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LEAF TO UPLIFT MINDORO: REHABILITATION AND PROPAGATION OF NIPA (*Nypa Fruticans* Wurmb) IN OCCIDENTAL MINDORO

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Abstract - *Nypa fruticans* wurmb commonly called nipa is the only palm considered as mangrove. It plays an important role in stabilizing river banks preventing, soil erosion and producing various useful products. In Occidental Mindoro, this species is dwindling and might be considered endangered if not given utmost attention at this point in time. The location of the site was mapped out using GPS coordinates. The assessment of nipa was conducted along Amindan River, Bubog, San Jose, Occidental Mindoro with a plantable area of 7,800 sq m. Nipa species density shows 379 plants on the right side of the river bank and 414 plants on the left side. The seaward zone has the highest density of 770 plants/ha and middle ward zone of 630 plants/ha. The least dense is the landward zone of 247 plants/ha. A survey questionnaire and unstructured interview were administered and conducted respectively among 30 randomly selected stakeholders. Continuous consultation and partnership with the community and other stakeholders; provision of financial and technical support from collaborating agencies, nursery establishment and additional trainings and seminar to enhance the participation of the community are the most important strategies done in the implementation of the project.

Keywords - *Nypa Fruticans* Wurmb, nipa, Mindoro

INTRODUCTION

The Philippines is an archipelago of about 7,100 islands bordered by 17,460 km of coastline and 26.6 million ha of coastal waters. Marine resources are important in providing food and other goods and services because more than half of the country's 1,500 municipalities and 4, 2000 villages are coastal (Primavera 2002). The mangroves along the coastal zone are among the most productive ecosystems, which directly or indirectly provide economic and ecological benefits to man. Mangroves, those predominantly tropical trees and shrubs growing on sheltered coastlines, muddy river banks in many parts of the world, belong to a variety of plant families. The common characteristic they all possess is tolerance to salt and brackish waters (Field 2007).

One of the most useful mangroves in the Philippines is ni*p*a(***Nypa fruticans*** **Wurmb)**belonging to the family ***Arecaceae.*** Hence, the famous song, "My Nipa Hut" (Bahay Kubo), in vernacular typifies the close association of nipa in the Philippine folklore. The generic name *Nypa*is the latinised derivative of "nipah", which is the native name used in the Moluccas and the Philippines while the specific epithet *fruticans*, is Latin for shrubby, referring to its stemless appearance. It is commonly known as ***attap palm*** in Singapore, ***mangrove palm***or***buahatap*** in Indonesia, ***buahnipah*** in Malaysia; **dừanước** in Vietnam, and by other names in other countries in Southern Asia and northern Australia within the Indomalaya ecozone.

Nypa fruticans is, however, not a mangrove in the strict sense, as it does not exploit truly littoral environments nor can it tolerate inundation with undiluted sea-water for long periods. A critical environmental condition for Nipa is the percentage dilution of the sea-water by seaward flowing fresh-water. It occurs most commonly in areas of brackish water, extending upstream into permanent fresh-water areas where tidal-influenced water-level fluctuations are able to carry and deposit the seeds. Nipa does not require saline conditions at all as it can grow well in pure fresh-waters. However, the salt-water tides are crucial for seed dispersal and deposition of silt. Nipa can also grow as an undershrub, infrequently as a tree, or can dominate in mixed forest(www.worldagroforestrycentre.org/sea).

Figure 1. Nipa palms with its mature fruits along Amindan River,Bubog, San Jose, Occ. Mindoro.

Nypa palm has a trunk that grows beneath the ground and only the leaves and flower stalk grow upwards above the surface. It cannot be considered a treeal though the leaves can extend up to 9 m(30 ft) in height. The female flowers grow atthe tip of the inflorescence with catkin-likered or yellow male flowers on lower branches.

The seed is woody and arranged in a cluster compressed into a ball up to 25cm (10 in) across on a single stalk. The fruits are spherical, (30.48 cm in diameter) actually a closely packed clump of carpels, each about 7.62 to 16cm long. Seeds are hard, white and edible with the size and shape of a small hen's egg. The ripe seeds separate from the ball and are floated away on the tide, occasionally germinating while waterborne.

Figure 2. A globular fruit cluster of Nipa palm which is football sized. The hollow portion shows the space where 1 of the seeds was removed.

