their negative impacts, can not be ascertained yet as MBIs have not been previously implemented nor piloted in the MFR. Hence, this report can not suggest accompanying environmental measures to be implemented to reduce the potential negative effects of proposed MBIs.

6.0 Recommendations

The Philippine study on the development of MBIs for MFR resources has provided its researchers with a rich methodological experience that can be shared with other researchers undertaking similar studies.

Firstly, the involvement of key stakeholders in the valuation and formulation of the proposed instruments should be given prime importance. Only when people are involved can their support of proposed reforms such as the implementation of MBIs be solicited. The research team ensured that all sectors were invited and allowed to participate in the discussions during the consultation meetings. The team admits though that the discussion on MBIs for the land resource will take a long time to advance.

Secondly, the research served as an important means of awareness-building among the stakeholders on the important role played by MBIs in managing the MFR as well as on their role in maintaining the sustainability of MFR resources, namely: water, recreation and eco-tourism, land resources, and non-timber forest products. The rich involvement of the stakeholders enabled the research team, as well as the resource users, to arrive at a consensus that MBIs can be implemented for all of these resources.

Thirdly, in support of the Philippine Strategy for Sustainable Development (PSSD) wherein proper natural resource pricing is a key component, the study team strongly recommends the use of MBIs, not only by DENR, but also by other government agencies charged with managing other natural resources. DENR has initiated the use of MBIs and has mandated its various agencies and bureaus to explore how they can use MBIs to help manage resources under their jurisdiction, namely: timber in forestland, public lands that have been reclassified as alienable and disposable, grasslands, coastal areas and recreational sites in protected areas of the country. The PEENRA system, as provided for by Executive Order 406, has been implemented for a year now. Its continued implementation will pave the way for the desired full cost pricing of natural and environmental resources in the Philippines.

Lastly, specific to the MFR, the research team recommends the approval of the draft Administrative Order on the Guidelines on the Imposition, Collection and Administration of Watershed Protection and Conservation Fees. The Administrative Order has the following objectives: 1) to implement the MFR Master Plan on watershed conservation to ensure adequate and continuous supply of quality water for various uses; 2) to promote equitable sharing of costs and benefits derived from the extraction, utilisation, enjoyment, and development of the natural resources found inside the MFR; 3) to generate sufficient funds and resources for the conservation and management of the MFR; and 4) to establish collaborative undertakings with the various sectors deriving benefits from the MFR for the sustainable development of the Reserve.

LIST OF ACRONYMS

BCR	Benefit-Cost Ratio
BIODESS	Biodiversity Decision Support System
BGPED	Botanical Gardens, Parks and Eco-tourism Division
BOR	Board of Regents
BSP	Boy Scouts of the Philippines
CBFMP	Community-Based Forest Management Program
CFNR	College of Forestry and Natural Resources
CVM	Contingent Valuation Method
CWD	Calamba Water District
DENR	Department of Environment and Natural Resources
EEPSEA	Economy and Environment Program for Southeast Asia
EIA	Environmental Impact Assessment
ERDB	Ecosystems Research and Development Bureau
FDC	Forestry Development Center
FPRDI	Forest Products Research and Development Institute
FWD	Forests and Watersheds Division
HKI	Handog Kalikasan, Inc.
HH	Households
IEC	Information, Education and Communication
IFC	Institute of Forest Conservation
IRRI	International Rice Research Institute
ISF	Integrated Social Forestry
KAKAMPI	Kaisahan para sa Kapakanan ng mga Magsasaka tungo sa Pagpapaunlad, Inc.
KASAMA	Kaisahan ng mga Magsasaka sa Bundok Makiling
KASAMAPA	Kaibigang Samahan ng Magsasaka sa Paanan ng Bundok Makiling
KMPBM	Kapatirang Magsasaka sa Pangangalaga ng Bundok Makiling
LLDA	Laguna Lake Development Authority
LGUs	Local Government Units
LWD	Laguna Water District
MBG	Makiling Botanical Gardens
MBI	Market-Based Instrument
MCM	Million Cubic Meter
MCME	Makiling Center for Mountain Ecosystems
MCDP	Mount Makiling Forest Reserve Conservation and Development Program
MDF	Municipal Development Fund
MEDF	Makiling Experimental and Demonstration Forest
MFR	Makiling Forest Reserve
MITF	Makiling Implementing Task Force
MMO	Makiling Management Office
MMRALBC	Mount Makiling Reserve Area and Laguna de Bay Commission
MOA	Memorandum of Agreement
MOOE	Maintenance and Other Operating Expenses
MOU	Memorandum of Understanding
NAC	National Arts Center
NEDA	National Economic and Development Authority
NGOs	Non-governmental Organisations
NIPAS	National Integrated Protected Areas System
NMPBM	Nagkakaisang Magsasaka sa Pangangalaga ng Bundok Makiling

NPC	National Power Corporation
NPDC	National Parks Development Council
NPV	Net Present Value
NRDBCP	Natural Resources Development and Biodiversity Conservation Programs
NSCB	National Statistics Coordinating Board
NTFPs	Non-Timber Forest Products
NWRB	National Water Regulatory Board
OVCCA	Office of the Vice-Chancellor for Community Affairs
PAMANA	Pagpapaunlad ng mga Magsasaka na Nagkakaisa
PCARRD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
PD	Presidential Decree
PEENRA	Philippine Economic and Environmental Natural Resources Accounting
PNMM	Pook ni Maria Makiling
PNOC	Philippine National Oil Company
POF	People-Oriented Forestry
POs	People's Organisations
PSSD	Philippine Strategy for Sustainable Development
RA	Republic Act
REECS	Resources, Environment and Economics Center for Studies
SAMALUP	Samahan ng Magsasaka sa Mataas na Lupa ng Lalakay sa Bundok Makiling
SBPBM	Samahang Bagong Pag-asa sa Bundok Makiling
SEARCA	Southeast Asia Regional Center for Research and Graduate Study in Agriculture
SFD	Social Forestry Division
SMPBM	Samahan ng Magbubukid sa Paanan ng Bundok Makiling , Los Baños
SUMAMAKA	Samahan at Ugnayan ng mga Magsasaka para sa Kaunlaran
TCM	Travel Cost Method
TREES	Training Center for Tropical Resources and Ecosystems Sustainability
UAP	UPLB Agroforestry Program
UNEP	United Nations Environment Programme
UPLB	University of the Philippines Los Baños
UPLBFI	UPLB Foundation, Inc.
WB	World Bank
WPC	Watershed Protection and Conservation
WTP	Willingness to Pay

DEVELOPMENT OF ECONOMIC INSTRUMENTS FOR MANAGEMENT OF THE MAKILING FOREST RESERVE (MFR)

1.0 Introduction

Proper pricing of natural resources is recognised as a basic component of the Philippine Strategy for Sustainable Development (PSSD). In the past, natural and environmental resources were not priced leading to their wasteful use that eventually translates into resource degradation and depletion. Without having to pay for the use or misuse of resources, there is little or no incentive for economic agents to use natural and environmental resources efficiently. To arrest further resource degradation and encourage more efficient use of limited resources, full cost resource pricing is recognised as a necessary step. For this condition to be sufficient, however, it is important that the price be set at a level that will lead to the optimal use of the resource—i.e., where the marginal revenue from resource extraction is equal to the marginal cost of the extraction activity. Furthermore, where the resource extraction activity has significant off-site effects, some mechanisms should be put into place to redirect revenue generated from the use of the resources, to resource protection, restoration, or rehabilitation and management. Towards this end, the use of market-based instruments (MBIs), implemented under an appropriate institutional set-up, is needed.

The Mount Makiling Forest Reserve (MFR) is a 4,244-hectare forestland whose administration and management are vested in the University of the Philippines Los Baños (UPLB). It is an important resource because of its biological diversity, watershed, recreational, geothermal, educational and other scientific values. It is also a major source of employment and economic benefit to its immediate and surrounding communities.

Several goods and services in the MFR need to be conserved and maintained. Recreational areas, for example, are preserved and maintained through user charges. In principle, these fees are expected to ration the use of resources, by reducing congestion and resource degradation. However, this is rarely practised and the fees are imposed mainly to cover the reserve's maintenance and operation costs. The Makiling Botanical Gardens (MBG) is the only recreational facility where entrance fees are currently imposed. These fees are inadequate to cover the maintenance cost requirement of the MBG—hence, many of the MBG facilities are not maintained properly. In addition to the need to review the fees structure for MBG, other recreational sites in the MFR can also be subjected to economic instruments to effect better resource use.

A broad distinction can be made between command and control mechanisms and economic instruments. Command and control mechanisms are based primarily on legislative and regulatory provisions and are implemented through disincentives. Economic instruments operate through market operations or other financial incentives (James, 1997).

Command and control mechanisms have several deficiencies. First, they require a regulator to expend human resources to acquire information that polluters already possess. Second, polluters vary in the ease with which they can abate pollution, and hence, they have different marginal costs of abatement. The imposition of pollution caps or fixed standards does not recognise this cost differential and thus fails to encourage investment in the cheapest pollution abatement opportunities. In contrast, market-based economic instruments encourage efficient resource use by permit-

ting polluters with high marginal abatement costs to reduce pollution externally by cooperating with other polluting agents, either directly through joint projects, or indirectly through the trading of pollution rights. It is to the best interest of polluters with low marginal abatement costs to control pollution internally at the least cost and earn income in the process by trading pollution rights to other polluters who are unable to control pollution as efficiently. Furthermore, although they take effect through various price and/or quantity controls, they usually allow for adoptive choice and decentralised decision-making by affected or affecting parties (Pearce and Warford, 1993). In reality, the distinction between direct regulation and economic instruments is often blurred because most economic instruments must have appropriate legislative or regulatory backup to render policy effective. Thus, the system that works is often a combination of command and control and market-based economic instrument.

The MFR is a watershed that supplies water to the communities within and around it. The extraction and delivery of water is in the hands of the various water districts and cooperatives operating in the area. Some of these water districts are already engaged in watershed protection, albeit at a minimal level, while others have expressed their willingness to invest in this activity. Even water consumers from around the area have recognised the importance of the MFR in sustaining their water supply in terms of both quantity and quality. The case study done by Cruz et al (1998) provides some basis for estimating what consumers are willing to pay for the protection and conservation of the MFR as a source of water. The findings of the study and specific recommendations – discussed in Section 4 of this report – proposes a watershed protection and conservation fee be charged to water users. It is noteworthy that two big institutional users, the International Rice Research Institute (IRRI) and the UPLB are not considered in the initial analysis but subsequent discussions on the implementation of the proposed fee have involved them along with MFR resort owners and real estate developers. There is also a need to review the basis for the fees imposed on collecting minor forest products in the MFR and to develop new estimates that truly reflect the economic value of their use.

Other important functions of the MFR that were not included in the initial analysis of the project team are biodiversity and carbon sequestration. Biodiversity is a difficult commodity to value but it can be promoted through the use of voluntary economic measures such as donations from the public. Donations can come in the form of animal/plant sponsorship schemes, under which individuals can “adopt” a certain species or area of land. This feature of the MBG will be the subject of a subsequent analysis by the MFR administration. An introductory paper on biodiversity in the MFR and proposed projects to strengthen the biodiversity conservation goals is included in this report as Appendix E.

For the carbon sequestration function of the MFR, Covar (1998) estimated the amount of carbon sequestered by forest vegetation. Together with biodiversity, this aspect will be the subject of a future study.

2.0 Review of Literature

Several undergraduate theses and special projects have been conducted on the valuation of goods and services from the MFR. Table 2 shows the resource focus of these studies and the values that were derived for the various resources. However, some of the results of these studies need to be validated as most were done over a relatively short period of time and involved only a small sample size.

2.1 The Various Recreational Sites in the MFR: Results of Valuation Studies

Pook ni Maria Makiling Park. In 1968, the Rizal Park’s nursery was established under the Marcos regime. From 1970 to 1975, it was developed into a tourism site. A year after, the national

TABLE 1
Summary of the various goods and resources from MFR and possible economic instruments for related resources

GOOD OR SERVICE	PROPOSED ECONOMIC INSTRUMENT (S)	FEATURES/ADVANTAGES/DISADVANTAGES
Recreational sites	User charges	Fees are charged to gain access to the site and are supposedly used to ration the use of resources, especially to reduce congestion and resource degradation. However, this is rarely practised and fees are imposed mainly to cover the maintenance costs only.
Watershed	User charges for resources within the watershed	Fees encourage the conservation of the resource and reduce the risk of depletion
	Tradable use rights	Water may be traded. Many restrictions hamper the existence of a free market. Restrictions imposed by water management agencies include volume controls, environmental consideration and prevention of monopoly behaviour in the market for rights (James, 1997).
Forest trees	Harvest for private use is prohibited in MFR.	
Biodiversity	Transferable quotas	A limit is set on the allowable level of harvest on different species. The drawback to this measure is that species are not protected in the context of whole ecosystems from a conservation viewpoint.
	Voluntary economic measures	Donations may be sought through animal sponsorship schemes, under which individuals could "adopt" a certain species or area of land. Funds may be reallocated to research programmes on preservation and management schemes.
Timber and non-timber products	User charges	Fees encourage the conservation of the resource and reduce the risk of depletion.

park was formally opened to the public and named Pook ni Maria Makiling Park (PNMMP) (Garcia, 1993).

There are numerous features of this national park. The PNMMP contains spacious cottages, executive houses, pelota courts, squash courts, tennis courts, picnic grounds, tree houses, huts and an Olympic size swimming pool which make it an ideal place for relaxation. The strategic location of the park enables visitors to view the whole of Laguna de Bay (IFC, 1994).

Little destruction has occurred to the natural environment of the park. However, some damages were done on man-made facilities in the park mainly by the lack of discipline of visitors. Vandalism, littering and negligence have been the main culprits for the park's facilities deterioration. Due to the dilapidation, some of these facilities have become unavailable for use and need to be completely rehabilitated.

The limited budget for park management compounds the problem of renovation. Even if the National Park Development Council (NPDC) allocates a monthly budget to the park, the mainte-

nance requirement of PNMMP is still in constant deficit. Revenues of PNMMP from entrance fees and user charges for various facilities in the park are not sufficient for the park to break even or cover all its expenses.

Makiling Botanical Gardens (MBG). The Makiling Botanical Gardens (MBG) was built on June 20, 1963 through Republic Act 3523 as a unit of the College of Forestry in UPLB. The garden occupies 300 hectares (ha) of forestland divided into three main sectors: an arboretum, a nursery and a recreational area. The MBG was created to support research and education related to forestry and plant sciences, and to serve as a recreational area for the public (MBG Office, 1996).

Some of the facilities (e.g., comfort rooms, streetlights, screen houses and the nursery) are in need of repairs. Due to budget constraints, management cannot finance construction of new facilities or repair all of the old ones.

TABLE 2

Valuation of goods and services derived from the Makiling Forest Reserve

Good or Service	Value		Valuation Method
1. Recreational Sites			
a. Pook ni Maria Makiling	Per Year: ₱ 16,560,138.00		Contingent Valuation Method
b. Botanical Gardens	Per Visit: ₱19.07		Contingent Valuation Method
c. Mudspring	WTP	Annual Benefits	Contingent Valuation Method
Plan 1	14.33	66,963.03	
Plan 2	16.14	75,421.50	
Plan 3	20.96	103,225.68	
Plan 4	26.32	128,599.78	
d. Peak II	Per visit: ₱21.78		Contingent Valuation Method
2. Watershed			
Users: a. Household	One Time:	₱95.88	Contingent Valuation Method
	Per Year:	₱26.23	
	Per Month:	₱1.38	
b. Farmer	One Time:	₱ 11.07	Contingent Valuation Method
	Per Year:	₱ 5.33	
	Per Month:	₱ 0.00	
c. Resort Owner	One Time:	₱ 251.67	Contingent Valuation Method
	Per Year:	₱ 68.00	
	Per Month:	₱ 10.67	
3. Timber and Non-timber Resources			
from (Present Value per tree)	12 per cent	15 per cent	Asset Value Approach
a. Coconut	₱5,217.56	₱3,788.94	
b. Coffee	₱1,061.84	₱835.99	
c. Mango	₱7,691.01	₱5,561.28	
d. Jackfruit	₱1,651.82	₱1,318.19	
e. Mahogany	₱3,408.50	₱2,411.46	

The MBG charges an entrance fee of P3.00 for UP students and personnel, and P5.00 for non-UP visitors. The fee for the use of the swimming pool is P15.00 and P20.00, respectively for UP and non-UP visitors. These fees are not sufficient to generate the resources needed to maintain the MBG.

Laforteza et al (1997) used a contingent valuation methodology to determine how much more are people willing to pay to help in the improvement of the MBG facilities. An interview

schedule was formulated containing background information on the status of the MBG and the definition of the hypothetical good being valued—the improvement of the gardens. The payment vehicle was a higher entrance fee. To eliminate a starting point bias in eliciting the bid, an open-ended question was utilised. Respondents were simply asked to state the maximum increase in entrance fee that they are willing to pay to enjoy the improvements in the MBG. Primary data were gathered through face-to-face interviews with 80 MBG visitors who were randomly chosen from the visitors of the park in a span of two weeks.

People had positive attitudes to the proposed improvements. The heightened awareness for the natural environment in this decade may have contributed to the demand for natural parks. On average, individuals are spending P102.37 per visit to avail themselves of the amenities in the Gardens. Individuals are willing to pay P19.07 more than they are paying now. Such an increase may be used for enhancement in the recreation value of the gardens.

Some limitations of the study must be noted. First, the sample was limited and not representative of the population of MBG visitors throughout the year. Most of the respondents were also university students yet most MBG visitors are non-students.

Makiling Mud Springs. The Makiling Mud Springs are located at the base of Mount Makiling. The area is approximately four (4) kilometres from the Botanical Gardens and accessible by an existing road system and by nature trails within the rain forest. Existing facilities include: comfort stations, a parking area, picnic tables, and benches. Once said to be the volcano's crater, the mudsprings continually spout off sulphuric gas. Containing very hot, grey-colored mud, the springs have a radius of approximately two meters and continue to enlarge (Sargento, n.d.).

Through the years, several problems make the area neither safe nor conducive to viewing, especially when there are crowds of sightseers. Due to inadequate disposal facilities, many tourists litter the site with their wastes. Aside from this, soil erosion near the mouth of the mudsprings caused by the expansion of the orifice has resulted in accidents for people stepping too close to the springs.

In a discussion, the mudsprings management revealed a plan for several improvements to protect the mudsprings from damages induced by carelessness of visitors. The plan included an elevated platform made of light materials parallel to the crater to preserve the natural surroundings and enable visitors to take a closer look at the crater. Furthermore, there is a plan to open an additional trail leading from the MBG to make the site more accessible. The trail, measuring 1.5 m wide and 0.10 m thick, will follow the terrain elevation.

Since these proposed improvements require additional funds above the allocated budget, a valuation survey for charging entrance fees was made. In addition to the possible use of an entrance fee, it is also worth considering the imposition of fines for littering – this being a major problem in the area. The imposition of this fine system will require closer monitoring and an information and education campaign, both of which require resources and hence, must be studied further.

Erasga, et al. (1997) used the Contingent Valuation Method (CVM) to estimate how much people are willing to pay for the proposed improvements in the mudsprings. Ninety-eight UPLB students were surveyed and informed about the proposed projects complete with different pictures representing the various improvements for the mudsprings vis-à-vis the site's current status. Picture 1 showed the present, unprotected state of the mudsprings. Picture 2 illustrated the mudsprings with signboards and installed garbage cans. Picture 3 showed the mudsprings with signboards, garbage cans and a viewdeck. Picture 4 illustrated the mudsprings with signboards, garbage cans, a view-deck and an improved trail. The students were asked how much they would be willing to pay to visit the site, given the various levels of improvements being proposed for the site.

Regression analysis was used to determine how significant factors affected the willingness to pay (WTP) of individuals for the improvement of the site. WTP values for improvements to mudsprings ranged from P14.33 to P26.32. There was a direct relationship between WTP and level of improvement of the mudsprings.

Benefit cost analysis was used to analyse the feasibility of projects for both current and projected visitors to the site. Net deficits occurred for current visitors but if the projected increased in number of visitors will be realised, the net benefits could range from P474,613.75 to P1,354,300.48 per year.

It should be emphasised, however, that the student respondents compose only one segment of the whole range of mudsprings users. A more complete analysis should include all the other user groups.

Peak 2. Peak 2 is a lofty mountain peak with a panoramic view of Laguna. The site can be reached after a three-hour hike from the mudsprings. The enjoyment from the experience comes from hiking on nature trails and enjoying the natural environment along the way.

There are signs that littering hikers are not paying much attention to the condition of the forest trail. There must be some effort to patrol and maintain the condition of the trails but this would entail costs. The MFR Conservation and Development Project Fund which is the source of the MFR support budget is inadequate. Another means of sourcing funds must be implemented such as collecting user fees from visitors trekking to the peak. Currently, Peak 2 is trekked free.

Abrina et al. (1997) conducted a study to determine the WTP for an entrance fee based on views expressed by over 100 respondents. Their data consisted of 30 samples from each of four groups of community members: working professionals, UPLB students, non-UPLB students and hikers belonging to environment recreation-oriented organisations; and five protest bidders.

All the types of respondents were willing to pay an average of P21.78, with the professionals willing to pay the highest (P32.17) and the hikers, the lowest (P9.20). Regression analysis could not uncover relevant variables that affected the WTP of individuals. Recreational benefit from hiking was the main use value of the area as cited by sampled visitors. The top non-use value is the existence value – the satisfaction of awareness of the continued existence of the site.

The study concluded that a per-visit entrance fee is feasible for the hiking pleasure. Information campaigns regarding the existence of hiking trails to Peak 2 and other recreational sites should be more extensive. Finally, Peak 2 should be conserved and maintained in its present state with the help of the suggested user fees.

2.2 Valuation of the Watershed Function of the Reserve

The MFR is a watershed that supplies the water requirements of two provinces and at least four municipalities in the Philippines. Water users range from the nearby Los Baños community to the distant municipalities of Calamba, Sto. Tomas and Bay. Households need the watershed for the consumption of potable water. Farmers use it for the irrigation requirements of their farmlands. Commercial establishments utilise the water for swimming pools.

The activities within the watershed influence the ability of the watershed to supply water to its constituents. In the past, and to a limited extent at present, certain groups have converted some forestland into upland agriculture sites. Unlike the situation in many parts of the country, it is worth noting that upland agriculture in the area is dominated by the agroforestry system. There is still a concern by community members, however, that further conversion can threaten the watershed function of the reserve and hence, must be stopped or regulated.

Forest conversion affects water quality and quantity. Increased violation of reserve regulations by non-MFR residents also poses as a serious problem to the stability of the watershed (Cruz, R.V., et al., 1991). Watershed management and protection, however, have costs.

Soguilon (1996) conducted a study to determine how much people are willing to pay to protect the watershed function of the MFR. Different communities from within and around Mount Makiling that derived their water services from the watershed were taken as the population of the study. Barangay Pansol of Calamba, and Barangays Anos, Bagong Silang, and Timugan of Los Baños were used as sites for an intensive field study. These communities were selected because they are the immediate users of water from the watershed (ground and surface water). Fifteen resort operators and some 30 farming households from within the MFR were also interviewed for this study.

Data were collected through personal interview. Respondents were presented information about the watershed to give them a clear knowledge as to the 'good' that they are asked to value. Three separate interview schedules were used for each type of respondent. The interview schedule included respondents' socio-demographic characteristics and their willingness to pay (WTP) for the retention of benefits from these goods through watershed protection activities. An open-ended valuation format was used to eliminate a starting point bias.

The study revealed that 20 per cent of the household users and 23.3 per cent of the commercial users did not know that the MFR is their source of water. Among the household users, 65 per cent were willing to pay an average of P98.88 as a one-time donation. Only 50 percent were amenable to an annual payment. Household respondents were willing to pay an average of P26.23. Very few (12.5 per cent) were willing to pay monthly fees at an average of only P1.38.

Most of the farmer-respondents (65 per cent) were willing to pay an average amount of P11.07 for a one-time fee. 67 per cent expressed a willingness to pay annually at an average of P5.33. None of the farmers were willing to pay monthly fees.

On the other hand, most resort owners (66.7 per cent) were willing to pay an average of P251.67 for a one-time fee while 53.3 per cent were willing to pay P68.00 for annual payments. Only 20 per cent of resort owners were willing to pay an average of P10.67 for monthly collections.

