



Mini Forest in Lingayen, Pangasinan: An Adaptive Response to Climate Change Adaptation and Risk Reduction

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Abstract –The main objective of this exploratory study is to identify barangays that could host and develop the proposed miniforest in Lingayen, Pangasinan according to the various factors: climatope, hygrotrope, topotrope, and physiogeographic setting of the said barangay. Corollary to this, the study also seeks to layout the plan for the development and sustainability of the mini forest as a climate change mitigation strategy. A survey was conducted involving the different stakeholders to determine their favorability/acceptance of the proposed mini forest. In this study, the proposed mini forest was classified into agro forest, beach forest and bakawan/swamp forest as dictated by the geographical characteristics and physiographic profile of the surveyed barangays. It also determined the adaptability/sustainability of trees and shrubs in relation to this proposed project. Included in the survey are the prioritized strategies, adequacy/availability of physical, human and financial resources needed in the establishment of a mini forest. In addition, barangay captains are asked of their opinions why or why they are not interested in the project. The establishment of agro forest, beach forest and bakawan/swamp forest is perceived to be favorable in terms of climatope, hydrotrope, soil features and physiographic factors. Barangay Balangobong and Domalandan West are the two barangays which have high favorability/acceptability of putting up the three types of mini forest due to their nearness to the river system and the shoreline of Lingayen Gulf. Six trees such as mango, ipilipil, santol, mahogany, caimito and tamarind were identified to have high potential for adaptability and sustainability to be planted and for the shrubs bayabas, guyabano, calamansi, and papaya while tupang bakod, anonas, kadios and oranges have low potentiality. The needed strategies for the establishment and management of the mini forest such as research, community organization and development were identified to be of “average priority” while to mobilized active participation of the community have the “high priority”. All the physical, human and financial resources are available in all of the barangays involved in the study. The benefits perceived to be by the respondents derived to preserve coastal margin of Lingayen Gulf came out as the number one reason. Other reasons cited were; trees are important in CO₂ sequestration, to provide shoreline protection and for biodiversity conservation, which was also cited by barangay chairmen interested in putting up all the three types of mini forest. It is highly recommended that the establishment of a mini forest in the form of agro forest, beach forest and bakawan/swamp forest is a strategy to mitigate climate change and at the same time to rehabilitate the coastal and river ecosystems. Also the forest will be a means of risk reduction in time of storm surge, tsunamis and other calamities. This can be achieved thru the assistance of Local Government Unit (LGU) by providing financial assistance and support; and the Department of Environment and Natural Resources (DENR) for supplies of trees and shrubs.

Keywords –Agro forest, beach forest, swamp forest, Forest Management Action Plan

INTRODUCTION

Forests can provide part of the solution to limit the unprecedented effects of climate change and to help society to adapt to the changes that we will face. Trees and forests help mitigate climate change by removing carbon dioxide from the atmosphere and converting it during photosynthesis to carbon, which they can “store” in the form of wood and vegetation, a process referred to as “carbon sequestration”. They provide many benefits

and services to society, including clean water, recreation, wildlife habitat, carbon storage, and a variety of forest products.

Destruction of forests, on the other hand, adds almost six billion tons of carbon dioxide into the atmosphere each year, and preventing this stored carbon from escaping is important for the carbon balance and vital in conserving the environment, the UN agency says.

In Pangasinan, only one virgin forest remains – that is Manleluag which is also threatened by various

illegal forms of activity such as logging and kaingin farming. There have been several attempts to secure the area but due to man’s way of looking at the environment, some problems are still in place.

Pangasinan maintains a forest land area of 130,423 hectares. In 2011, the provincial administration distributed over 20,000 forest seedlings to several private and public organizations in an effort to improve the province’s sustainability against the ill-effects of climate change. The seedlings were simultaneously distributed from the provincial plant nursery in the town of Sta. Barbara and breeding station in San Quintin. These were sent to recipients in Labrador, Alaminos City, Basista, Manaoag, Urdaneta City, Pozzorubio, and Binalonan. Other recipients were Balungao, Umingan, Sta. Maria, Natividad, and Rosales. The recipients, 33 in total, were public elementary and secondary schools, local government units, community associations, and business.