Shingles / roof material for thatched houses are considered the most important product from the long, feathery leaves of the nipa. Researchers at the Ecosystems Research and Development Bureau (ERDB) described handcrafting shingles as one of the indigenous livelihood that has been developed through trial and error experiences. The leaves/fronds are also used in many types of basketry, brooms, and other household articles. The inflorescence can be tapped before it blooms to yield a sweet, edible sap collected to produce a local alcoholic beverage called Tuba. It is stored in "Tapayan" for several weeks to make vinegar. The food prepared from nipa vegetative pith "ubod" is considered exotic. Since nipa is grown for its leaves, ubod production is rarely practiced. Hence, there is a limited supply of ubod from nipa in the market which is sold at a higher price as compared to coconut ubod. The flower petals can be infused to make an aromatic tisane and some are used in floral arrangement. The young petioles are use as tying materials and coarse brush.

The more important long-term benefit from the tree/palm that is commonly taken for granted is its role in the protection and conservation of the coastal ecosystem. They serve as buffers or inter-tidal protective zones against typhoons, storm surges and tidal waves, preventing soil erosion and minimizing water pollution; are instrumental in building considerable areas of tidal land; and provide unique habitat, sanctuary and breeding ground for endemic, rare and endangered species of aquatic and terrestrial flora and fauna that breed and thrive in brackish water.

Realizing the ecological importance of mangroves, national government units have passed laws for their protection and conservation. Nipa, aside from being a mangrove is also considered a minor forest product which is included in the National Greening Project (NGP) of the government.

Executive Order No. 26 Section 2. Coverage states:

The National Greening Program shall plant some 1.5 Billion trees covering about 1.5 hectares for a period of six (6) years from 2011 to 2016, in the following lands of the public domain: Forestlands, *Mangrove and protected areas*, Ancestral domains, Civil and military

reservations, Urban areas under the greening plan of the LGU's, Inactive and abandoned mine sites and other suitable lands.

On **Section 3. Social Mobilization**

All students, identified by the DepEd and CHED and all government employers shall be individually required to plant a minimum of ten (10) seedlings per year in areas determined by the convergence initiative. Private sectors and civil society groups shall likewise be encouraged to participate in the NGP.

It is regrettable though that not much attention is being devoted by government agencies concerned, non-government organizations whose advocacies are environment protection and management, and local leaders to the protection and conservation of the coastal ecosystem, particularly mangroves.

The Ecosystems Research and Development Bureau of the DENR reported that ". . .over the past decades, the Philippine mangrove ecosystems and beach forests have suffered severe degradation to the point that biological diversity is threatened. Based on statistics, the extent of mangroves in the country is now barely 117,700 hectares out from the reported 450,000 hectares in 1920. The continuous degradation of the fragile Philippine mangrove ecosystems stems from both the adverse effects of human activities and natural processes. Mangrove and beach degraded coastal areas therefore need serious rehabilitation and restoration efforts. Coastal rehabilitation and restoration primarily start from greening the coastline using mangrove and beach plants and associated coastal species with meager scientific planning" (http-erdb.denr.gov.ph.).

Man's continuous indiscriminate use of mangroves, particularly nipa, results in its degradation which later leads to irreparable damage. According to Primavera (1997), it is mangroves suffered the earliest and greatest degradation in the Philippines because of their relative accessibility and a long history of conversion to aquaculture ponds. In addition, the increase in population created greater pressure on mangrove resources due to over exploitation of coastal dwellers and settlements.

Moreover, Primavera (2002) pointed out that mangrove reforestation

projects have been initiated mainly in Visayas, central Philippines, whose numerous islands are more vulnerable to typhoons than the bigger islands of Luzon to the north and Mindanao to the south. In San Jose, Occidental Mindoro, nipa is observed to be continuously dwindling and might be considered endangered if not given utmost attention at this point in time. Moreover, no detailed studies have been conducted that will give a general picture of the status of nipa in Occidental Mindoro to guide environmental managers and policy makers in implementing rehabilitation initiatives. Hence, this study was conceived to provide baseline data on the rehabilitation and propagation of nipa in the province of Occidental Mindoro.

OBJECTIVES OF THE STUDY

To rehabilitate and sustain the coastal ecosystem in the Municipality of San Jose, starting in Bubog, where a five-year study in the propagation, planting, care, and management of the nipa (*Nypa fruticans* Wurmb*)* was conducted.