2.3 Valuation of Timber and Non-Timber Resources of Trees in the MFR

The Makiling Forest Reserve (MFR) has an abundant supply of forest tree species. These trees have several direct and indirect functions. They are a major source of food, wood, energy, medicine, recreation and raw materials. Furthermore, they assist in the global recycling of gases, reduce flood potential and recharge springs. Most often, the forest provides conflicting services. The conflict often arises between the utilisation of a tree for its timber and non-timber values (Sasing, 1994).

Trade-offs occur when one is faced with the decision to cut down trees. To harvest the trees for their timber means forfeiting the supply of non-timber products and vice versa. The increasing rate of deforestation from timber extraction points out the higher value attached to timber resources as compared to non-timber resources. However, this may not be completely true; by attaching accurate monetary values to the timber and non-timber value of trees, people will be guided towards the proper utilisation of these renewable resources.

Sasing (1994) estimated the net present value (NPV) of timber resources vis-à-vis non-timber products for dominant tree species found in the MFR. Benefits reflected the monetary value of the product in the market. Costs included establishment cost, maintenance cost, and extraction cost for

timber and non-timber products. Five dominant tree species found in the MFR were considered in the analysis: coconut, coffee, mahogany, jackfruit and mango.

Forty households living within the MFR area were interviewed. The information gathered focused on the extent and nature of utilisation of timber and non-timber products of the dominant trees in the area. Technical information on the harvest values for different products deriving from the trees were obtained from experts of the University in the Philippines Los Baños.

Separate NPVs of timber and non-timber resources per tree were computed as well as the NPV for joint use of the resources. Costs included not only maintenance, establishment and extraction cost, but also foregone benefits from the non-use of timber or non-timber resources. Twelve percent and 15 per cent discount rates were used over the rotation cycle of the various tree species.

The NPV for non-timber resources from coffee ranged from P904.36 - P1,169.01. The NPV for coffee timber ranged from P-37.21 - P-36.46 indicating a loss for the use of coffee as timber only. On the other hand, the NPV for joint use of resources ranged from P835.99 - P1,061.84.

The NPV for non-timber resources from coconut ranged from P3,840.38-P5,275.80 while the NPV for coconut timber ranged from P73.74-P72.01, again indicating a loss from the use of coconut as timber only. Joint-use for coconut yielded an NPV of P3,788.94 - P5,217.56. For mango, the NPV for non-timber resources was estimated to be P5,537.02 - P7,557.02. with joint use yielding an NPV of P5,561.28 - P7,691.01.

The corresponding figures for jackfruit ranged from P1,663.71 to P2,275.91 for non-timber use alone and P1,318.19-P1,651.82 for joint use. The same pattern was noted for mahogany with an NPV of P2,693.83-P4,098.91 for non-timber value and P2,411.46 – P3,408.50 for joint use. Results showed that a tree has far greater value from its non-timber products than its timber products.

3.0 Mount Makiling Conservation and Development

Master Plan: An Overview

On June 18, 1996, Malacanang Executive Order No. 349 was issued by then President Fidel V. Ramos adopting the Mount Makiling Reserve Area and the Laguna de Bay Region Master Plan and authorising its implementation. The Master Plan for Mount Makiling Conservation and Development provides the formal blueprint for pursuing a more systematic and organised management and development of the MFR over 25 years. It symbolises the contribution of UPLB as an academic institution to the country's Medium Term Plan in the areas of sustainable development and people empowerment.

Overall, the master plan charts the course towards sustaining the function of the Reserve as an outdoor laboratory for research, instruction and extension. It aims to accomplish the following milestones:

- contained and well managed forest occupancy
- increased forest cover
- conserved and protected MFR biodiversity and other natural resources
- established demonstration areas
- strengthened institutional capacity

Efforts to bring the MFR to the desired state are organised under three umbrella programmes, namely: people-oriented forestry, natural resources development and biodiversity conservation and institutional development.

3.1 People-Oriented Forestry (POF) Programs

These programmes primarily focus on the development and management of people or the social element of the MFR. Components of POF include accreditation and tenure of farmer occupants, promotion of community participation, establishment of agroforestry, and provision of livelihood development.

An accreditation system will be instituted to recognise bona fide occupants and tenure will be granted to them in exchange for their commitment to conserve and protect the forest. Mechanisms will be developed to promote the active participation of stakeholders in the conservation, development and management of the MFR. Stakeholders include the farmer households, POs, LGUs, UPLB, lessees, NGOs, resort owners, water districts, and other MFR resource users. Farms of all accredited occupants shall be transformed into fully developed agroforestry farms, the production of which is expected to provide additional income to farm families and help reduce the rate of land degradation. Families of accredited farmers will be provided welfare and livelihood assistance with emphasis on the development of non-farm livelihood.

3.2 Natural Resources Development and Biodiversity Conservation Programs (NRDBCD)

These programmes will provide for resource development and conservation activities in the MFR. Program components include rehabilitation of degraded areas, biodiversity conservation, botanical gardens, parks and recreation development, and environmental impact assessment.

Under these programmes, existing forest stands will be maintained. Forest cover shall be brought back in degraded lands through appropriate land uses and implementation of natural resource development programmes like reforestation. This will be done in cooperation with forest users, upland farmers, communities, local government units, and other concerned institutions. Limited utilisation of timber and non-timber forest products may be allowed so that the value that people attach to the forest will be higher than the benefits that they may gain from other land uses.

The remaining forests and those that will be developed in the future will no longer be subjected to conversion to other land uses and various forms of exploitation which are inconsistent with the vision of the Master Plan. In keeping with the participatory spirit of the plan, a multi-sectoral forest protection system will be established.

The botanical gardens and recreational areas will be improved and expanded. This is to promote appreciation of, and increase knowledge, awareness and understanding about, forests and plants, their diversity, importance and conservation, as well as to provide quality outdoor recreation opportunities for the public and to enhance eco-tourism in the forest reserve.

An environmental impact assessment system to evaluate all development projects in the MFR will be instituted. A buffer zone starting outside with the first 18 percent slope towards the MFR boundary will be established to prevent further encroachment and the occurrence of consequent on-site and off-site ecological damages. The first 100 meters from the MFR boundary will be declared as “green belt” area and only uses compatible with the maintenance of the long-term integrity of the Reserve will be allowed.

Watershed management and protection will be carried out to insure the dependability and safety of the domestic water supply from the MFR especially that for industrialisation, tourism and other land developments taking place around the MFR.

3.3 Institutional Development Programs

To efficiently and effectively deliver the various technical programmes and sub-programmes identified in the Master Plan, institutional development programmes have been lined up to support MFR management. These include research and demonstration, information, education and communication (IEC), and legal and special concerns.

Continuing research will be conducted and demonstration areas will be established for biodiversity and sustainable natural resource management and development. Research results will serve as a basis for developing appropriate conservation, management and development strategies, not only for the MFR, but for other mountain ecosystems in the country as well.

Extensive IEC will be conducted among the stakeholders and other relevant groups to enhance appreciation of the immense value of the MFR and to synchronise multisectoral efforts for its conservation and development. Present policies affecting the Reserve shall be reviewed to identify policy gaps and overlaps and formulate appropriate policies, rules and regulations consistent with the participatory and multisectoral management direction for the resource. Likewise, an organisational set-up (that is acceptable to the stakeholders) will be established to oversee the implementation. This proposed organisational set-up has already been formulated in consultation with the various interest groups and was discussed in Section 2.0.

All the programmes and their components are meant to efficiently accomplish the goal of sustainability. The Master Plan is expected to provide immeasurable social benefits to communities within, and adjacent to, the MFR through increased farm productivity, enhanced capability to manage resources, educational benefits through training and scholarships, and improved opportunities to earn extra income through alternative livelihood projects and employment in several forest development activities. Similarly, the plan is expected to provide tremendous environmental and scientific benefits to local communities and UPLB constituents and clientele: fresher air, a healthy environment, sufficient supply of potable water, additional scientific knowledge, new technologies and aesthetic values.

3.4 Sources of Annual Funds

Current sources of funds of MME for the various programmes of the MFR Master Plan are reflected in Table 3. The sources include regular government appropriation, entrance fees, leases, rentals, sales of seedlings/plants, and grants and donations from private companies and civic organisations. Total value from these amounts to US\$271,600 or only about 10.5 per cent of the total MFR investment requirements for the five-year period.

3.5 Investment Program for MFR Conservation and Development

An investment plan for the MFR aims to provide a rational basis for programme prioritisation, fund sourcing and resource allocation. It prescribes the direction for development of the resource and thus the orderly manner by which it should be pursued. The proposed investment programme covers the costs to be incurred for additional personnel, maintenance and operating expenditures (travel, supplies and materials), equipment, and capital outlays (buildings, roads, and other infrastructures). The total cost for the first five years is presented in Table 4. The basic cost data were obtained from the Master Plan for Mount Makiling Conservation and Development

TABLE 3.
Sources of annual funds

PARTICULARS	AMOUNT (₱)
Regular government appropriation through UPLB	8,000,000.00
Entrance fees	1,000,000.00
Lease/rentals	135,000.00
Sales of seedlings/plants	50,000.00
Grants/donations (private companies, MMRALBC, civic organisations, etc.)	1,000,000.00
TOTAL	10,185,000.00

(1996), adjusted to reflect current prices and conditions. Only part of the cost of the operations of the Makiling Center for Mountain Ecosystems (MCME) was taken to reflect the fact that the Center performs other functions. In particular, only 60 per cent of the programme management cost of MCME was included in the estimated cost of the five-year Investment Program for MFR Conservation and Development.

The costing was done for the major programmes identified for the MFR, namely: (a) a people-oriented programme, (b) a natural resources and biodiversity development and conservation programme, and (c) an institutional development programme. The requirement for the management and protection of the MFR for five years in present value terms and using a discount rate of 10 per cent is US\$2.59 million. On an annualised basis, the cost amounts to US\$683,589. The biggest percentage requirement (about 36 per cent) goes to Natural Resources and Biodiversity Conservation and Protection. Almost one-fourth goes to the overall programme management.

MBI implementation works on the premise that by making resource users pay appropriate prices for the natural resources, a more rational use of resources will result. Furthermore, the system will allow for the raising of self-generated revenue to finance the management of the resource. Revenue generated through a watershed protection and conservation (WPC) fee will be used directly in rehabilitation/protection efforts in the MFR as well as in financing other activities related to resource management and conservation such as institutional support and people-oriented programmes.

3.6 Legal Basis of Watershed Protection and Conservation Fee

The legal basis for institutionalising the watershed protection and conservation fund is anchored on a number of policies promulgated for the effective management of the MFR. These are RA 6967, EO No. 349, and UPLB Chancellor Executive Order No. 2. The pertinent provisions in these policy issuances are discussed below.

1. RA 6967 approved on October 15, 1989

Sec. 1 – The entire forest reserve at Mount Makiling in Laguna ceded, transferred and conveyed to the University of the Philippines pursuant to Rep. Act No. 3523 shall be administered and conserved primarily as a training laboratory for the advancement of scientific and technical knowledge particularly in the preservation, conservation, and development of our forest, flora and fauna, and natural resources.

TABLE 4.

Investment programme for MFR conservation and development

STRATEGIES/ ACTIVITIES	INVESTMENT COST					PV (P)	PV (US\$)
	Year 1	Year 2	Year 3	Year 4	Year 5	r = 10 per cent	r = 10 per cent
I. People-Oriented Forestry							
A. Accreditation and Tenure	412,000	335,500	369,505	332,750	366,025	929,091	25,111
B. Agroforestry Farm Development		550,000	605,000	200,000	200,000	1,500,000	40,541
C. Livelihood Development	200,000	385,000	350,000			1,023,747	27,669
SUB-TOTAL	612,000	1,270,500	1,324,050	532,750	566,025	3,316,474	89,634
II. Natural Resources and Biodiversity Conservation and Protection							
A. Natural Resources Development	2,825,000	2,502,500	2,389,750	2,229,425	2,761,439	9,669,182	261,329
B. Botanical Gardens, Parks and Recreation Dev't	6,282,000	5,506,200	5,858,820	4,082,702	4,460,972	20,221,759	546,534
C. Forest Protection and Law Enforcement	2,031,350	1,592,949	806,087	722,258	550,743	4,604,073	124,434
SUB-TOTAL	11,138,350	9,601,649	9,054,657	7,034,385	7,773,154	34,495,014	932,298
III. SUPPORT SERVICES							
A. Research and Demonstration	5,420,000	3,850,000	2,722,500	998,250	1,098,075	11,518,182	311,302
B. Development Communication and Community Relations	2,060,000	891,000	980,100	146,410	161,051	3,545,455	95,823
SUB-TOTAL	7,480,000	4,741,000	3,702,600	1,144,660	1,259,126	15,063,636	407,125
IV. Program Management	8,402,699	5,852,699	5,852,699	5,852,699	5,852,699	24,504,516	662,284
V. Capital Outlay	20,350,000					18,500,000	500,000
GRAND TOTAL	47,983,049	21,465,848	19,934,006	14,564,494	15,451,004	95,879,640	2,591,342

Sec. 2 – The exclusive jurisdiction, administration and complete control of the forest reserve are hereby vested in the University of the Philippines at Los Baños.

Sec. 3 – The University of the Philippines in Los Baños shall preserve watershed areas in the forest reserve for the development of hydro-geothermal power in coordination with the National Power Corporation, provided such development will not endanger the forest reserve and prejudice its purpose as a training laboratory.

2. *Office of the President Executive Order No. 349* dated June 18, 1996 – “Adopting the Mount Makiling Reserve Area and Laguna de Bay Region Master Plan, providing for the implementation thereof and for other purposes”

Sec. 1 (b) – The implementation of the Master Plan shall be directed towards the rehabilitation and sustainable development of the watershed to ensure adequate and continuous fresh water supply for various uses.

Sec. 1 (d) – The implementation of the Master Plan shall also ensure the protection of the natural ecological attributes of the Mount Makiling Reserve area.

Sec. 3 (b) – The Laguna Lake Development Authority (LLDA) and the University of the Philippines Los Baños (UPLB) in coordination with various agencies, shall lead in the implementation of the Master Plan for the Laguna de Bay Region and the Mount Makiling Reserve area, respectively.

Sec. 3 (d) – All concerned government units and other government agencies or entities shall align their development plans, programmes and projects and extend full support to the implementation of the master Plan. The private sector is also encouraged to support the Master Plan and coordinate their activities with the Commission.

3. *UPLB Chancellor Executive Order No. 2* signed on July 26, 1994 – “Rules and Regulations in the Conservation, Sustainable Development and Management of the Mount Makiling Forest Reserve.”

Chapter V. Sec. 1 (1) – The general development strategy for the Forest Reserve shall be through a sustainable integrated management system consistent with its primary purpose as a training and research laboratory. Such forest reserve management system shall have a regulatory subsystem...

Chapter V, Sec. 1 (2) – The regulatory subsystem shall specify rules and regulations and other control measures and requirements for the management, conservation and sustainable development of the Forest Reserve.

Chapter VI, Sec. 2 – no person shall be allowed to use a portion of the Forest Reserve and its resources without securing a permit or a license from the UPLB, the terms and conditions of which shall include criteria that insure sustainability of resource use.

Chapter VIII, Sec. 2 – To ensure the attainment of the objectives set forth herein, the University shall issue orders, circulars, memoranda and other directives which may be necessary to implement these rules and regulations and provide or source necessary budget allocation and support services that conform with existing policies, plans and programmes of the Forest Reserve.

Aside from these policy issuances, there are analogous DENR administrative issuances that institutionalise the collection of a rehabilitation fund for the sustainable rehabilitation of a resource. For instance, Section 180 of DENR Administrative Order No. 96-40 dated December 19, 1996, otherwise known as the Revised Implementing Rules and Regulations (IRR) of RA 7942, institutionalised Contingent Liability and Rehabilitation Fund to ensure just and timely compensation for damages and progressive and sustainable rehabilitation for any adverse effect of a mining operation or activity may cause.

By virtue of RA 6967, the exclusive administration of the MFR has been vested to the UPLB. The word “administration” according to the Philippine Law Dictionary (1988) includes all acts for the preservation of property. Administrative expenses, on the other hand, are those that are necessary for the management of the estate: protecting it against destruction or deterioration and supporting the production of fruit (Philippine Law Dictionary, 3rd Ed. 1988).

Is the WPC fee a tax? No, because it is not an exaction for revenue. Rather, it is a form of regulatory mechanism to control the use of watershed resources and at the same time, compensate for the use thereof, to ensure the sustainability of the MFR.

To provide the legal basis for WPC fee, the team has drafted an Administrative Order on the Guidelines on the Imposition, Collection and Administration of Watershed Protection and Conservation Fee, included in this report as Appendix B.

4.0 Market-Based Instruments for Water Resources in Mount Makiling

Water prices generally reflect only the costs of bringing water to the tap. Like in other parts of the country, the fees for water use do not include the cost of protecting and managing the source watersheds and therefore tend to underestimate the true value of water as a capital resource. The under-valuation of water has virtually made raw water a free commodity and hardly discouraged its wasteful use. Consequently, water resources in many parts of the country deteriorated quickly. The situation is aggravated by the insufficiency of public funds to rehabilitate and protect the watersheds. The need to institute reform in the water resource is now recognised by the national government. A bill pending in the Senate, calling for the creation of the Water Resources Authority of the Philippines (WRAP), identifies the need to charge water users for the protection of the watershed resources all over the country. Once approved, the Bill will legitimise the imposition of watershed protection fee on water consumption—that will address both inefficiency in water use and the need for environmental financing.

This study aimed to develop an MBI that will reflect a more accurate pricing scheme for water that will encourage more efficient use of water and generate funds for the protection and development of MFR watersheds.

4.1 Objectives

The main objective of the study was to develop a market-based instrument for the use of the MFR watershed as source of water to downstream water users.

Specifically, the study was aimed to:

- identify the different types of water users, their consumption rates and existing fees and charges collected from them;
- determine how much the household water users willing to pay to rehabilitate, protect and manage the watershed resources where this water is sourced;
- assess how these fees can be collected, managed and used for the MFR through consultative meetings with concerned sectors;
- design and pilot test the implementation of the economic instrument to collect watershed protection fee from various groups of water users; and,
- draw policy recommendations relevant to the use of MBIs for water resources conservation.

4.2 Methodology

The study relied heavily on a study produced by the Forestry Development Center with funding from the Institute of Forest Conservation of UPLBCF entitled Viability of Water Users' Fees and Charges as a Source of Funds for Sustainable Watershed Management (Cruz et al., 1998).

The project consisted of the following activities:

Secondary data gathering. The study assembled relevant information from the FDC study and from the Master Plan for Makiling Forest Reserve Conservation and Development.

Consultative meetings. A series of consultative meetings with various water users have been scheduled. The first, attended by 40 participants, was conducted on May 27, 1998 at the UPLB College of Forestry and Natural Resources (CFNR). Several papers were presented and simultaneous workshops were conducted to discuss the various issues pertaining to water pricing.

Subsequent consultative meetings were conducted to further discuss the mechanisms of the pilot implementation of the economic instruments for pricing water and other related issues that need to be addressed.

Several individuals involved in water distribution and University personnel have also conducted several intensive meetings to design how the water district offices can play a more active role in the management and protection of MFR watersheds.

4.3 The Proposed Economic Instrument for Water: Watershed Protection and Conservation Fee Based on Water Users' Willingness to Pay

The FDC study (Cruz, et al., 1998) sought to determine how much people were willing to pay to contribute to efforts to protect and restore the watershed where their domestic water comes from, and equate this value to a fee. The study used the contingent valuation method (CVM) to determine this value—referred to here as an watershed protection and conservation fee. This fee is an amount in addition to current fees and charges that the users are paying to the water distributors/districts.

The study conducted a survey of the various water users in five municipalities surrounding the MFR. The respondents included three water districts, four community waterworks, 149 residential users, 9 government/religious institutions, 18 resort owners, and 77 commercial/industrial users (Table 5).

Survey results showed that majority of the domestic water users (about 67 percent) expressed their willingness to contribute an additional amount to the current fees, with the monthly payment being the dominant choice (Table 6). On the average, the domestic users were willing to pay an additional amount ranging from P1.07/m³ to P1.45/m³.

Domestic water users expressed higher WTP for watershed protection and rehabilitation than commercial water users. The low response of commercial water users may reflect strategic bias since the former is a high water user and any increase in a fee on a per cum would translate to a higher expense on their part.

Table 7 summarises three terms of payment of proposed fees and charges to be piloted for three major types of MFR water users. It also shows the number of users, their average monthly consumption, their WTP, and the computed future collections based on WTP and consumption rates by type of user. For monthly charges, it is possible to collect about 1.4 million pesos, about 3.76 million pesos for annual charges and about 3.06 million pesos on a one-time basis.

The increase in water fees that can be generated from the water resource users through a watershed protection fee system appears significant enough to meet the financial requirements for

TABLE 5

Respondents by type of water user and municipality

USERS	MUNICIPALITY	NO. OF RESPONDENTS
Water district	Calamba	1
	Los Baños, Bay, Calauan	1
	Sto. Tomas	1
	Sub-total	3
Community waterworks	Sto. Tomas	5
Residential	Bay	28
	Calamba	37
	Calauan	29
	Los Baños	24
	Sto. Tomas	31
	Sub-total	149
Commercial/industrial	Sto. Tomas	13
	Bay	13
	Calamba	20
	Calauan	4
	Los Baños	27
	Sub-total	77
Swimming pools/resorts	Calamba	10
	Los Baños	8
	Sub-total	18
Government institutions	Sto. Tomas	2
	Bay	1
	Los Baños	6
	Sub-total	9
TOTAL		261

TABLE 6.

Willingness to pay for watershed protection and conservation by MFR water users

Item	CWD		LWD		STWD		Total
	Domestic/ Gov't	Comm'l	Domestic/ Gov't	Comm'l	Domestic/ Gov't	Comm'l	Domestic/ Gov't
No. of service connections	16,281	909	11,462	785	10,265	1,694	38,008
Ave. monthly consumption (m ³ /mo)	33.71		27.00		25.00		28.57
Total monthly consumption (m ³)	548,833	30,642	309,474	21,195	256,625	51,837	1,114,931
Monthly WTP (₱)	36.19	15.00	36.19	15.00	36.19		
WTP/m ³	1.07	0.45	1.34	0.55	1.45		
Total collection (₱)/mo	587,251	13,789	414,695	11,657	372,106	25,446	1,374,052

Assumptions:

Total consumption/mo = no. of service connections x avg. consumption/mo;

WTP/mo = WTP/m³ x avg. monthly consumption (for: monthly, annual and one-shot deal)Total collection = WTP/m³ x total monthly consumption

the management of MFR watersheds. The major activities related to the development and rehabilitation of water sources in the watershed include: people-oriented programmes, conservation and development programmes, and institutional development programmes. These programmes usually require a big annual budget that the existing University allotment is unable to sufficiently meet. The proposed fees and charges could cover a large proportion of the budget required to sustainably manage MFR watersheds as sources of water for the community.

A major limitation of the survey conducted by FDC is its failure to include big institutional users like the UPLB and the International Rice Research Institute. Some have argued that these institutional users consume more water than that which is being extracted by the water district, a point that was not substantiated in the study presented in the next paper. It was, however, resolved that a consultative meeting involving the water district, IRRI, UPLB and even the Laguna Lake

TABLE 7

Average amount that respondents are willing to contribute for MFR watershed management

TERMS OF PAYMENT	RESIDENTIAL (N = 96)		GOVERNMENT/ RELIGIOUS (N = 9)		RESORT (N = 18)		COMMERCIAL/ INDUSTRIAL (N = 47)	
	No.	per cent	No.	per cent	No.	per cent	No.	per cent
One-shot deal								
• Ave. amount		₱80.00		none		none		₱13.67
• Range of amount		₱10-200						₱2-35
• n		4						6
• Percent		4.17 per cent						12.76 per cent
Monthly payment								
• Ave. amount		₱36.19		₱75.00		₱55.00		₱15.00
• Range of amount		₱5-200		₱50-200		₱5-200		₱5-50
• n		48		2		8		6
• Percent		50.00 per cent		22.22 per cent		44.44 per cent		12.76 per cent
Annual payment								
• Ave. amount		₱54.09		none		₱75.00		₱82.00
• Range of amount		₱10-200				₱50-100		₱10-100
• n		11				2		5
• Percent		11.45 per cent				11.11 per cent		10.63 per cent
Other Terms								
<i>per cent of monthly bills</i>								
> 2 per cent		1		1.04				
> 3 per cent								1 0.58
> 4 per cent								1 0.58
> 5 per cent				1 11.11				3 1.75
> 10 per cent		1 1.04		1 11.11				2 1.17
> 20 per cent								3 1.75
> 25 per cent		1 1.04						
> 30 per cent								1 0.58
<i>per cent of income</i>								
1 per cent						1 5.56		
5 per cent		1 1.04						
per cent of rental = 5 per cent						1 5.56		
Any/agreed amount		5 5.21		2 22.22		5 27.78		2 1.17
No idea/can't say		24 25.00		2 22.22		1 5.56		17 36.17

Development Authority (LLDA), who also clam rights over the water resource from the MFR, should be held to resolve the issue. Other water users will also be invited and other interest groups like the local government units.

