



BRP presents research results to stakeholders

Around 200 individuals from the local government units, government-line agencies, academe, nongovernment organizations working within the Mt. Malindang area, communities within the research sites, and Dutch partner institutions participated in

aquatic, and coastal ecosystems, as well as the socioeconomic-cultural aspects within the research area. The results of these research projects are intended to address the needs of the community, and to aid in formulating policy recommendations for biodiversity conservation and sustainable development.

One of the highlights of the conference was a dialogue with the stakeholders to determine the impact of the research results. The stakeholders recognized the importance of research, especially in awareness raising and knowledge generation useful for the conservation of the biodiversity in their area. They now recognize the endangered and threatened species of flora and fauna in their area as well as the bioindicators of water quality. The local researchers have seen the importance of using organic fertilizer, introduced by the integrated pest management (IPM) project in increasing production and return of investment. Others mentioned that the results of the river study are useful for river management planning. The Heads of the participating universities have seen the value of the Programme in building the capacity of their researchers. On the other hand, members of the local communities expressed their concern on livelihood security. They hope that through the research results, the local government and nongovernment organizations could provide them with alternative livelihood activities to decrease their dependence on the biological resources in the Mt. Malindang area.

Furthermore, the participants suggested the dissemination of more information, education and communication (IEC) materials on biodiversity conservation, the conduct of some seminars and training on environment-friendly food production strategies such as organic farming, and other applied R & D projects geared towards alternative livelihood activities.

The feedback and suggestions of the stakeholders were discussed during the Joint Programme Committee (JPC) Business Meeting on 20-22 April 2005. The JPC agreed to pursue the production and

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the BRP Closing Conference held on 19 April 2005 at Royal Garden Hotel, Ozamiz City.

The Closing Conference served as the venue to present the research results to the various stakeholders of the Programme. "These research projects are considered the shining glory of the BRP", said Dr. Gil C. Saguiguit, Jr., SEARCA Deputy Director for Administration, and Head of the BRP National Support Secretariat, "because we attempted to apply and articulate the landscape approach, which as far as we know, has never been tried before successfully."

The landscape approach is an in-depth look at the interactions of the different ecosystems in Mt. Malindang and its environs – the upland, lowland,

BRP gets 6 months extension

The Biodiversity Research Programme (BRP) for Development in Mindanao was granted a six-month budget-neutral extension by the Netherlands Ministry for Development Cooperation (DGIS), which funds the Programme, for the period 1 July to 30 December 2005 to complete, consolidate and contextualize research results and other program activities to achieve clear research-for-development outputs of the BRP.

The BRP was originally designed as a 10-year North-South collaborative research for development programme on biodiversity and sustainable development for at least two phases. The guaranteed grant period for Phase I covered 1 July 2000-30 June 2005. However, the current policy of the Netherlands government no longer includes the Philippines in

the list of Priority Countries for Development Assistance.

Given the extension, the BRP has lined up a number of activities including the integration and consolidation of research results, the conduct of a regional conference-workshop to draw lessons from the BRP experiences for developing similar conservation and development projects in the Philippines and in the Southeast Asian region, the completion of process documentation research, the institutionalization of a database/information management system, and the production and dissemination of information, education and communication (IEC) materials for enhancing awareness on biodiversity conservation. ▪

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dissemination of IEC materials to enhance awareness on biodiversity conservation and management in the remaining life of the programme. ▪

May 22 is International Day for Biological Diversity. This year's theme is "*Biodiversity: Life Insurance for Our Changing World*".

The Convention of Biological Diversity is dedicated to promoting sustainable development. The Convention recognizes that biological diversity is about more than plants, animals and micro organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.

<http://www.biodiv.org/convention/default.shtml>

"Next to the economy and social conditions, biodiversity is the third pillar in sustainable development."

- Dr. Theresa Mundita S. Lim
Director, Protected Areas and Wildlife Bureau (PAWB)

Biodiversity and Livelihood...from page 7

7. *Improve infrastructure and access to social services.* This entails building more farm-to-market roads to improve access to social services in the upland and interior lowland communities. Government plans for public works and social welfare should include population management and/or future settlement expansion.

8. *Adopt strategies for enforcement of policies.* To counter perceptions of weak policy enforcement, a combination of "soft" and "hard" approaches in policy enforcement should be adopted. "Soft" approaches include IEC activities, monitoring and evaluation, and social mobilization. "Hard" approaches include apprehension and prosecution of violators and imposition of appropriate sanctions. The government and nongovernment organizations must work together to provide qualified personnel and logistic support, which are essential in the successful enforcement of policies.

It is clear that livelihood, biodiversity and cultural diversity are entwined: the sustainability of one cannot be considered without the others. Policy makers and other stakeholders can use the results of the SEC Studies Master Project and consider its recommendations in strategic planning for environmental and developmental concerns. ▪

Wildlings growth and survival unaffected by various potting media and hormone treatments

Wildlings when planted in different potting media and subjected to various hormone treatments, show no significant difference as to percentage survival and growth – one of the BRP research projects reported.