MATERIALS AND METHODS

This study utilized the descriptive development method of research. As cited by Casihan (2006), the developmental method is a problem – oriented and interdisciplinary research methodology. It is performed in order to gain a sound basis for development activities and is characterized by two purposes namely: development of prototypical models; and, generating methodological direction for design and assessment of such models. Nipa rehabilitation program in Bubog will serve as prototype model for its massive rehabilitation in San Jose, Occidental Mindoro. The descriptive design was used for the researcher to gather relevant information about the prevailing ecological issues and concerns, specifically on *Nypa fruticans*. According to Sevilla et al (2000), descriptive method describes the nature of a situation as it exists at the time of the study and to explore the causes of particular phenomena.

The researchers employed both qualitative and quantitative modes of data collection. Qualitative research is a type of scientific

research that crosscuts disciplines, fields, and subject matters (Denzin and Lincoln, 2000). It produces findings that are applicable beyond the immediate boundaries of the study. The present study calls for a continuing program of a sustainable coastal ecosystem rehabilitation and management. To a significant degree, the researchers made use of quantitative method to help them interpret and better understand the complex reality of a given situation and the implications of the qualitative data that they were able to obtain from the residents and community leaders of the village, as well as other stakeholders and participants in the study.

The information on this study were gathered through (a) survey questionnaires developed and validated by the researchers using the four - point Likert scale to determine their level of awareness on the pressing issues and concerns about nipa. To further substantiate the data, (b) unstructured interviews were conducted among the sample population from the village, local government officials, non-government organizations concerned, and representatives of national government agencies, like the Department of Environment and Natural Resources (DENR) and the Department of Public Works and Highways (DPWH), who are assigned in the municipality/province; (c) ocular surveys/ inspections and observations of the area along Amindan River; (d) readings of existing public documents and related literature on the situation of the coastal ecosystem in the village and municipality; and (e) the GPS-maps, courtesy of DENR Research Specialist, on the specific area of the Amindan River where the rehabilitation program will be implemented. The study made use of descriptive statistics such as frequency, mean and percentages.

This study is one (1) of the stages of the unified 5-Year Development Plan of the Graduate School Research, Development and Extension (RDE) Program. Following are the stages of the said program:

Stage 1 Assessment

a. Identification / Mapping of the site for nipa rehabilitation
b. Plantable area
c. Number of planting materials needed

d. Species density of nipa
e. Perception/awareness of people towards coastal ecosystem
f. Information Education Campaign (IEC) towards nipa

Stage II Nursery

a. Traditional propagation
b. Clonal propagation (Biolotechnology)
c. Wildlings
d. Construction
e. Maintenance
f. Identification and prevention of pests and diseases

Stage III Pilot Testing

a. Transplanting in identified site
b. Maintenance
c. Identification and prevention of pest and diseases

Stage IV. Monitoring and Evaluation

a. Plant yield
b. People's evaluation

Stage V Diffusion of Technology for Production and Extension

Table I. Projected timetable of activities in nipa rehabilitation program

PHASES	2012	2013	2014	2015	2016
1. Assessment	X				
2. Nursery	XX	XXXX			
3. Pilot testing		XXXX			
4. Monitoring& Evaluation	XX	XXXX	XXXX	XXXX	X
5. Diffusion of Technology				XXXX	XXXX

Legend: X = three (3) months

Research Locale

San Jose is the 1st class municipality in the province of Occidental Mindoro, Philippines. It is considered as the main commercial port, the center of entertainment and business in the province. Most of the people are Visayans, Batangueños and Ilocanos. It is the most thickly populated area in the province which continuously grows at 2.38% annually. As of 2010, population data reveal that the municipality has a population of 146,669 where 2% are expected to belong to the indigenous people group called Mangyans.

It is located at the southern part of the province with a total land area of 551.9294 km^2. Climatic condition is classified under Type A category and slope is generally flat. Soil composition developed from recent alluvial deposits which are silty-loam to clay loam and landforms consist of limestone and sedimentary rocks. All types of erosion are present: slight, moderate and severe erosion. Eleven (11) rivers and creeks serve as natural drainage.

Tagalog is the most spoken dialect and 83.97% are practicing Catholicism. The municipality has large diverse economic activities. However, majority of the working force which is estimated at 76%, and are still engaged in agriculture. Major crops produced include corn, rice, garlic, onions and among others. It is also known for inland fishing producing lapu-lapu, milkfish, and export quality prawn from fish ponds. Substantial quantities of marine products are also available. Known tourism facilities are beach resorts, hotels and restaurants.

