



Representatives from different stakeholder groups in the Mt. Malindang environs who have been participating actively in the BRP were invited to a meeting on 21 August 2003 in Oroquieta City for the organization of a Local Advisory Group (LAG). In attendance were Hon. Melquiades D. Azcuna, Jr., Municipal Mayor of Lopez Jaena, Misamis Occidental, representing the local government units; Forester Rolando S. Dingal, Protected Area Superintendent, representing the government line agencies; Matadong Arsenio Samson, Jr., Administrative Officer of the National Commission on Indigenous People (NCIP), representing the Subanon indigenous people of Mt. Malindang; Mr. Andy O. Pestaño, Director of CARE-AWESOME, representing the nongovernment units and other project implementors in the area; and National Support Secretariat (NSS) and Site Coordinating Office (SCO) staff.

The meeting started with the presentation of the framework and updates of the programme, followed by the presentation of the roles and responsibilities of the members of the LAG and its composition.

The LAG, which is envisioned to be the programme's direct link to local stakeholders shall: (1) provide the direct entry points to local policy making bodies on agriculture, environment and other concerns in the Mt. Malindang environs, (2) provide the lead in defining the needs of the stakeholders and how these needs can be addressed through research activities, (3) assess the problems and needs of the local stakeholders and translate these into priority areas for

BRP establishes direct link to local stakeholders



The Local Advisory Group (LAG) is organized to provide direct linkages with the local government, institutions and stakeholders in Mt. Malindang and its environs. The input of the members of the LAG is intended to align the programme's research targets with actual needs of the area.

research, and (4) identify support activities that will further make research results relevant to the lives of the local stakeholders.

The LAG shall also serve as the advisory body to the Joint Programme Committee (JPC) on how the programme can operate more effectively with strong participation and clear lines of coordination with the local stakeholders.

The LAG was organized to ensure that the programme's focus and outputs are well connected to local policy.

Hon. Azcuna was designated as Chair of the LAG and Mr. Pestaño as Vice Chair. The SCO shall serve as the Secretariat of the LAG. ■

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Researchers, research staff and local researchers undergo training on field data collection

A two-part capability building on field data collection for biodiversity research for the flora, fauna, soil ecology and socioeconomic-cultural studies was organized by the Terrestrial Ecosystem Master Project (TEMP) and Socioeconomic-cultural Studies (SECS) research teams on 15-16 and 22-23 August 2003 in Barangay Toliyok, Oroquieta City and Elena Tower Inn, Iligan City, respectively. It was participated in by researchers and research staff from the two projects, local researchers from Oroquieta City, Calamba, and Don Victoriano, Misamis Occidental, and staff of the Site Coordinating Office (SCO).

The training was conducted to operationalize and harmonize the participatory - multidisciplinary principles in the implementation of studies within and across the projects. It aimed to: (1) orient the researchers, research staff and local researchers with the basic skills in gathering relevant data for the different studies, (2) equip the researchers with the skills necessary to generate data and information that are comparable across research sites to simplify evaluation and analysis, and (3) enhance awareness on the need to exchange ideas and information among BRP researchers throughout field operations.

Hands-on exercise on processing of floral specimens.



The first part of the training was facilitated by the TEMP research team, led by Dr. Jose B. Arances, Project Leader, with support from the Study Leaders and researchers who served as resource persons. Topics discussed by the flora team included the establishment of sample plots/subplots, inventory of flora, collection and processing of specimens, and tree profiling. Dr. Olga M. Nuñez, Study Leader of the Vertebrate Fauna team discussed thoroughly the field sampling, processing and identification of birds and volant mammals, while Ms. Fritzie B. Ates and Dr. Apolinario A. Alicante, researchers of the vertebrate fauna study discussed

amphibian sampling, and sampling of reptiles and non-volant mammals, respectively. Dr. Myrna G. Ballentes, Study Leader of the Invertebrate Fauna Study discussed in detail the field sampling, processing and identification of insects and other arthropods. The Soil Ecology team discussed the identification and selection of sampling sites, collection and sampling tools for physico-chemical analyses and soil profile description. Field demonstration was carried out for better understanding of the topics presented.