4.4 Follow-through Activities

To improve further the design of MBIs for the watershed rehabilitation by water users, the following steps are essential:

- Collect more basic information on streamflows and groundwater resources from and within the MFR. This will involve monitoring the quantity and quality of streamflows from major streams of the MFR.
- Establish a database of water users and consumption patterns within and around MFR watersheds.
- Conduct interactive participatory workshops to refine the various elements of MBIs initially developed (i.e., amount of additional fees to be collected from domestic, agricultural, commercial and industrial users, mode of collection, management and use of funds, and other related elements).
- Develop detailed protection and development plans for the different major watersheds of the MFR.

5.0 Water Consumption of Various Water Users and Watershed Protection and Conservation Fee Based on a Cost Recovery Principle

5.1 Introduction

Water supports life. It is the only substance necessary to all life; many organisms can live without oxygen, but none can live without water.

Because water is priced so cheaply, we tend to use it wastefully. On the average, each person in developed countries uses about 83 gallons of water: 24 gallons for flushing; 32 gallons for bathing, laundry and dish washing; 25 gallons for watering home garden and use of swimming pools, and 2 gallons for drinking and cooking (Canby, 1980). It is be noted that daily drinking and cooking by an individual requires only about 9 litres (2 gallons) of water, the only water each person directly requires in order to survive.

In the province of Laguna, the Makiling Forest Reserve (MFR) is a very important watershed. Water is one of its most valuable resources. It provides water for irrigation and domestic uses. The Reserve's groundwater is also very vital in the operation of the geothermal power plant. The MFR also serves as an important catchment area for Laguna de Bay, the largest freshwater lake in the Philippines and one of the largest in the Southeast Asia.

Water plays a pervasive role in the overall economic development of the areas within and adjacent to the MFR. Agriculture, commerce and industry, hydroelectric power generation, inland fisheries and aquaculture are some of the sectors dependent on access to water.

This study provides a rough estimate of water consumption around the MFR. As demands for fresh water grow against its finite supply, water consumption estimates are indispensable in investment decisions and policies involving optimal allocation of water among the different water-using

sectors. This paper therefore aims to provide an empirical estimate of the volume of water consumed by the different water-using sectors. Estimating water consumption levels is not an end in itself but is an important tool in making economically sound investment decisions and policies.

5.2 The Distinctive Nature and Characteristics of Water that Make Pricing Difficult

A number of special characteristics distinguish water from most other resources or commodities. First, it is a limited resource with few substitutes. Second, it is highly variable in space and time, with response to its variability being a continuous management requirement. Third, it is relatively immobile, due both to the costs, investment indivisibilities and “plumbing” constraints associated with its physical transfer, as well as to the complex social and institutional arrangements governing water ownership and use. These characteristics, and the externalities to which they give rise, constrain the role of markets in balancing supply and demand and create complex and difficult regulatory problems (Frederiksen, et al, 1993).

Due to its physical nature, water is a “high-exclusion cost” resource in the language of economists (Schmid, 1989). This implies that exclusive property rights for water, which are the basis of a market or exchange economy, are relatively difficult and expensive to establish and enforce. Frequently, then, property rights in water are incomplete and in most cases, absent (Young, 1996).

Examining water demand more closely, the economic characteristics of water demand vary across the continuum from rival to non-rival goods (Randall, 1987). A good or service is said to be a rival in consumption, if one person’s use of water in some sense precludes, or prevents, use by other individuals. Goods that are rival in consumption are amenable to supply and allocation by market or quasi-market processes, and are often called private goods. The opposite end of the continuum is occupied by goods that are nonrival in consumption, meaning that one person’s use does not preclude enjoyment by others. Goods that are non-rival are often called public or collective goods. Because non-payers cannot be easily excluded, private firms will not find it profitable to supply public goods. Water for agricultural, residential or industrial uses tends toward the rival end, while the aesthetic value of a beautiful stream is non-rival (Young, 1996).

At this point, it is important to note the significant association between non-rivalry and high exclusion cost. Exclusion cost refers to the cost required to keep those not entitled from using a good or service. Water is frequently a high exclusion-cost good because of its physical nature discussed above: when the service exists for one user, it is difficult to exclude others.

These special characteristics of water, and the externalities of its use, pose significant challenges for water-related investment decisions and policies for the MFR. The effective protection, conservation and development of the MFR depends on local and national capabilities to evolve and adapt an institution (in its widest sense: i.e., private and public organisations, laws and customs, rules and regulations and regulatory and market mechanisms) that will plan, manage and develop the forest reserve (and its water resources) to meet the objectives of the different stakeholders.

5.3 The Water Resources of the MFR Watershed

Water is valued as one of the most important resources in the MFR. There are eight water intakes in Mount Makiling used to tap the stream flow of perennial streams, mainly for domestic use. The average annual stream flow for the major streams are: 0.071 cu. m per second for Dampalit, 0.035 cu. m per second for Maralas and 0.031 cu. m per second for Molawin Creek. In addition to these, more than 60 perennial and intermittent streams that have been identified (Cruz, et al., 1991).

5.4 Water Consumption Estimate

The aggregate water consumption level within the vicinity of the MFR was estimated by identifying the different water-using sectors. They consist of the water districts, resorts and private pools, various institutions and households without water connections to the water district (Table 8).

Estimation of water consumption by major water-users within the MFR area showed that some 48.6 MCM (million cu. m) are consumed annually. This value is broken down as follows: 18.6 MCM by the water districts, 0.72 MCM by resorts and private pools; 10.6 MCM by institutional users and 18.7 MCM by households without water connections.

Percentage-wise, the water districts and the households are the major users of water from the MFR. Thirty-eight percent each of the estimated total volume of water is consumed by the water districts and households with no water connections. Moreover, 22 per cent of the total volume of water is used by institutional users like the UPLB, IRRI, PCARRD, and FPRDI.

The study was able to give an order of magnitude of the volume of water extracted from the MFR. However, a caveat on the estimated water consumption must be noted. The study was not able to capture all the major water-users from the MFR. For one, industrial plants located in the science parks of Sto. Tomas and Calamba areas were not included in the study. They have their own wells and system of distribution of water and collection of fees for water services. Secondly, the irrigation water consumed by the rice growing areas was also not included.

TABLE 8

Estimate of water consumption by major water users within the MFR area, 1999

MAJOR WATER USERS	ANNUAL CONSUMPTION (cu. m)	PERCENT OF TOTAL
Water districts	18,568,332	38
Alaminos	1,372,416	
Calamba	7,622,940	
Laguna	6,929,928	
Sto. Tomas	695,748	
Tanauan	1,947,300	
Resorts and private pools ¹	716,400	2
Government offices and other institutions	10,659,768	22
UPLB	5,254,932	
IRRI	5,323,020	
PCARRD	44,400	
FPRDI	37,416	
Households not serviced by the water district	18,662,772	38
TOTAL	48,607,272	100

¹ Assuming a medium-size pool having a 75 cu. m capacity and the frequency of changing water is 4x a month.

5.4.1 *Water Districts*

Water districts provide water services for domestic consumption. They are classified as government-owned and -controlled corporations mandated by law to manage and operate the distribution of water for domestic consumption. Data were gathered in five water districts believed to be supplied by water from the MFR. They are Alaminos, Calamba, Sto. Tomas, Tanauan and Laguna which serve the towns of Bay, Calauan and Los Baños.

The different features of the water districts are summarised in Table 9. As can be seen in the table, the percentage of household population served by the water districts ranged from a low 10 per cent (Sto. Tomas Water District) to a high of 77 per cent (Laguna Water District servicing Los Baños). The data clearly indicate that significant proportions of the domestic water consumers are not served by the water districts. It is also evident that the Calamba and Laguna Water Districts are the most progressive water districts for having the greatest number of service connections. The Sto. Tomas Water Districts has the least number of service connections.

The water distributed by the water districts is mainly sourced from springs and groundwater. They have installed wells capable of pumping water at various capacities.

Depending on the availability of data, the average monthly production of the different water districts was estimated based on the rated capacity of pumps or on the average monthly consumption per connection. The average monthly production of different water districts is as follows: 635,245 cu. m for Calamba; 577,494 cu. m for Laguna; 162,275 cu. m for Tanauan; 114,368 cu. m for Alaminos; and, 57,979 cu. m for Sto. Tomas. These estimates can be considered as low estimates since there are substantial water losses along the pumping, treatment, storage and distribution stages due to leakage.

Different water rates are charged for different types of customers, size of water pipes being used, as well as the volume of water consumed (Table 10). Water users are classified either as residential/government or commercial/industrial. Residential/ government rates are lower than the commercial/industrial rates. The data presented in Table 10 show that water is charged highest by the Laguna Water District: P90 and P180 for the first 10 cu. m of water consumed by residential/ government and commercial/industrial, respectively. Moreover, water is priced lowest by the Sto. Tomas Water District. In general, an additional fee is charged for the succeeding increases in the volume of water consumed and this ranges from P0.50-P2.35 for residential users and P1.00– P4.70 for commercial/industrial users.

5.4.2 *Resorts and Private Pools*

The MFR is a natural source of hot springs since the reserve is an inactive volcano. Hence, the proliferation of resorts and private pools in the Calamba and Los Baños areas. Business is good especially during the summer months. The average monthly income of resort owners can range from P1,000 to P150,000 (Cruz, et al., 1998). As of the 1997 survey of business establishments in Calamba, resorts and private pools occupied the highest number of business establishments. There were 184 private pools and resorts in Calamba alone and 15 in the Los Baños area. It was also common to find a resort having more than one pool. In the same study made by Cruz, et al., 1998, the number of pools per resort can be as high as 11 pools with varying capacity. The majority of the resort owners do not rely on the water distributed by the water district. They have their own electric water pumps. Frequency of changing water depends on the briskness of business: once a week or every other day.

For the purpose of this paper, the authors derived a medium value based on the Cruz, et al., 1998 study to estimate the volume of water consumed by resorts and private pools. By assuming a medium-size pool having a 75 cu. m capacity and a frequency of changing water of once a week, the estimated annual consumption of resorts and private pools is 716,400 cu. m per year.

5.4.3 *Government Offices and Other Institutions*

Mount Makiling is the site of several institutions of various types making it a major educational and research centre. These include, in the north-eastern fringes, the UPLB, the IRRI, the Southeast Asia Regional Center for Graduate Studies in Agriculture (SEARCA), the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), the Forest Products Research and Development Institute (FPRDI), the Ecosystems Research and Development Bureau (ERDB), the National Arts Center (NAC), Pook ni Maria Makiling (PNMM) and the Boy Scouts of the Philippines (BSP). On its south-eastern fringes is the Macban geothermal power plant of the National Power Corporation (NPC).

Data were gathered for institutional water users like the UPLB, IRRI, PCCARD, and FPRDI. Each of these institutional users has its own deep well that it manages and maintains. The study, however, failed to include the NPC due to the latter's failure to provide the needed information to the researchers.

Table 11 shows the estimated volume of water consumed by the UPLB. The University is maintaining, through the Physical Plant Maintenance and Service Office (PPMSO) and the different concerned offices, at least 11 wells for the operation and maintenance of utilities, laboratories, water needs of experimental animals, drinking needs of residents and irrigation requirement of experimental fields. The total volume of water consumed by the whole UPLB complex was estimated as 5,254,928 cu. m per year.

IRRI reported an annual water consumption amounting to 5,323,024 cu. m This estimated amount includes water consumed by the Research Center, staff housing and by the experimental field sites of the Institute.

PCARRD reported an average monthly consumption of 3,700 cu. m It supplies water to the Bureau of Plant Industry, the Los Baños Community High School, staff and directors housing and the buildings in the research complex. All the housing units are metered and billed. Collection and administration of fees are managed by a specific unit within PCARRD.

FPRDI also has its own deep well capable of drawing 35,000 to 40,000 gallons of water a day. Aside from meeting the water needs of the laboratories and other utilities of the building, it also supplies water to ERDB and the Makiling Botanical Gardens.

5.4.4 *Households not Serviced by the Water District*

Due to the limited coverage of the water districts, households not connected to the water system obtain their water from various sources. These include water cooperatives, public artesian wells, shallow wells, dug wells, rivers, springs, streams and even rainwater. The volume of water consumed by households not connected to the water districts was estimated using the 1995 household data and an average monthly household water consumption of 30 cu. m for urban areas and 25 cu. m for rural areas. The estimated average annual consumption of water was computed to be 18.7 million cu. m (Table 12).

Household consumption poses a major challenge for the pricing initiative in the MFR since it is difficult to monitor water usage when water use is not registered at all. Furthermore, water consumption is not metered thus making the accounting of water use even more difficult. Major efforts need to be done to make these households register their groundwater extraction and the best mechanism to do this is through the efforts of the local government units (LGU). The LGU will have to pass some local ordinances that will make the various economic units within their jurisdiction register their extraction of groundwater. Since groundwater resources are a depletable resource, it is in the best interest of everyone to ensure that rate of extraction is done within the safe yield or level. It is envisioned that this group of water users will be recruited last to cooperate

TABLE 9
Features of the different water districts

ITEM	WATER DISTRICTS				
	Alaminos	Calamba	Laguna	Sto. Tomas	Tanauan
Total no. of service connections	2,410	21,015	13,251	1,278	6,491
Residential		20,056		1,230	
Commercial		959		48	
Number of barangays served	9	25	Bay: 10 Calauan: 4 Los Baños: 13	9	26 and partial for 8
Total no. of barangays	15	54	Bay: 15 Calauan: 17 Los Baños: 14	30	48
Type of water supply system	Direct pumping from spring and distributed by six pumping stations	Direct pumping from spring and groundwater deepwells	Shallow well, deepwell and surface water	Direct pumping from three spring sources and four groundwater deepwells	Three groundwater deepwells
Percentage of household population served	38 per cent	48 per cent	Bay: 22 per cent Calauan: 3 per cent Los Baños: 77 per cent	10 per cent	36 per cent
Average monthly production	114,368 cu. m ¹	635,245 cu. m ²	577,494 cu. m ¹	57,979 cu. m ¹	162,275 cu. m ²

¹ Based on rated capacity of pumps

² Based on average monthly consumption per connection

TABLE 10
Water rate of the different water districts, 1999

Water Districts	Volume of Water Consumed (cu. m.)					
	Minimum	11-20	21-30	31-40	41-50	Over 50
Alaminos						
Residential (1/2"Ø)	86	9.10	10.10	10.90	11.60	
(3/4"Ø)	137	9.10	10.10	10.90	11.60	
Commercial (1/2"Ø)	172	18.20	20.20	21.80	23.20	
(3/4"Ø)	275.20	18.20	20.20	21.80	23.20	
(1"Ø)	550.40	18.20	20.20	21.80	23.20	
Calamba						
Residential/government	60	6.90	9			
Commercial/industrial	120	13.80	18			
Laguna						
Bay						
Residential/government	90	9.30	10.65	12.20	13.40	15.75
Commercial/industrial	180	18.60	21.30	24.40	26.80	31.50

TABLE 10 (continued)

Water Districts	Volume of Water Consumed (cu. m.)					
	Minimum	11-20	21-30	31-40	41-50	Over 50
Calauan						
Residential/Government	35.85	4.05	4.55	4.70	4.70	4.95
Commercial/Industrial	71.70	8.10	9.10	9.40	9.40	9.90
Los Baños						
Residential/government	90	9.30	10.65	12.20	13.40	15.75
Commercial/industrial	180	18.60	21.30	24.40	26.80	31.50
Sto. Tomas						
Residential	40	2	2.50	3		
Commercial	80	4	5	6		
Semi-Commercial	50	2.50	3.10	3.75		
Tanauan						
Residential (1/2"Ø)	83.85	9.30	10.35	11.55	13	
(3/4"Ø)	134.15	9.30	10.35	11.55	13	
(1"Ø)	268.30	9.30	10.35	11.55	13	
(2"Ø)	1,677	9.30	10.35	11.55	13	
Commercial(1/2"Ø)	167.70	18.60	20.70	23.10	26	
A (3/4"Ø)	268.26	18.60	20.70	23.10	26	
(1"Ø)	536.60	18.60	20.70	23.10	26	
(2"Ø)	3,354	18.60	20.70	23.10	26	
Commercial(1/2"Ø)	125.75	13.95	15.50	17.30	19.50	
B (3/4"Ø)	201.20	13.95	15.50	17.30	19.50	
(1"Ø)	402.40	13.95	15.50	17.30	19.50	
Flat Rate						
Residential	228.70					
Commercial (A)	457.40					
(B)	343.20					

in MFR watershed protection and conservation. Nevertheless, efforts along this line, with strong involvement of the local government units shall be done.

5.5 Watershed Protection and Conservation Fee Based on Cost Recovery Estimates

Using the information presented in Table 4 of the Five-Year Investment Program for MFR Conservation and Development and the data on Table 8 regarding water consumption, one can come up with an estimate of the cost of watershed protection and conservation on a per cu. m basis. The assumption is that all the investment requirements over the five-year period of P95,879,640 (US\$2,591,342) will be shouldered by the water users. This may be a strong assumption since a stable supply of good quality water is just one of the many benefits that will result from watershed protection and conservation. While this may be so, one could also contend that all the water users are also potential consumers of recreation, non-timber resources and beneficiaries of ecological functions such as erosion control, regulation of climate, and carbon sequestration. Everyone also stands to benefit from biodiversity maintenance and the regulation of climate change.

If the total investment cost is borne by all water users. Given an annual water consumption of 48,607,272 cu. m, the per cu. m cost estimate is P0.52 or US\$0.014 (Table 13). A typical household which consumes 30 cu. m per month will have to pay an additional fee of P15.60 (US\$0.42)

TABLE 11

Volume water consumed by UPLB estimated based on the rated capacity of wells or capacity of reservoir

Area/Location	No. of wells/reservoir considered	Rated capacity of well	Capacity of tank or reservoir	Operation time	Uses of water	Estimated volume of water consumed (cu. m)		
						Per day	Per month	Per year
UPLB wells managed by Physical Plant Maintenance and Service Office (PPMSO)	5			18 hrs/ day 7 days a week	Supply water in diff. offices, dormitories and houses; water is potable because it is treated in the pumphouse before distribution			
	Deepwell (DW) N0. 2	250 gal/min				270,000 gal/day		
	DW No. 4	200-300 gal/min				324,000 gal/day		
	DW No. 5	400 gal/min				432,000 gal/day		
	DW No. 6	300 gal/min				324,000 gal/day		
	DW No. 8	400 gal/min			432,000 gal/day			
					Sub-total	1,782,000 gal/day	188,71.82	2,262,857.20
DTRI	1		30,000 gallons	3-4 hrs/day (2 hrs. in A.M. & 2 hrs. in P.M.) 7 days a week	For milking activity and cleaning of barns	30,000 gal/day	3,174.60	38,095.24
University Animal Farm, IAS	1		147.1 cu. m	2 hrs/day; the tank is filled every other day (3-4 days operation)	For feeding and caring of animals used for experiments, cleaning of barns and others	38,923 gal/day	2,353.60	28,243.20
BIOTECH	1		30,000 gallons		Operation and maintenance of buildings and laboratories except for drinking purposes	30,000 gal/day	3,174.60	38,095.24
IPB	1				For irrigation of experimental plots			703,638
CES					For irrigation & utilities of building			1,170,000 1,014,000
TOTAL								5,254,928

TABLE 12

Estimated water consumption by households not serviced by water districts

MUNICIPALITY	AVERAGE ANNUAL CONSUMPTION (cu. m)
Alaminos	1,179,600
Calamba	8,199,072
Bay	818,100
Calauan	1,551,300
Los Baños	39,600
Sto. Tomas	3,375,600
Tanauan	3,499,500
Total	18,662,772

¹ Estimate is based on 1995 Census of Population and Housing and an average monthly water consumption per household of 30 cu. m for urban areas and 25 cu. m for rural areas.

– an amount even less than that one pays for a litre of a popular softdrink. This minimal amount is surely affordable to everyone. The calculation assumes that everyone, including the households not connected to the water district will pay for the water bill. This may be a strong assumption initially, given that some work needs to be made to facilitate the collection of payments from this group.

Table 13 shows that if one assumes that expenditures for biodiversity and eco-tourism (items II.A: Natural Resources Development and II.B: Botanical Gardens, Parks, and Recreation Development) can be passed on to other beneficiaries of the resource (both domestically and internationally)—CASE II as indicated in the table—then, the cost per cu. m will be reduced to an even lower figure of P0.36. CASE III in the same table defines a situation wherein the budget for III.A: Research Demonstration is also removed from the total cost, thus reducing further the cost per cu. m to P0.30.

As a whole, the cost of watershed protection and conservation when translated to a cost per cu. m of water consumed is negligible. As indicated in Table 14, the distribution of the water bill is shared largely by the household and commercial consumers (38 per cent) who are connected to the water districts and those households dependent on groundwater sources (38 per cent). The

TABLE 13

Watershed Protection and Conservation

Strategies/Activities	NPV (PHP)	NPV (USD)		
I. People-Oriented Forestry				
A. Accreditation and Tenure	929'091	25'111	245'092	6'624
B. Agroforestry Farm Development	1'500'000	40'541	395'696	10'694
C. Livelihood Development	1'023'747	27'669	270'062	7'299
SUB-TOTAL	3'316'474	89'634	874'878	23'645
II. Natural Resources and Biodiversity Conservation and Protection				

TABLE 13 (continued)

A. Natural Resources Development	9'669'182	261'329	2'550'706	68'938
B. Botanic Gardens, Parks and Recreation Development	20'221'759	546'534	5'334'449	144'174
C. Forest Protection and Law	4'604'073	124'434	1'214'543	32'825
SUB-TOTAL	34'495'014	932'298	9'099'698	245'938
III. SUPPORT SERVICES				
A. Research and Demonstration	11'518'182	311'302	3'038'467	82'121
B. Development Communication and Community Relations	3'545'455	95'823	935'282	25'278
SUB-TOTAL	15'063'636	407'125	3'973'749	107'399
IV. Program Management	24'504'516	662'284	6'464'230	174'709
V. CAPITAL OUTLAY	18'500'000	500'000	4'880'253	131'899
GRAND TOTAL (case 1)	95'879'640	2'591'342	25'292'808	683'589
GRAND TOTAL (case 2)	65'988'700	1'783'478	17'407'653	470'477
GRAND TOTAL (case 3)	54'470'518	1'472'176	14'369'185	388'356
Yearly water consumption	48'607'272			
Watershed fee per cu. m.(case 1)	0.52			
Watershed fee per cu. m.(case 2)	0.36			
Watershed fee per cu. m.(case 3)	0.30			

Case 1: all cost borne by all water users

Case 2: all cost except II.A and II.B borne by all water users

Case 3: all cost except II.A, II.B, and III.A borne by all water users

institutional water users, the most prominent being the UPLB and the IRRI, will have to foot 22 per cent of the total water bill. Resort owners/operators will pay a minimal amount.

5.6 Conclusions and Recommendations

Water is valued as one of the most important resources in the MFR. This study attempted to estimate the total volume of water consumed by the different water-using sectors. These estimates serve as a basic input to the computation of the conservation and development investment programme for the MFR.