Provincial Agriculturist Dalisay Moya said that the seedling distribution is part of a bigger advocacy of the province, which is entitled Alog ko, Bilayen Ko Tan Aroen ko. The vision of the project is to re-establish forest in the province to protect it from the effects of climate change particularly ravaging floods. Pangasinan was hit by massive flooding during Typhoon Peping in October 2009. The storm submerged at least 60 percent of the province causing billions of pesos in damages to businesses, homes, and agriculture.

In Lingayen, establishment of a mini forest as a climate change mitigation strategy is advantageous. It is in this light that the proponents would like to corroborate with the existing program that our provincial government had established as a way of reinforcing or strengthening its vision that our department share with.

Brief Socio-Economic Profile of the Municipality of Lingayen

Lingayen, the capital town of Pangasinan, is situated along the famous Lingayen Gulf, the Agno River and Limahong Channel. It was founded by Augustinian missionaries in 1614. The word “Lingayen” was from the Pangasinan language word “lingawen” which means “to look back” as a certain huge tamarind tree that grew at the present town plaza would be a favourite sight to look at by the people before. It had an exceptional and stand out size as people would look back and back again at this tree. Later the place became “Lingayen”.

Today, Lingayen is a first class municipality in the province of Pangasinan on the island of Luzon in the

Philippines. Lingayen is the heart, the soul and the face of the Province Pangasinan as it is the capital municipality and the seat of government of the province of Pangasinan. It has a land area of 6,689.68 hectares consisting of 32 barangays and also has 7 sitios all classified as urban according to the recent National Census. Its terrain is flat suitable for farms and fisheries. Lingayen experienced cool and chilly climate from December to February, warm climate from March to April and wet climate form May to October. The municipality is bounded by the town of Labrador in the north, Bugallon on the west, San Carlos City on the south and Binmaley on the east.

Lingayen was one of the strategic points during the World War II. Lingayen’s long beach served as runway for several attack planes. It is also the birth place of President Fidel V. Ramos. Lingayen is also the hometown of one of the most beautiful Capitol in the Philippines.

Lingayen is politically subdivided into 32 barangays:

Table No. 1 List of Barangays in Lingayen

<u>Alivkewek</u>	<u>Dulag</u>	<u>Pangapisan North</u>
<u>Baay</u>	<u>Estanza</u>	<u>Pangapisan Sur</u>
<u>Balangbong</u>	<u>Lasip</u>	<u>Poblacion</u>
<u>Balococ</u>	<u>Libsong East</u>	<u>Quibaol</u>
<u>Bantayan</u>	<u>Libsong West</u>	<u>Rosario</u>
<u>Basing</u>	<u>Malava</u>	<u>Sabangan</u>
<u>Capandanan</u>	<u>Maliguec</u>	<u>Talagtog</u>
<u>Domalandan Center</u>	<u>Maniboc</u>	<u>Tonton</u>
<u>Domalandan East</u>	<u>Matalava</u>	<u>Tumbar</u>
<u>Domalandan West</u>	<u>Nagueguel</u>	<u>Wawa</u>
<u>Dorongan</u>	<u>Namolán</u>	

Economically, Lingayen has a promising future as investments and business opportunities continue to come in. The presence of numerous establishments like hotels, restaurants and recreation facilities boosts the municipalities’ business agenda. Its annual income P49,254,733.24.

Its economy is heavily dependent from agriculture-based production like rice, corn, tomato, and other vegetable. An industry Lingayen is well-known for its bagoong making as well as native sweets such as “bocayo”, furniture, handicraft, bamboo craft, and vinegar making. Also, Lingayen as a tourist destination is already making its mark in the tourism industry. Some enchanting and majestic spots to visit include the pristine beaches, War Memorial, the Urduja House, Sison



Auditorium, Limahong Channel, Capitol Building, The Narciso Ramos Sports Complex and Civic Center, and former President Fidel Ramos birthplace.