The research titled “Conservation and Utilization of Endemic, Rare and Economically Important Plants in Three Barangays of Don Victoriano, Misamis Occidental” aimed to select, identify, evaluate and mass propagate the endemic, rare and economically important plants by establishing a nursery, greenhouse, and community garden involving the local community. It is an offshoot of the first generation research that identified the endemic, rare, and economically important plants found in Mt. Malindang.

Prior to the conduct of the research, the study team, headed by Dr. Cecilia B. Amoroso, consulted the local community as to the priority plants, from those identified by the first generation research, to be propagated in the nursery and greenhouse. After a series of validation, only six tree species were recommended. With the assistance and recommendation of the local researchers, more than six species of economically important wildlings were collected from the forests of Palo 6, formerly under Barangay Mansawan but now a part of Barangay New Liburon; Sitio Pongol of Barangay Gandawan, and Linaw of Barangay Lake Duminagat to be propagated in the nursery.

The wildlings collected were grown in various potting media such as, a) Mansawan soil; b) forest soil from Palo 6; c) mixture of forest soil and horse manure; and d) mixture of forest soil and moss. The wildlings were also subjected to naphthalene acetic acid, a hormone that significantly increases the number, length, and dry weight of root hairs, small roots and large roots; benzyladenine, a plant

growth regulator which promotes shoot development; and Hormex, a vitamin hormone concentrate that stimulates root growth.

Findings reveal that there was no significant difference as to percentage survival and growth of the wildlings grown in various potting media. This indicates that the wildlings could grow well even in Mansawan garden soil regardless of the soil’s low organic matter content and low phosphorus, as long as it has high exchangeable potassium. More importantly, this also means that there is no need to add fertilizer for the plants to grow.

Furthermore, the cuttings of *Agathis philippinensis* and *Cinnamomum mercadoi* subjected to hormone treatments showed that their percentage survival was not significantly different to that of the control. This implies that the species could be propagated easily by immersing only in water (5-7 minutes) prior to propagation.

Moreover, the roots of the wildlings of *A. philippinensis* and *Podocarpus rumphii* showed nodule formation in the roots, an indication of mycorrhizal association, which could be the reason why these two plants have high percentage survival.

These results were further substantiated when the hardened wildlings were outplanted along the roads and trails of Barangay Mansawan. Most of them survived, which is an indication that they could be easily propagated as reforestation species. As such, the local government in Barangay Mansawan, where the nursery is established, has drafted a barangay resolution whereby an area in the barangay (i.e., Sitio Kalilangan, located in the denuded mountain of Mansawan) is allocated as a site for reforestation. The nursery will be the source of wildlings that will be used as planting materials in the segregated area; the ensuing tree planting activities will be participated in by the local community.

Another barangay resolution has been drafted prohibiting the pasturing or grazing of animals along the roads and trails where the wildlings have been outplanted. There is also a plan by the Barangay Council to make the nursery into an income-generating project for the community by requiring visitors or tourists to buy the wildlings from the nursery and plant them along the trails leading to the forest. The researchers recommended the creation of a management team composed of four local researchers and other members of the community who have been closely involved in the project to handle and supervise the nursery and its operation. ▪



Agathis philippinensis and *Cinnamomum mercadoi* planted in various potting media.

Biodiversity and Livelihood: Confirming the Link

The link between biodiversity, cultural diversity and livelihood is confirmed in the findings of the researches under the Socioeconomic and Cultural (SEC) Studies Master Project.

The SEC Studies Master Project is the “human component” among the Master Projects of the Biodiversity Research Programme. It is composed of three individual researches that generally aim: (1) to examine the major patterns of resource use over time in the terrestrial and aquatic ecosystems in Mt. Malindang and its environs, viewed in terms of livelihood security and environmental sustainability; (2) to describe the potential of indigenous knowledge systems for synergy with modern technology-based approaches to biodiversity resource management and conservation in Mt. Malindang and its environs; and (3) to evaluate policies, laws, and ordinances that are relevant to biodiversity management and conservation, with particular reference to livelihood security and environmental sustainability and their implications to gender, ethnicity, and culture.

The research sites of the studies included 12 barangays in five municipalities and one city of the province of Misamis Occidental representing the upland, lowland, and coastal communities of Mt. Malindang. A number of activities were conducted prior to the implementation of the researches. Entry protocols, which included courtesy calls to barangay officials, were done in order to secure prior informed consent of the communities to be studied. Consultative community assemblies were organized wherein the BRP principles, vision and mission, and the objectives of the SEC studies were presented to the communities. In these assemblies, community members were encouraged to ask questions or give suggestions on how to further enrich the research methodologies in the context of their specific conditions. The assemblies often served also as the venue for seeking out and identifying local research partners, more commonly known as the local researchers. The local researchers were then trained in field methodologies in socioeconomic and cultural research.

A triangulation of quantitative and qualitative research methods were used in gathering data. Data on resource utilization and environmental policy assessment were specifically derived from a combination of simple random and area sampling

survey techniques, key informant interviews, and focus group discussions. Data for indigenous knowledge were drawn mainly from key informant interviews and focus group discussions. Participant and non-participant observation techniques were also employed.

