Journal of Natural and Allied Sciences
Vol. III. No. 1, pp. 13-22, January – December 2019

Ecosystem Services and Management of Nipa Palm Resource in Selected Local Communities in Lingayen, Pangasinan

LORENA F. AQUINO
Pangasinan State University, Binmaley Campus
Binmaley, Pangasinan
Email add: lorenaaquino38@yahoo.com

Abstract - *Nipa palm resource plays an essential role in the maintenance of the environment through its numerous environmental services. This research paper determined the goods and services that can be obtained from Nipa palm ecosystem in selected local communities in Lingayen, Pangasinan through stakeholders' viewpoints. A qualitative method was used with a ground truth theory through focus group discussion (FGD) and personal interview among the participants. The focus group discussion (FGD) was conducted with the participation of concerned barangay officials, representatives from the owners, growers, sap harvester and vendor of Nipa palm while a personal interview was done among selected local residents directly involved in the processing of Nipa palm. As perceived by the stakeholders, there were several goods and services they derived from Nipa palm ecosystem. The current management and protection of Nipa palm ecosystem were described by the respondents from each study area and yet it had no specific guidelines or ordinance implemented in each barangay. As main stakeholder of Nipa palm ecosystem, the participants' responses and perspectives on the ecosystem services of Nipa palm resource were an indication of its viability as it greatly helped to increase the awareness and understanding of the local residents. The community residents should continue to protect the Nipa palm ecosystem to achieve quality life and collaboration among different users is necessary for sustainable management and utilization of Nipa palm ecosystem.*

Keywords: *Ecosystem services, Management, Nipa palm, Stakeholder*

INTRODUCTION

Nipa palm is widely used and the indiscriminate cutting and/or overutilization of this resource is quite common in many coastal areas, particularly its leaves as commonly used by coastal and inland dwellers for roofing material of houses. The Nipa sap is processed into vinegar, alcohol (tuba or lambanog), molasses and sugar. Nipa palm could be used for medicinal purposes and for remediation of heavy metals from polluted areas [1]. Xylem sap is a potential source for the production of bioethanol which generates higher yield than sugarcane [2]. This means that Nipa palm plays an essential role in maintaining the integrity of the environment in terms of its numerous environmental services.

The current status of the Nipa industry in Lingayen in terms of the area, utilization and over-extraction are not documented yet. All the information provided with regard to the common issues on the utilization of Nipa palm were based from the experiences of the residents interviewed during the initial visit in the two areas of concerned and through observations of the researcher. According to them, the potential of Nipa palms particularly the economic values were threatened due to lack of enough knowledge and limited skills of local residents which are regarded to be the challenges for the application of new production method. Another concern is the overharvesting of Nipa palms in the study areas which may result to the thinning of Nipa plants that will eventually become unhealthy in the coming years. In addition, some local residents in the study area are also trying to engage in entrepreneurial activities to augment

ISSN 2599-4646 (Print) *www.psurj.org/jonas* ISSN 2599-4654 (Online)

their source of living as people experience low marketable exchange of Nipa products.

OBJECTIVES OF THE STUDY

This research paper was conducted to determine the goods and services that can be obtained from Nipa palm ecosystem in selected local communities in Lingayen, Pangasinan through stakeholders' viewpoints.

Specifically, it aimed to:
1. identify the use of Nipa palm's ecosystem services;
2. determine ecological benefits and functions of Nipa palm ecosystem; and
3. describe the management practices employed by the local residents in protecting Nipa palm resource.

METHODOLOGY

Study Area

The study was conducted in Barangay Balococ (15°59'51.54"N, 120°13'26.86"E) and Barangay Bantayan (15°59'11.9" N, 120°13'05.1" E), Lingayen, Pangasinan. In the municipality of Lingayen, Pangasinan, two (2) communities namely: Balococ and Bantayan were selected as the study areas. Both were located at the mid-stream of brackish water that flows along Agno River through Limahong Channel. Because of its location, Nipa palm abound in the town particularly in these two (2) riverine communities where most of their residents are engaged in making of Nipa wine, vinegar and shingles as their prime source of income. This was the reason why most of their people preferred to establish homes closed to the Nipa palm ecosystem in order to have easier access and utilization of Nipa palm resource.

Research Design

The researcher used a qualitative research method with a grounded theory through focus group discussion (FGD) with guide questions and an interview to obtain data and information on the ecosystem goods and services of Nipa palm resource and the management practices used in the study areas.

The focus group discussion involved the community members, barangay officials and representatives of community organizations while the personal interview was conducted among selected local residents living near Nipa palm area.

However, the respondents in the focus group discussion or group interview was attended by 8 or 9 participants coming from the representatives of barangay officials, Nipa owners and growers, farmers and fishers, traders, and barangay workers. A group interview was conducted in a place where all participants felt convenient and an area where "bystanders" were not allowed.