The town is also a home of quality educational institutions in Western Pangasinan. Located here are the Pangasinan State University, Pangasinan Memorial College, The Adelphi College, St. Columban's School, Harvent School as well as public and private elementary, secondary and preparatory schools.

OBJECTIVES OF THE STUDY

The main objective of this exploratory study is to identify barangays that could host and develop the proposed mini-forest in Lingayen, Pangasinan according to the various physiogeographic setting of the said barangay. Corollary to this, the study also sought to layout the plan for the development and sustainability of the mini forest as a climate change mitigation strategy.

MATERIALS AND METHODS

Research Design

The researchers made use of the descriptive method to achieve the purpose of his research. This method of research was directed towards ascertaining the condition that permits respondents in answering the questionnaire in the different barangays. Random sampling was utilized.

Research Respondents

Target respondents were residents of the different barangays in Lingayen. The study involved different stakeholders numbering to 820 which consisted of students, parents, employees both in government and non-government agencies who resides in the different barangays in the municipality of Lingayen.

Barangay chairman and other barangay officials also asked to answer the questionnaire. Their answers were important in Part II of the questionnaire.

Data Gathering Instrument and Validation

The perceptions of residents were gathered by asking them to answer a checklist/questionnaire (See Appendix). This elicited information on the respondents' approval/favorability on the establishment of a mini forest classified as agroforest, beach forest, swamp/bakawan according to the climate, water, and soil factors.

To validate the questionnaire, authorities/experts in agriculture and forestry were consulted. They are as follows: the DENRO Director in Dagupan City, and an

expert in the field of Environmental Science Also, a statistician was consulted prior to the respondents. The questionnaire was corrected and validated by the consultants and revised by the researchers.

Treatment of Data

Data interpretation involved basic statistical presentation such as average, weighted means and rank.

RESULTS AND DISCUSSION

As the world reels under the tumultuous effects of shifting weather patterns in the form of rising temperatures, floods, drought and dying species of flora and fauna, it is clear that everyone from the government down to the barangay level should do their share to address the issue of adaptation and mitigating climate change. However it is also clear that all actions on climate change must be concerted, structured and sustainable. It must target the rising carbon emissions and work towards the dual objective of reducing the greenhouse gases being spewed into the atmosphere and reviving nature's ability to heal itself.

Dealing with climate change is no easy task and none can underestimate the effort involved. For everyone's sake—but especially for the poor living in the barangay—they need a sustained and effective climate change strategy that ensures moderating potential hazards and prepare for future climate changes. But, that alone is not enough. It should also involve the active participation of the community in formulating a strategy against the effects of climate change. In the barangay level, doing nothing to mitigate climate change and its destructive effects is never an option.

The main objective of this exploratory study is to identify barangays that could host and develop the proposed miniforest in Lingayen, Pangasinan according to the various climatope, hygrotape, topotape, and physiogeographic setting of the said barangay. Corollary to this, the study also seeks to layout the plan for the development and sustainability of the mini forest as a climate change mitigation strategy.

In line with this, a survey was conducted involving the different stakeholders to determine their favorability/acceptance of the proposed mini forest. In this study, the proposed mini forest was sorted into agro forest, beach forest and bakawan/swamp forest as dictated by the geographical characteristics and physiographic profile of the surveyed barangays.

The study also determined the adaptability/sustainability of trees and shrubs in relation to this proposed project. Also included in the survey are

the prioritized strategies, adequacy/availability of physical, human and financial resources needed in the establishment of a mini forest. In addition, barangay captains are asked of their opinions why or why they are not interested in the project.