The second part focused on the socioeconomic methods of doing participatory research. The data collection and analysis techniques covered during the training were: Community and Resource Mapping, Seasonal Diagrams, Venn Diagrams, Stakeholder Analysis, Timeline, Key Informant Interview and Sample Survey Instrument, Multi-stakeholders' Integrative Social Planning (MISP) Matrix, Focus Group Discussion, Network/Problem Tree Analysis, Commodity Flows, and Participant Observation. A field activity was also conducted for the Participant Observation Technique, which was undertaken in Brgy. Kiwalan, Iligan City. ■



Participants participate actively in workshops and group discussions.

Three weeks, I found my 'new love'

by Ms. Rhea Amor C. Lumactud

It was a fortuitous set of circumstances that allowed me to find myself seated on an airplane bound for the Netherlands on 14 June 2003. I was on my way to the two-week Nematode Identification Course (which was part of the training needed as the research assistant of the Soil Ecology study of the BRP Terrestrial Ecosystems Master Project) at Wageningen University conducted by the Dutch nematologist, Dr. Tom Bongers. As the plane soared through the clouds, it seemed like a dream...

It was 7:30 a.m. of 15 June when I arrived at Schipol airport. When the plane landed, I still thought, "Is this a dream?" What a wonderful dream! No, it's not a dream.

When I got out of the plane I just followed the other passengers because I didn't know where to get my baggage. My mind was then filled with thoughts like, "What if I don't see the person who will pick me up?" "What should I do?"

Following the directions given about the meeting place, I saw a man with a young girl and a card bearing "BRP-Rhea". My heart leapt with joy. It was our research collaborator, Dr. Ron de Goede with her lovely daughter. I felt relieved that I didn't have to go to Wageningen alone.

On the train to Wageningen, I was delighted with the scenery: green vegetation, grazing lands, greenhouses, windmills, exotic buildings, beautiful houses, huge highways, several small canals and many others.

I was accommodated at Wageningen International Conference Centre and Residence. My room was very cozy and spacious with TV set, radio, small refrigerator, stove and coffee maker. In spite of this, I felt lonely. It was a solitary, quiet Sunday. All stores and establishments, except a few restobars, were closed. I wanted to rest and sleep but I couldn't. It was strange. I got out of bed, took a shower and strolled around the park square. There I met a woman from Spain. Despite some language difficulty, our chatter relieved my loquacious nature, and the loneliness was gone.

At 8 p.m. (I was amazed that it was still daylight!), I went to Dr. Bongers' house with Ron for an acquaintance party with the course participants. Only five others were present – Maria Dahl and Sanja Manduric from Sweden, Stephanie Colvan



Rhea (first row, second from right) with the other participants of the course and Dr. Tom Bongers (second row, fifth from right), Course Instructor and Ms. Hanny Megeen (first from right), Assistant instructor.

Colvan from UK, Jonas Lekfeldt from Denmark, and Brian Darby from USA. We were all silent—just staring at one another—for one and a half hours, until Stephanie broke the ice. Tom then began quizzing us on our background. I was the only beginner in nematology work!

The next day was the start of the course. I was anxious, and got to the laboratory room an hour ahead of schedule. There I met the other four participants – Martin Czarnowski from Germany, Christine Griffin from Ireland, Danielle Driessen and Eric Diepenveen, both from the Netherlands.

Being a beginner, I was given other basic books on nematology by Dr. Bongers. Course material include the book "De Nematoden van Nederland". Although it was in Dutch, it was very useful for its good illustrations. It was a hands-on course. We examined slides with specimens guided by a manual. We spent the whole day looking through the microscope.

For a week, we were guided by the manual. We started with examining the simpler-structured nematodes and then to the more complex ones. I found the course difficult. I went home late. I had to work double time. I chose to forget my social life. While my other classmates found time to stroll, play cards and drink, I was in my room buried in my books.