Data Gathering Procedure

This study used the instruments of interview guide questions to gather important primary data. In the conduct of a face-to-face and individual interview, the researcher was guided by questions translated in Filipino which were primarily focused on the respondents' knowledge and understanding on the direct and indirect uses of Nipa palm as a resource, their practices in the utilization, maintenance and protection of Nipa palm. This was also conducted among community members, barangay officials and representatives of community organizations concerned with the extraction, production and utilization of Nipa palm.

Analysis

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The data gathered were tallied, listed, and summarized and applied descriptive analysis was also employed in the presentation of the information gathered.

RESULTS AND DISCUSSION

Identification of Ecosystem Services of Nipa Palm

The identification of ecosystem services of Nipa palm were anchored on the International Union for Conservation of Nature (2014) [3] and Millennium Ecosystem Assessment (2005) [4]. In this research, the ecosystem services of Nipa palm was identified based on the four (4) main categories, namely: Provisioning, Regulating, Supporting, and Cultural Services

Use Value of Nipa Palm's Environmental Services

Table 1 presents the use value of Nipa palm's environmental services as indicated by the respondents in Barangays Balococ and Bantayan.

Table 1
Use Value of Nipa Palm's Environmental Services as Indicated by the Respondents in Barangays Balococ and Bantayan

	BARANGAY BALOCOC		BARANGAY BANTAYAN	
	Environmental Services	**Category**	**Environmental Services**	**Category**
1	Leaves are used as shingle making for house roof thatching.	Provisioning	Leaves are used as thatching materials for roofing	Provisioning
2	Sap is used in fermenting vinegar and wine or alcohol	Provisioning	Sap is for fermenting vinegar and wine making	Provisioning
3	Fruit is edible and can be cooked as dessert ingredient	Provisioning	Fruit is eaten raw and can be cooked as dessert ingredient	Provisioning
4	Dried rhizomes, stalk of fronds and fruit hard shells are good source of fuel for cooking	Provisioning	Dried stalk and rhizome are used as fuel wood	Provisioning
5	Sap is boiled for molasses production	Provisioning	Sap can be used to produce molasses	Provisioning
6	Dried stalk of fronds are used as fence in the backyard garden	Provisioning	Petiole of fronds can be dried used for backyard fence	Provisioning
7	Fresh sap can be drunk to cure kidney illness	Provisioning	Damaged fronds are used for brooms making.	Provisioning
8	Fermented wine can be used to treat person suffers hyperacidity or ulcers	Provisioning	Young leaf blades as wrappers for delicious food/rice cake	Provisioning
9	Damaged fronds are made a bundle of broomsticks and even a baskets	Provisioning	Nipa palm wine is used to cure menstrual cramps	Provisioning
10	Young leaves can be burned for the cure of toothaches as mouthwash.	Provisioning	Pure vinegar is used to help cool a fever as lukewarm bath	Provisioning

The use value of the environmental services of Nipa palm was obtained from the respondents during the conduct of personal interview and were eventually listed and summarized according to their statement. Respondents in both study areas were able to identify several uses and functions of Nipa palm ecosystem in their respective barangays as shown in Figures 1, 2 and 3, respectively. The highest source of use values were for a source of income, employment opportunities, food and medicines, and habitat for most aquatic resources.

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Figure 1: Valuable products extracted from Nipa palm

Ecological benefits and functions of Nipa palm resource

Table 2 presents the ecological benefits and functions (non-use value) of Nipa palm as indicated by the respondents in Barangays Balococ and Bantayan. Prevention of soil erosion, strong currents and floods were regarded as the main function of Nipa palm and protection against strong winds and typhoons was also considered by the respondents. Some respondents also considered it as nursery area of most aquatic organisms and can act as shed to provide cool and fresh air. Other respondents said that Nipa palm was easy to plant, had aesthetic function and can be a research-based area.

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Table 2
Ecological Benefits and Functions (Non-Use Value) of Nipa Palm as Indicated by the Respondents in Barangays Balococ and Bantayan

	BARANGAY BALOCOC		BARANGAY BANTAYAN	
	Environmental Services	**Category**	**Environmental Services**	**Category**
1	The bunch of stems helps in sediment deposits lead to soil build-up or formation that prevents erosion, flooding, and currents.	Supporting	The bunch of stems helps in sediment deposits lead to soil build-up or formation that prevents erosion, flooding, and currents.	Supporting
2	The underground roots perform soil compaction against strong currents and erosion.	Regulating	The underground roots perform soil compaction against strong currents and erosion.	Regulating
3	It serves as breeding ground for aquatic living things and a shelter for birds.	Provisioning	It serves as breeding ground for aquatic living things and a shelter for birds.	Provisioning
4	It provides cool air and windy conditions.	Regulating	It provides cool air and windy surroundings.	Regulating
5	It acts as sheds that can provide fresh air.	Regulating	It acts as sheds that can provide fresh air.	Regulating
6	It has good resistance to strong winds.	Regulating	It serves as defense against the impacts of strong winds and typhoon.	Regulating
7	New fronds can quickly appear even when destroyed due to storm.	Supporting	It has aesthetic functions for viewing, picture taking and pre-nuptial shoot.	Cultural
8	It can tolerate infrequent water flows as long as the soil is kept in moist condition.	Supporting	Nipa palm is rich in nutrients around its base for aquatic resources.	Supporting

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9	It does not need high saline condition as it grows best in brackish water.	Regulating	Nipa palm shingles can be a good thermal insulation as house roofing.	Regulating
10	It is easy to plant.	Cultural	It can be used for a research-based area.	Cultural

Figure 2: Some goods obtained around and under Nipa palm ecosystem

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Figure 3: Some ecological benefits and functions of Nipa palm

Management of Nipa Palm Ecosystem

Table 3 presents the management and protection of Nipa palm ecosystem by the respondents.