**Resource Utilization Patterns Across Terrestrial and Aquatic Ecosystems of Mt. Malindang and its Environs*

Land and water resources are what the people utilize to generate their means of survival. Socioeconomic pressures, such as the rate of population growth, migration from rural to other rural areas or urban to rural and vice versa, economic trends, relative prices, among others, greatly influence the utilization of these resources, particularly those relating to livelihood. Engaging in livelihood activities, however, does not only require the consideration of these *natural resources* but the combination of other equally important assets, such as the *physical capital* (e.g., buildings, irrigation canals, roads, etc.), the *financial capital* (i.e., stocks of money that households can accessed which refer mainly to savings and access to credit or income from alternative livelihood), and the *social capital* (i.e., social claims that an individual or households can harness due to personal and family networks, and participation and membership in political, social, and religious organizations). All these need to be taken into consideration in order to strike a balance between livelihood and environmental sustainability.

As such, this study intended to compare the prevalent land and water resource use patterns of communities along Layawan and Langaran Rivers, and describe the major natural resource use patterns at the selected terrestrial sites, including ethnic, class and gender differentiation in the use, access, and/or control over such assets in pursuit of livelihood and other major activities. It also aimed to identify and recommend sustainable livelihood opportunities for the communities.

Results show that in the upland communities, people are heavily dependent on available land and forest resources for livelihood. Farming is the primary source of income of the majority, however, income from this activity is low, which prompts the majority to also engage in off-farm and/or non-farm livelihood activities. Extraction of resources

continually occurs either for own consumption or sale; these resources include trees and non-timber products such as honey, almaciga resin, and plants for handicrafts, and wildlife, especially wild pigs and birds. The presence of other assets such as the physical, social, financial, and human capital are considered minimal.

Like in the upland communities, people in the lowland barangays are also heavily dependent on natural resources, with farming as the main source of income. The majority cultivates crops like coconut, rice, rootcrops, and fruit trees. They use spring and river waters to irrigate rice paddies. Timber, medicinal plants, and wildlife are still gathered from forests in the surrounding area either for own consumption or sale. The use of coconut lumber for construction and coconut husks and fronds for fuelwood augment the need for timber. Sand and gravel for domestic construction, and fish for home consumption are extracted from the river. For lowland barangays near cities or towns, there are still a significant number of residents who are dependent on land and river resources for livelihood. With the reduction of farmlot sizes because of land conversion from agricultural to residential usage, people try to engage in non-farm and off-farm livelihood activities, such as public and private employment, quarrying, and business.

Fishing is the main source of income in coastal communities. This activity has contributed to the destruction of coral reefs due to the use of modern and sometimes illegal fishing methods in massively extracting fishes from the ocean. Another threat to the coastal ecosystem is the increasing population in the coastal areas, which has caused conversion of land use from mangrove or swamp forests to agricultural or residential purposes. On the other hand, the location has given the coastal people an advantage in terms of enhancing human capital through greater exposure to trainings, seminars, and information media, providing more opportunity to engage in alternative livelihood activities such as weaving, vending, and other employment.

Gender differentiation in the three ecosystems is indicated by the dominance of men in farming, fishing, and quarrying activities while women dominate in crop or fish catch marketing, micro-business, gleaning, and food preparation. Class differences are shown by land size owned or cultivated, type of houses occupied, and various valuables possessed, and in particular to the coastal communities, by the type of fishing vessels and gear used.



Men dominate in fishing while women engage in the marketing of produce.

✱ ***Indigenous Knowledge Systems and Modern Technology-based Approaches: Opportunities for Biodiversity Management and Conservation in Mt. Malindang and Its Immediate Environs***

Indigenous knowledge is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture. Modern technology-based approaches include, among others, introduced technologies whose knowledge, processes, skills, and practices require the use of power-driven machines, or are the products of knowledge, processes, skills, and practices in the use of such.

The study aimed to provide basis for formulating appropriate strategies in designing programs for biodiversity resource management and conservation grounded on the synergism of indigenous knowledge systems (IKS) and modern technology.

The study shows that the indigenous knowledge system of the Subanun, the indigenous people and first occupants of the Zamboanga Peninsula, consists of an extensive and detailed knowledge



of the natural environment, customs governing resource use related to the beliefs in spirits, the impermanence of the world, and the guardianship over the natural resources by the supernatural. There are several Subanun IKS elements that are

integrating them with modern technology-based approaches that have been proven to be effective in simulating better-situated environments.

All is not lost for the ecosystems of Mt. Malindang where the Subanun communities are situated. Some community-based and functional organizations in the research sites have expressed a deep sense of environmental concern, as well as the desire for environmental rehabilitation, restoration of cultural dynamism, and identification of elements of Subanun indigenous knowledge systems that are vital in community development interventions. Furthermore, relevant community-based organizations have declared their intention to use BRP studies in the crafting of proposals for development interventions, including programs for biodiversity conservation.



The Subanun perform rituals to invoke the spirits for various purposes: in seeking cure for illness and restoration of one's health or protection against harm brought by evil spirits, in appealing for a successful marriage, in supplication for achieving the goals of certain important events that necessitate the blessing of the spirits, and in thanksgiving for bountiful harvest or for good fortune.

conservationist in character. Some of these are observed in farming, hunting, and fishing practices, and even in rituals.