A week passed. I noticed a sense of excitement in me each time I went to class (made me wonder why? ☺). I usually arrived an hour early. Each waking time, I tried to recount my dreams. I realized that I've been dreaming of nematodes since the start of the training course. **Weird, but I found myself falling in love with these minute creatures!**

Aside from identifying nematodes, we also learned some
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Biodiversity Assessment of Selected Arthropods in Cabbage-Growing Areas in Mt. Malindang and Environs

by Dr. Emma M. Sabado
MSU-Marawi

Vegetables are the major sources of income of the people in the upland areas of Mt. Malindang. One of the factors limiting vegetable yield is pest infestation, such as in the production of cabbage, which is the major vegetable crop in the area. To control these pests, farmers rely heavily on the use of pesticides. However, dependency on pesticides poses threat not only to the people but also to the ecosystem, which may lead to loss of biodiversity.

One way to conserve biodiversity in the cabbage agroecosystem is reduction of pesticide use, which can be made possible through the implementation of integrated pest management (IPM). However, before IPM can be implemented, there is a need to identify the insect pests and associated beneficial species that can provide the natural control. The project therefore, was conducted to fill this need.

Biodiversity of arthropods was assessed in cabbage fields of seven local partners in three upland barangays of Don Victoriano, Misamis Occidental. These were Mansawan, Gandawan, and Lake Duminagat. Cabbage fields varied in size (60-836 m²) and slope (20-40°).

The researchers assessed the impact of farmers' insect control practices on arthropod diversity and community structure in seven cabbage farm sites with different proximity to the natural forest margin. The main hypothesis was that farms nearer the forest would have higher diversity compared with those farther away. Moreover, parasites and predators could be more abundant in farms closer to the forest.

Insects and related arthropods associated with cabbage were

monitored through sweep net, visual counting, and use of sticky and pitfall traps.

Several classes of arthropods were found associated with cabbage. The more numerous included insects, spiders, sowbugs and amphipods. Insects dominated these arthropods comprising 10 orders belonging to 60 families.

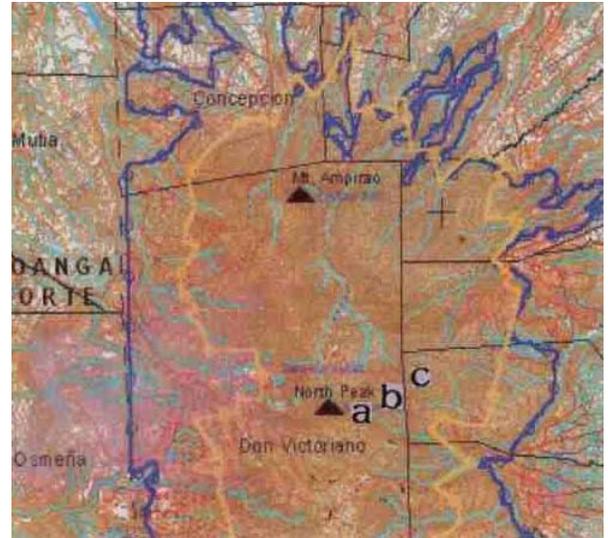
The major pest of cabbage was the diamondback moth or DBM [*Plutella xylostella* (Linn.)], which limited production and reduced yield. Populations from the three sites, however, did not differ significantly. Spiders, which dominated the predatory guild, were more abundant in Gandawan and Lake Duminagat. Among treatments, the farm near the forest harbored significantly more spiders than the sprayed and unsprayed cabbage farms.

Other insect pests observed included the cabbage looper [*Trichoplusia ni* (Hubner)], cabbage worm [*Crocidolomia pavonana* (Fabr.)], cutworm [*Spodoptera litura* (Fabr.)], and the green peach aphid [*Myzus persicae* (Sulzer)] (see Table 1).

There were two leaf-feeding beetles found associated with the cabbage agroecosystem, but their populations were very low. These were the flea beetle (*Psylliodes sp.*) and squash

beetle [*Aulacophora indica* (Gmelin)]. Hymenopterous parasites and predators, such as black ants, sphecids, and braconid wasps were minimal. Tachinid flies parasitized cutworm larvae, while a single cabbage looper larva was parasitized by a braconid wasp, *Cotesia sp.* (Braconidae). However, there were very few adults of this wasp that were collected in cabbage fields.