Analysing the cross-section of water users within the MFR, the study identified the major water-users and estimated their volume of annual consumption. These are as follows:

Water districts.....	18.6 M cu.m
Resorts and private pools	0.72 M cu.m

TABLE 14

Share to Watershed Protection Bill by Water Users at P0.52 per cu. m fee

Major Water Users	Yearly Water Consumption	Per cent share	Watershed Protection Bill at Cost Recovery
HH and Commercial	18'568'332	38.20 per cent	9'655'533
Alaminos	1'372'416	7.39 per cent	713'656
Calamba	7'622'940	41.05 per cent	3'963'929
Laguna	6'929'928	37.32 per cent	3'603'563
Sto. Tomas	695'748	3.75 per cent	361'789
Tanauan	1'947'300	10.49 per cent	1'012'596
Resort and Private Pools	716'400	1.47 per cent	372'528
Govt Offices & other Institutions	10'659'768	21.93 per cent	5'543'079
UPLB	5'254'932	49.30 per cent	2'732'565
IRRI	5'323'020	49.94 per cent	2'767'970
PCARRD	44'400	0.42 per cent	23'088
FPRDI	37'416	0.35 per cent	19'456
LGUs not connected to water districts	18'662'772	38.40 per cent	9'704'641
TOTAL YEARLY WATER DEMAND	48'607'272		25'275'781

Institutional users.....	10.6 M cu. m
Households with no water connection.....	18.7 M cu. m
Total volume of water extracted from the MFR.....	48.6 M cu. m

Studies have shown that the MFR is facing water problems. In an agro-ecosystem analysis done for the MFR, Cruz et al (1991) projected that water supply will soon become a problem in Calamba, Los Baños, Sto. Tomas and Tanauan. Using water stress index, Espiritu (1999) classified the regions in the Philippines as water sufficient, water stressed and water scarce. The water stress index is measured as the annual renewable water resources per capita that are available to meet the needs of agriculture, industry and domestic consumers. Regions that have annual renewable resources above 2,000 cu. m per capita are designated as water sufficient. Those regions which have annual renewable resources between 1,000 to 2,000 cu. m per capita are designated as water stressed while those regions which have below 1,000 cu. m per capita are considered as water scarce. According to the study, the Southern Tagalog Region is already a water-scarce region. Considering that the MFR is located in the Southern Tagalog Region, water problems due to water scarcity are a reality.

The water problems in the MFR may be attributed to the escalating population and industrial concentration in some urbanised areas. Together with improper land uses, these factors may result to potentially irreversible environmental impacts like the problem of water supply and effluent disposal. Given the scenario, users should all be willing to contribute something for the conservation, protection and development of the Makiling Forest Reserve not only for themselves but also for future generations.

Note that the cost estimate is very much within the range of WTP values given in the earlier section. This would mean that one's perception of benefits from undertaking watershed protection

and management far exceeds the costs of these activities. There is a net benefit (consumers surplus) to be realised from undertaking this investment.

6.0 Market-Based Instrument For Forest Recreation and Eco-tourism in the MFR

The objective of this case study is to assess by how much the existing fees for MFR recreational facilities' use should be increased to finance the planned improvements to develop eco-tourism in the reserve. It then explores mechanisms for managing this increased fee.

As a basis the study, respondents in past surveys, and recreational users in a consultation held last year, were questioned as to the amount they were willing to pay to experience improvements in MFR recreational facilities. It also assessed the fee charged by a nearby substitute site. Participants to the consultation meeting were also asked to assess how much more they were willing to pay to finance improvements in the facilities of the Makiling Botanical Gardens (MBG) (Table 15). The survey and the consultation meeting revealed that a doubling of the fee could be reasonably implemented for the MFR without any significant change to demand for the use of these facilities. The zero elasticity of demand assumption is based on the fact that MBG is quite a unique site: a natural resource park with some man-made facilities to make it more attractive to visitors. Furthermore, the higher price is still lower than the neighbouring resort sites charge. Thus, the MBG still remains competitive with other tourism areas when higher fees are implemented.

The MBG was built on June 20, 1963 through Republic Act 3523 as a unit of the College of Forestry in UPLB. The garden occupies 300 ha of forestland distributed into three main sectors: an arboretum, a nursery and a recreational area. It was mainly created to support research and education related to forestry and plant sciences, as well as, to serve as a recreational area for the public (MBG Office, 1996).

Some of the facilities (e.g.; comfort rooms, streetlights, screen houses and the nursery) are in need of repair. Due to budget constraints, management cannot finance construction of new facilities or repair all old ones. The lack of discipline of some visitors also hastens the deterioration of the facilities. It is envisioned that fines shall be imposed on visitors who do not observe prescribed rules of conduct (e.g., a ban on littering) within the recreational area.

6.1 Comparison of the MBG with a Private Resort

The MBG was compared with a privately owned resort, Hillspa Resort, which is located in Lalakay, Los Baños, Laguna, in terms of facilities, unique features and entrance or user fees. This resort is comparable to the MBG in terms of facilities such as swimming pools, huts, tables and barbecue pits. Furthermore, the setting bears similarities to MBG with highly diverse trees and plants species (Table 16).

A major difference between the two recreational sites is that Hillspa is open 24 hours a day whereas the MBG operates only from 8 AM to 4 PM. In terms of services, MBG offers more natural resources than Hillspa and therefore has this distinct scientific and natural appeal to visitors.

Hillspa charges an entrance fee of P50/person during daytime and P80/person during nighttime. This fee is charged regardless of whether the visitor will swim or not. For MBG, the entrance fee for University of the Philippines (UP) personnel and students is P3/visitor while a swimming fee of P15/person is charged. For non-UP visitors, the entrance fee is P5/visitor while the swimming fee is P25/person.

TABLE 15

Present fees and proposed fees to finance desired improvements in MFR recreation areas

RECREATION AREA	DESIRED IMPROVEMENTS	PRESENT FEES	PROPOSED FEES
Makiling Botanical Gardens	<ul style="list-style-type: none"> waste disposal improve facilities parking area IEC additional picnic tables 	Entrance: P3/P5 Swimming: P15/P25	P6/P10 P30/P50
Pook ni Maria Makiling	<ul style="list-style-type: none"> cottages independent water supply improve halls, etc. revival of wildlife collection with resident veterinarian 	Entrance: P10 + 2 Swimming: P20	no change P50
Museum of Natural History	<ul style="list-style-type: none"> need bigger space airconditioning parking area more display items waiting shed improve roads IEC 	Entrance: < 11 yrs. P5 > 11 yrs. P10 with free bookmark Weekends: P10 for all	P7 - P10 P12 - P15
Boy Scouts of the Philippines	<ul style="list-style-type: none"> repair facilities IEC 	Entrance: P1 scouts P2 others Swimming: P25 scouts P50 others Camping area: P500/500 p Camping fee: P20/day	no change
National Arts Center	<ul style="list-style-type: none"> open to hikers IEC 	P15/car P30/mini bus P50/big bus	P10/hiker (hiking fee)
Mudspring 1 Peak 2	<ul style="list-style-type: none"> gate with personnel view deck waste management IEC incentive for volunteer organisations to collect garbage hikers' code of conduct rescue teams 	Camping fee: P5/person (with permit)	hiking fee: P10 (local) \$10 (foreign)

A survey of about 80 visitors in the area revealed that the respondents were willing to pay for improvement in the garden through increased entrance fees – P19.07 more than the current fees. Such an increase may be used to enhance the recreation value of the garden.

6.2 Financial Feasibility of Operating and Improving MBG

The efficiency of MBG operation was evaluated following the hypothesis that the income it generates is not enough to cover its maintenance and operating costs. This was confirmed by the

TABLE 16

Comparison of the features of Makiling Botanic Gardens and Hillspa Resort, Los Baños, Laguna, 1998

FACILITY	MAKILING BOTANIC GARDENS	HILLSPA RESORT
Swimming pool	1 (40 ft x 80 ft)	1 big 3 ft - 6 ft deep 1 shallow pool with slide 3 ft - 4 ft deep children's area 2.5 ft 1 hilltop falls 4.5 - 7.0 ft deep
Tables	65 (free)	50 (₱150/table)
Huts/sheds	none	none
Play area	swing/seesaw in need of repair	none
Shower room	2 (4 persons, male/female)	for 24 persons
Comfort room	2 in swimming pool area (male/female) 2 in pavilion (male/female, 4 persons)	2 for males 2 for females
Barbecue pits	8	6
life guard	1	3 on regular days 2 per pool or 6 during peak season
Parking space	4-5 buses or 10 cars	15 to 17 buses
Other features	natural forest natural pool floating gardens trails for hiking creek	rooms for overnight stay
Business hours	daytime only	24 hours
Fees	UP Staff and Students: ₱3/visitor - entrance ₱15/visitor - swimming Other Visitors: ₱5/visitor - entrance ₱25/visitor - swimming	₱50/person from 6:30am to 5:30pm ₱80/person from, 5:30pm to 6:30am

result of the study conducted in May 1999 showing that UPLB has indeed been heavily subsidising the operations of MBG.

The amount of subsidy from UPLB for general MBG operations ranged from P974,395.28 in 1994 to P3,497,712.15 in 1998. For all years, the incomes generated from entrance fees were considerably lower than the total operating costs. The income was lowest in 1995 at P169,034.00 and highest in 1997 at P432,516.00. A large part of the subsidy was for personal services. Most of the income from MBG came from entrance fees, although there was some income from the sale of plants, pavilion rental and commercial/film shooting.

Excluding the 1997 data, which was an unusual year, the highest income from the swimming pool was obtained in 1994 at P73,175.00 and lowest in 1998 at P59,965.00. For all years, the income generated per year was lower than the costs of operating the swimming pool. The subsidy for swimming operations was highest in 1998 at P145,084.47 and lowest in 1997 at P5,359.47 (Table 17). Again, a large part of the subsidy was for personal services. The gross income as a percentage of costs (general operations) ranged from 8.86 per cent (1998) to 22.24 per cent (1994). The data show that the income generated was low compared to the costs. For the swimming pool operations, the percentages of cost covered by income were higher, ranging from 29.24 per cent (1998) to 60.86 per cent (1994).

TABLE 17
Subsidy from UPLB for MBG operations, 1994-1998

	1994 (₱)	1995 (₱)	1996 (₱)	1997 (₱)	1998 (₱)
A. MBG operations (excluding swimming pool)					
Total income	278,690.00	169,034.00	327,149.50	432,516.00	340,035.00
Total cost	1,253,085.2	1,425,110.0	2,003,450.7	2,845,037.0	3,837,747.1
UPLB subsidy	8	0	7	1	5
per cent UPLB subsidy	974,395.28	1,256,076.0	1,676,301.2	2,412,521.0	3,497,712.1
Gross income as a percentage of cost	77.76	0	7	1	5
	22.24	88.14	83.67	84.80	91.14
		11.86	16.33	15.20	8.86
B. MBG operations (swimming only)					
Total income	73,175.00	60,400.00	71,280.00	140,000.00	59,965.00
Total cost	120,230.72	157,235.47	158,646.66	145,359.47	205,049.47
UPLB subsidy	47,055.72	96,835.47	87,366.66	5,359.47	145,084.47
per cent UPLB subsidy	39.14	61.59	55.07	3.69	70.76
Gross income as a percentage of cost	60.86	38.41	44.93	96.31	29.24

The financial feasibility of improving the MBG in accordance with the Master Plan for Mount Makiling Conservation and Development (MPMMCD, 1995), was likewise assessed. The following assumptions were made:

1. The number of visitors was projected over 25 years using the average number of visitors to MBG from 1994-1998 and a 2 per cent growth rate.
2. Of the total number of visitors, 25 per cent will go swimming while 75 per cent will come to the area to enjoy the natural setting of the site. It was also assumed that the entrance will be increased to P20/person and the swimming fee to be P40/person, or a total swimming fee of P50/person (including entrance).
3. The cost estimates for the various activities identified in the MPMMCD are shown in Table 18.
4. A discount rate of 10 per cent was used to compute for the net present value (NPV) of the proposed improvements for the MBG.

Table 19 shows the projected number of visitors, total revenue, total cost and net revenue over a 25-year period. The net revenue will be negative from Years 1 to 9, but will be positive starting Year 10 until Year 25. The NPV at 10 per cent is negative P2,580,628. This means that given the projected number of visitors, the total revenue will not be able to cover the cost improving MBG.

The annuity of the total costs at 10 per cent interest rate is P2,938,060. To recover the annualised cost, there should be at least 106,839 visitors/year, 26,710 visitors of whom will swim and 80,129 visitors who will not swim (Table 20). The break-even number of visitors can be easily reached. In 1997, there were 140,002 visitors to MBG. The bigger problem lies in the number of swimmers. The 25 per cent swimming rate used in the projections can be higher than the actual

percentage, about 5 per cent based on observation. However, this low percentage can still be improved with the proper marketing strategies.

In the June 7, 1999 consultation meeting, it was pointed out that the MBG may have lost its market for swimmers because of the numerous swimming pools found along the highway from Biñan to Los Baños. It was suggested that MBG and MFR management should instead focus on providing, and seriously marketing, unique recreation activities. These may even be packaged with the recreation opportunities offered by private resorts in the area. For example, the private sector may handle the swimming aspect, while eco-tourism activities like a jungle trek or mountaineering may be handled by the MCME.

Since UPLB uses the MBG for education and research purposes, it is only proper for it to share some of the costs for the benefits derived. The minimum number of swimmers and visitors were determined with 25 per cent and 50 per cent subsidies (Table 19). With a 25 per cent subsidy, 20,032 swimmers and 60,097 non-swimmers are needed to meet the annualised cost. If the subsidy is increased to 50 per cent, 13,355 swimmers and 40,064 non-swimmers are required.

The minimum payment of visitors necessary to recover the annualised cost was based on the average number of visitors per year for the 25-year period, or 105,801 visitors per year. Of this number, 25 per cent or 26,450 visitors will swim, while 75 per cent or 79,351 visitors will not swim. The swimming fee should be P52.27/person while the entrance fee should be P19.60/person if the annualised cost is to be recovered.

6.3 The Makiling Rainforest Eco-tourism and Park Development (Makiling ECOPARK) Project

A short-term plan for eco-tourism was presented during the June 7, 1999 meeting. This plan was developed by the Botanical Gardens, Parks and Eco-tourism Division (BGPED) of MCME. It aims to enhance visitors' understanding of the biodiversity and aesthetic values of the Makiling Forest Reserve. The estimated cost of implementing the project is P6,240,000.00

The components of the project are:

1. *Location, mapping and development of a nature trail*

This component will include the location and mapping of significant scenic and natural features within the Makiling Rainforest Park (MRP). These will be identified and marked as stations. A network of trails will connect these stations to form a loop. A map of the area and the location of the trails will be prepared. There will be minimal alteration of the topography although the trail will be cleared of fallen trees or objects that could pose danger to visitors.

2. *Construction of boardwalks, viewing platforms and lookout tower*

Appropriate walkways, stairways, hanging bridges and viewdecks will be constructed in some sections of the loop and stations. The aim is to allow visitors to safely pass the nature trail and view the natural features including the creek and natural falls, Mudspring area, natural forest stands and others. Likewise, a viewdeck or elevated platform will be constructed on a stable area overlooking the Mudspring crater. Elevated footways leading to the viewing platforms will be added to prevent the visitors from walking around the crater area where they might step on volcanic vents. A lookout tower will also be constructed in an appropriate station to give visitors a panoramic view of the rainforest canopy and the Laguna de Bay.

TABLE 18

Botanical Gardens, parks and recreation management and development programme cost ('000 Pesos)

COST ITEM	YEAR									
	1	2	3	4	5	6-10	11-15	16-20	21-25	
1. Costs by activity	4,842	2,842	2,842	2,842	2,842	2,664	2,664	2,664	2,664	
a. Gardens and parks development	1,365	1,365	1,365	1,365	1,365	1,218	1,218	1,218	1,218	
b. Interpretation, education and information	350	350	350	350	350	319	319	319	319	
c. Conservation and management of living collections	829	829	829	829	829	829	829	829	829	
d. Recreation and eco-tourism	298	298	298	298	298	298	298	298	298	
e. Infrastructure development	2,000									
2. Costs by items	4,842	2,842	2,842	2,842	2,842	2,664	2,664	2,664	2,664	
a. Personal Services	632	1,705	1,705	1,705	1,705	1,598	1,598	1,598	1,598	
b. MOE	620	1,137	1,137	1,137	1,137	1,066	1,066	1,066	1,066	
c. Equipment & Infrastructure	3,590									
- Office Building (1)	2,000									
- Vehicle (2)	1,200									
- Computer with peripherals (2)	120									
- Refrigerator (2)	80									
- Oven (2)	40									
- Dehumidifier	100									
- Handheld radios (4)	50									

Source: Master Plan for Mount Makiling Conservation and Development, 1996.

TABLE 19

Projected number of visitors, revenues and costs for MBG operations, 25 years

YEARS	1	2	3	4	5	6	7	8	9	10	11	12
Number of Visitors	82,579	84,231	85,915	87,634	89,368	91,174	92,998	94,858	96,755	96,690	100,664	102,667
25 per cent Swim* P50	1,032,240	1,052,885	1,073,942	1,095,421	1,117,330	1,139,676	1,162,470	1,185,719	1,209,434	1,233,622	1,258,295	1,283,461
75 per cent Visit * P20	1,236,688	1,263,462	1,288,731	1,314,506	1,340,796	1,367,612	1,394,964	1,422,863	1,451,320	1,480,347	1,509,954	1,540,153
Total Revenue	2,270,928	2,316,347	2,362,673	2,409,927	2,458,126	2,507,288	2,557,434	2,608,582	2,660,754	2,713,969	2,768,249	2,823,614
Total Cost	4,842,000	2,842,000	2,842,000	2,842,000	2,842,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000
Net Revenue	(2,571,072)	(525,653)	(479,327)	(432,073)	(383,874)	(155,712)	(105,566)	(54,418)	(2,246)	50,969	105,249	160,614
Present Value of TR	24,088,262											
Present Value of TC	26,668,890											
NPC (10 per cent)	(2,580,628)											
With 25 per cent Subsidy	1	2	3	4	5	6	7	8	9	10	11	12
Total Revenue	2,270,928	2,316,347	2,362,673	2,409,927	2,458,126	2,507,288	2,557,434	2,608,582	2,660,754	2,713,969	2,768,249	2,823,614
Total Cost	3,631,500	2,131,500	2,131,500	2,131,500	2,131,500	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250
Net Revenue	(1,360,572)	184,847	231,173	278,427	326,626	510,038	560,184	611,332	663,504	716,719	770,999	826,364
Present Value of TR	24,088,262											
Present Value of TC	20,001,668											
NPC (10 per cent)	4,086,595											
With 50 per cent Subsidy	1	2	3	4	5	6	7	8	9	10	11	12
Total Revenue	2,270,928	2,316,347	2,362,673	2,409,927	2,458,126	2,507,288	2,557,434	2,608,582	2,660,754	2,713,969	2,768,249	2,823,614
Total Cost	2,421,000	1,421,000	1,421,000	1,421,000	1,421,000	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500
Net Revenue	(150,072)	895,347	941,673	988,927	1,037,126	1,175,788	1,225,934	1,277,082	1,329,254	1,382,469	1,436,749	1,492,114
Present Value of TR	24,088,262											
Present Value of TC	13,334,445											
NPC (10 per cent)	10,753,817											

TABLE 19 (continued)

13	14	15	16	17	18	19	20	21	22	23	24	25
104,730	106,825	108,962	111,141	113,364	115,631	117,943	120,302	122,708	125,163	127,666	130,219	132,823
1,309,130	1,335,313	1,362,019	1,389,259	1,417,044	1,445,385	1,474,293	1,503,779	1,533,854	1,564,531	1,595,822	1,627,738	1,660,293
1,570,956	1,602,375	1,634,423	1,667,111	1,700,453	1,734,462	1,769,151	1,804,535	1,840,625	1,877,438	1,914,986	1,953,286	1,992,352
2,880,086	2,937,688	2,996,441	3,056,370	3,117,497	3,179,847	3,243,444	3,308,313	3,374,480	3,441,969	3,510,809	3,581,025	3,652,645
2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000	2,663,000
217,086	274,688	333,441	393,370	454,497	516,847	580,444	645,313	711,480	778,969	847,809	918,025	989,645

13	14	15	16	17	18	19	20	21	22	23	24	25
2,880,086	2,937,688	2,996,441	3,056,370	3,117,497	3,179,847	3,243,444	3,308,313	3,374,480	3,441,969	3,510,809	3,581,025	3,652,645
1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250	1,997,250
882,836	940,438	999,191	1,059,120	1,120,247	1,182,597	1,246,194	1,311,063	1,377,230	1,444,719	1,513,559	1,583,775	1,655,395

13	14	15	16	17	18	19	20	21	22	23	24	25
2,880,086	2,937,688	2,996,441	3,056,370	3,117,497	3,179,847	3,243,444	3,308,313	3,374,480	3,441,969	3,510,809	3,581,025	3,652,645
1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500	1,331,500
1,548,586	1,606,188	1,664,941	1,724,870	1,785,997	1,848,347	1,911,944	1,976,813	2,042,980	2,110,469	2,179,309	2,249,525	2,321,145

TABLE 20
Cost recovery analysis of improving MBG with and without subsidy

Scenario	To Recover Cost				
	Present Value of Total Cost (₱)	Annuity of Present Value of Total Cost (₱)	Number of Swimmers	Number of Non-swimmers	Total Number of Visitors
No subsidy	26,668,890	2,938,060	26,710	80,129	106,839
25 per cent subsidy	20,001,668	2,203,545	20,032	60,097	80,129
50 per cent subsidy	13,334,445	1,469,030	13,355	40,064	53,419

3. *Improvement of camping area and picnic facilities*

The existing camping facilities inside the MRP will be improved and renovated: the parking area and playground, toilets, picnic tables and benches, barbecue grills, and water supply lines. Additional measures will be put in place for the safety and convenience of visitors and at the same time, protect the natural environment. These will include landscaping, silvicultural measures, tree care, and maintenance works.

4. *Installation of locator maps and signage*

Interpretative signs, information boards, tree labels, directional signs and regulatory notices will be installed in appropriate places to inform visitors and to facilitate understanding of rainforest ecosystems and the natural geologic features of the area.

5. *Production of information materials*

Brochures, posters, and other printed materials will be prepared. These materials will contain information about the stations and significant sites that are marked on the ground. The brochures will be designed as a handy reference and promotional material that may be taken home by visitors and shown to other people, thus multiplying the educational impact of the nature trail.

6. *Waste management*

A garbage collection and disposal system will be planned and implemented to prevent littering and damaging the natural landscape. This system will include the placement of garbage bins in strategic places along the trail and within the camping area. Plastic trash bags will be purchased and placed in the bins. A staff will be assigned to regularly collect garbage and replace the trash bags.

7. *Renovation of Visitor Center building*

The existing College Motor Pool will be renovated and converted into a Visitor Center. This facility will serve as a place where visitors can safely park their vehicles, use clean restrooms/washrooms after their trek, and purchase snacks and souvenir items. The vacant lot adjacent to the building will be paved and converted into a parking lot for buses and cars of the visitors. The current sentry/checkpoint for incoming visitors will be relocated in front of this facility.

The project will be implemented by MCME for two years. The MCME, through the BGPED, has already done some pre-project development work and investment in the MRP. The BGPED/MCME will carry through the project activities by providing all the appropriate technical, organisational and manpower resources related to the establishment and maintenance of the park facili-

ties and services. A cooperating organisation will be sought to provide the financial resources needed to develop the MFR for forest recreation and eco-tourism.

The expected outputs and funding requirements of the Makiling ECOPARK Project are given in Table 21.

TABLE 21

Expected outputs and funding requirements of the Makiling ECOPARK Project

COMPONENT/OUTPUTS	AMOUNT (₱)
1. Location, mapping and development of nature trail Prepared 2 copies of the trail map with appropriate coordinates, bearings and location of stations	50,000.00
2. Construction of boardwalks, viewdeck, lookout tower Constructed 1 km boardwalks/stairways (Road to Mudspring) Constructed 1 unit viewdeck with railings (Mudspring) Constructed 1 unit lookout tower (Station 1)	2,000,000.00
3. Improvement of camping area and picnic facilities Renovated 2 units restrooms/toilets Improved 1000 sq. m. picnic area Paved 500 sq. m. parking area Repaired 200 m. water supply lines Completed 1000 sq. m. landscaping and silvicultural works	330,000.00
4. Installation of locator maps and signage Installed 10 units information/regulatory boards Installed 10 units directional signs	300,000.00
5. Brochures and printed materials Printed 10,000 copies brochures Printed 200 copies posters	100,000.00
COMPONENT/OUTPUTS	AMOUNT (₱)
6. Waste management Put up 20 units garbage bins Purchased 50,000 trash bags	20,000.00
7. Renovation of Visitor Center building Renovated 1 building (with 2 restrooms, 1 store) Paved 5000 sq. m. parking lot Constructed 1 sentry/gate	2,000,000.00
TOTAL INVESTMENT COST	4,800,000.00
Pre-Planning/Architectural Expenses (20 per cent of Total Investment Cost)	960,000.00
Environmental Impact Assessment Cost (10 per cent of Total Investment Cost)	480,000.00
TOTAL PROJECT COST	6,240,000.00

6.4 Feasibility Study Proposal for Further Development of the MFR as an Eco-tourism Area

The eco-tourism opportunities available to tourists are, at present, concentrated in the MBG and MRP. Yet, the MFR houses many other sites with great potential for eco-tourism activities.