A. On the favorable/approval of Agro Forest in Lingayen

The proposed establishment of Agro forest was perceived favorably by the residents of Lingayen, Pangasinan with the average weighted mean of climatic factors (2.96) water factors (2.88), soil factors (2.92) and physiographic factors (2.65) all equivalent to “favorable”. Although most of the Climatope, Hygrotope, Tropotope, and other physiogeographic conditions considered have weighted mean values within the range 2.12—3.1, their average is still descriptively equivalent to “Favorable”. The only condition which was described as “slightly favorable” by the different stakeholders surveyed is the items on “Hilly” (2.3), “Mountainous” (2.12), and “Proximity (2.5) which are not really the physiographical characteristics of the municipality of Lingayen.

Table 1. Perceived Approval /Favorability of an Agro Forest in Lingayen.

A. Climatic Factors	Weighted Mean	Descriptive Equivalent
1. Rainfall	2.97	Favorable
2. Temperature	3.07	Favorable
3. Wind	2.98	Favorable
4. Humidity	2.82	Favorable
Average Weighted Mean	2.96	Favorable
B. Water Factors		
1. Water Type	3.1	Favorable
2. Water Flow	2.92	Favorable
3. Water Acidity/Alkalinity	2.64	Favorable
4. Hardness	2.67	Favorable
5. Nearness to Water Source	3.06	Favorable
Average Weighted Mean	2.88	Favorable
C. Soil Features		
1. Soil Type/Nature	3.07	Favorable
2. Soil Component	3.02	Favorable
3. Spatial Arrangement of Component	2.91	Favorable
4. Soil Color	2.92	Favorable
5. Soil Moisture	3.05	Favorable
6. Soil Temperature	2.98	Favorable
7. Mineral Content	3.01	14
8. Composition	2.98	Favorable
9. Soil Colloids	2.72	Favorable
10. Soil Structure	2.92	Favorable
Average Weighted Mean	2.92	Favorable
D. Physiography		
1. Plain Lowland	2.85	Favorable
2. Abundance Body of Water	3.07	Favorable
3. Hilly	2.3	Slightly Favorable
4. Mountainous	2.12	Slightly Favorable
5. Proximity	2.5	Slightly Favorable
6. Rice field	3.09	Favorable
Average Weighted Mean	2.65	Favorable

With regards to the proposed Beach Forest in Lingayen, all the climatic factors (2.92), water factors (2.82) and soil features (2.84) were descriptively rated as favorable while that of the physiography (2.59) was rated as “slightly favorable”. This particular finding would imply that the climate, water and soil setting in Lingayen are perceived favorably by the residents of Lingayen and would tend to suggest that they are approving and would encouraged the proposed mini agroforest in Lingayen, Pangasinan.

Again, contributing to the less than favorable response of the residents on the physiogeographic condition of Lingayen is the item on “Hilly” (2.23), “ Mountainous” (2.24),

Proximity (2.49) which are all equivalent to “slightly favorable” and are not really the features of the town. The findings on these physiographical setting somehow validates that of the previous findings which shows that these three items are also obtained a relative low rating.

Table 1.2 Perceived Approval/Favorability of a Beach Forest in Lingayen.

A. Climatic Factors	Weighted Mean	Descriptive Equivalent
1. Rainfall	3	Favorable
2. Temperature	2.99	Favorable
3. Wind	2.91	Favorable
4. Humidity	2.77	Favorable
Average Weighted Mean	2.92	Favorable
B. Water Factors		
1. Water Type	2.91	Favorable
2. Water Flow	2.89	Favorable
3. Water Acidity/Alkalinity	2.75	Favorable
4. Hardness	2.59	Favorable
5. Nearness to Water Source	2.97	Favorable
Average Weighted Mean	2.82	Favorable
C. Soil Features		
1. Soil Type/Nature	2.89	Favorable
2. Soil Component	2.97	Favorable
3. Spatial Arrangement of Component	2.78	Favorable
4. Soil Color	2.8	Favorable
5. Soil Moisture	2.83	Favorable
6. Soil Temperature	2.87	Favorable
7. Mineral Content	2.96	Favorable
8. Composition	2.81	Favorable
9. Soil Colloids	2.73	Favorable
10. Soil Structure	2.8	Favorable
Average Weighted Mean	2.84	Favorable
D. Physiography		
1. Plain Lowland	2.74	Favorable
2. Abundance Body of Water	2.92	Favorable
3. Hilly	2.23	Slightly Favorable
4. Mountainous	2.24	Slightly Favorable
5. Proximity	2.49	Slightly Favorable
6. Rice field	2.94	Favorable
Average Weighted Mean	2.59	Favorable