The major attractions of the industrial town of San Jose are its three offshore islands - Ambulong, Ilin, and White Island. San Jose is also a favorite jump-off point to the world-class diving site - **Apo Reef Marine Park**. The provincial highway of Occidental Mindoro links most of the towns from north to south. Local bus and jeepney operators ply the route from the northernmost town of Abra de Ilog all the way to San Jose. Tricycles are the common mode of transportation around town. *Banca* (small boat) transfers to nearby island resorts and diving spots are available (http://web.me.com/sanjosemindoro/phi/Welcome.html).

San Jose is politically subdivided into 38 barangays. Out of these, Bubog was chosen as the ideal site based on the ocular inspection of the researchers. The following figures show the location of San Jose in

the provincial and national setting.

Figure 3 - Map of Occidental Mindoro showing
the location of San Jose.
Source: http://web.me.com/sanjosemindoro/phi/Welcome.html

Identification of the Site for Nipa Rehabilitation

Initially, the researchers sought the permission of the Bubog village officials about the rationale and intent of the study. The Captain and officials gave their consent and full support towards the attainment of the research study. They accompanied the researchers in identifying the ideal site of the proposed project. After visiting several sites, the two (2) parties arrived at a common consensus that Amindan River will be the site for the proposed rehabilitation project.

Amindan River, better known as Molasses River by the locals in Village Bubog, municipality of San Jose, province of Occidental Mindoro has been chosen as the site of the study for the following reasons:

- The urgent need to institute immediate and long-range measures

to minimize the decreasing population of the nipa palm and rehabilitate the area. The continuing trend of the loss of the palm brings about the erosion of the banks of the river on both sides; loss of breeding ground of fish, freshwater/brackish water shrimps, mud crabs and other mollusks, and other marine life; loss of economic opportunities of the greater majority of the residents of the village who derive supplementary income from making vinegar and "tuba" from the palm's sap and roofing and walling materials "pawid", brooms, and other items from the palm's fronds/leaves;

- The willingness of the local government officials (both at the municipal and barangay levels), leaders of barangay associations, and the residents themselves to participate actively in the rehabilitation of the natural habitat of the Nipafruticans; and
- Availability of sufficient planting materials in the locality.

The assistance of the DENR research specialist and forester for the technical aspect of gathering substantial data was likewise sought. The former headed the GPS mapping of the site. One of the proponents of the study is teaching Ecological Management, a basic subject in the curriculum of the Graduate School. It is a part of the course to undergo educational tour/community immersion as well as Information Educational Campaign IEC about prevailing ecological issues and concerns. Hence, the researchers and the graduate students administered the questionnaires and conducted interview among the randomly selected respondents of the locality.

The residents who dwell along Amindan River were the samples taken out of the entire population of Bubog because they will be the future partners in the next stages of the study

RESULTS AND DISCUSSION

The location of the site was mapped out using **GPS coordinates**. The Research Specialist and Chief Forester of DENR assisted the researchers in gathering relevant data. The following figure shows the research site.

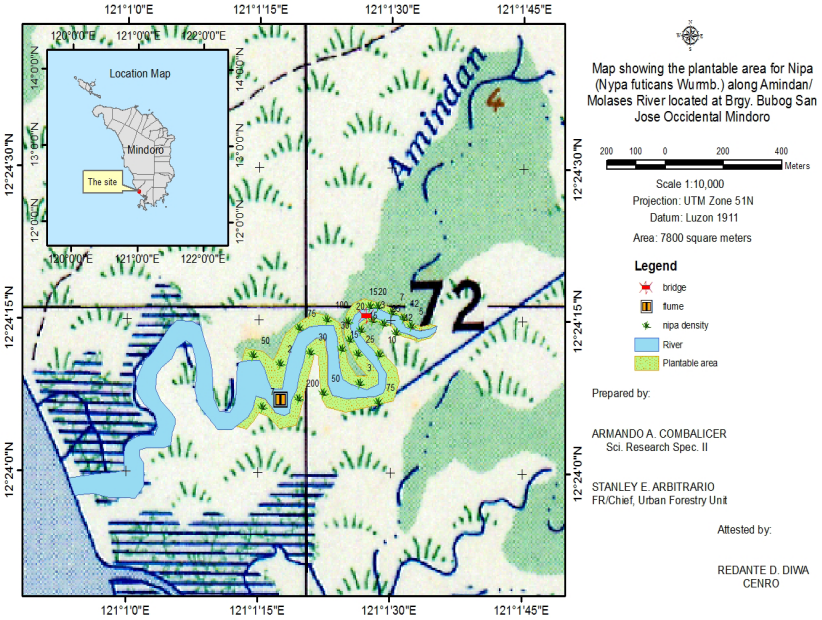

Figure 5 –Research site/map showing the plantable area for nipaalong Amindan River

The assessment of nipa was conducted along Amindan River (2.60km) with a plantable area of 7,800 sq. meters. The number of planting materials needed in 1meter x 1 meter spacing is 7,800. In terms of nipa species density, there are 379 individuals on the right side of the river bank and 414 individuals on the left side. The seaward zone has the highest density of 770 plants/ha. followed by the seaward zone of 630 plants/ha. The least dense is the landward zone of 247 plants/ha. Figure 6 clearly illustrates this.