Species richness and DBM population was not correlated with yield. Soil nutrients, especially phosphorus,



Sampling sites: a.) Brgy. Lake Duminagat, b.) Brgy. Gandawan, c.) Brgy. Mansawan.



Pitfall trap installed in the study site.

Six Mindanao institutions join BRP for biodiversity research

Six Mindanao institutions signed a Memorandum of Understanding (MOU) with SEARCA-BRP for biodiversity research in Mt. Malindang and its environs. These institutions were Misamis University (MU) in Ozamiz City, Northern Mindanao State Institute of Science and Technology (NORMISIST) in Butuan City, University of the Philippines (UP)-Mindanao in Davao City, Sultan Kudarat Polytechnic State College (SKPSC) in Tacurong, Sultan Kudarat, University of Southeastern Philippines (USEP) in Davao City, and Bukidnon State College in Malaybalay City, Bukidnon.

The partnership was initially established when researchers from these institutions were invited to the

Mindanao Biodiversity Consortium Meeting-Workshop in July and August 2002 to prepare the integrated proposal for the Master Project and were selected to implement such Project.

These institutions agreed to cooperate towards the fulfillment of the objectives of the BRP, particularly to undertake research for biodiversity management and conservation in Mt. Malindang and its environs, and to strengthen capabilities of Mindanao researchers, institutions and other stakeholders for biodiversity research, focused on the following activities: (1) biodiversity research and related support activities, (2) related programme training/workshops and other capability building activities, (3) application of the DENR-PAWB

gratuitous permits, (4) programme planning, monitoring, review and evaluation, (5) research proposal and project development, (6) research results documentation and report writing, (7) community validation of research results, and (8) publication and dissemination of research results.

Dr. Nestor Feliciano, MU President, Dr. Wenceslao Tianero, Sr., NORMISIST President, Dr. Ricardo M. de Ungria, UP Mindanao Chancellor, Dr. Nelson Binag, SKPSC President, Dr. Julieta Ortiz, USEP Officer-in-Charge, Dr. Victor Barroso, BSC President, and Dr. Arsenio Balisacan, SEARCA Director signed the MOU in July 2003. ■

Biodiversity Assessment...from page 4

affected yield. There was a strong correlation between average cabbage yield (kg) and the amount of phosphorus in the soil. Moreover, average cabbage yield was correlated with spider number.

Based from the findings of the study, there is really a need to implement IPM to minimize pest problems in the uplands without full reliance on pesticides. It would also minimize the problem on shifting cultivation, as farmers will no longer plant in newly opened areas to avoid pest damage. ■



Diamondback moth, the major pest of cabbage (Photograph taken from <http://vegipm.tamu.edu>).

Table 1. List of economically important insect pests associated with cabbage grown in three barangays of Don Victoriano, Misamis Occidental (January-March 2002).

Order/Family	Species	Common Name
LEPIDOPTERA		
Plutellidae	<i>Plutella xylostella</i>	Diamondback moth
Geometridae	<i>Trichoplusia ni</i>	Cabbage looper
Pyalidae	<i>Crocidolomia pavonana</i>	Cabbage worm
Noctuidae	<i>Spodoptera litura</i>	Cutworm
Arctiidae	Unidentified sp.	Tiger moth
COLEOPTERA		
Chrysomelidae	<i>Aulacophora indica</i>	Squash beetle
	<i>Psylliodes sp.</i>	Flea beetle
HEMIPTERA		
Aphididae	<i>Myzus persicae</i>	Green peach aphid
ORTHOPTERA		
Acrididae	<i>Oxya sp.</i>	Short-horned grasshopper

News bits

BRP researchers undertake Community Information Drives

Researchers and research staff of the Terrestrial Ecosystem Master Project and Socioeconomic-cultural studies, staff of the SCO, and Mr. Roy Adam Dacagan, representative of the National Commission on Indigenous People (NCIP) organized a series of community assemblies to present BRP activities highlighting the rationale, objectives and methodology of the different studies to be implemented, and community participation.