All the climatic factors (2.92), water factors (2.81), soil features (2.87), and physiography factors (2.88) are perceived to be favorable with regards to the proposed Bakawan/swamp forest in the area. This finding would imply that all the surveyed stakeholders – from barangay officials, teachers to students, assessed the climatope, hydrotope, tropotope, and physiographic profile of their respective barangay as favorably suitable for the establishment of Bakawan forest in the area. Contrary to the findings on Agro and Beach forest, the physiographic conditions of the barangays is now perceived favorable for the setting up of Bakawan/swamp forest.

Table 1.3 Perceived Approval/Favorability of an Swamp Forest in Lingayen.

A. Climatic Factors	Weighted Mean	Descriptive Equivalent
1. Rainfall	2.95	Favorable
2. Temperature	2.94	Favorable
3. Wind	2.88	Favorable
4. Humidity	2.76	Favorable
Average Weighted Mean	2.92	Favorable
B. Water Factors		
1. Water Type	2.93	Favorable
2. Water Flow	2.86	Favorable
3. Water Acidity/Alkalinity	2.65	Favorable
4. Hardness	2.63	Favorable
5. Nearness to Water Source	3.01	Favorable
Average Weighted Mean	2.81	Favorable
C. Soil Features		
1. Soil Type/Nature	2.82	Favorable
2. Soil Component	2.88	Favorable
3. Spatial Arrangement of Component	2.86	Favorable
4. Soil Color	2.85	Favorable
5. Soil Moisture	2.92	Favorable
6. Soil Temperature	2.9	Favorable
7. Mineral Content	2.89	Favorable
8. Composition	2.87	Favorable
9. Soil Colloids	2.73	Favorable
10. Soil Structure	2.9	Favorable
Average Weighted Mean	2.87	Favorable
D. Physiography		
1. Plain Lowland	2.76	Favorable
2. Abundance Body of Water	2.98	Favorable
3. Proximity to river	2.88	Favorable
4. Rice field	2.94	Favorable
5. Presence of Wetlands	2.95	Favorable
6. Coastal	2.93	Favorable
7. H ₂ O is flowing	2.88	Favorable
8. H ₂ O is steady	2.69	Favorable
Average Weighted Mean	2.88	Favorable

Table 1.4 Respondents Favorability/Acceptability of Agroforest, Beachforest and Bakawan Forest according to Barangay.