Table 3
Management and Protection of Nipa Palm Ecosystem by Respondents

	Barangay Balococ	Barangay Bantayan
	Plant	
1	Plant more Nipa palm at the river embankments to reduce risks of disasters from flooding and strong currents.	Plant more and protect existing Nipa palm along the river banks.
2	Owners/growers and sap harvesters are responsible in cleaning their Nipa	Regular cleaning around Nipa palm by removing damaged leaves and stalks

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	palm by removing damaged leaves to maintain its growth.	from diseased to grow fast and have a good source of sap for vinegar and wine making.
3	Avoid picking flowers, fruits and fronds of Nipa palm without permission from the owner.	Controlled cutting of fronds or leaves for every six months.
4	Controlled cutting of leaves should be encouraged to sustain quality growth of Nipa palm.	
Habitat		
5	Prohibit throwing garbage around Nipa palm area.	Avoid dumping wastes in the Nipa palm areas that may affect its growth and to protect it from damage and harm.
6	Owners/growers and sap harvester are responsible in cleaning their Nipa palm by removing damaged leaves to maintain its growth.	Regular cleaning around Nipa palm by removing damaged leaves and stalks from diseased to grow fast and have a good source of sap for vinegar and wine making.
		Nipa palm needs to be reserved in permanently wet condition for its growth stability.

When an inquiry was made as to the policies or rules in place on management of Nipa palm ecosystem, all the informants said that there were no local policies or ordinances in place to address the protection of Nipa palm in their respective communities. However, the respondents in both study areas had mentioned their cooperation in tree planting activities as part of the conservation efforts as their perceived role being surrounded by Nipa palm and have affirmed that Nipa palms have provided them numerous benefits.

The Nipa palm ecosystem is open to the residents only for those harvesting crustaceans, bivalves and molluscs but not the Nipa palm leaves and sap. As member of the community, the respondents were not hesitant to identify simple ways of management and protection they usually practice to ensure the continued provision of ecosystem services of Nipa palm which were enumerated, listed, and summarized in Table 1 and 2.

Moreover, there were some recommended gaps from literature that can support for the management and protection of Nipa palm ecosystem as presented in the following:

a. Planting Nipa palm is normally during the dry season with adequate soil and depth [5].
b. Observed proper cutting of stalks where its own sap flows inside the sheaths to avoid slow death for the plants [6].
c. Only mature Nipa palm leaves are used to make shingles to ensure quality roofing materials [7].
d. Harvesters used to leave at least 2 to 3 immature leaves during harvest so that the palm continues to grow [8].
e. Salinity requirements should be observed and monitored that are necessary for the collection of Nipa palms sap [5].

The identification of ecosystem services of Nipa palm in each study area was conducted through a focus group discussion represented by barangay council, owners, growers, vendors and harvesters of Nipa palm and other groups and personal interview among selected households. In the focus group discussion (FGD), the participants were initially informed that all the statements were documented and recorded. They were motivated by providing them a brief overview about Nipa palm ecosystem and the purpose of the conduct of the study in their barangay. It became productive where all participants attentively involved in the discussion. Each of them was given the opportunity to speak up all their views and thoughts on the ecosystem goods and services of Nipa palm ecosystem in their respective community. Furthermore, the selected households in each study areas were interviewed personally with a guide questions and eventually were encouraged to tell everything they knew about the uses and ecological functions of Nipa palm and their normal practice for the management and protection of the ecosystem in their respective community. The FGD and personal interview were significant avenues in convincing and encouraging target participants to answer the questions, to express themselves and to mention important things they still need such as the other methods of processing Nipa palm sap for the local community. In addition, the ecosystem services of Nipa palm obtained from the respondents were classified and compared with the theory-based approach as bases for the quantification and monetization of the ecosystem services of Nipa palm.

CONCLUSION AND RECOMMENDATION

Respondents were able to identify the ecosystem services of Nipa palm in their respective communities which were predominantly based on their own point of views. They were also conscious and had knowledge on the economic uses of Nipa palm as well as its ecological functions in their community. The community residents therefore, should continue

ISSN 2599-4646 (Print) *www.psurj.org/jonas* ISSN 2599-4654 (Online)

to protect the Nipa palm ecosystem to achieve quality life. They should also involve themselves to regularly monitor the activities within the Nipa palm ecosystem to avoid encroachment of gatherers in order to sustain ecological balance and socio-economic stability.

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ISSN 2599-4646 (Print) *www.psurj.org/jonas* ISSN 2599-4654 (Online)