These include rock climbing in the Sto. Tomas, Batangas side of the mountain, three peaks tour, bird watching and photo safari, butterfly house, and spelunking or cave exploration, among others.

However, there is a need to determine the feasibility of developing these areas for eco-tourism. A capsule proposal is presented in Appendix C. The total cost of the feasibility study is P 585,200.00 for a one-year period.

6.5 Recommendations

1. The mechanism for the collection of the additional fee for the use of the MBG is already in place. Entrance and swimming fees are being collected at the MBG gate. Fees were increased in January 1999 as follows:

Fee Classification	UP Visitors (₱/person)		Non-UP Visitors (₱/person)	
	Old	New	Old	New
Entrance Fee	3	6	5	10
Swimming Fee	15	30	25	50

The new rates were based on the findings of the MBI team in 1998.

The team recommends that the differential pricing scheme for UP and non-UP visitors be dissolved. It is not efficient to subsidise the visitors from UP since they are already enjoying large consumer surpluses.

2. Efforts should be exerted to ensure the maintenance of the MBG and MFR not only for educational and research purposes, but also for forest recreation and eco-tourism.

3. Since the financial viability of the MBG and MFR would be enhanced by a large number of visitors, an aggressive marketing programme for both sites is needed. Together with this, however, the carrying capacity of the area should be determined so as not to impair the resources.

Continuing the operations of the swimming pool can be likewise feasible if the number of swimmers can be increased. It may not be advisable to raise the swimming fee at this time because of the competition offered by resorts in the Los Baños-Calamba area.

4. The University does not have sufficient funds to develop the various potentials of the MFR. Donor organisations should be sought to become partners in this worthwhile undertaking.

5. To facilitate further researches on forest recreation and eco-tourism in the MBG and MFR, complete and accurate recording of visitor information is recommended. At the very least, the visitor type should be recorded, e.g. swimmers or non-swimmers, UP or non-UP, and paying or non-paying.

6. There should be differential pricing of forest recreation and eco-tourism in the MFR in favour of local visitors. This will encourage Filipinos to enjoy nature-based recreation and tourism for a change.

The possibility of including eco-tourism in the MFR as part of a package for recreational users should be explored. The package can include a visit to the Museum of Natural History (MNH), International Rice Research Institute (IRRI), Forest Products Research and Development Institute (FPRDI), and other places of interest in Los Baños.

7.0 Market-Based Instrument for Land Resources in the MFR

Over time, the importance of land as an input to production activities of farmer-settlers in the MFR has been demonstrated. For these people, the farmlands within the MFR are a natural resource where varied products can be obtained. Land has been the centre of their economic activities, a way of life, a key to personal wealth, and among other things, source of related social benefit like power.

The efficient use of land on a sustainable basis through time, becomes an important consideration in the management of the resource. At present, the area occupied by farmers comprises of 1,924 hectares (45 per cent of total area) found mostly in the disturbed/cultivated portions of the MFR. Legally, the cultivation of farmlands within the MFR has no basis but the farmers have been living in the area for quite sometime. The University has already accepted their presence in the place and is currently working on accreditation mechanism to prevent further expansion of cultivated areas in the MFR. This accreditation scheme is also seen as a means to offer the farmers security of tenure over the land area that they are currently cultivating. Since this recognition was only given in the last few years, and the mechanism to make this occupancy legal is still currently underway, the farmers have not been paying any amount for the use of the land resource within the MFR. It is, however, recognised that farmers as users of the land, just like other resource users in the MFR, should be made to pay for the use of this resource. In the recent consultation with them, they did acknowledge that they should be made to pay but they were also hoping that whatever efforts they do to protect the MFR should be considered and counted to offset whatever payments will be asked of them.

7.1 Objectives

The study done for the land resource has the following objectives:

1. To estimate the rent for the use of the land
2. To value the cost of soil conservation measures at the farm level
3. To assess and monetise the community initiatives to protect and manage the MFR.

In addressing these concerns, the study made use of data obtained from previous site and it also conducted consultation meetings with the various people's organisations (POs) to assess what their activities were and how much time they put into these activities. The group also estimated the cost of soil conservation measures given local knowledge of the place and results of previous studies.

A brief description of the present agriculture land use is provided as background information. Discussion of pricing using the economic rent concept follows. The costs of rehabilitation and protection at the farm level (that is, through soil conservation measures) are then presented followed by a discussion on the valuation of communal efforts by POs in other parts of the MFR away from their farmlands.

7.2 The Agriculture Land Use and its Economics in the MFR

Area and Coverage. In 1898, the number of families settled within the MFR was reported to be only 19. At present, there are about 300 families in the reservation. In addition are the non-resident farmers who cultivate farm lands within the MFR. Total farming households was placed close to a thousand households, occupying around 1,924 hectares with a total of 1,267 farm lots. Most farms are situated along the peripheries or boundaries of the reservation or the more accessible parts of the MFR.

Farming Systems. There are three broad categories of farming systems within the MFR: “kaingin”, plantation-based, and home garden (Carandang and Lawas, 1992). Kaingins are few in number and in most cases occur in recently cleared secondary growth stands. The system is market and production oriented, with most crops consisting of fruits grown for the lucrative market in Los Baños.

Soils in kaingin areas are not adequately protected since the removal of forest canopy and the clearing of the under-storey and the subsequent planting of root crops expose the soil. However, the planting of cash crops requires some form of tillage practices that hasten soil movement. The movement and deposition of litter in ground depressions, flow patterns on the surface soil and on very steep slopes, and the abundance of surface rock fragments are commonly observed in the areas.

The plantation-based system is the dominant form in the MFR that ranges from monoculture to diculture and finally to higher complexes (multi-storey systems) with as much as 15 crops being grown at one time. This system is found to be productive, stable and sustainable and found in well established farms particularly in Zones 4, 5 and 6 of the MFR. The condition in the area allows for great variations in crop combinations. Farmers often use cover crops; the topsoil is still thick and soil erosion is much less than the situation in the kaingin farms. Despite these conditions, farmers need to be encouraged to adopt other forms of soil conservation since the area is not free from soil erosion. The monoculture plantation-based type, e.g. pure citrus plantation, which closely approximates the conditions found in the kaingin area, is no longer dominant in the area because of a massive pest infestation on the crop some years back. Today, only few farmers are venturing into this system. Overall, appropriate cultural management practices are still wanting in most plantation-based farms.

The home garden farming system is basically the same as plantation-based farming system except that the farmer and his family live on the farm. Annual crops are usually cultivated in small areas and are produced mostly for home use only. Sizes of farms are usually small with less than a hectare with very few having more than three hectares. The larger the farms are, the more varied are the crops grown. Home gardens are usually better managed than plantation-based type of farming system. This can be attributed to closer supervision provided by the farmers from the establishment of the crops to the maintenance and harvesting of the crops. Moreover, farmers tend to put greater value on the conservation of the soil though the planting of kakawate (*Gliricidia sepium*), ipil-ipil (*Leucaena leucocephala*) and other tree crops.

Economics of MFR Farm Crop Enterprises. The profitability of the dominant cropping systems classified into agroforestry, mixed perennials, and mono-perennial (Sumalde, Francisco and Fermindoza 1992) was analysed. Profitability analysis for the agroforestry system using four modules (3.5 ha, 2 ha, and 1 ha), was evaluated. The one-hectare and two-hectare modules were more financially rewarding compared to the larger sized module. Both modules exhibited positive net present value (NPV) and benefit-cost ratio (BCR) of greater than 2.0. The IRR was also estimated to be 63 per cent for the two-hectare module and 88 percent for the one-hectare module. The annualised values of the net benefit streams for 30 years were also high under each of the discount factors used (Table 22).

There are three modules of the mixed perennials cropping systems (4 ha, 3 ha, and 1 ha) evaluated. Based on the results, the one-hectare module was the most profitable. The NPVs for all discount factors were positive and the BCR values ranged from 2.81 to 4.57 while the IRR was 66.77 per cent. The annual of the stream of net benefits also pointed out to the profitability of this module.

The citrus plantation (mono-perennial cropping system) did not appear to be profitable as shown by the low value of all the criteria. This situation could be attributed to the pest infestation that attacked the crop during this time. As mentioned, only very few farmers are attempting to re-establish their farms because of their bad experience in the past.

TABLE 22

Profitability analysis of dominant cropping systems in the MFR

CRITERIA	AGROFORESTRY MODULE (Ha)				MIXED PERENNIALS MODULE (Ha.)			MONOPERENNIAL (One Ha.)
	3.5	3.0	2.0	1.0	4.0	3.0	1.0	
Net Present Value								
10 per cent	93,195	104,424	435,043	111,827	78,579	51,044	344,591	₱ 48,798
15 per cent	25,452	43,232	242,402	71,507	26,582	21,511	182,309	21,879
24 per cent	(15,956)	3,832	100,739	34,087	(7,685)	2,588	68,782	(3,840)
Benefit-Cost Ratio (BCR)								
10 per cent	1.57	1.87	3.25	3.07	1.58	1.98	4.57	1.33
15 per cent	1.20	1.51	2.77	2.71	1.28	1.60	3.83	1.19
24 per cent	0.82	1.14	2.12	2.22	0.88	1.12	2.81	0.95
Internal Rate of Return								
(IRR) per cent	19.01	25.98	63.47	87.74	20.78	26.97	66.77	25 per cent
Annualised Value								
10 per cent	9,886	11,077	46,149	12,711	8,336	5,415	36,554	₱ 6,416
15 per cent	3,876	6,584	36,918	10,891	4,408	3,276	27,766	3,742
24 per cent	(3,835)	921	24,215	8,194	(1,847)	622	16,532	(960)

Source: Z. M. Sumalde, H.A. Francisco and G.A. Fermindoza, 1992.

7.3 Basis of Pricing for Use of Land: Economic Rent Estimation

Rent can be viewed as a residual or surplus after payments for other inputs have been netted out. The unit cost of a good includes the value of labour, capital, materials, and energy inputs used to convert land as a natural resource into the good, plus a reasonable margin for profit. What remains after these factor inputs are netted out is the value of land as a natural resource itself. This is the definition of rent per unit (per acre or per hectare).

The rent for a particular piece of land can vary depending on how the land is used. The rent per unit can be an average value—the difference between the price of the good and the average cost of the inputs used to produce the good—or it can be a marginal value—the difference between the price of the last unit of the good sold and the cost of inputs to produce the last unit of the good. Marginal measurement of rent for land is often so difficult to obtain that average calculations must be made instead (Hartwick and Olewiler, 1998).

Rents refer to the excess or above normal profit from a productive activity. For the MFR, rents were estimated based on the estimates of costs and benefits from the different cropping systems in the MFR done by Sumalde, Francisco, and Fermindoza (1992). For the MFR, rent was computed by estimating the difference between benefits and costs, the latter includes 50 per cent mark-up for normal profit. Different discount rates for future value were used in the estimations.

For the one-hectare agroforestry farm, the estimated annualised rent ranged from P 4,802 to P11,057 depending on the discount rate chosen (Table 23). For the two-hectare farm annualised rent ranged from P6,715 to P22,113 per hectare while for the 3.5-hectare agroforestry farm positive rents can be obtained only for the 6 per cent and 10 per cent discount rates. The negative annualised rents for bigger farm size could mean inefficient use of land hence, most farmers should not be allowed to farm more than two hectares.

TABLE 23

Rent estimation for different farm sizes and cropping patterns in Mount Makiling

CROPPING SYSTEM	DISCOUNT FACTOR			
	6 per cent	10 per cent	15 per cent	24 per cent
Agroforestry				
1 hectare	11,057.57	9,504.77	7,632.98	4,801.90
2 hectares	44,226.04	35,890.79	26,504.57	13,432.98
3.5 hectares	7,579.81	1,141.03	(5,735.40)	(14,664.43)
Mixed-Perennials				
1 hectare	39,786.53	31,844.30	23,304.23	12,418.67
3 hectares	4,656.69	2,633.05	537.58	(2,078.84)
4 hectares	4,859.32	1,077.40	(3,319.08)	(9,527.05)
Monoculture Citrus				
1 hectare*			(7,961.08)	(13,201.79)

Note: the negative returns for citrus production was caused by the pest infestation that happened in the late 1980s. Today, very few households are attempting to re-establish citrus farms.

For the mixed perennial farm, the estimated annualised rent ranged from P12,418 to P39,786 per hectare depending on the discount rate chosen. Lower rents were obtained for bigger mixed perennial farms. Rent for mono-perennial farm was negative regardless of the discount rate. Hence, this type of cropping pattern should not be encouraged.

7.4 Cost of Rehabilitation/Conservation at the Farm Level

The earlier section has presented a way of estimating pricing of land resources – through economic rent estimation. When it is difficult to obtain reliable estimates of economic rent, a second best approach to estimate how much farmers should pay for the use of the land, is given by the cost of rehabilitation/controlling degradation of the land resource. This cost-based approach provides a proxy measure of the cost that the user of the land should shoulder so as not to impose a higher user cost to future generations and an external cost to downstream communities.

The case study also estimated the cost of soil and water conservation measures. These costs can come in many forms: vegetative, engineering structures or combinations of both. Their use is generally dictated by terrain conditions, type of soil, crops planted, and farming practices adopted.

In the MFR, a number of farming practices are observed. Studies conducted by Carandang and Lawas (1992) and Francisco et al. (1992) recognised three broad farming systems: traditional kaingin systems, plantation based (mixed perennials and mono-perennials), and home gardens. This classification may be rather loose, but may serve the purpose for prescribing soil and water conservation measures appropriate for the farming system adopted by the farmers.

There may be exceptions, but farming practices in the Makiling Forest Reserve are generally erosive in nature. Erosion rates in farms studied by Lasco et al. (1998) inside the forest reserve amounted to 199 to 382 tons/ha/year which are much more than the acceptable rate of 12 tons/ha/year. In recently opened secondary growth forests, which are usually devoid of trees or in areas that were formerly grasslands (cogonal), the establishment of hedgerows is considered the best intervention for soil and water conservation. In plantation-based farming systems, the use of cover crops, and the construction of contour ditches and drainage canals, rockwalls and other structures along the contours are recommended for soil and water conservation.

Visco (1997) concluded that the use of single hedgerows appears more advantageous than double hedgerows from an economic viewpoint. This is because single hedgerows cost less to

TABLE 24

Cost estimated for the establishment and maintenance of single hedgerows in a hectare of farmland

ACTIVITY	MAN-DAYS*	COST/Ha.**
Locating and marking contour lines	1	200.00
Manual preparation of contour lines using grub hoe	3.5	700.00
Seeding and fertiliser application	3.5	700.00
Thinning, replanting and within row weeding	5	1,000.00
Pruning off hedgerows and spreading of prunings on the alley	37	7,400.00
TOTAL	50	10,000.00

* Based on Celestino (1985); Wage rate of P200/man-day

establish and maintain and occupy a smaller area, yet they reduce soil loss and maintain soil fertility as well as double hedgerows.

Based on the labour data generated by Celestino (1985) as cited by Visco (1997), the labour requirement to establish a double hedgerow is about 26 man-days per hectare. This system consists of 22 sets of two row hedges or a total of 44 contour strips. A single hedgerow farm then will have around 25 contour strips spaced at 4-metre intervals, which is about one-half that of the double hedgerows. The labour requirements to establish a single hedgerow are assumed to decrease by half. Based on this, Visco (1997) gave the following cost estimates in Table 24.

In pure plantations of fruit trees and other crops, including coconut and coffee, it is highly desired that there should be adequate cover crops, or preferably inter-plantings of forest tree species. The ideal farming system is one that will approximate the multi-storey agroforestry system. Erosion rates in plantations of mono-perennials (citrus) which are clean-weeded can be as high as 182.9 tons/ha/year; but with cover crops, soil loss can be as low as 0.10 to 5.60 tons/ha/year (Wiersum, 1984 as cited by de la Cruz, 1987). *Centrosema pubescens* is a leguminous cover crop that can be used in coconut and citrus plantations within the MFR. The recommended seeding rate is 6-8 kg/ha (Lustria, 1994 as cited in UAP, 1994). On a hectare of pure plantation, the cost for establishing of *Centrosema* cover crop is shown in Table 25.

Maintenance cost is insignificant because once established, the cover crop needs no further treatment.

One other soil and water conservation measure that can be adopted in the coconut plantation is the inter-planting of tree crops. The principle of allocating 20 per cent of the land in Integrated Social Forestry (ISF) programme areas can be adopted here. Hence, in a hectare of coconut plan-

TABLE 25

Cost estimate for establishing one hectare of *Centrosema* cover crop

ACTIVITY/ITEM OF EXPENDITURE	UNIT	COST/UNIT	NUMBER	COST/Ha.
Site preparation	Man-days	200	3	600
<i>Centrosema</i> seeds	Kg	50	8	800
Seeding of <i>Centrosema</i>	Man-days	200	1	200
TOTAL				1,600

TABLE 26

Cost estimate of inter-planting of tree crops in coconut plantation

ACTIVITY/ITEM OF EXPENDITURE	UNIT	COST/UNIT	NUMBER	COST/Ha.
1. Site preparation (staking, holing and weeding)	Man-day	200	3	600
2. Planting	Man-day	200	3	600
3. Cost of planting materials	Seedling		625	3,125
4. Maintenance			9	1,800
TOTAL				6,125

tation, 625 trees of suitable species with a spacing of 4x4 meters can be inter-planted between the coconut trees. The cost to establish and maintain such trees for three years in a coconut plantation is estimated in Table 26.

Soil loss can also be enhanced if pineapple is under-planted in coconut plantations. In a study by Serrano (1982), the soil erosion rate in such farms can be as high as 15 tons/ha/year, which is above the tolerable limit. This situation may also be applicable when the coconuts are under-planted with other agricultural crops that will involve soil tillage. For such farms in the forest reserve, contour planting of crops should be adopted and a system of contour ditches and drainage canals should be established as soil and water conservation measures. These structures are established on farms to check the erosive power of surface runoff by trapping soil particles. On a hectare of such farms, contour ditches can be dug at 8-meter intervals. Drainage canals intersecting the ditches can be constructed on the sides and at the middle of the farm. For greater efficiency in trapping soil particles moving downslopes, soil traps and check dams will have to be constructed at various intervals along the drainage canals. Costs for the construction and maintenance of the contour ditches and drainage canals are estimated in Table 27.

The above estimates are quite diverse ranging from P1,600 to P10,000 per hectare investment. The benefits from these investment can be realised, however, from 5-10 years and hence are still low compared to what the farmers are getting in terms of their excess profit from the use of the resource. They should therefore be made responsible for shouldering these costs but must be given technical support in the implementation of these various soil conservation measures.

TABLE 27

Cost estimates for the construction and maintenance of contour ditches and drainage canals

ACTIVITY	MAN-DAYS	COST/Ha.
1. Locating and marking contour lines and direction of drainage canals.	6	1,200
2. Digging of contour ditches and drainage canals	24	4,800
3. Construction of soil traps and check dams	8	1,600
3. Soil removal from soil traps	6	1,200
TOTAL		8,800

7.5 Valuation of the Farmers' Communal Efforts in Protecting the MFR

Currently, the various POs in the MFR are involved in undertaking communal efforts to protect and manage the MFR. These are used as proofs their commitment to work hand in hand with the University in managing the resource. At present, there are 11 recognised POs in the MFR that serve as partners of the University in the protection, conservation and rehabilitation of the reservation. In addition, there are also a number of communities not formally organised but are also doing protective and conservation activities in the MFR.

The community forestry projects and activities are varied and implemented at different levels, phases or stages by participating communities. For purposes of valuation, the projects and activities are grouped into two main categories, namely: forest protection and forest rehabilitation; and conservation. Other activities that are difficult to monetise are the charging of fees for quarrying in adjacent areas of the reservation; monitoring of MFR in-migration; and implementation of formulated rules against in-migration. Also, farmers' training programmes and seminars are implemented but not valued.

The forest protection activities consist of: 1) boundary delineation between protected areas and farmlands involving the planting of African tulips on the ground and 2) forest protection by guarding against illegal cutting and related activities. In addition to these, the POs also undertake forest rehabilitation and conservation efforts such as: 1) reforestation/tree planting activities in denuded and critical areas such as riverbanks, creeks and sloping areas; 2) establishment of nurseries for reforestation/tree planting activities; and, 3) ground maintenance through cooperative efforts or the "bayanihan" system.

Tables 28 and 29 show the cost estimates of the various community forest protection, and forest rehabilitation and conservation activities in the MFR. The dates were provided by the farmers themselves during the consultative workshop involving various resource users. Valuation was done using the opportunity cost concept with farmers' input valued using the prevailing wage rate in the locality.

Forest protection activities consist of boundary delineation/surveying and forest protection/guarding. Five POs participated in boundary delineation over the period of 1993 to 1998. The number of members who directly participated in this activity ranged from 14 to as high 87 individuals. On the average, about 39 members of the association joined this effort. The average annual man-days spent by a participating PO was 647 man-days which was valued at P102,330 using 1998 prices.

In the task of guarding the forest, six POs have been involved since 1993 to present. The number of members involved varied tremendously with some POs assigning only 1-2 persons while others involved as many as 87 individuals, with members taking turns in carrying out this task. For many, the task is considered a full-time activity but valuation is difficult since they normally performed this task as they go about their daily activities on their farms.

In forest rehabilitation and conservation activities, almost all the POs in the different municipalities around the MFR are involved in reforestation/tree planting activities. Some POs have been involved as far back as 1993 while some have only been involved since 1997. The number of persons who participated in the activity ranged from 10 to 120, with the average being 51 persons per PO. On the average, each PO had put in P34,058 worth of efforts per year with the value ranging from P7,500 per year to as much as P180,000 value of labour input for the SAMALUP in Los Baños.

A separate costing for nursery establishment and ground maintenance was estimated. Five POs carried out the former with the time input averaging 435 man-days since they started this activity. This time input was valued at P66,440 for the average PO. In ground maintenance, only

TABLE 28

Cost estimates on the undertaken forest protection development activities in the MFR

ACTIVITIES	AREA / POS	PERIOD	NO. OF PERSONS INVOLVED	TOTAL MANDAYS	COST (₱)
1. Boundary delineation/Surveying					
	Los Baños				
	SMPBM	1998	13	395	59,250
	SAMALUP	1993	87	2,610	391,500
		1995			
	SBPBMLI	1993	14	42	6,300
	Calamba:				
	NMPBM	1996	42	42	6,300
	KMPBM	1995	36	148	48,300
Total			192	3,237	₱511,650
Average			39	647	₱102,330
2. Guarding of forest*					
		Since			
	Los Baños:				
	SMPBM	1995	1		
	SAMALUP	1992	87		
	SBPBMLI	1993	10		
	SNSJ	1996	10		
	Calamba:				
	NMPBM	1995	8		
	Bay:				
	PAMANA	1994-1995	2		
Total			38		
Average			6		

* All year round.

one PO is undertaking this task since 1992 with about 60 persons involved per year. The time input per year was estimated at 135 man-days and valued at P20,250 per year.

Aside from their labour inputs, farmers also invested to buy seeds, seedlings and other material inputs for MFR activities. With limited resources on hand, farmers identified assistance that they would appreciate getting from the University. These are: 1) technical assistance for soil conservation efforts and farming activities; 2) financial support for nursery / seedling maintenance; 3) coordination and linkage with possible funding institutions to finance their livelihood activities; and, 4) preparation of plans by the various POs that are consistent with the overall management plan for MFR.