Interviews, focus group discussions, and observations reveal that Subanun farmers and their families are generally deprived socio-economically. The income derived from vegetable gardens and other cash crops, like coconut, is not enough to provide for their basic needs. As such, most are compelled to seek alternative sources of income from neighboring communities through contract labor, among others. Basic services in the Subanun communities, such as farm-to-market roads, water system, electricity, and health services need to be adequately developed to improve the quality of life of the people. Further aggravating this socioeconomic deprivation are the environmental problems of forest denudation and poor soil conditions. The government has also imposed sanctions against expansion of land used in farming to prevent forest clearings.

In order for the Subanun communities to act as a social fence against undue intrusion into the Mt. Malindang National Park, their capacity to meet the increasing demand for survival must be strengthened. One approach toward this goal is to utilize a two-edged strategy of improving the quality of life of the Subanun together with environmental protection and conservation. The traditional survival strategies of the Subanun farmers must be enhanced by carefully

*** Policy Analysis for Biodiversity Management and Conservation in Mt. Malindang and its Environs**

The formulation of environment-related policies is intended for the proper management and conservation of natural resources, without jeopardizing the livelihood of those who are dependent on those resources. However, due to some basic flaws in policy orientation and implementation, these policies fail to maintain the balance between natural resources conservation and sustainable livelihood for the people. This study aimed to determine the impact of the National Integrated Protected Areas System (NIPAS) Act, the Indigenous People's Rights Act (IPRA), and the Philippine Fisheries Code of 1998 on biodiversity management and conservation in Mt. Malindang and its environs.

As stipulated, the NIPAS Act establishes the different management zones of a protected area and specifies the activities that are prohibited within. The IPRA embodies the government's formal recognition of the rights of the country's various indigenous peoples and indigenous cultural communities. The Fisheries Code aims to develop, manage, and conserve the country's fishery and aquatic resources, while also providing food security for the population.

Results of the study indicate that there is a generally low level of awareness of the NIPAS Act in the terrestrial and riverine communities. Those who are aware of the Act perceived it only as the law that prohibits the cutting of trees.

In the terrestrial and riverine areas where the Subanun constitute a large proportion of the total population, the rights and responsibilities of the indigenous

peoples as stipulated in the IPRA were almost unknown.

The extremely low level of awareness of policies in the terrestrial and riverine areas can be attributed to the minimal and ineffective information dissemination campaign of the NIPAS Act, or, in the case of IPRA, the lack of it.

In coastal communities, people have claimed awareness of some illegal fishing activities and gears that are prohibited by the Fisheries Code such as dynamite fishing, commercial vessels' encroachment into municipal waters, and use of fine mesh nets. However, awareness of the law has not stopped the people from engaging in these illegal activities.

Moreover, results indicate that the awareness of the positive impact of policies on the environment does not necessarily translate into acceptance and compliance of those policies, especially if compliance is perceived to have a negative impact on livelihood.

In terms of equity (i.e., natural resources conservation vis-à-vis livelihood), results indicate that current implementation of the policies does not intentionally prejudice the welfare of certain stakeholders. For policies to be implemented effectively, the community's acceptance of the policy, together with institutional support in terms of logistics, funding, and manpower must be present.

From the results of the three studies under the Socioeconomic and Cultural Studies Master Project, the following are recommended:

1. Provide measures to improve human capital.

This involves capacity building activities, such as trainings on the proper application of fertilizers and pesticides in the upland and interior riverine communities, appropriate fishing techniques in coastal communities, and special skills for alternative livelihood activities across the landscape. Furthermore, training of local officials at the barangay level on local environmental governance may strengthen institutional capabilities. The provision of scholarships for higher education to deserving youths from the uplands and Subanun groups is also recommended.

2. Provide measures to build social capital.

This involves strengthening of existing people's organization in the communities by directing their energies to certain concerns that affect their daily life, such as learning skills to negotiate better terms in trading their produce or catch, and in

procuring inputs to farm and fishing operations. For the Subanun, setting up of an indigenous knowledge center or "school of living traditions" which will facilitate the revival and strengthening of Subanun culture and practices, particularly those identified as conservationist has been proposed.

3. Provide measures to enhance the natural assets.

The establishment of co-management schemes in the differentiated management zones of the Mt. Malindang Natural Park and in its immediate environs will mobilize community members and other stakeholders toward attaining the goals of biodiversity conservation, reinvigoration of cultural diversity and livelihood security. Activities under this scheme include the enhancement of farming techniques, which comprise a vital step toward soil conservation and improvement on livelihood. The structure for co-management of fishery and aquatic resources in coastal communities is already in place through the Barangay Fisheries and Aquatic Resources Management Councils (BFARMCs); there is a need, however to assess its mechanics and direction.

4. Develop alternative or supplemental livelihood.

For conservation strategies to succeed, alternative or supplemental livelihood activities that fit the conditions in the community must be developed. Examples of these are livestock raising, cut flower production, and production of spices. These can also include non-farm activities and services such as tailoring, carpentry, masonry, and the like.

5. Provide measures to enhance access to financial capital. This refers to providing credit at low interest rates to the community.

6. Conduct information, education, and communication (IEC) to enhance environmental awareness.

Due to the limited awareness of the people on the long-term significance of protecting and conserving the environment, sustained IEC activities on the conservation status of Mt. Malindang and on policies regarding resource utilization and prohibitions in the protected area must be implemented. Policy awareness campaigns that show the interconnection between the protection and conservation of the environment and livelihood security must also be conducted to increase the acceptability of existing environmental policies.