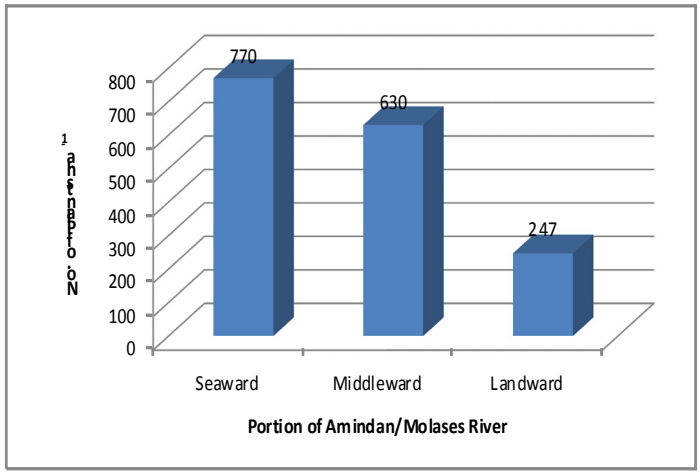

Figure 6. Density of Nipa along the Amindan/Molases River, San Jose, Occ. Mindoro

A survey questionnaire developed and validated by the researchers was administered to 30 randomly selected respondents who dwell along Amindan River. An unstructured interview was likewise conducted to solicit their opinions, ideas and perception on the prevailing issues and activities concerning nipa. The assessment of the respondents on nipa was determined using the modified four – point scale with the following verbal description:

4	**-**	**Strongly Aware**
3	**-**	**Aware**
2	**-**	**Moderately aware**
1	**-**	**Not Aware**

As gleaned from Table I, the weighted mean of 3.54 reveals that residents in Bubog, San Jose, Occ. Mindoro are **Strongly Aware** on almost all the salient features of nipa. This finding is in consonance to the study of Ong Jin -Eong et al.(1995) about community participation in mangrove forest management and rehabilitation in Southern Thailand whose recommendation include the following components

namely : 1. awareness creation and social mobilization and 2. capacity building of the local people as partners in mangrove rehabilitation.

Table 2.Summary of the stakeholders' awareness on nipa

Statements	Mean	Interpretation
1. Nipa serves as the habitat for fishes and other aquatic animals.	3.17	Aware
2. Nipa prevents heavy floods and soil erosion along riverbanks and nearby lands.	3.47	Strongly Aware
3.The abundance of nipa in the rivers will lessen the effect of " global warming"	4.17	Strongly Aware
4.The use of nipa as roof and wall of houses will lessen the effects of " global warming"	3.37	Strongly Aware
5. The making of nipa products such as pawid, vinegar, alternative medicines, food ingredients, etc. are sources of additional income.	3.53	Strongly Aware
Weighted Mean	**3.54**	**Strongly Aware**

Legend:

3.26 – 4.00	Strongly Aware
2.51 – 3.25	Aware
1.76 – 2.50	Moderately Aware
1.00 - 1.75	Not Aware

The responses of the "partners" on the unstructured interview were categorized by the researchers on the basis of their commonality.

"What are the different uses of nipa?"	**Count**	**Percentage**
Use as materials in constructing houses	30	100
Source of "Tuba"	3	18
Nesting/breeding places of fish and other marine organisms	3	18
As buffer zone	2	12

"What are the causes of the diminishing number of nipa in Bubog?"

"Pawid"making, shingles for roofing and walling	20	67
"Early killing", harvesting at an early age	17	57
Fishpond expansion	10	33
Personal consumption "(ubod",vegetative pith)	8	27
Dwellers/Settlers on the river banks	7	23

"What are your suggestions / recommendations for the rehabilitation of Nipa?"

Replanting	19	63
Timely harvesting of nipa	14	47
Limit the use of nipa	12	40
Implementing government ordinances	9	30
Awareness campaign	7	23

When asked if they are willing to collaborate with the educational sector such as OMSC in the nipa rehabilitation program, 100% of the respondents said Yes.