The community information drives were undertaken in various barangays covered by the research sites from June to September 2003. The NCIP provincial office, through its representative, also explained the process of securing Free and Prior Informed Consent (FPIC) and the roles of the community people in responding to any project to be implemented in their communities.

The community information drives were conducted to: (1) establish awareness and understanding of the purposes of the BRP projects; (2) drum up support from the community people; (3) solicit participation of people from the communities involved as research partners; and (4) secure FPIC from these communities in compliance with NCIP Administrative Order No. 3.

After the series of community assemblies and interactions, community people favorably endorsed the implementation of the research projects on the condition that the FPIC and Mayors' permits have to be secured first. ■

2nd Quarterly Researchers' Planning and Integration Meeting

On 19 July 2003, the second quarterly researchers' meeting was held in Ozamiz City. Researchers and research staff of the Master and Open research projects, thesis grantees and staff of the National Support Secretariat (NSS) and Site Coordinating Office (SCO) attended the meeting. Discussions centered on the Code of Conduct for the BRP researchers, integration of the Monitoring and Evaluation System for research projects, reporting protocol, and delineation of the roles and responsibilities between the National Support Secretariat and Site Coordinating Office. It also served as the venue for the signing of the Research Grant Agreements for the members of the terrestrial, socioeconomic-cultural, and open research project teams. ■

Researchers and research collaborators of the Terrestrial Ecosystem Master Project (TEMP), socioeconomic-cultural studies, and Open Research Projects signed the Research Grant Agreements on 19 July 2003, which officially signaled the start of implementation of these projects.



Community information drive in Small Potongan, Concepcion, Misamis Occidental.

BRP researchers win 1st and 2nd Best Research Paper Awards

With 40 competing research papers presented during the 15th Regional Symposium on Research and Development Highlights organized by the Northern Mindanao Consortium for Agriculture and Resources Research and Development (NOMCARRD) held on 7-8 August 2003 at Xavier University, Cagayan de Oro City, BRP researchers garnered 1st and 2nd best research paper awards. The research paper of Dr. Victor B. Amoroso, Dr. Cecilia B. Amoroso, Dr. Jose A. Escarlos, Jr. and Ms. Alma B. Mohagan titled "Inventory and Conservation Studies of Endemic, Endangered and Economically Important Flora and Fauna in Selected Forests in Mindanao" won 1st place while the research paper of Dr. Proserpina L. Gomez-Roxas, Dr. Renato D. Boniao, Dr. Linda Burton, Ms. Annabella M. Gorospe, and Mr. Sherwin S. Nacua on "Community-Based Inventory and Assessment of Riverine and Riparian Ecosystem in the Northeastern Part of Mt. Malindang" won 2nd place. The research papers presented during the Regional Symposium were judged by Dr. Romulo Agangan (PCARRD), Dr. Vel Suminguit (SANREM), Dr. Art Argañosa (DA-BAR) and Dr. Leuviña Tandug (ERDB-DENR). ■



PROJECTS PROFILE

Terrestrial Ecosystem Master Project (TEMP)

Floral Diversity and Relevant Interrelationships of Critical Resources on Mt. Malindang

This study aims to come up with a more comprehensive information and knowledge of the floral landscape of Mt. Malindang, as well as the status of its floral diversity. The relevant interrelationships between and among plant species in the area are hoped to be established, as influenced by the socioeconomic-policy-cultural factors inherent in the local communities and other stakeholders.

This study hopes to generate packages of sound, operational, acceptable and sustainable recommendations for monitoring, conservation, management and utilization of the critical floral resources in Mt. Malindang. Relevant and effective IEC materials are also to be produced that would enhance awareness, understanding and involvement of the local communities and other stakeholders. The study hopes to organize a committed network of stakeholders for a stronger and concerted effort of floral diversity conservation, management and sustainable utilization.