BARANGAY	AGROFOREST					BEACHFOREST					BAKAWAN/SWAMP							
	Climatic	Water	Soil	Phys.	MEAN	RANK	Climatic	Water	Soil	Phys.	MEAN	RANK	Climatic	Water	Soil	Phys.	MEAN	RANK
1. Aliwekwek	3.59	2.78	2.99	3.19	3.08	8.00	3.68	3.00	3.15	2.98	3.20	3.00	3.70	3.23	3.05	3.52	3.38	5.00
2. Alvarez	3.50	3.00	2.97	2.92	3.10	5.00	2.50	3.20	2.65	2.67	2.76	19.00	3.25	3.10	3.20	3.00	3.14	8.00
3. Bay	2.97	2.65	2.82	2.48	2.78	19.50	2.85	2.85	2.83	2.66	2.80	14.50	3.03	2.88	2.93	2.91	2.94	12.50
4. Babaco	2.00	1.80	1.80	1.67	1.82	32.00	1.75	1.60	1.60	1.67	1.66	32.00	2.00	1.80	1.80	1.63	1.81	32.00
5. Balongobong	3.50	3.50	3.50	3.50	3.71	1.00	3.50	3.80	3.72	3.58	3.65	1.00	3.50	3.70	3.55	3.58	3.58	1.00
6. Bantayan	3.13	3.04	3.02	3.16	3.09	6.00	2.95	2.80	3.07	2.70	2.88	11.00	2.93	3.16	2.94	2.93	2.99	9.00
7. Basing	2.81	2.88	2.80	2.78	2.82	16.00	2.98	2.89	2.77	2.88	2.78	16.00	2.79	2.90	2.99	2.99	2.92	14.00
8. Capandian	2.72	2.73	2.80	2.63	2.75	21.00	2.73	2.70	2.80	2.69	2.76	19.00	2.75	2.70	2.69	2.77	2.80	19.00
9. Domalandan Center	3.47	3.35	3.07	2.76	3.24	3.00	3.16	3.08	3.24	2.45	2.97	7.00	3.31	3.13	3.43	3.04	3.23	6.00
10. Domalandan East	2.81	2.69	2.86	2.41	2.72	23.00	3.00	2.89	2.83	2.93	2.81	13.00	3.00	2.84	2.96	2.75	2.89	16.00
11. Domalandan West	3.50	3.69	3.57	3.52	3.52	2.00	2.82	3.06	3.26	2.95	3.02	5.00	3.50	3.38	3.64	3.63	3.54	2.00
12. Dorongan	3.68	3.26	3.04	2.93	3.08	8.00	3.26	2.98	2.94	2.91	2.85	12.00	4.13	3.45	3.48	2.81	3.47	3.50
13. Dulog	3.00	2.66	2.74	2.78	2.79	17.50	2.89	2.87	2.84	2.45	2.76	19.00	3.11	2.82	2.81	2.78	2.83	19.00
14. Estanda	2.44	2.70	2.98	2.83	2.74	22.00	2.88	3.05	3.48	3.42	3.21	2.00	3.19	3.05	3.43	3.41	3.47	3.50
15. Lapa	3.42	3.00	2.82	2.89	2.91	11.00	3.11	2.84	2.93	2.71	2.90	9.50	1.50	1.69	2.01	2.93	2.03	30.00
16. Librang East	3.00	2.79	2.88	2.83	2.83	14.00	2.90	2.80	2.84	2.82	2.72	21.50	2.74	2.48	2.47	3.04	2.68	22.00
17. Librang West	2.83	2.78	2.81	2.77	2.80	16.00	2.82	2.78	2.84	2.76	2.80	14.50	2.47	2.75	2.84	2.79	2.71	21.00
18. Molave	3.25	2.80	3.00	2.80	3.04	10.00	2.00	2.20	2.30	2.50	2.25	29.00	2.25	2.80	3.20	3.58	2.91	15.00
19. Malinao	2.30	2.29	2.43	2.45	2.37	28.00	2.52	2.73	2.69	2.72	2.67	23.00	2.65	2.67	2.63	2.65	2.65	24.50
20. Maniboc	3.44	3.30	3.32	2.83	3.17	4.00	3.38	3.05	3.20	3.60	3.06	4.00	3.05	2.78	3.07	2.89	2.95	10.50
21. Manina	2.38	2.34	2.40	1.97	2.25	29.00	2.52	2.34	2.50	2.43	2.42	28.00	2.38	2.05	2.44	2.25	2.38	29.00
22. Nagvelvel	2.98	2.94	3.07	2.84	2.88	13.00	3.00	2.95	3.02	2.82	2.90	9.50	2.95	2.88	3.01	2.96	2.95	10.50
23. Nandan	2.53	2.30	2.57	2.52	2.48	27.00	2.34	2.55	2.66	2.45	2.48	27.00	2.63	2.54	2.66	2.48	2.58	27.00
24. Pangasinan North	2.82	2.58	2.74	2.17	2.58	26.00	2.99	3.10	3.21	2.88	3.00	6.00	2.91	2.81	3.00	3.00	2.94	12.50
25. Poblacion	2.83	2.82	2.82	2.83	2.78	19.50	2.82	2.91	2.72	2.61	2.77	17.00	2.78	2.79	2.71	2.83	2.77	20.00
26. Quihol	2.82	2.74	2.70	2.48	2.64	26.00	2.79	2.67	2.43	2.43	2.58	26.00	2.88	2.49	2.70	2.51	2.65	24.50
27. Rosario	2.92	2.65	2.89	2.67	2.79	17.50	2.83	2.45	3.02	2.51	2.65	24.00	2.84	2.83	2.92	2.85	2.86	17.00
28. Sabagan	2.78	1.82	1.94	2.00	2.13	31.00	2.50	1.50	2.15	1.75	1.98	31.00	2.63	1.20	1.90	1.69	1.86	31.00
29. Tagtag	2.00	2.40	3.03	2.17	2.23	30.00	2.00	1.60	2.40	2.33	2.08	30.00	2.90	2.40	2.50	2.00	2.38	30.00
30. Tanton	2.81	2.80	2.76	2.82	2.70	24.00	2.78	2.89	2.88	2.42	2.59	25.00	2.89	2.81	2.86	2.88	2.66	23.00
31. Tumbur	3.32	2.74	3.17	3.07	3.08	8.00	2.49	2.95	3.68	2.75	2.72	21.50	3.11	3.08	3.45	3.33	3.19	7.00
32. Wawa	3.21	2.64	2.80	2.90	2.89	12.00	3.04	2.87	3.13	2.81	2.96	8.00	2.29	2.53	2.88	3.06	2.64	28.00