Cabahug (2002) pointed out that local people's involvement and participation in mangrove development and management provide them the opportunity to have direct contact with their natural environments. As it has often been said, "*to care we must understand, to understand we must know, and to know we must have met.*" The consciousness-raising should be done for local people. Hands-on and on-the-job/field work increases their level of awareness and understanding and strengthens their capability to manage their resources sustainably. These principles from notable ecologists propel the researchers to conduct an IEC among the residents of Bubog to immerse them fully on the importance of the proposed project in their locality. Thus, during the Special Consultation Meeting, they, together with Mr. Redante Diwa and Engr. Bobby Matira,Community Environment and Natural Resources Officer (CENRO) and Department of Science and Technology (DOST) Provincial Director respectively spearheaded this worthwhile activity.

CONCLUSIONS

On the basis of the results of the interviews and ocular surveys/ observations, the following conclusions are hereby drawn:

1. The landward zone of Amindan River needs intensive rehabilitation since it has the least nipa density among the identified three zones.
2. The stakeholders can be active participants in the implementation of nipa rehabilitation project.
3. The most important strategy done in the implementation of the project is the continuous consultation and partnership with the community and other stakeholders. Concerned agencies are willing to provide financial and technical support in the implementation of the said project.

RECOMMENDATIONS

In view of the findings and conclusions, the following recommendations are presented:

1. Institute a sustainable program to rehabilitate nipa through nursery establishment in Occidental Mindoro.
2. Enhance the participation of the community through additional trainings and seminar.
3. Strengthen existing linkages through Memorandum of Agreement.

LITERATURE CITED

Casihan,L.
2006 *Development of a prototype online courseware in management of physical resources*. Unpublished Doctoral Dissertation, Philippine Normal University, Manila.

Denzin, N.,K, Yvonne, S. Lincoln
2000 *Qualitative research*. Boonhill St., United Kingdom: sage PublicationInc.

Denzin, N., K, Yvonne, S. Lincoln
2010 *Research information series on ecosystems*. Vol.22 No.1. January – April.

Cabahug, D.M.
2002 Rehabilitation, conservation and sustainable utilization of mangroves in Egypt. http://www.fao.org/docrep/007/ae213e/ae213e00.htm. Retrieved December 14,2011

Field, C.D.
2007 Rehabilitation of mangrove ecosystems: An Overview http://www.globalrestorationnetwork.org/uploads/files/LiteratureAttachments/242_rehabilitation-of-mangrove-ecosystems---an-overview.pdf. Retrieved, January 30,2012.

Melana, D., E. E. Melana, MF3, and A. M. Mapalo
2012 Mangrove management and development in the Philippines. http://oneocean.org/download/20000427/mangrove_management_phils.pdf. Retrieved February 2,.

Mendoza, A. B. and D. P. Altura
2011 Mangrove Structure on the Eastern Coast of Samar. http://tucson.ars.ag.gov/isco/isco10/SustainingTheGlobalFarm/P148-Mendoza.pdf

Ong Jin-Eong, K., G. H., B. F. Clough
1997 Mangrove forest management and rehabilitation in Southern Thailand. Second Interim Report (ECU funded project), p. 26.

Primavera J.
2002 Development and conservation of Philippine mangroves: Institutional issueshttp://mangroveweb.seafdec.org.ph/pubs/Development%20and%20conservation%20of%20Philippine%20mangroves.pdf Retrieved January 10,2012

Sevilla, C.
1992 *Research Methods*, Manila: Rex Printing Company Inc.

INTERNET SOURCES

http://www.globalrestorationnetwork.org/uploads/files/LiteratureAttachments/242_rehabilitation-of-mangrove-ecosystems---an-overview.pdfRetrieved December 10,2011.

www.en.wikipedia.org/wiki/Nypa_fruticans. Retrieved December 11, 2011.

http-erdb.denr.gov.ph. "Rehabilitation & Ecological Restoration R & D for Marginal & Degraded Landscapes and Seascapes. A Research Compendium for Damaged Coastal Areas."May 2010.Retrieved January 25, 2012.

http://web.me.com/sanjosemindoro/phi/Welcome.html Retrieved January 20, 2012.

www.worldagroforestrycentre.org/sea

www.fhi360.org/NR/rdonlyres/. . ./overview1.pdf, "Qualitative Research Methods: A Data Collector's Field Guide. Module 1", p.1.Retrieved February 2, 2012.-

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