Invertebrate Faunal Diversity and Relevant Interrelationships of Critical Resources on Mt. Malindang

Invertebrates have great ecological and economic value. An inventory of various aspects of the invertebrates especially the entomofauna (insects) may show the unique position of Mt. Malindang for invertebrates as well as the relationships of the vegetation zones and/or elevation.

The study aims to assess the invertebrate faunal resource diversity and distribution in the area for better understanding of the landscape and appropriate management of critical resources. It further aims to analyze significant interrelationships of invertebrate fauna with other critical resources within the research. Finally, it aims to formulate recommendations and strategies for increasing awareness on conservation and management of biological diversity.

Vertebrate Faunal Diversity and Relevant Interrelationships of Critical Resources on Mt. Malindang

Vertebrates are very good indicators of environmental health. They are also socioeconomically significant to the life of the Subanon indigenous people of Mt. Malindang. The recent study of CARE-Philippines in the municipality of Don Victoriano in Mt. Malindang showed that 48% of birds found are endemic with an additional record of fourteen species for Mt. Malindang. However, the same report indicated that the status of biodiversity in Don Victoriano stands on unstable ground.

This study is geared towards knowledge generation on vertebrate faunal resources in Mt. Malindang through a participatory approach so that better understanding of faunal resource diversity in the area can lead to a shared and better management of these resources. These faunal resources include the endemic, economically important, threatened and abundant faunal species. The interactions of the different factors that affect and influence the faunal resources in Mt. Malindang will also be analyzed. The knowledge gained from these actions is hoped to enhance the local communities' efforts in biodiversity conservation, with those of other stakeholders.



Barangay Lake Duminagat, one of the study sites for the different studies under the terrestrial ecosystem Master Project.

Soil Ecological Diversity and Relevant Interrelationships of Critical Resources on Mt. Malindang

This study focuses on certain key groups of soil organisms (i.e., earthworms, nematodes, bacteria, fungi, actinomycetes) and some specific soil properties whose conditions (presence or absence) are tell-tale signs of soil environmental health.

This study is conducted to: (1) assess soil ecological resource diversity and availability, (2) analyze significant interrelationships of critical soil

ecological resources, and (3) assess scientific and indigenous knowledge systems (IKS) in conserving and managing biodiversity for community-level capacity building.

The study is geared towards the identification earthworms and nematodes for each land use type in Mt. Malindang and additional information on soil ecology and soil fertility. Finally, it hopes to generate knowledge for the better understanding of the effects of human activities in forest ecosystems, and to identify indicators of sustainability.

Indigenous Knowledge Systems (IKS) and Modern Technology-Based Approaches: Opportunities for Biodiversity Management and Conservation in Mt. Malindang and its Immediate Environs

Central to the issue of sustainable development is an understanding of IKS. 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.

The study recognizes that the indigenous people possess an immense knowledge of their environments, based on centuries of living close to nature, with the richness and variety of complex ecosystems. It also discerns the gender differentiations in biodiversity resource use, management and conservation of floral and faunal resources.

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

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

Policies, laws, codes and ordinances are normally designed to improve the status of the vast majority, if not all, of the affected stakeholders.

The intent of environmental-related policies, both at the national and local levels is for proper management and conservation of the natural resources, without jeopardizing the livelihood of those who are dependent on those resources.

Socioeconomic-cultural Studies (SECS)

Resource Utilization Patterns in the Aquatic and Terrestrial Ecosystems in Mt. Malindang and its Environs

Land and water comprise the major natural resources utilized by people to survive. People enhance the utilization of land and water resources to increase productivity.

However, pressures on these resources mount over time. These influence resource utilization, particularly those that relate to livelihood.

Engaging in livelihood activities, however, involves more than just the use, access to or control over land and water resources, but also over other natural resources, referred to as “assets” (i.e., natural, physical, human, financial, and social capital).

Social differentiations affect access to, control over, and use of these assets. Three important social differentiations are considered in this study: those that

pertain to ethnicity, class, and gender.