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UPCOMING ACTIVITIES

September 2005

Exit Seminars in Mindanao Universities

22 - Central Mindanao University (CMU), Musuan, Bukidnon

23 - Mindanao State University - Iligan Institute of Technology (MSU-IIT), Iligan City

October 2005

Exit Seminar at Southern Philippines Agribusiness, Marine and Aquatic School of Technology (SPAMAST), Digos, Davao del Sur

23-24 November 2005

BRP Regional Conference-Workshop
Manila, Philippines

4-8 December 2005

10th Joint Programme Committee (JPC) Meeting and Closing Conference
The Netherlands

Biodiversity in MMRNP

Mt. Malindang Range Natural Park (MMRNP), the only representative natural forest of the Zamboanga Biogeographic Zone boasts of rich biodiversity. Results of the Terrestrial Ecosystem Master Project (TEMP) attest to this.

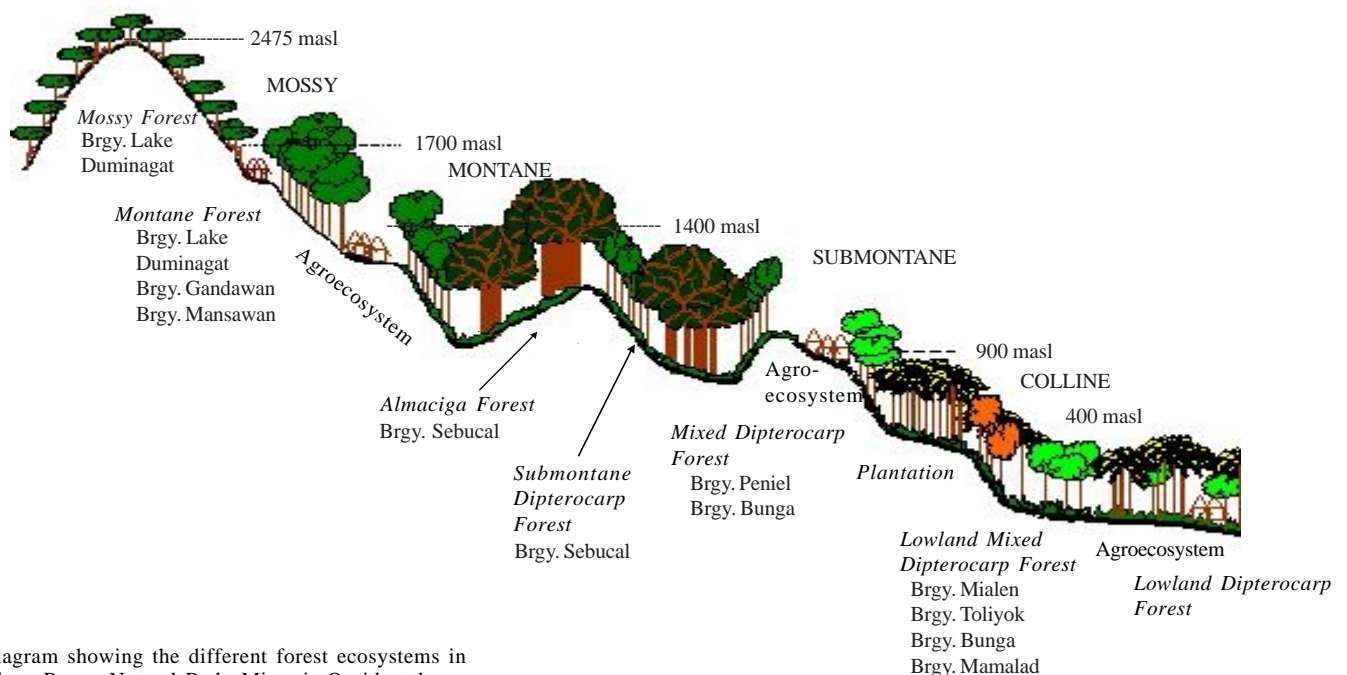
Four studies under TEMP were conducted in the northern landscape of Mt. Malindang to assess the soil, plant and animal resources in Mt. Malindang. Fieldwork was conducted in the mossy forest, montane forest, almaciga forest, submontane dipterocarp forest, lowland dipterocarp forest, mixed dipterocarp forest, mixed lowland dipterocarp forest, plantation forest, and agroecosystem at elevations of 120 to over 1700 meters above sea level (masl). The researchers probed into the dynamics and interrelationships of the critical resources, and documented the Subanun's indigenous knowledge and practices on resource utilization. The goal is to develop a monitoring and conservation instrument, to be used as a tool in formulating policy recommendations and strategies for the protection and conservation of Mt. Malindang.

Soil and soil biotic communities play an important role in the ecosystem. The soil provides a range of habitats for a multitude of flora and fauna. However, disturbance of the ecosystem due to logging and conversion of land for agriculture pose a major threat to the quality and biodiversity of the soil. Investigating the quality and biodiversity of the soil

is necessary for the development of sustainable land use, which ultimately leads to the protection of the natural ecosystems. The study focused on certain key groups of organisms and some soil properties, whose conditions, presence or absence, indicate the health of the soil and its environment.