Among the top four barangays whose residents recorded the highest mean favorability/acceptability ratings are Balongobong (3.71), Domalandan West (3.52), Domalandan Center (3.24), and Maniboc (3.17). It will be noted that the top two barangays, namely Balongobong and Domalandan West are near the river – favorable for the establishment of an AgroForest.

With regards to the acceptability of BeachForest, again barangay Balongobong ranked first with a high favorable rating in Climactic (3.5), water (3.8), soil (3.72), and physiographic (3.58) conditions. Other barangays which recorded moderately favorable response to Beachforest are barangay Estanda (3.21), Aliwekwek (3.20), and Maniboc (3.06).

On the favorability/acceptability of a Bakawan/swamp forest, again barangay Balongobong (3.58) ranked first, followed by Domalandan West (3.54), Dorongan (3.47), and Estanda (3.47). Taking into account their mean favorability, it will be noted that the mentioned barangays have favorable response on the setting up of a Bakawan/Swamp forest in their area.

All these numerical findings of the survey indicate that Barangay Balongobong ranked first in all the Climactic, Water, Soil, and physiographic factors considered. It can also be observe that Barangay Domalandan West ranked second in both the Agroforest and Bakawan forest acceptability. These two barangays are near the river making it favorable for them to host an Agroforest, Beachforest, and Bakawan forest.

A. Trees and Shrubs perceived to be adaptable/sustainable in Relation to the Proposed Mini Forest

Among the identified 21 trees, six were recorded to have high potential for adaptability and sustainability with regards to the proposed mini forest. These are Mango (3.81), Ipilipil (3.63), Santol (3.62), Mahogany (3.46), Caimito (3.43) and Tamarind (3.4). On the other hand, two trees were recorded to have low potential: Bignay (2.46) and Agoho (2.43). And the rest were identified as having average potential.

As far as the shrubs are concerned, four are recorded to have high potential for adaptability and sustainability. These are Bayabas (3.61), Gayubano (3.45), calamansi (3.4), and papaya (3.4). Four shrubs are found out to have low potential: Tupang Bakod (2.54), Anonas (2.52), Kadios (2.47), and Oranges (2.34).