Social differentiation by ethnicity is of fundamental importance to the study, given the presence of indigenous peoples – the Subanon – in the study sites. Social differentiation by class is also vital, as there exists pronounced differences in land ownership, personal wealth, and educational attainment among and between households. Meanwhile, gender specialization in production is to be explored as this results in different perceptions and priorities in coming up with livelihood and biodiversity conservation strategies.

Knowledge about resource utilization patterns over time as they relate to livelihood and environment is seen to have important implications for policy formulation, both at the national and local levels. Resources or assets used, controlled or accessed are widely accepted springboards for programs and policies that are oriented to poverty alleviation and long-term livelihood security.

This study is designed to address the policy-related concerns of the biophysico-chemical studies and other socioeconomic and cultural studies under the aquatic and terrestrial components of the Master Project.

This study aims to evaluate policies, laws and ordinances that are relevant to biodiversity management and conservation, with particular reference to livelihood security and environmental sustainability, and other implications to gender, ethnicity and culture.

Results of the other studies will be used as inputs to this study, particularly in recommending policy formulations, as well as policy advocacy for livelihood security and environmental sustainability.

Open Research Projects

Conservation and Utilization of Endemic, Rare and Economically Important Plants in Three Barangays of Don Victoriano, Misamis Occidental

Results of the first-generation research project of Dr. Jose B. Arances and Dr Victor B. Amoroso, et. al. with the participation of six Subanen on the inventory and assessment of the flora in three barangays of Don Victoriano, Misamis Occidental revealed two endangered, 71 endemic, 11 rare, and 161 economically important species.

This research project aims to select, identify, evaluate and mass propagate the endemic, rare and economically important plants by establishing a Community Economic Garden and Barangay Nursery involving the local community. The establishment of Community Economic Garden and Barangay Nursery are seen as livelihood projects and an *ex-situ* strategy in conserving the remaining biodiversity in the forest.

Master Project for Aquatic Ecosystem

Comparative Assessment of Langaran and Layawan Rivers

Layawan River had been awarded as the “cleanest and greenest river” in Region X in 2001. Langaran River, on the other hand is a disturbed and exploited ecosystem due to quarrying activities and construction of irrigation dams.

The two rivers will be compared in terms of three general categories: biological, physico-chemical and socioeconomic. The water quality and quantity of the two rivers will be assessed in order to establish benchmarks and generate information that will be useful for the development of protocols for basic monitoring systems and environmental management. It also aims to relate the prevalent land use patterns to water quality, state of biodiversity and the livelihood activities in the area that would be useful in developing policies for regulatory measures.

Comprehensive Analysis of the Ecological Factors Useful for the Development of Strategies to Sustain Coastal Biodiversity and to Improve Fish Stock Management

One of the major concerns affecting the aquatic ecosystem is the poor state of fish stock in the coastal waters. This study aims to do the following: (1) assess the prevailing biological, physical and chemical parameters that potentially cause the poor state of fish stock and relate these to existing water quality standards, (2) recommend regulatory measures and provide information in the development of protocols for basic monitoring systems, (3) relate the prevailing socioeconomic and policy factors with the state of coastal resources to help set policy directions that will reduce pressure on the coastal ecosystem.

Lastly, the data generated in this study will be used to come up with strategies aimed at biodiversity conservation and sustainable development in the Mt. Malindang area.



Site where the Community Economic Garden and Barangay Nursery will be established.

Biodiversity Conservation of Arthropods in an Upland Cabbage-Growing Area of Mt. Malindang through Integrated Pest Management

Mt. Malindang is an important producer of high valued vegetables in the province of Misamis Occidental, Zamboanga del Sur and Zamboanga del Norte. These include the crucifers like cabbage, Chinese cabbage, pechay, green onion, chayote, pepper and carrots. Intensification of vegetable production leads to heavy reliance of high inputs of fertilizers and pesticides to obtain maximum yield and control pest population. Majority of pesticide application are targeted at the diamondback moth or DBM, the major insect pest of cabbage that greatly limits the production of cabbage.