The soil properties are at their best levels in ecosystems where there is almost no occurrence of human activities. There is high organic matter and good amounts of nitrogen and phosphorus in the forest ecosystem, unlike in the grasslands and agroecosystems, where soil properties are close to critical values. Earthworms, which are considered as ecosystem engineers have the ability to change the physical and chemical conditions of the environment affecting other biota and their interactions. Earthworm population is diverse in the forest ecosystem, in contrast with the grasslands and agroecosystems where only one earthworm species, *Pontoscolex corethrurus*, exotic as it is from Brazil, thrive. Meanwhile, nematodes, which are either plant feeders, hyphal feeders, bacterial feeders, or algal feeders contribute directly to the mineralisation of nutrients for plant growth. The plant-feeding trophic group is the most abundant in all ecosystems, wherein the moss and root-hair feeding nematodes dominate the forest ecosystems while the semi-endoparasitic ones dominate the agro and grassland ecosystems. Analyses of the chemical and physical properties of the soil help in understanding crop growth, composition of specific soil biota communities and occurrence of species.

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Transect diagram showing the different forest ecosystems in Mt. Malindang Range Natural Park, Misamis Occidental.

BRP researchers win best research paper awards

BRP researches bested other 13 research projects during the Central Mindanao University (CMU) In-House Review and Evaluation of On-Going and Completed Researches held on 30 June–1 July 2005.

1st place - *Diversity and Assessment of Plants in the Northern Landscape of Malindang Range, Misamis Occidental* (Dr. Victor B. Amoroso)

2nd place - *Conservation and Utilization of Endemic, Rare and Economically Important Plants in Three Barangays of Don Victoriano, Misamis Occidental* (Dr. Cecilia B. Amoroso)

3rd place - *Arthropod Faunal Diversity and Relevant Interrelationships of Critical*

Resources on Mt. Malindang (Dr. Myrna G. Ballentes)

- *Conserving the Diversity of Selected Arthropods in Cabbage-Growing Areas in Mt. Malindang, Misamis Occidental through Participatory Integrated Pest Management* (Prof. Lucy B. Ledres)

The board of evaluators included Dr. Feliberto A. Pollisco, Jr. of PCARRD, Dr. Luz I. Guzman of the Department of Agriculture (DA), Ms. Myrna S. Decipulo of the Department of Environment and Natural Resources (DENR), and Mr. Ramir M. Balquin of the National Economic and Development Authority (NEDA). •



Medinilla malindangensis, found only in Mt. Malindang.

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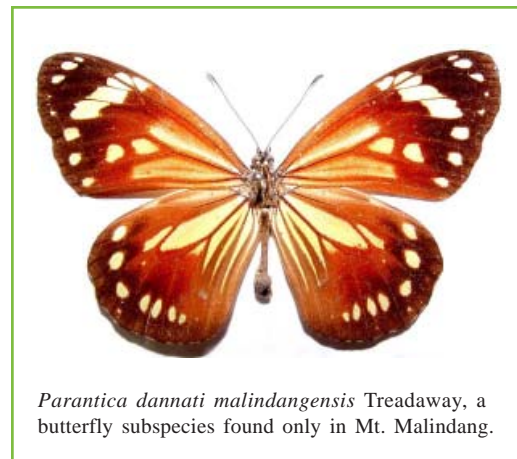
A total of 1,286 plant species were recorded in the forest ecosystem, with 289 species of economic importance. Protection of these plants is greatly needed since 56 of these economic plants are threatened. Thirty-five species are nationally threatened and 18 are locally threatened due to overutilization and land conversion. Endemicity recorded 138 endemic species with percent endemicsm

ranging from 24-41% for gymnosperms and angiosperms (trees). One species can be found only in Mt. Malindang: *Medinilla malindangensis*.

Vertebrate fauna is also diverse on Mt. Malindang. Two hundred fifty-seven species were recorded (26 species of amphibians, 33 species of reptiles, 162 species of birds, and 36 species of mammals). Of these, 114 species (44%) are endemic to the Philippines including 25 species that are endemic to Mindanao. Twenty-five species were threatened due to local resource utilization practices and destruction or disturbance of their habitat. These threatened species comprise nine amphibians, nine birds, three volant and four non-volant mammals. Results of the vertebrate fauna study revealed that the 257 species recorded on Mt. Malindang represents 48% of the 536 species occurring in the island of Mindanao, and 23% of the 1114 species recorded in the Philippines.

Seven hundred forty-one species of invertebrates belonging to five classes were recorded. The majority was found in the mixed dipterocarp forest. From these 741 species, 17 species are endemic to the

Philippines and 67 species are endemic to Mt. Malindang. At least 21 endemic arthropod species were associated with 18 endemic plants as host plants. This finding suggests that urgent actions must be taken for the protection and conservation of the endemic host plants so as to protect and conserve the existence of these endemic fauna.



Parantica dannati malindangensis Treadaway, a butterfly subspecies found only in Mt. Malindang.