7.6 Recommendations

Farmers, like other resource users, should pay for their use of land. Rent for the use of the land, as indicated in this study, is positive and of high value owing to the locational advantage and

TABLE 29

Cost estimates on the undertaken forest rehabilitation and conservation activities in the MFR

ACTIVITIES	AREA / POS	PERIOD	NO. OF PERSONS INVOLVED/YR	TOTAL MANDAYS/YR.	COST/YR. (₱)
Reforestation/Tree planting					
Los Baños					
	SMPBM	1998	50	50	7,500
	SAMALUP	1994	40	1,200	180,000
	SBPBMLI	1995	55	165	24,750
	SNSJ	1993/1995	120	120	18,000
Calamba:					
	NMPBM	1997	46	46	6,900
	KMPBM	Yearly	42	42	6,300
Bay:					
	PAMANA	1996/1997	21	5	750
Sto. Thomas:					
	HKI	1997	30	30	4,500
	Brgy. San Pablo	1993	100	50	7,500
	Brgy. San Pedro	1990/1993/1995	10	563	84,375
Total			514	2,271	₱340,575
Average			51	227	₱34,058
Nursery establishments					
Los Baños:					
	SAMALUP	1992	87	525	6,851
	SBPBMLI	1996	55	935	140,250
Calamba:					
	NMPBM	1997	42	84	12,600
Bay:					
	PAMANA	1994	21	504	75,600
Sto. Thomas					
	HKI	1996	38	646	96,900
Total			243	2,174	₱332,201
Average			49	435	₱66,440
Nursery establishments					
Los Baños:					
	SNSJ	1992	60	135	20,250
		1993	60	135	20,350
		1996	60	135	20,350
		1997	60	135	20,350
		1998	60	135	20,350
Total			300	675	₱101,250

inherent productivity of the MFR. It is unreasonable to assume that all of the rent estimated for MFR farms can be collected through taxes—but even if only 10 percent were collected, this amount would provide a significant source of revenue for the MFR to finance conservation efforts at the farm and watershed levels. The high rent estimates can also be used as basis to appeal to farmers that they can very well afford to invest in soil conservation efforts given the very high level of excess profits that they enjoy. The case study provides information on both these rent estimates and the financial requirements for soil conservation investments.

For the MFR, the discussion on how the rent can be collected and the mechanism for its collection will still be the subject of subsequent discussions with the farmers – as part of the on-going consultations and discussions with the various people's organisations. The team and the University administrators are hesitant to pursue this matter with the farmers given the past “stormy” dealings with them.

As a whole, there is a high level of awareness among the various POs in the MFR that they need to work closely with the University in pursuing efforts to manage the MFR in a sustainable manner. The University for its part has also accepted this fact. Both parties, however, are taking things slowly having lived in the atmosphere of animosity in the past. Furthermore, there is a general acceptance of the principle of resource pricing making the use of MBIs acceptable to all parties concerned. The key to an acceptable and workable MBI, however, is to develop it with stakeholders in a consultative fashion.

8.0 Market-Based Instrument for Non-Timber Forest Products

Non-timber forest products (NTFPs), also called non-wood forest products (NWFPs) or minor forest products, refer to goods of biological origin other than wood as well as services derived from the forests and allied land uses (FAO, 1995). In this paper, the discussion of the NTFPs is limited only to minor forest products. Punzal (1994) defined minor forest products as those products of the forest other than timber such as fruits, seeds and seedlings. People who extract various minor forest products reduce the biodiversity of the MFR, and therefore their activities must be managed.

Market information on minor forest products specifically in the MFR is insufficient. Since products are sold in informal markets, information about product flow, prices and market options is not generally available. When it is available, the focus is only on a few products which are important in the market. The following discussions are gleaned from studies dealing with the use and valuation of minor forest products in the MFR.

Peñalba et al (1993) identified two resource users in the MFR. The first type includes those who directly use the lands for farming and residential purposes while the second type includes those whose interest is not land per se, but the products which can be derived from the forest. The latter users' perception is that the MFR is their gathering grounds—a common resource, hence, there is no need to conserve or exert effort to conserve and regenerate the forest. The study showed that most of the minor forest products gathered such as fuelwood, mahogany seeds, kaong midribs and bamboo were consumed at home particularly during fiesta. Some were sold for decorations or as souvenir items or utilised for other purposes.

A valuation study conducted by Punzal (1994) on minor forest products revealed that 16.33 percent of MFR residents are engaged in the collection of minor forest products “illegally”, that is, without permit either for home consumption or for resale. Forty five percent (45 per cent) of the gatherers interviewed came from Los Baños. The estimated added income ranged from P50-

TABLE 30

Guidelines and rates of charges/fees on forest goods at the Makiling Forest (excerpts)

General Guidelines	Specific Guidelines
1. The Institute of Forest Conservation shall offer prices on forest goods and services at competitive prices compared to the existing commercial rate.	1. There are three (3) types of permit issued by the Institute: a. permit to gather minor forest products; b. permit to use forest products (specifically for c. services); and permit to transport Each permit issued has a corresponding charge.
2. Rates of charges/fees shall be reviewed annually or as the need arises to determine their competitiveness with existing rates.	2. Conduct of activities and gathering of minor forest products shall be allowed on areas declared as critical (i.e. plantation, research and demonstration areas).
3. The Institute shall charge a minimum rate for the forest goods and services rendered to compensate for overhead cost.	3. Services rendered and a limited quantity of minor forest products shall be given free of charge to students, faculty and researchers provided an official request is forwarded in advance to the IFC Director's Office.
4. All payments shall be receipted and remitted through the Special Collecting Officer of the Institute of Forest Conservation.	4. No gathering and transporting of forest products shall be done without proper supervision and inspection by the forest officer-in-charge.

P8,600 per year depending on the quantity and type of minor forest products collected as well as the frequency of collection.

Seeds of mahogany, narra, palmera and Gmelina are kept in sacks and sold by gatherers. Seedlings of mahogany and jade vine are planted in plastic bags and are taken care of while waiting for orders from buyers. The market price value and user charge instrument were used as the valuation method to estimate the value of minor forest products and the economic instrument, respectively. The market price value consisted of permit, transportation and collection costs of minor forest products. The net value of minor forest products was estimated to be P384,270.30/year.

The University has long been allowing the sale of minor forest products from the MFR except during some periods when it was suspended temporarily. These products are either extracted directly from the forest on a "permit" basis or products are produced in the nursery intended for sale – such as seedlings.

Two types of permits are issued by the University namely: 1) permits to gather minor forest products; and 2) permits to transport forest products. Each permit has corresponding user fees/charges. These forest fees/charges are used to regulate the harvest of minor forest products and as means of indirectly controlling adverse environmental impacts. Table 31 reflects the summarised guidelines and rates/fees on minor forest products in the MFR set by the IFC. Some of the prices of the products were based on the prevailing market prices in 1997 while others are based on what IFC considered as minimal charges to cover its administrative and operating costs.

In the case of the minor forest products raised in the nursery, specific sites are identified in the MFR where collection and/or gathering of the products like wildlings, seeds, vines and fire-

TABLE 31

Comparative income from minor forest products, MFR, 1997

YEAR	MEDF	MBG	TOTAL	TOTAL INCOME (VARIOUS SOURCES)	Per cent INCOME FROM MINOR FOREST PRODUCTS
1992	₱ 25,371	29,789	55,160	226,056	24.40
1993	69,043	25,242	94,285	350,040	26.94
1994	35,682	26,412	62,094	519,026	11.96
1995	-	-	-	274,699	-
1996	-	-	-	324,732*	-
1997	-	8,285	8,285	572,516	1.42

* MBG only

Source: IFC,UPCFNR-LB

wood can be allowed. Most of the commonly bought minor forest products are seeds and seedlings of various tree species and ornamental plants.

The income generated from the sale of minor forest products contributes a lot to the overall income of the office. Under the defunct IFC, two offices were allowed to sell minor forest products from the MFR. These offices were the Makiling Experimental and Demonstration Forest (MEDF) and the MBG.

Table 31 shows the summary of income from minor forest products for the last seven years from 1992- 1997. From 1992-1997, the percentage income from minor forest products increased from 24.40 per cent to 26.94 per cent and decreased to 11.96 per cent in 1994. Income from 1995 to 1996 cannot be ascertained because the figures presented in the reports of MEDF and MBG reflected only the total income for these years. In 1997, the sale of minor forest products and issuance of permits were lodged with the MBG.

It is noted that with proper management, valuation and promotion of minor forest products, more income can be generated which can be plowed back and utilised for the conservation and development of the MFR.

With the given charges/fees set by IFC, the question now is, do these charges/fees reflect the true value of the minor forest products? What appropriate market-based instrument/s shall be used and how should this/these instrument/s be implemented?

8.1 The Stakeholders' Consultation Meeting

The participants in the consultation meeting were limited to selected landscapers, plant growers and contractors mostly from Los Baños, nearby towns and a few from Metro Manila. They represent the potential buyers of non-timber resources found in the MFR. Previous studies conducted in the MFR considered the actual collectors of the minor forest products, quite a different group from this set of participants.

The specific objectives of the consultation meeting were to: 1) determine market prices of selected non-timber forest products, particularly plant species; 2) determine factors/issues affecting the pricing of these plants; and 3) formulate solutions/recommendations to enhance utilisation of the varied and highly diverse resources found in the MFR.

In order to validate the existing fees/charges imposed for the collection of non-timber resources within the MFR, people were asked how much they were willing to pay for selected plant species derived from the MFR. Two survey forms were prepared for the participants to fill out, namely: 1) the socio-economic characteristics of the respondents, the type of species commonly used in their businesses/landscaping and the problems they have encountered in obtaining these resources; and; 2) detailed list of possible plant/seed materials available in the MFR.

Prices that buyers of non-timber products would pay depended upon the financial status of the owner/buyer; quantity/volume of plants/seeds to be purchased; physical appearance of plants/seeds; uses of plants (i.e. reforestation; landscaping); and popularity of species (whether widely used or newly introduced in the market). On the supply side, quantity to be supplied depends on the cost of production and on the availability of plant/seed sources.

Problems encountered by plant growers/landscapers/contractors included: lack of reliable sources of plant materials, inaccessibility to roads of plant suppliers, graft and corruption ("tongs" at check points), and inadequate resources such as land, water supply and money (Table 32).

TABLE 32

Problems encountered by participants in their businesses

PROBLEMS	FREQUENCY	PERCENTAGE per cent
Lack of plant sources	11	78.57
Inaccessibility of roads from source	8	57.14
Lack of resources (money, land, water supply and money)	6	42.86
Graft and corruption (tongs)	3	21.43

The participants have confirmed that there is really a big demand for products coming from the MFR with 78.57 per cent of those in attendance indicating their need for high quality planting materials.

8.2 Suggestions and Recommendations

Suggestions and recommendations for MFR management consist of the following:

1. Manage the MFR like a business enterprise in order to earn profit.
2. Designate an area to showcase the various plants for sale.
3. Document available plant species of the MFR (include biological and ecological characteristics).

8.3 Implementing Mechanisms for the Selected MBIs

1. The existing system of issuing permits, one for gathering minor forest products and another for transporting, shall be continued. Securing of permits shall be coursed through the Makiling Center for Mountain Ecosystems (MCME) or any authorised office of the University.
2. Issuance of permits shall be done with caution to safeguard the proper gathering of the resource. Hence, applicants shall be required to give accurate personal information and to state the nature and extent of product gathering that they plan to undertake.

3. User charge/fee shall be collected per product depending on: a) type of product e.g., seed, seedlings, etc.; b) size; c) volume; d) purpose/use (i.e., ornamental medicinal, etc). The fees which were prepared by IFC shall be used with revisions adopting some of the updated prices that were gathered during the group's consultation meeting using the WTP approach.
4. Activities of permit holders shall be regularly monitored by an assigned staff of the University to check adherence to terms and conditions stipulated in the permit. Otherwise, offenders shall be fined or permits shall be cancelled depending on the severity of the offence/s.
5. Permit holders shall be confined to areas which will not affect the biodiversity of the MFR. Areas for collection and harvesting shall be identified by the University.
6. Sharing schemes for those permit holders who personally gather seeds needs further study.
7. An inventory of all minor forest products found in the MFR shall be conducted to determine its supply/capability and identify/classify them based on the following: a) their major use (edible plant species, non-edible; pharmaceutical or medicinal uses which may include tannins and dyes); b) whether they are endangered or not; and c) their areas of availability. Furthermore, data on the volume, yield, season to harvest and other important biophysical characteristics must be studied for proper valuation of these minor products. A project proposal on the inventory and utilisation of NTFP in the MFR is included in this report as Appendix D.

9.0 Institutional Structure Governing the Management of Makiling Forest Reserve

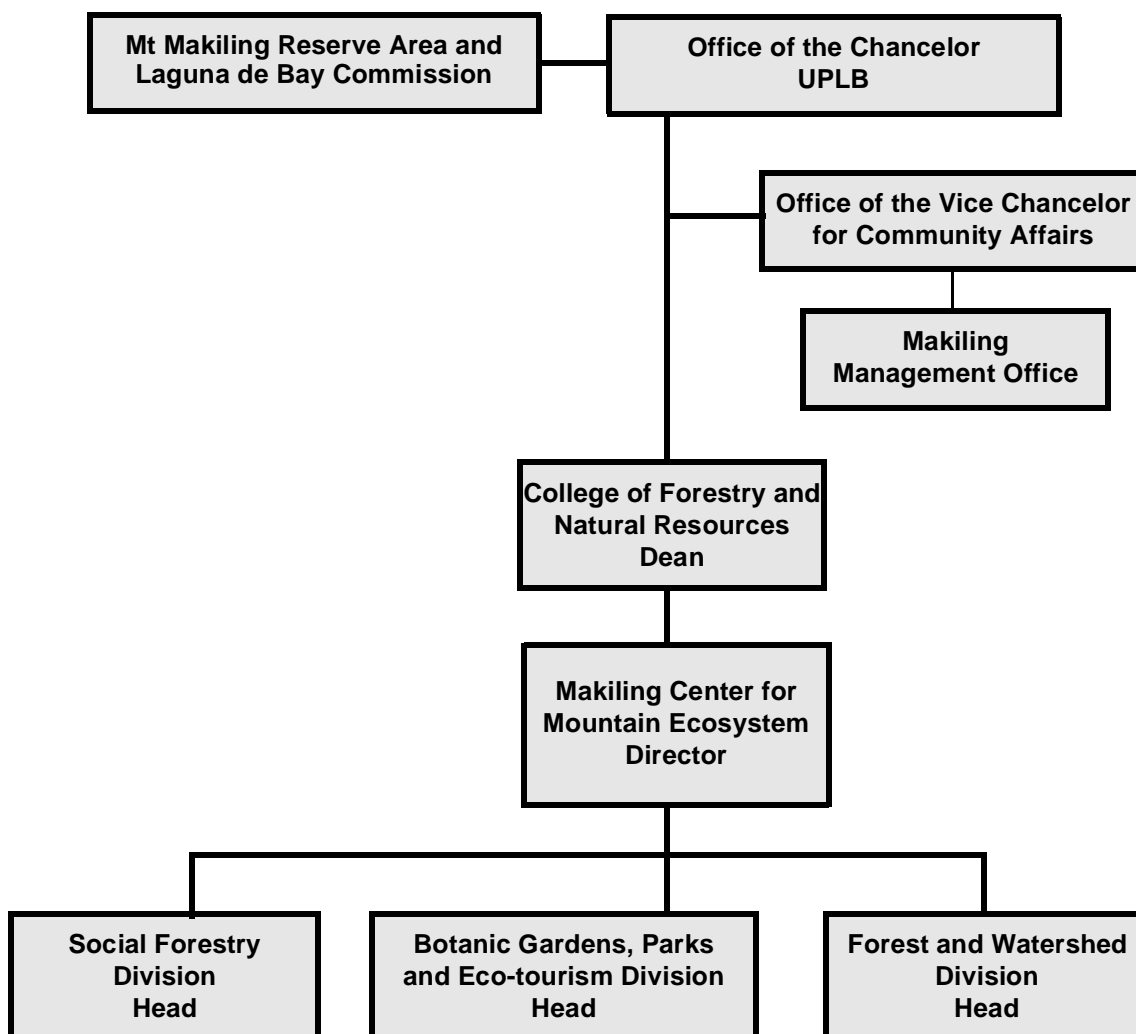
9.1 Organisational Structure

The existing organisational structure for the management of the MFR is presented in Figure 1. Presidential Executive Order No. 121 (1993) created the Mount Makiling Reserve Area and Laguna de Bay Commission (MMRALBC) as an advisory body to the Office of the President designating UPLB as its technical arm. With the reorganisation of the UPLB in 1997, the Office of the Vice Chancellor for Community Affairs (OVCCA) was created along with the Makiling Management Office (MMO) which was placed under its jurisdiction. The Makiling Center for Mountain Ecosystems (MCME) and the Training Center for Tropical Resources and Ecosystems Sustainability (TREES) were established by the Institute of Forest Conservation (IFC). The main function of MCME is to formulate and execute plans for the sustainable management of the MFR and to conduct research and demonstration programmes in mountain ecosystem development. It consists of three divisions, namely, the Social Forestry Division (SFD), Botanical Gardens, Parks and Eco-tourism Division (BGPED), and Forest and Watershed Division (FWD).

The concept of participatory management has brought to the fore the involvement of all stakeholders in the MFR. The UPLB adopts the social forestry principle and a community-based conservation and development framework in its efforts to conserve, manage, and develop the MFR. Institutional mechanisms were set up so that various sectoral concerns are addressed as UPLB plans and formulates policies for the MFR. Among the early initiatives of UPLB towards this end is the signing of a Memorandum of Agreement (MOA) with recognised people's organisations (POs) existing in the MFR (Table 34). At present, UPLB has MOA with five of the 11 POs existing in the MFR. The other POs are in the process of completing the necessary papers in preparation for the signing of the same MOA with the University. The MOA stipulates the duties and responsibilities of both the UPLB and the POs in the conservation and protection of the MFR. Eight of these POs have federated into an umbrella organisation called the KASAMA or the Kaisahan ng mga Samahan sa Bundok Makiling.

FIGURE 1.

Existing organisational structure for the management of the Mount Makiling Forest Reserve (MFR)



The University has also forged links with local government units that have jurisdiction over the barangays where the POs are located. These are the barangay councils of Bagong Silang, Putho-Tuntungin, Lalakay and Timugan in Los Baños; Bagong Kalsada and Pansol-Bucal in Calamba; Masaya, Tranca and Sta. Cruz in Bay; and 10 barangays in Sto Tomas, Batangas.

The formulation of the MFR Master Plan is anchored on a community-based forest management principle and is one of the recent efforts undertaken by UPLB towards the development and conservation of the MFR. Partnership with POs and LGUs is strengthened through regular dialogues and joint implementation of conservation projects to ensure active participation of the stakeholders.

Another distinct management feature of the MFR is the presence of institutional lessees within the reserve. The University, through the UPLB Land Use and Property Committee, has signed MOAs with the various institutions that lease portions of the MFR for civic, scientific, recreational, and power generation purposes. These institutions are the Boy Scouts of the Philippines (BSP), National Power Corporation (NPC), Pook ni Maria Makiling (PNMM), National Arts Center (NAC), Environmental Research and Development Bureau (ERDB) and Forest Products Research and Development Institute (FPRDI). These lessees are also actively involved in the maintenance and protection of the MFR.

TABLE 34

List of people's organisations (POs) in the Makiling Forest Reserve.

NAME OF People Organisation (PO)	ADDRESS	NO. OF MEMBERS	DATE OF MOA
Kaisahan Para sa Kapakanan ng mga Magsasaka Tungo sa Pagpapaunlad, Inc. (KAKAMAPI)	Sta. Cruz, Bay, Laguna	109 HH	March 26, 1994
Pagpapaunlad ng mga Magsasaka na Nagkakaisa (PAMANA)	Tranca, Bay, Laguna	50 HH	
Samahan at Ugnayan ng mga Magsasaka para sa Kaunlaran (SUMAMAKA)	Masaya, Bay, Laguna	21 HH	
Kapatirang Magsasaka sa Pangangalaga ng Bundok Makiling (KMPBM)	Bagong Kalsada, Calamba, Laguna	33 HH	
Nagkakaisang Magsasaka sa Pangangalaga ng Bundok Makiling (NMPBM)	Pansol, Calamba, Laguna	41 HH	October 1, 1997
Kaibigang Samahan ng Magsasaka sa Paanan ng Bundok Makiling (KASAMAPA)	Putho-Tuntungin, Los Baños, Laguna	100 HH	
Samahan ng Magsasaka sa Mataas na Lupa ng Lalakay sa Bundok Makiling (SAMALUP)	Lalakay, Los Baños, Laguna	80 HH	October 16, 1993
Samahang Bagong Pag-asa sa Bundok Makiling, Los Baños (SBPBM)	Bagong Silang, Los Baños, Laguna	98 HH	September 13, 1993
Samahan ng Magbubukid sa Paanan ng Bundok Makiling (SMPBM)	Timugan, Los Baños, Laguna	80 HH	October 30, 1993
Handog Kalikasan, Inc. (HKI)	Sta. Elena, Sto. Tomas, Batangas	38 HH	
Samahan ng mga Uring Magsasaka sa Paanan ng Bundok Makiling	San Bartolome, Sto. Tomas, Batangas	54 HH	

Source of Basic Data: Primary Survey, 1998.

9.2 Institutional Framework for the Management of the MFR Watershed Protection and Conservation Fund

9.2.1 Rationale

The intent to charge major users of the Mount Makiling Forest Reserve (MFR) a “watershed protection and conservation (WPC) fee” is anchored on the fundamental policy of “pay as you use”. It is viewed as an equitable means for sharing not only the benefits derived from the watershed resources but also the burden and the responsibility for sustainably managing the forest reserve. The various stakeholders such as the UPLB, IRRI, institutional leaseholders, LGUs, POs, NGOs, industries, water districts, resort owners, LGUs, recreational users, and other groups recognise the need to conserve and protect the MFR as an important watershed. Likewise, these sectors have expressed their commitment and desire to plow back resources to implement projects and activities pertaining to conservation of the MFR. Hence, there is a need to develop an institutional framework that will define institutional arrangements, guidelines and mechanisms for more equitable, efficient and effective conservation, and protection of the MFR watershed resources. Ultimately, this will make the various stakeholders become more responsible not only as right-holders but also as duty-bearers.

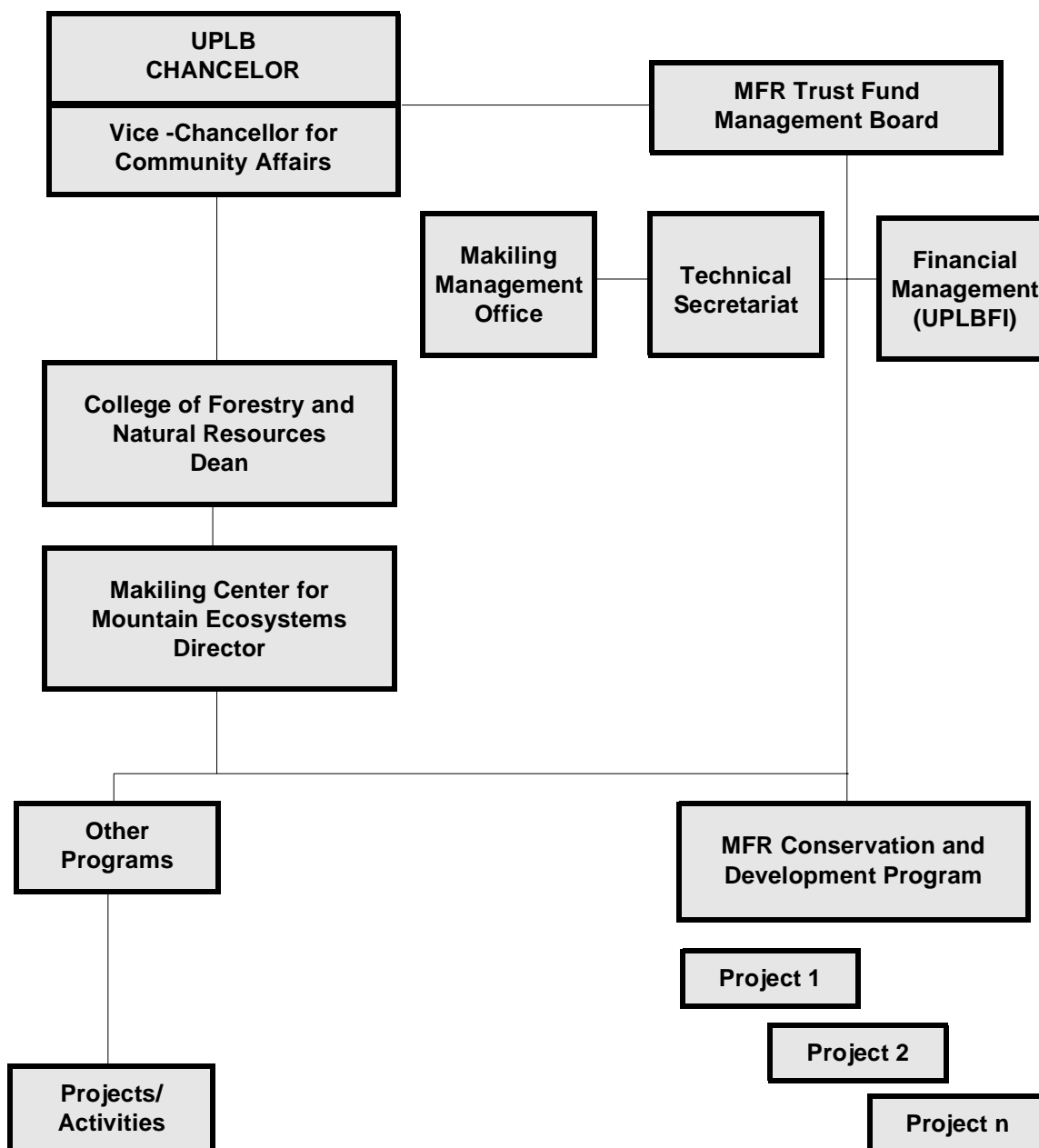
9.2.2 Objectives

The proposed institutional framework specifically aims to:

1. Establish and sustain a more representative multisectoral institution that will manage the financial resources derived from market-based instruments designed for the MFR.
2. Rationalise and systematise the collection, allocation and use of watershed conservation and protection (WCP) fees that will be charged from the various resource users of the MFR.
3. Install mechanisms that will enable responsible users to participate more substantively in the direct management of the MFR.
4. operationalise the values of equity and transparency in natural resource management

FIGURE 2.