To avoid pest infestation, farmers cultivate newly opened areas. Farmers encroach, and plant cabbage on patches of the protected primary forest. However, this practice of shifting cultivation is unsustainable and often leads to loss of biodiversity.

The best option in dealing with pest problem is integrated pest management (IPM).

This study aims to conserve beneficial arthropods' biodiversity through the implementation of participatory IPM research and training in the uplands of Mt. Malindang. It also aims to assess the effect of IPM versus the conventional method of pest control on the diversity of arthropods in cabbage grown in the uplands of Mt. Malindang.

There are four studies/components in this project. First is biodiversity conservation of arthropods, which is geared towards the assessment of arthropod population to further compare the effect of two cropping systems (monoculture vs. polyculture) under two pest management practices (IPM vs. conventional practice). The second study is a survey on the economic value of vegetable crops in the upland areas of Mt. Malindang. Third is the survey on indigenous technical knowledge and pest management strategies, and fourth is the socioeconomic analysis of the impact of IPM, which aims to assess the economic benefits of IPM for the participating farmers of the project.

con't. Three weeks...from page 3

basic nematological techniques such as sampling, isolating, fixing and mounting nematodes. The intensive course culminated in a final examination where we were required to identify 10 nematode specimens to the species level. After the exam, most of my classmates headed for home. Despite our short time together, *it was hard to say goodbye!*

One of my classmates came to me and asked in her straightforward manner, "So, did you pass?" (Was this question intended for a beginner or was this her way of asking for my score?) I told her I passed and gave her my score. She exclaimed, "Oh, you beat me!" Dr. Bongers told me that for a beginner, I did excellently. I had initial qualms of not performing well. Had it not been for Dr. Bongers' kind assistant, Ms. Hanny Megen, who patiently answered all my questions and explained painstakingly the various nematode structures and identification techniques, it would have been so.

I stayed a week longer after the course to work in the soil biology laboratory under the supervision of Dr. Ron de Goede. He showed me some apparatus and demonstrated some techniques for various aspects of the study of soil quality. I also had the chance for another hands-on experience on sampling, fixing and mounting nematodes. We discussed the soil ecology research project for which I did some literature search.

Three weeks seemed just like a gust of wind. I had to say goodbye to the land where I met my *new love*. At least I have fallen for the cousin of my first love, microbiology!

The training course gave me enough confidence to work on some aspects of soil biology: sampling, extraction, nematode characterization and identification, and to use these information to come up with indicators for soil quality.

It is expected that 90% of the nematodes that I studied in the Netherlands would be different from those that I will encounter here. Species identification would therefore, be up to the Family level only. Nonetheless, their identification (whether new species or not) and their distribution in the different soil and land use types could generate a wealth of information.

I was unprepared to be a research assistant, more so with attending a training course abroad. Thus, I was anxious at the start; but words from one of my favorite mentors, Dr. Olga Nuñez inspired me, "**When God gives blessings, He will put no burden onto it**". True enough, in that three-week adventure, everything seemed perfect.

I had wondered many times why the unexpected, but worth reminiscing circumstances happened...

I have just placed the last piece of the puzzle! ▪

Research Teams

Terrestrial Ecosystem Master Project

Project Leader:

Dr. Jose B. Arances [Central Mindanao University (CMU)]

Floral Diversity and Relevant Interrelationships of Critical Resources on Mt. Malindang

Study Leader:

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Comprehensive Analysis of the Ecological Factors Useful for the Development of Strategies to Sustain Coastal Biodiversity and to Improve Fish Stock Management

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Socioeconomic-Cultural Studies

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Resource Utilization Patterns in the Aquatic and Terrestrial Ecosystems of Mt. Malindang and its Environs

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Indigenous Knowledge Systems and Modern Technology-Based Approaches: Opportunities for Biodiversity Management and Conservation in Mt. Malindang and its Immediate Environs

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

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Biodiversity Conservation of Arthropods in an Upland Cabbage-Growing Area of Mt. Malindang through Integrated Pest Management

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Conservation and Utilization of Endemic, Rare and Economically Important Plants in Three Barangays of Don Victoriano, Misamis Occidental

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