The researchers also documented several indigenous knowledge systems (IKS) on resource utilization and regulation, tillage practices and community mechanisms. Most farmers still perform rituals to the mountain spirits before their farming activities. Subanuns also believe that opening of the flower of the orchid “ting-ulan” indicates coming of the rain, the flowering of “gulayan” (*Lithocarpus* sp.) signals hunting time for wild pigs, and the call of “pisupit” (plaintive cuckoo, *Cacomantis merulinus* or brush cuckoo, *C. variolosus* or oriental cuckoo, *Cuculus*

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BRP researchers present research findings in international conferences

Ms. Aurelia Luzviminda V. Gomez, study leader of the Policy Study presented a paper on “Government Policy and Local Participation: Managing the Mt. Malindang Natural Park, Philippines” at the 11th International Symposium on Society and Resource Management (ISSRM) on 16-19 June 2005 at the Mid Sweden University. The theme of the symposium was “From knowledge to management: balancing resource extraction, protection and experiences”. It was organized by the European Tourism Research Institute (ETOUR), Mid Sweden University, and Fjäll Mistra (The Swedish Mountain Mistra Programme).

Ms. Gomez participated in the panel session titled “Local participation as magic or mistake”, which focused on local participation in nature conservation and management.

Dr. Olga M. Nuñez, study leader of the Vertebrate Fauna Study, meanwhile, presented a poster on “Participatory Assessment of Amphibian Fauna in Malindang Range, Philippines” at the 5th World Congress of Herpetology on 19-24 June 2005 in Stellenbosch, South Africa. The Congress is designed to bring together herpetologists from all over the world to discuss and present recent developments in herpetology. ▪

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micropterus) signals the start of farming. The close interaction with and dependence of communities on the environment has allowed them to develop functional relationships with the local resources. IKS can be the first stepping-stone in enhancing



ABSTRACT

Government Policy and Local Participation: Managing the Mt. Malindang Natural Park, Philippines

Ms. Aurelia Luzviminda V. Gomez

This paper presents the results of a policy-oriented research conducted in Mt. Malindang Natural Park (MMNP) in the southern Philippine island of Mindanao. MMNP is one of the priority protected areas under the National Integrated Protected Area System (NIPAS), which was set up by legislation in 1992. Research results indicate that while local participation in management of the protected area is one of the main objectives of the NIPAS Act, the major indigenous populace presently inhabiting the surroundings of the park generally lacks awareness of its status as a protected area. Furthermore, while the community generally acknowledges the value of not cutting trees for environmental protection against soil erosion, landslides and flooding, timber poaching continues due to lack of alternative livelihood. Based on the results of this study, a number of recommendations are presented. First is a review of the existing policy with regards to the roles of various stakeholders of the park: the multi-sectoral protected area management board as a policy making body, the local community as a major partner in park protection, and the Department of Environment and Natural Resources as the government agency mainly responsible for the management of the protected area. Second, there should be effective information, education, and communication regarding the protected area and the importance of local participation in its management. Finally, it is strongly recommended that alternative livelihood opportunities for the communities dependent on the park be considered in the implementation of policies aimed at conserving biodiversity. ▪

awareness and interest towards the conservation of biological resources as these are founded on their belief system and traditions, resulting from their long interactions with nature.

Mt. Malindang has been endowed with rich biological resources. The findings of the research studies indicate the high number of endemic and threatened species, suggesting that Mt. Malindang is a priority conservation site. ▪

5th WCH: Opening new doors for research and collaboration

by Olga M. Nuñez

Since the inception of the BRP, we believed that the vertebrate faunal diversity research is a very important project that will arouse interest from conservation biologists all over the world. We are very happy that at the close of the project, the highlights of the research results on the amphibian fauna on Mt. Malindang found its way into the 5th World Congress of Herpetology (WCH) held in Stellenbosch, South Africa on 19-24 June 2005. This international forum is held every four years. It was last held in Sri Lanka in 2001.

The 5th World Congress brought together 300 or more herpetologists from all over the world. It was indeed an excellent opportunity to present the BRP research results and establish linkages with herpetologists from all over the world. I was the only participant from the Philippines and I found myself among the “Who’s-Who-in-Herpetology”.

There were three poster sessions, one held daily for three days. BRP’s poster was titled “*Participatory Assessment of Amphibian Fauna on Mt. Malindang, Philippines*” and was presented in the first session on the second day of the Congress. I realized that the poster session is a very good venue for discussions and forging of collaborations. Many were interested in the poster and in the research results. Among them was Dr. Richard Wassersug of the University of Dalhousie, a former student of Dr. Robert Inger. Dr. Inger is the author of the book we use as reference for the identification of amphibians. Dr. Wassersug was interested to collaborate with us

particularly on the study of *Megophrys*, a non-endemic frog abundant in Mt. Malindang. Another was Dr. Sumida Masayuki from Hiroshima University, who signified that their group is interested to collaborate with us on the study of frogs of Family Rhacophoridae found also on Mt. Malindang. Another delegate from India volunteered to share his expertise by teaching for a week on molecular biology in Mindanao State University-Iligan Institute of Technology (MSU-IIT), just so he can collaborate with us on the study of caecilians, found in Mialen, Toliyok, and Bunga in Mt. Malindang. A participant from France was also happy that the project was funded by the Netherlands Ministry for Development Cooperation (DGIS), since he used to work with Naturalis. A herpetologist from Taiwan indicated his desire to make us his research partners in the Philippines.