Proposed Institutional Framework for the Management of the MFR Conservation and Protection Fund.



9.2.3 General Guidelines

1. All fees collected from market-based instruments (MBIs) shall form a fund for the implementation of various projects and activities identified in the MFR Conservation and Development Program (MCDP).
2. The Fund shall be managed by a MFR Trust Fund Management Board, an independent body attached to the Office of the Chancellor (Figure 2).
3. The Trust Fund Management Board shall draw membership from the stakeholders or resource users who have paid or contributed their due share of the WPC fee in cash or in kind.
4. Relevant sectors and user groups shall choose their representatives to the Board.

9.2.4 Institutional Arrangements

The **MFR Trust Fund Management Board** shall be composed of the following:

- UPLB
- Institutional Leaseholders
- People's organisations
- LGUs (Laguna and Batangas)
- Laguna Tourism Association
- Laguna Chamber of Commerce and Industries
- Industries from Sto. Tomas, Batangas
- NGOs
- Others

The MFR Trust Fund Management Board shall have the following functions:

1. Formulate the policies, guidelines, and criteria for funding of projects and activities related to the MFR Conservation and Development Program (MCDP).
2. Ensure effectiveness and efficiency in the implementation of various projects supported by the Fund.

The **Technical Secretariat** shall serve as the technical staff of the Board. Specifically, it shall:

1. Review the technical feasibility of all projects and activities proposed for funding from the Trust Fund and shall recommend to the Board projects to be funded.
2. Keep a repository of records and documents and information pertinent to MCDP.
3. Continuously monitor and periodically evaluate project implementation to ensure effectiveness and efficiency.

9.2.5 Financial Management

The Board shall tap the services of the UPLB Foundation, Inc. (UPLBFI) to manage the funds generated from WPC fees. A Memorandum of Agreement (MOA) to this effect shall be executed between the Board and the UPLBFI.

Specifically, the UPLBFI shall:

2. Allocate and disburse funds for the projects and activities approved by the Board.
3. Monitor financial operations of all supported projects under the MDCP.
4. Prepare periodic financial reports to the Board.

10.0 Conclusions and Recommendations

The important role that market-based instruments can play in the management of the Makiling Forest Reserve is recognised by the key stakeholders in the MFR. The high rate of participant turn-out during the consultation meetings and the active participation of those in attendance attest to the wide acceptance of the rationale for the use of MBIs in resource management. This acceptance is also the result of the on-going policy initiative taken by the country's Environment Department that pushes for the adoption of MBIs in various resource sectors of the country. Admittedly, the primary motivation for the initiative is the need to raise funds for resource management but it is also recognised that MBIs can lead to an efficient use of the country's limited natural resources.

This project evaluated the feasibility of subjecting the various resources of the MFR to the use of MBIs. The resources considered are: water resource, recreation and eco-tourism, farm/land resource, and non-timber forest products. At present, user-fees are already imposed on the collection of minor forest products and the use of Makiling Botanical Gardens (MBG), a major recreational facility in the MFR. However, there are other recreational sites in the area in which no fees are currently charged. What remains to be done in the case of the recreation and minor forest products sectors is to effect a review of current fees to ensure that they closely reflect the true value of these resources. The case studies presented earlier enabled the University to impose a new fee schedule for MBG and have identified the necessary steps to come up revised user fees for minor forest products and other recreational sites in the MFR.

The bigger challenge lies in the imposition of a watershed protection and conservation fee as part of the water bill of the water resource users. Water users were convinced that watershed protection is a service that is required in the "production" of water, and hence, just like other inputs must be paid. Water users include household, industrial, institutional, and agricultural water users—some of who are connected to the water districts—but a large proportion rely on groundwater sources accessed through private pumps.

An important finding of the task force on MBIs for water resource is that only a small increase in current fee is needed to generate the resources required to manage water resources. Household consumers, who are the major water users, are willing to pay from P1.07 to P1.45 per cu. m of water consumed—the cost of undertaking the watershed protection and conservation activities would only require a payment of P0.52 per cubic meter. A fee falling in these price ranges can generate the needed resources for the management of the MFR.

The water districts themselves are quite open to the idea of imposing this additional fee for watershed conservation. During subsequent meetings with them to discuss how they can help in the management of the MFR, they have expressed their willingness to contribute a certain amount from their current profit, even if the fee increase will not be imposed. Others, however, have openly acknowledged that they will have to pass on to consumers such MFR watershed protection costs. The University, through the MMO has had several meetings with the various water districts around the MFR. These meetings gave rise to the formulation of the financing framework discussed in Section 9.2 of this report.

Given the long history of dispute that has existed between the University and the farmer-cultivators/claimants in the area, it will be difficult to apply MBIs to land resources. The project believes, however, that this sector cannot be set aside in the implementation of MBIs for the MFR since farmers are expected to play an active role in undertaking the watershed protection and restoration efforts. Since they will expect some compensation for their efforts, it is hoped that the

compensation can be used to offset the rent payments they will be charged with. It is recognised, however, that the discussion on MBIs for land resources is something that will take time and cannot be rushed.

Overall, the atmosphere appears good for MBI implementation in the MFR and the basic structure for them is already in place. Still, everyone recognises that a memorandum of understanding between the University and the various water user groups must be signed before the watershed protection and conservation fee can be imposed. The University has to initiate and complete this process in the near future.

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APPENDIX A

SUMMARY REPORT OF CONSULTATION MEETINGS WITH RESOURCE USERS OF THE MFR

Introduction

The University of the Philippines Los Baños (UPLB), through the College of Forestry and Natural Resources and the Resources, Environment and Economics Center for Studies, Inc. (REECS) are currently implementing a UNEP-funded project on valuing and pricing of goods and services from the Makiling Forest Reserve (MFR). The project aims to develop a set of market-based instruments (MBIs) that will reflect an integrated scheme for pricing access to the various goods and services being generated by the MFR.. These goods and services include air and water, non-timber forest products, recreation and tourism, and agriculture.

A series of consultation meetings/group discussions with concerned stakeholders was conducted to discuss appropriate resource pricing schemes, institutional structures and policies in implementing the MBIs. The first of the series of consultation meetings was with the water users of the MFR, which included the water districts, industries, resort owners and community-based water cooperatives. 40 participants attended this meeting held at the UPLB College of Forestry Auditorium on May 27, 1998.

The second consultation meeting held on July 24, 1998 at the Training Center for Tropical Resources and Ecosystems Sustainability (TREES), was with 65 participants representing the recreation and eco-tourism, non-timber forest products, and agriculture sectors.

A third project activity was a forum on water use policies held on February 25, 1999. As a culminating activity, a national consultation on natural resource pricing in the MFR was conducted on June 7, 1999.

Summary of the May 27 and July 24 1998 Consultation Meetings

Both consultation meetings had two parts. First there was a plenary session where background papers on the Mount Makiling Forest Reserve, and concept papers on the use of market-based instruments for the sustainable management of natural resources, were presented. The second part consisted of simultaneous workshops followed after each plenary session.

The papers presented during the plenary and workshop sessions are shown in Table A-1.

During the plenary session of the first consultation meeting, some salient points and the corresponding suggestions/recommendations were brought out during the open forum. These were:

- 1. Prevention of further intrusion into the MFR*

UPLB should adopt management by collaboration wherein it will coordinate with inter-sectoral groups and conduct meetings with institutional lessees. The project on accreditation of MFR

TABLE A-1

Papers presented during the consultative meetings held with MFR resource users

TITLE	AUTHOR
1. Opening Remarks	Dr. Lucrecio L. Rebugio
2. Project Overview	Dr. Veena Jha
3. Conservation and Development Framework for the Mount Makiling Forest Reserve	Dr. Jose O. Sargento
4. The Use of Economic Instruments in the Management of MFR	Dr. Herminia A. Francisco
5. Market-Based Instruments (MBIs) for Water Pricing: Synthesis of Literature and Policy Perspective	Dr. Nena O. Espiritu
6. Current State of Resources at the Makiling Forest Reserve	Dr. Rex Victor O. Cruz
7. Viability of Water Users' Fees and Charges as a Source of Funds for Sustainable Watershed Management: Preliminary Results	Dr. Rex Victor O. Cruz, Ms. Leonida A. Bugayong Ms. Priscila C. Dolom
8. Pricing of Water	Engr. Pantaleon Ll. Tabanao
9. Water Pricing Scheme: The Cooperative Way	Mr. Obadiah R. Mendoza
10. Participatory Assessment of Tigbi Water Distribution System	For. Emmanuel R. G. Abraham
11. Pricing of Forest Recreation and Eco-tourism for Mount Makiling	Dr. Margaret M. Calderon and Dr. Cerenilla A. Cruz

occupants should be pursued vigorously to determine the bona fide occupants of the MFR. Researches and action projects conducted in the MFR by various UPLB units should be properly monitored.

2. *Activities allowed and not allowed in the MFR buffer zone*

Guidelines on buffer zones are pending at the Office of the President. Local government units should give attention to buffer zones' activities.

3. *Water charges and permits*

Deep wells at UPLB and at the International Rice Research Institute (IRRI) are not registered at the National Water Regulatory Board (NWRB) and therefore, water at UPLB is 80 per cent unaccounted for. Only water franchise holders can charge water fees.

4. *Potability of drinking water*

Water coming from the water districts are potable since this is subjected to regular bacteriological test. However, water from shallow wells is not potable because of high level of nitrite and coliform bacteria. In addition, water from hot springs is also not potable due to its high sulphur content.

5. *Seepage of garbage fluids into ground water along PCARRD road*

The present garbage dumping site is only temporary while UPLB is looking for an alternative site in cooperation with the municipality of Los Baños.

Outputs of the May 27 and July 24 1998 Consultation Meetings

Water Resources

The participants in the consultation meeting with water users of the MFR were grouped into three to discuss issues and recommendations regarding the : 1) evaluation of economic instrument, 2) institutional structure for water pricing, and 3) enabling policies to implement water pricing reforms. The following are the issues and recommendations identified:

Evaluation of economic instruments

The major questions asked were how much fee to collect, who will be in charge of collection and who will administer the collection. The amount to be collected should be a percentage increase of fees based on current consumption. The fund for maintenance and protection of the MFR should be shared with other users of the MFR such as the recreational users, upland farmers and other sectors benefiting from the Reserve. As far as mode of collection is concerned, suggested schemes include cooperatives, through the water districts, and several points of collection and then turned over to an organisation or institution. Memorandum of understanding (MOU) will be signed between cooperatives/parties and UPLB. As to who will administer the funds, the participants suggested that payers should be recognised as stakeholders and be involved in determining fund administration.

Institutional structure for water pricing reforms

In charging water fees, there is a need to categorise water users, e. g., industrial, institutional, recreational, and domestic users, and water fees should be charged accordingly. However, non-cash mechanisms on water charging should also be explored. Instead of fees, contribution in kind, such as reforestation activities, can be encouraged. Using information, education and communication (IEC) as a strategy, resource depletion as a reason for pricing reforms rather than revenue generation should be highlighted.

The existing conflict between LGUs and water districts should be addressed by defining the role and jurisdiction of each unit.

Enabling policies to implement water pricing reforms

There is a need to clarify existing policies relevant to water use e. g. Presidential bills and policies. Decree (PD) 198, PD 1067, WRAP Bill and others. The mandates of the different institution that have overlapping jurisdiction/authority on water rights should be reviewed. The existing pricing scheme of Laguna Water District and the community-based water cooperatives should be reviewed and develop a mechanism to allow provision for rehabilitation and conservation of the MFR.

The institutionalisation of the Master Plan for the Mount Makiling Conservation and Development should be vigorously pursued. There is a need to review Executive Order No. 349, which provides for the adoption of Mount Makiling and Laguna de Bay Master Plan. Substantial support from various sectors in the implementation of the Master Plan should be sought. A vigorous information, education and communication on how much it takes to produce and distribute water as a commodity is likewise needed.

The impacts of various users on the sustainability of water resources should be done by establishing good database on consumption by different water users and conducting more researches on impacts to sustainable use of resources. In addition, a review of the existing land use policies and their impacts on water supply should be done. Efforts to make land use planning more environment-friendly are a must.

In the light of the above issues and recommendations, the creation of a super body called the "Makiling Task Force on Water Resources and Management" to monitor use of water resources was suggested. This multi-sectoral agency will be composed of all water districts, cooperatives, farmers/ irrigators' associations, commercial/ industrial establishments, LGUs, and institutions like UPLB, National Power Corporation (NPC), and the Department of Environment and Natural Resources (DENR). Its roles and functions will include: 1) policy recommendation, 2) coordination, 3) monitoring and regulation, 4) funds generation, and 5) IEC.

Forest Recreation and Eco-tourism

The workshop on forest recreation and eco-tourism had 26 participants coming from schools which have visited the Makiling Botanical Gardens, institutional lessees in the Makiling Forest Reserve, and other interested parties.

The objectives of the workshop were: 1) to propose economic instruments for pricing forest recreation and eco-tourism in Mount Makiling, 2) to identify research and development activities necessary to determine appropriate charges, and 3) to identify the institutional requirements of collecting proper charges

Among the issues discussed were:

- Whether the entrance fees charged at MBG are sufficient for the recreation and eco-tourism services provided.
- The participants, except for one, agreed that the entrance fees charged at MBG are very low compared to the satisfaction users derive from using it.
- The implications of providing other services free of charge (e.g., hiking, camping, etc.) were also discussed. It was pointed out that the budget allocation for the Makiling Forest Reserve was insufficient to effectively protect and develop the MFR.
- The representatives of the institutional lessees providing outdoor recreation, eco-tourism and similar services (Pook ni Mariang Makiling, Boy Scouts of the Philippines, National Arts Center and the Museum of Natural History) informed the body about their operations. Most of them said that the revenues generated from entrance fees were not enough to maintain and develop these areas. They have to ask for subsidies from their mother offices.
- The participants agreed that it was all right to raise fees (or impose fees where none exist) even before improvements are made in the recreation areas. It was recommended that the revenues generated from entrance fees should be plowed back for the improvement of the recreation areas.

Through the workshop, the following were identified:

Research studies will be conducted to determine the demand for and supply of forest recreation and eco-tourism in the MFR.

The possibility of developing tour guide services should also be considered.

Among the institutional mechanisms that should be explored are:

- To semi-privatise the operations of the recreation and eco-tourism areas. Government procedures of disbursing funds are not compatible with the efficient provision of recreation and eco-tourism services.
- To form a recreation/eco-tourism association which will strengthen linkage between and among institutions within and outside the MFR.

Non-Timber Forest Products

The objectives of this discussion group were to: 1) determine the values of selected non-timber forest products particularly plants; 2) determine factors/issues affecting the valuation of the selected plants; and 3) formulate solutions/recommendations for proper valuation of the selected plant species.

To accomplish these objectives, the resource persons reiterated the importance of the MFR to the participants in terms of its various land uses and the huge amount of capital needed to rehabilitate and conserve it. They likewise emphasised the important role of the participants in the preservation of the MFR by contributing partly to the needed capital as potential and actual buyers of MFR's available planting materials. Participants were asked their willingness to pay for selected plant species derived from the MFR. The resource persons prepared two (2) survey forms: 1) one containing the characteristics of the respondents, the common type of species used in their landscaping /businesses and the problems they have encountered; and 2) detailed list of possible plant/seed materials available at the MFR. In the latter form, the participants were requested to indicate their willingness to pay for the species that they might and actually be using and the corresponding sizes, volume and period needed. The data that would be gathered would be used in determining the demand, supply and pricing of the selected plant species. In addition, the participants were encouraged to contribute actively in the group discussion regarding their experiences in managing their businesses with special emphasis on factors affecting valuation of plants, problems, possible solutions and recommendations.

The following are the highlights of the discussion:

On Price Determination

With regard to pricing of their products, the participants were silent or very "cautious" to mention figures, hence the group relied on the survey forms that were provided to them. At present, the prices for the plants have not yet been determined since the second survey form has to be revised and returned to the participants. The participants wanted that the scientific names of the plants should be indicated rather than their common names.

On Problems Encountered by Plant Growers /Landscapers/ Contractors:

- Lack of sources of plant materials
- Inaccessibility of roads from plants suppliers to buyers
- Graft and corruption ("tongs" at check points)
- Lack of resources (land, water supply, money)

Suggestions and recommendations for the MFR:

- Manage the MFR like a business enterprise in order to earn profit.
- Designate an area to showcase the various plants for sale.
- Document available plant species of the MFR (include biological and ecological characteristics such as adaptability)
- Establish database /directory of plant growers
- Conduct researches on the development of appropriate technology i.e., techniques in balling, planting of dipterocarp seedling / trees.
- Plant rare and exotic species that are in high demand in the landscaping business.

Agriculture Sector

The workshop participants consisted mainly of representatives from different people's organisations and barangay councils as major stakeholders of the MFR. The general objective of the workshop was to encourage attendance and active participation of the agriculture sector in the consultation/group discussion for the development of MBIs for the MFR. Its specific objectives were:

- To provide the participants with background information on the concept of MBIs towards better and sustainable management of the MFR;
- To determine previous and current undertakings of the agriculture sector in the rehabilitation, conservation and development of the MFR;
- To identify issues associated with the current MFR efforts and undertakings of the agriculture sector; and
- To draw insights on the appropriate strategies and mechanisms to conduct case analysis and testing of MBIs suited to the MFR agriculture sector.

The workshop was designed specifically to elicit active participation from the farmer-participants. Based on the set objectives, the workshop included the following phases:

1. Participants' orientation on the role of Mount Makiling and on the concept of MBIs for better and sustainable management of the MFR.
2. A 10 to 15 minute informal presentation/narration of the activities, issues and problems the farmers encountered in implementing conservation and rehabilitation efforts in the MFR.
3. Open forum on farmer/community problems and issues in the conduct of different MFR activities.
4. Farmers' exercise to test the applicability of the economic instrument which can be later adopted by the MFR agriculture sector.

Specific outcomes were the following:

General positive reaction from the farmers with regard to coming up with an MBI for the agriculture sector after the initial briefing on project objectives.

Farmers/leaders' participation in the community/PO activities in the MFR. Among the major activities conducted in varying degrees are:

- MFR boundary surveying and delineation,
- tree planting and/or reforestation,
- nursery establishment,
- forest protection by guarding,
- control and monitoring of in-coming migrants,
- collection of fees from quarrying activities in a barangay adjacent to the MFR,
- maintenance of specific areas through the "bayanihan" system, and
- limited attendance in training courses and seminars.

With limited resources on hand, the participants identified five essential needs not only to sustain their initial cash inputs but to support their interest and current efforts in the conservation and rehabilitation of the MFR. These are:

- technical assistance through conduct of training and seminar and possibly to identify institutions which could provide funding for various activities under the technical programme or project;
- financial support for nursery maintenance;
- coordination and linkage establishment with possible funding institutions;
- need for a process documentor from UPLB to document what are being done by each PO; and
- individual PO plan and an integrated plan for all the POs with corresponding necessary support/assistance. The plan can be submitted to funding organisations, individually or as an integrated plan.

Farmers' exercise on valuing the inputs they have provided in the conservation and development of the MFR. The outputs in this exercise will be used to firm up the MBI case analysis for the MFR agriculture sector.

Outputs of the February 25 and June 7 1999 Consultation Meetings

Forum on Water Use Policies

The forum on water use policies was held on February 25, 1999 at the Training Center for Tropical Resources and Ecosystems Sustainability (TREES) at the College of Forestry and Natural Resources. It was conducted for two main objectives: 1) to clarify policies and guidelines concerning water extraction and use, and 2) to draw mechanisms for institutional arrangement regarding water use management.

It was conceived to provide a venue where the institutional water users like the Laguna Water District, UPLB, IRRI, and LLDA can discuss issues regarding their stakes on the water resources emanating from the MFR. Eng. Pantaleon Ll. Tabanao, President of the Laguna Association of Water Districts (LAWAD) presented the pertinent National Water resources Board (NWRB) policies which give them the authority to manage the local water resources. The heads of the three institutions, UPLB, IRRI, and LLDA, were invited to react to Eng. Tabanao's discussion paper. The following people represented their institution: Dr. Cecilio R. Arboleda, Dean of College of Agriculture, UPLB; Mr. Tomas P. Clemeno, Manager of IRRI's Experimental Station; and Atty. Ma. Theresa Oledan, Legal Division Chief, LLDA.

The possibility of tapping the Molawin Creek as a source of surface water at least for irrigation requirements of UPLB and IRRI was the focus of another paper presented by Dr. Victor S. Luis of the College of Engineering and Agricultural Technology (CEAT), UPLB. Meanwhile, Dr. Rex Victor O. Cruz discussed the proposed institutional framework for external financing of Mount Makiling Watershed Protection and Conservation Projects.

About 60 people representing the following organisations attended the forum:

- Resort Owners (Hillsipa Resort, Doña Jovita Garden Resort, City of Springs, Splash Mountain)
- Water Districts (Laguna, San Pablo, San Pedro, Calamba, Sto. Tomas, Dasmariñas)
- Department of Environment and Natural Resources (Provincial Environment and Natural Resources Office, Community Environment and natural Resources Office, Ecosystems Research and Development Bureau, Mount Makiling Reserve Area and Laguna de Bay Commission, Coastal Environment Program)
- Local Government Units (Los Baños, Bay, Sto. Tomas, Batangas)

- Department of Science and Technology (Forest Products Research and Development Institute)
- NGO (Resources, Environment and Economics Center for Studies)
- Ateneo de Manila University
- International Rice Research Institute
- Laguna Lake Development Authority
- UPLB (College of Forestry and Natural Resources, College of Economics and Management, College of Public Affairs, College of Agriculture)

Questions, Comments, Issues and Concerns

1. The Laguna Water District charges all water users a Production Assessment fee by virtue of PD 198. Where does this fund go? How is it used? It was said that a portion of the production assessment revenue is being used to protect the Dampalit watershed in the MFR, which is the main water source of the Laguna Water District. If this is so, can the water district contribute some amount to the watershed conservation and protection fund out of its production assessment? If, yes, what is the mechanism?
2. The proposed environmental fee will be an added cost to the small water users like the households. Why not include also the institutional water users like the National Power Corporation, UPLB, and IRRI?
3. There is a big potential for tapping the Molawin Creek as a source of surface water. However, there is a need to conduct a study to determine the economic, financial, and social feasibility of the activity. The presence of toxic elements in the water is a major consideration.
4. The legality and mechanism of the proposed environmental fee has to be studied further. A deeper study should be done to provide answers to questions such as: How much to collect? How will collection be done? Who will manage the fund? Where will the collected fee be spent?
5. More public hearings should be conducted since not all the sectors in the community are invited to the previous consultation meetings and to the forum. People and other stakeholders who can speak for the sector they represent should be identified and invited to the public hearings.
6. There is a need to revise the proposed institutional framework and present it during the public hearings.
7. Since the proposed environmental fee will be managed by UPLBFI, may be there is a need to amend its by-laws to provide a seat in the UPLBFI Management Board for the representatives of the various stakeholders.
8. According to Eng. Tabanao, the water districts have agreed to contribute to the conservation efforts in the MFR.

National Consultation Meeting on Natural Resource Pricing in the MFR

The Meeting was held on June 7, 1999 at the Training Center for Tropical Resources and Ecosystems Sustainability at the College of Forestry and Natural Resources at UPLB. The main objectives of the meeting were: 1) report the progress of natural resource pricing efforts in the MFR, 2) identify mechanisms for institutional partnership and benefits sharing, and 3) identify investment requirements and fund sources for the conservation and development of the MFR.

- About 50 participants representing the following organisations attended the meeting:
- Resort owners/administrators (Pook ni Maria Makiling, RWR Resort, Hilspa Resort, Doña Jovita Garden Resort)
- NGO (Tourism Association of Laguna, Foundation for Philippine Environment, Haribon, Earth Savers Movement)
- National Water Resources Board
- Laguna Water District
- Manila Water Company
- DENR (Presidential Task Force on Water Resources Development and Management, Protected Areas and Wildlife Bureau, ASEAN Regional Center for Biodiversity Conservation, Mount Makiling Reserve Area and Laguna de Bay Commission, Ecosystems Research and Development Bureau, Community Environment and Natural Resources Office)
- United Nations Environment Programme
- Resources, Environment and Economics Center for Studies
- Laguna Lake Development Authority
- UPLB (College of Forestry and Natural Resources, College of Public Affairs, Office of the Vice Chancellor for Planning, Office of the Vice Chancellor for Community Affairs)

The research teams discussed the specific recommendations of the project with regard to the pricing of water and recreation in the MFR. Proposals for biodiversity conservation, eco-tourism, and non-timber resources of the MFR were presented. The institutional structure to implement the pricing scheme was discussed. Moreover, it was agreed that the University will meet with the various sectors for further consultation and discussion.

Questions, Comments, Issues and Concerns:

1. There may be a need for UPLB to reconsider turning over the management of its water system to the Laguna Water District for higher efficiency (i.e. reduce wastage and accounted use of water).
2. The legality of charging fees for water use rests on the National Water Resources Board (NWRB). Collection of the watershed conservation and protection fee will not necessarily be done by UPLB.
3. Some efforts to touch-base with the consumer groups who will actually be affected by water pricing have actually been done. The previous and current meetings where the representatives of the various sectors were invited to participate were indicative of this effort. However, reaching out to the household level has not yet been done. Perhaps the local water districts and the LGUs, who may eventually collect the charges from the end users will be in a more appropriate position to conduct public hearings.
4. Ugnayan, a federation of NGOs in based Los Banos, has expressed desire to be invited and be included in discussions, meetings and consultations pertaining to the MFR. MFR management took note of this.
5. The water district is the only entity legally empowered to collect water use fees. The legality of UPLB imposing the fee and coursing the collection through water district may have legal implication. Nonetheless, UPLB would have to coordinate with the water districts concerning this matter.
6. The distinction between the amount of surface and ground water being extracted from the MFR will be a useful basis for pricing. The water task force is now in the process

of producing the data and information about this. That covering Laguna may be obtained upon proper request.

7. The legality of issuing permits for water extraction rests only on the NWRB. So far, only two resorts in Laguna have obtained such permits. Even UPLB, IRRI and NPC have not complied yet with this requirement.
8. Charging of fees as expected faces tough opposition and contradictions. It may be worthwhile for UPLB at this point to instead concentrate on improving its current sources of income (i.e. seedling production and expanded MBG or eco-tourism) that are already in place and/or are within its legal jurisdiction.
9. The MFR is considered an important watershed, hence, the garbage dumping now being allowed within its portion is a matter that needs the urgent attention and action of UPLB and the local government of UPLB.
10. UPLB assuming the leadership in taking up matters re: is based on the legal mandate given to it by RA 6967. The suggestion to take up issues of public interest, which seemingly fit more under LGU concerns (such as water), through multisectoral conventions rather than mere consultations, has been noted. This will have the advantage of obtaining other expertise that may be available from other sectors.
11. The government as a key player in providing this service should also share in the cost. In the MFR case, subsidies from UPLB worth about P8 -m per year are being provided in terms of salaries for personnel and maintenance costs.
12. A caution about subsidies, was, however, brought out. Consumers paying less may not help regain actual costs which could lead to a higher effective cost instead. For example, poor quality of water is likely to compel people to buy the more expensive mineral water. In the long run, people will shell out more than if they share in the costs of maintaining good quality water at manageable price. Here, the notion of subsidy distorts the cost.
13. A request for more public hearings and information dissemination to peers of those usually invited to the consultations was expressed. Due to limited resources, however, it was noted that it was indeed impossible invite everybody. The expectation set was that those invited, being officials of the various institutions they represent, should now be sharing and discussing these information to their colleagues.
14. Current efforts to exact a fee from major water users in the MFR do not necessarily exclude other user groups. Papers in the afternoon session in fact dealt with forest products and services which other users are deriving and the recommended pricing for their use.
15. From the businessman's point of view, MBG can be a very viable income generating project. Hence, the possibility of it being managed by a private business group instead of the government was suggested. Another alternative is for MBG to develop more unique and innovative eco-tourism and recreation experiences that will lure the more adventurous tourists to pay for a package, instead of only one, of recreation activities. A tie up between MBG and the nearby resorts will be explored.
16. The unsightly and unhealthy dumping of garbage at the Jamboree site was also noted. UPLB informed the group that an alternative site somewhere in Bay is now being prepared to solve this problem.
17. Concern about the local communities now being allowed to stay in the MFR as threats to the stability and integrity of the resource was brought out. UPLB explained its

people-oriented philosophy of occupancy management and assured the audience that a programme is now in place to address the issue.

18. Proposed institutional framework for managing the watershed conservation and protection fund was generally acceptable to the stakeholders. It was emphasised, however, that whoever will seat in the board should have the authority and guts to make final decisions for the institutions or offices they represent. Otherwise, passing the buck to their superior may render the board ineffective. It was agreed that refinements of the institutional arrangement will be made later by the appointed board.
19. Membership to the board will be based on sectoral representation and the amount that each sector has paid as their due share in the fees. Proposed management will be more of a corporate-like system.
20. It was noted that costing for land resources has not been included. Perhaps, fees and rentals may also be charged from those occupying housing units and office spaces within the MFR.
21. Imposing charges on water use will be difficult to impose.. Hence, it was suggested that UPLB explore other sources of income for MFR conservation that will encounter less opposition from the public.

APPENDIX B

GUIDELINES ON THE IMPOSITION, COLLECTION, AND ADMINISTRATION OF WATERSHED PROTECTION AND CONSERVATION FEE

Atty. Eleno O. Peralta
Administrative Order No.: _____
Series of 1999

**SUBJECT: GUIDELINES ON THE IMPOSITION, COLLECTION, AND
ADMINISTRATION OF WATERSHED PROTECTION AND
CONSERVATION FEE**

Pursuant to the provisions of Republic Act No. 6967 dated October 15, 1990, which vests control, jurisdiction and administration of the Forest Reserve of Mount Makiling in the University of the Philippines in Los Baños and Executive Order No. 349 dated June 18, 1996 adopting the Mount Makiling Reserve Area and Laguna de Bay Master Plan, the following guidelines are hereby implemented for strict compliance of all concerned.

Section 1. STATEMENT OF POLICY

The watershed areas of the Mount Makiling Forest Reserve (MFR) shall be protected and conserved to ensure its sustainability primarily as training laboratory for the advancement of scientific and technical knowledge particularly in the preservation, conservation and development of our forest, flora and fauna and natural resources.

Section 2. OBJECTIVES

- A. To implement the Mount Makiling Reserve Area and Laguna de Bay Region Master Plan on the rehabilitation and conservation of the watershed to ensure adequate and continuous supply of quality water for various uses.**
- B. To promote equitable access and fair sharing of costs and benefits derived from the extraction, utilisation, enjoyment, and development of the natural resources found inside the MFR.**
- C. To generate sufficient funds and resources for the conservation and management of the MFR.**

- D. To establish collaborative undertakings with the various sectors deriving benefits from the MFR for the sustainable development of the reserve.

Section 3. SCOPE

These guidelines shall apply to the extraction, use, enjoyment, and development of the various watershed resources in the MFR.

Section 4. WATERSHED PROTECTION AND CONSERVATION FEE

A Mount Makiling Watershed Protection and Conservation (WPC) fee shall be charged for the extraction, utilisation, enjoyment, or development of all natural resources in the MFR. This fee shall be used to implement the watershed protection and conservation programmes in the MFR.

Section 5. IMPOSITION AND COLLECTION

The WPC fee shall be imposed and collected from any person engaged in the following activities:

- A. Cutting, gathering, and collection of non-timber forest products from the MFR.
- B. Entering and/or visiting the recreation and eco-tourism areas inside the MFR.
- C. Extracting, using, or otherwise sourcing out water from the MFR, to be classified as follows:
 - i) Institutional users deriving their water supply from the MFR
 - ii) Commercial users such as resorts, business establishments, etc.
 - iii) Households
 - iv) Industrial

Section 6. RATES/MODE OF PAYMENT OF WPC FEE

The rate of payment of WPC fee shall be determined based on the volume of water used. The MFR Trust Fund Management Board shall formulate the implementing rules and regulations of this Administrative Order.

Section 7. IMPLEMENTING UNIT

The University of the Philippines Los Baños-College of Forestry and Natural Resources (UPLB-CFNR), through the Makiling Center for Mountain Ecosystems (MCME), shall be the implementing arm of the University to ensure that these guidelines are complied with.

Section 8. INSTITUTIONAL LINKAGES

- A. The UPLB shall enter into formal arrangements with the local water districts, local government units (LGUs), non-governmental organisations (NGOs) and other institutions towards the full implementation of these guidelines.
- B. All existing agreements between UPLB and other institutions for the use of portions of the MFR shall be reviewed and amended to incorporate pertinent provisions of these guidelines.

Section 9. MT. MAKILING FOREST RESERVE TRUST FUND MANAGEMENT BOARD

- A. A Mount Makiling Forest Reserve Trust Fund Management Board shall be established to be composed of the following:
- UPLB
 - Institutional leaseholders
 - People's organisations
 - Local government units (Laguna and Batangas)
 - Water districts
 - Laguna Tourism Association
 - Laguna Chamber of Commerce and Industries
 - Industries from Sto. Tomas, Batangas
 - NGOs
 - Others
- B. The MFR Trust Fund Management Board shall be responsible to:
1. Formulate the policies, guidelines, and criteria for funding of projects and activities related to the MFR Conservation and Development Program (MCDP).
 2. Ensure the effectiveness and efficiency in the implementation of various projects and activities supported by the fund.

Section 10. SANCTIONS

Non-compliance with Section 5 hereof shall be a ground for the revocation of the license, permit, franchise, tenure agreement, contract, or any other instruments for the extraction, use, enjoyment, or development of any of the natural resources of the MFR, without prejudice to the right of the UPLB to impose surcharges and to institute other necessary actions against the violator/s.

Section 11. SEPARABILITY CLAUSE

If any clause, sentence or provision of these guidelines is held or declared to be invalid by a competent court, the remaining parts of these guidelines shall not be affected thereby.

Section 12. REPEALING CLAUSE

All previous orders, guidelines, rules and regulations inconsistent or contrary to these guidelines are hereby repealed or modified accordingly.

Section 13. EFFECTIVITY

These guidelines shall take effect fifteen (15) days after its complete publication in a newspaper of general circulation.

APPENDIX C

CAPSULE PROPOSAL FOR THE FURTHER DEVELOPMENT OF THE MAKILING FOREST RESERVE AS AN ECOTOURISM AREA

With its unique natural features and biological importance, the MFR offers potential eco-tourism and forest recreation opportunities that could be developed and offered to visitors. At present, however, there are no bases for developing the MFR for these purposes, thus this proposal for a feasibility study.

Objectives:

1. to identify sites in the MFR that have potential for eco-tourism; and
2. to determine the feasibility (market, technical, financial, and socio-economic) of developing these areas for eco-tourism.

Methodology:

The feasibility study will include the following components:

Market study – to assess the demand for different eco-tourism activities (local and foreign), similar eco-tourism opportunities provided in the vicinity, the factors affecting the market for eco-tourism, and to develop a marketing programme.

Technical feasibility – to prepare the development plan for the different eco-tourism sites, identify input and technical requirements, and to assess the ecological soundness of the proposed developments vis-à-vis the carrying capacity of the MFR.

Financial feasibility – to determine the costs that will be incurred in the development of the area, identify possible sources of financing, determine appropriate prices, and to conduct financial analysis.

Socio-economic study – to assess the effects of the project on employment, income and living patterns.

Budgetary Requirements of Feasibility Study

ITEMS	AMOUNT (₱)
Personal Services	
1 Project Leader (₱ 3,000.00/mo. x 12 mo.)	36,000.00
4 Study Leaders (₱ 1,000.00/mo. x 12 mo.)	48,000.00
1 University Research Associate	156,000.00
Contractual labour	50,000.00
Subtotal	290,000.00
MOOE	
Travel and related expenses	60,000.00
Supplies and materials	50,000.00
Computer and peripherals	50,000.00
Sundries (Photocopying, film development, map preparation, others)	60,000.00
Subtotal	220,000.00
Contingency (10 per cent of MOOE)	22,000.00
Administrative Cost (10 per cent of Total Cost)	53,200.00
TOTAL COST	585,200.00

APPENDIX D

PROJECT PROPOSAL

Title:	Inventory and Utilisation of Non-Timber Forest Products in the Mount Makiling Forest Reserve
Proponent:	UPLB College of Forestry and Natural Resources
Duration:	Two (2) years
Proposed budget:	P 2.50 M

Rationale

NTFPs include all forest products other than timber such as bamboo, rattan, fuelwood, resins, gums, oils, tannins, dyes, medicine, edible plants and ornamental plants. They are important in the livelihood of the people. They served as raw materials of important industries and have high export values. They can also be substitute construction materials and alternative energy sources.

NTFPs have been improperly manage as resource. They have been viewed as less economical important. They have also been over exploited because there is little knowledge about NTFPs. There are very scarce data in inventory of NTFPs. In other words, there have been no concerted effort to value, manage and assess the stock and quality of NTFPs. and their utilisation.

Model projects to test Market-based Instruments in determining values of NTFPs are effective strategies toward putting proper values to these resources. Model projects such as this require data from inventory and yield studies.

Overall objective

To conduct an inventory and utilisation of different NTFPs in the Mount Makiling Forest Reserve

Study 1: Inventory of Non-Timber Forest Products

Objectives

1. To characterise the density and size classes structure of NTFPs in the Mount Makiling Forest Reserve.
2. To determine the total volume of different NTFPs per hectare in different areas of the Mount Makiling Forest Reserve.
3. To determine the volume and stock of different NTFPs in hectare in the Mount Makiling Forest Reserve.
4. To quantify the resource/ product produced by different NTFPs sources of varying sizes.

Methodology

1. Collect information about the MFR
 - a. Topo-maps
 - b. Soil and geologic survey map
 - c. Climatological data
 - d. Descriptive analysis of the vegetation
 - e. Inventory data
 - f. Forest type maps
 - g. Standard aerial maps
 - h. Satellite images
2. Collect herbarium list of plants collected within the area
3. Collect ethnobotanical and use information
4. Gather literature about the area
5. Conduct forest typing
6. Conduct actual field inventory
 - a. Sampling
 - b. Field measurement/mapping
 - c. Data analysis
7. Preparation of reports

Expected output

Data on quality and quantity of non-timber forest products in the Mount Makiling Forest Reserve.

Study 2: Utilisation of Non-Timber Forest Products in the Mount Makiling Forest Reserve

Objectives

1. To identify and describe the uses and practices/technologies employed in the utilisation of NTFPs.
2. To determine the uses and identify problems involved in the utilisation of NTFPs and recommend possible solutions to the problems

Methodology

Data Gathering

Primary and secondary data will be used for this study. Primary data will be gathered through personal interview using pre-tested interview schedule and personal observation. Secondary data will come from Study 1 and from existing literature such as official published literature, reports, studies and researches from various libraries and organisations.

Analytical procedure

Qualitative and quantitative analysis will be done. Qualitative analysis will include description, characteristics and list of NTFPs, their uses, list of users, socio-demographic characteristics, technologies/practices being used and problems in NTFPs utilisation. On the other hand, quantitative analysis will consist of frequencies, mean and ranges. Maps and graphs will also be used to highlight important information.

Budgetary Requirement

PROJECT	YEAR/AMOUNT (₱)		
	1	2	TOTAL
Study 1	1.20 M	0.80 M	2.00 M
Study 2	0.25 M	0.25 M	0.50 M
TOTAL	1.45 M	1.05 M	2.50 M

APPENDIX E

MAKING MT. MAKILING A BIODIVERSITY CONSERVATION AREA

This paper presents an overview of the concept of biodiversity and proposes several projects to strengthen the biodiversity conservation goals in the management and development of the Mount Makiling Forest Reserve (MFR).

What is Biodiversity?

Conserving biological diversity is conserving the variety and variability among living organisms and the ecological complexes in which they occur (McNeely J. et al., 1990). Biodiversity (a contraction of biological diversity) is often defined in terms of genetic diversity, species diversity and ecosystem diversity, corresponding to the three fundamental and hierarchically related levels of biological organisation. Genetic diversity refers to the variety of genetic information contained in all of the individual plants, animals and micro-organisms. Genetic diversity occurs within and between population of species as well as between species. Species diversity refers to the variety of living organisms on earth. Current estimates of the total number of species existing on earth range from 10 million to nearly 100 million, though only about 1.4 million species have been described to date (Lovejoy, 1997). Species diversity can be measured according to species richness or the number of species in a site or habitat. Other measures may be in the form of species abundance, and taxonomic or phylogenetic diversity. Ecosystem diversity relates to the variety of habitats, biotic communities and ecological processes, as well as the tremendous diversity present within ecosystems in terms of habitat differences and the variety of ecological processes.

It is generally accepted that tropical forests have the best known concentration of biodiversity. While these forests comprise roughly 7 per cent of the dry land surface of the earth, they hold more than 50 per cent of all species.

Values of Biodiversity

- Three main approaches are being used for assessing the value of biological resources:
- Assessing the value of nature's products - such as firewood, fodder, and game meat – that are consumed directly, without passing through a market (consumption use value);
- Assessing the value of products that are commercially harvested, such as timber, fish, game meat sold in a market, ivory, and medicinal plant (productive use value); and,
- Assessing indirect values of ecosystem functions, such as watershed protection, photosynthesis, regulation of climate, and production of soil (non-consumptive use value), along with the intangible values of keeping options open for the future (option value) and simply knowing that certain species exist (existence values).

Biodiversity Loss

The loss of biodiversity may take many forms but its most fundamental and irreversible cause involves the extinction of species. Species may be exterminated through a series of harmful effects and antagonistic agents. These may be divided into two broad categories, namely: direct (hunting, poaching, collection and persecution), and indirect (habitat destruction and modification).

By overhunting, poaching and overfishing of animals, overharvesting of plants, and by destroying or altering natural environments, human activity results in some modification of the natural environment. This modification will affect the relative abundance of species and in extreme cases, may lead to extinction. This may result to the habitat being made unsuitable for the species (for example, clear-felling of forests or severe pollution of rivers), or the habitat becoming fragmented. The latter has the effect of isolating and dividing previously contiguous populations of species into small sub-populations. If these are sufficiently small, then change processes may lead to high probabilities of extinction within a relatively short period.

Biodiversity Conservation Approaches

General approaches to biodiversity conservation are grouped into in-situ conservation and ex-situ conservation. In-situ (on-site) conservation involves the maintenance of plant and animal genetic material in their natural habitat. The aim of in-situ conservation is to allow the population to maintain itself within the community of which it forms part and in the environment to which it is adapted so that it has the potential for continued evolution. Protected areas are among the most valuable in-situ conservation tool and cost-effective means for preserving genes, species, and habitats and for maintaining various ecological processes of importance to humanity. They are set aside to conserve species that cannot be preserved ex-situ and wild crop relatives. Ex-situ (off-site) conservation is the maintenance of wild or domesticated materials in arboreta, botanical gardens, zoo, game farms, orchards, plantations, hortoria, seed collections, tissue culture laboratories and gene banks. Off-site conservation programmes supplement on-site conservation by providing for the long-term storage, analysis, testing and propagation of threatened and rare species of plants and animals and their propagules. They are particularly important for wild species whose populations are highly reduced in numbers, serving as a backup to in-situ conservation, as a source of material for reintroduction, for research and education, and as a major repository of genetic material for future breeding programmes of domesticated species.

Philippine Biodiversity Goals and Policies

On 5 June 1992, the Philippines joined 153 other nations in signing the Convention on Biological Diversity. The convention has tasked governments to adopt measures including the survey of natural living resources and the protection of sites noted for their rich biodiversity. The Philippine government ratified this on 8 October 1993 thereby making a commitment to insure the long-term maintenance of biodiversity and ecological processes. Relevant goals and policies on biodiversity conservation are indicated in the Philippine National Biodiversity Strategy and Action Plan, the Philippine Agenda 21 and Republic Act 7586 - the National Integrated Protected Areas System (NIPAS) Act of 1992. NIPAS is the classification and administration of all designated protected areas in order to maintain biodiversity and the essential ecological processes and life-support systems to ensure sustainable use of resources found therein, and to maintain their natural conditions to the greatest extent possible. NIPAS adopted the 10 categories of protected areas set forth by the International Union for the Conservation of nature (IUCN). This categorisation however was revised by IUCN. In addition, the Bio-prospecting law (Executive Order 247) signed by the Philippine president in 1995 prescribes guidelines and procedures for the prospecting of biological and genetic resources.

Mount Makiling's Biodiversity

The Makiling Forest Reserve (MFR) is one of the few remaining forested areas in the country with a high occurrence of endemic, rare and threatened wildlife species. It contains 949 genera, 2038 species, 19 subspecies, 167 varieties and several forms of cultivars of ferns and endemic flowering plants belonging to some 225 families. Its rainforest zone still harbours the *Strongylo-don macrobotrys*, *Medinilla magnifica*, *Rafflesia manillana*, three species that are now officially listed among the country's 72 highly endangered plants. Likewise, an orchid species, *Phalaenopsis amabilis* previously classified as extinct in the wild, was recently rediscovered here (Gruezo 1997). In terms of faunal diversity, there is a presence of 375 vertebrate species, 128 of which are endemic to the Philippines, including 21 species of amphibians, 69 reptiles, 241 birds, and 44 mammals. One endemic hornbill bird, *Penelopides manillae* is known to be threatened (Gonzales, 1997). The MFR is the site of the Center for Philippine Raptors where a captive breeding programme for the endangered Philippine eagle is being implemented.

As one of the very first protected areas established in the country (as a forest reserve in 1910), the MFR provides important lessons and experiences generated from the numerous studies conducted on the biology and ecology of various groups or species of vertebrate fauna and flora. The MFR also functions as a vital watershed for the surrounding municipalities in the provinces of Laguna and Batangas with its major rivers and tributaries draining into Laguna de Bay - the country's largest lake.

The MFR is a unique but highly threatened lowland evergreen rainforest some 65 km south-east of Metro Manila. Habitat disturbance and degradation are occurring in the form of agricultural and residential encroachment, harvesting of forest plants, poaching of animals and birds, dumping of garbage, and air pollution from nearby industrial areas.

The tasks of conserving the MFR's biodiversity are reflected in Republic Act No. 6967 and the subsequent Master Plan for the MFR. The challenge now is how to implement appropriate steps to make it a biodiversity conservation area.

Proposed Biodiversity Conservation Projects in the MFR

Several projects are being proposed by MCME to conserve the MFR's biodiversity. These projects are intended to assist in advancing scientific knowledge on biodiversity conservation by sustainably managing the MFR as a globally significant biodiversity conservation area and a representative example of a threatened lowland rainforest ecosystem. Focus will be given to the conservation of endangered and endemic trees, shrubs, vines and other plant species by collecting, cultivating, studying and documenting monitoring plots; development of a computer-based biodiversity decision support system; and the conduct of biodiversity conservation education and information activities.

Ultimately, MFR biodiversity conservation projects are expected to improve capabilities in managing Mount Makiling as a in-situ and ex-situ biodiversity conservation area.

Planned projects and activities:

Conservation and management of living collections

- Botanical exploration and conservation biology studies of endemic and endangered rainforest plant species
- Documentation and management of MBG's living collections

Establishment of long term biodiversity monitoring plots

MFR biodiversity decision support system (BIODESS)

Biodiversity education and information

- Design and production of interpretative materials, signage and guides
- Publication of a new book and video about the MFR's rainforest flora and fauna
- Production of an interactive CD-ROM on the MFR's biodiversity
- Training and biodiversity camps for secondary school teachers

APPENDIX F

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