After attending the Congress, we are confronted with the questions: What can BRP and Mindanao benefit from a BRP researcher’s attendance to a world congress? Is the investment worth it? How can our participation help future research endeavors in Mindanao? I think the first positive thing that attendance to the World Herp Congress has accomplished was putting the Philippines in the world map; and not only the Philippines but also Mindanao. For a long time, Mindanao was known as the place of conflict. But with BRP results presented in a world congress, people become aware that biodiversity research is alive in this part of the country, that people from Mindanao are concerned on biodiversity conservation. On the part of the BRP researchers is a sense of pride that we are able to contribute scientific data to the international body of knowledge especially since global amphibian assessment started only in 2004. With our presentation, people become interested in the Philippines, and on biodiversity research in the Philippines, which could help future research endeavors in Mindanao. But how? Points of collaboration can enhance future researches in Mindanao. After the BRP Closing Conference, we thought that it would be the end of biodiversity research on Mt. Malindang but attendance to this world congress opened wide horizons on research. Listening to the presentations of other researchers in the Congress was definitely of great value for out from the papers presented we can formulate new research questions; we can think of what to do next for Malindang; what to do in Mindanao. In short, we get new ideas as to what to do next after inventory and assessment. If before, we know only inventory and assessment, now we know what else need to be done, how we could improve, and how we could possibly do it. This Congress has directly

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Dr. Olga M. Nuñez (first row, seated, third from left) with the other participants of the Congress.

Thesis Abstract

Bryophyte Flora of Mt. Malindang, Misamis Occidental, Philippines

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PhD in Biology
Central Mindanao University

An inventory of the bryophyte flora in three selected sites of Mt. Malindang Range, Misamis Occidental was conducted and studied. Field collections were made through alpha taxonomy method. The bryophytes were classified and described according to its diagnostic morphological characters. Taxonomic key has been prepared to identify the species, genera and families of bryophytes. Results of the study revealed 132 species in three study sites viz., Mt. Capole (dipterocarp forest), Ulohan sa Dapitan (montane forest) and North Peak (mossy forest). Of these, 114 species, 64 genera and 23 families were mosses, and 18 species, 13 genera and 11 families were liverworts. Taxonomic characters of each species such as habit, leaf arrangement and orientation, stem structure, rhizoids and sporophyte were used to identify into families, genera and species. The montane forest was found to show high species richness than the two vegetation types. The species

similarity indices were found comparatively higher in the montane and mossy forest than between dipterocarp and mossy and between dipterocarp and montane forest. Further results showed that the mossy forest obtained the highest bryophyte cover among the three study sites.

Statistical analysis showed that the distribution of bryophytes was found highly significant between study sites. Assessment of bryophytes revealed no new Philippine records. However, all the species of bryophytes were found new with respect to locality except for the two species that were earlier reported. Two of the species studied were found endemic to the Philippines viz., *Symphysodontella subulata* and *Ectropothecium ferrugineum*. Both species have been identified as biological indicator of clean environment. The existence of some species under restricted microhabitats such as those of the mosses that dominate as epiphytic on tree trunks and the liverworts in decaying logs indicate high in terms of species richness. Furthermore, results showed that the variability in structures between taxa and the niche preference of the bryophytes has provided taxonomic, economic and ecological importance.

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benefited the participant in terms of capability building, but other BRP researchers, students, and institutions are benefited as well through potential collaborations, new contacts established, additional literature, new ideas and insights shared. Benefits to the researchers would redound to the benefit of Mindanao.

Personally, I have learned a lot from the paper presentations especially on new techniques on herpetological studies and the herpetological diversity in other places of the world. I have gained enormous insights on recent trends on herpetological research, even on different styles on delivery and PowerPoint presentations. From what I saw and read and discussed with other participants during the congress, I have gained insights on what posters and other IEC materials and publications to produce from the Mt. Malindang data that would be very useful and appreciated by both the laymen and the scientific community, as well as numerous possibilities regarding biodiversity research. But these things I have not kept to myself, I have started transferring the information and knowledge to other Mindanaoans. Perhaps, I'm just fortunate that I have wider access to dissemination of information through the Biodiversity Research and Training

Center for Mindanao (BRTCM) where we have our Awareness Raising, Networking, Education, Support Mobilization, and Training (ANEST) project supported by HARIBON through the Royal Dutch Embassy.

Summing it up, attending the 5th World Congress of Herpetology opened new doors for further research in Mt. Malindang and in Mindanao, new collaborations as well as opportunities for Mindanao researchers and thesis students to link with laboratories abroad. With these, many would become interested to do research on biodiversity. Above all, it has tremendously increased my capacity as a researcher. I have attended numerous conferences in my professional life but nothing can compare to the insights I have gained, ideas I have gathered, and collaborations I had forged in this international forum.

In addition, the fact that the Congress was held in South Africa made the travel and presentation more meaningful, for South Africa is such a diverse country. The trip broadened my horizons, gave me many learnings and realizations. The sociocultural experience was very enriching. ▪

SAMU'T-SARI is the official publication of the BRP. Its name was derived from the Pilipino term for biodiversity which is "samu't-saring uri ng buhay." *Samu't-sari* means variety.

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