Table 2: Perceived Adaptability/Sustainability in relation to the proposed Mini Forest

A. TREE	Weighted Mean	Descriptive Equivalent	RANK
1. Acacia	3.33	Average	8
2. Agoho	2.43	Low	21
3. Avocado	2.74	Average	17
4. Ayosep	2.65	Average	19
5. Banaba	2.92	Average	13
6. Bignay	2.46	Low	20
7. Bitag	2.68	Average	18
8. Caimito	3.43	High	6
9. Duhat	3.31	Average	9
10. Eucalyptus	2.87	Average	14
11. Ipil-IPil	3.63	High	2
12. Kamatchili	3.44	High	5
13. Mabolo	3	Average	12
14. Mahogany	3.46	High	4
15. Mango	3.81	High	1
16. Molave	2.86	Average	15
17. Narra	3.02	Average	11
18. Paper Tree	2.84	Average	16
19. Santol	3.62	High	3
20. Tamarind	3.4	High	7
21. Umbrella Tree	3.15	Average	10
B. SHRUBS	Weighted Mean	Descriptive Equivalent	RANK
1. Atis	3.19	Average	6.5
2. Balimbing	2.83	Average	14
3. Bayabas	3.61	Average	1
4. Cacao	2.71	Average	17
5. Calamansi	3.4	High	3.5
6. Dalayap	3.02	Average	11
7. Eggplant	3.3	Average	5
8. Gayubano	3.45	High	2
9. Kamias	3.17	Average	8
10. Kasuy	2.94	Average	13
11. Oranges	2.34	Low	21
12. Papaya	3.4	High	3.5
13. Sampaguita	2.75	Average	16
14. Suha	3.04	Average	10
15. Tomato	3.08	Average	9
16. Anonas	2.52	Low	19
17. Kadios	2.47	Low	20
18. Lagundi	2.78	Average	15
19. Makopa	2.97	Average	12
20. Aratiles	3.19	Average	6.5
21. Tupang Bakod	2.54	Low	18

Table 3: Extent of Priority in the Establishment and Management of a Mini Forest

STRETEGIES	Weighted Mean	Descriptive Equivalent
A. Research Planning		
1. Identification of Site	3.13	Average Priority
2. Identification of Forest Trees to be planted	3.25	Average Priority
3. Identification of issues/concerns to develop/sustain	3.25	Average Priority
4. Mapping out source of seeds	3.18	Average Priority
5. Fund sourcing	3.27	Average Priority
6. Networking for support	3.2	Average Priority
7. Planning for relevant barangay ordinance	3.37	Average Priority
Average Weighted Mean	3.23	Average Priority
B. Community Organizing and Development		
1. Partnership Agreement	3.26	Average Priority
2. Mobilize active Participation of various sectors	3.42	High Priority
3. Possible "Adopt an Area Mechanism"	3.1	Average Priority
4. Encourage Spirit of Volunteerism	3.32	Average Priority
Average Weighted Mean	3.27	Average Priority
C. Planning and Monitoring		
1. Establishment of Forest Trees and Nurseries	3.19	Average Priority
2. Seedlings/wildlings Propagation	3.27	Average Priority
3. Provision for Maintenance of newly planted seedlings	3.26	Average Priority
Average Weighted Mean	3.24	Average Priority
D Information/Education and Communication Campaign		
1. Seminar	3.19	Average Priority
2. Production of Flyers, leaflets, pamphlets and posters	3.12	Average Priority
3. Consultancy with identified local information officer	3.1	Average Priority
Average Weighted Mean	3.14	Average Priority

As far as the needed strategies are concerned, Research (3.23), Community Organizing and Development (3.27), Planning and Monitoring (3.24), and Information, Education Campaign (3.14) are all recorded as Average Priority. The only "high priority" strategy recorded was on Mobilize active participation of various sectors.

Table 4: Extent of Availability of the Needed Resources in the Establishment of Miniforest

RESOURCES NEEDED	Weighted Mean	Descriptive Equivalent
A. Physical Resources		
1. Seed Collection of indigenous forest tree species	2.81	Available
2. Supply of the native tree species seedling	2.9	Available
3. Gardening tools	3.1	Available
4. Water Supply for initial planting	3.28	Available
Average Weighted Mean	3.03	Available
B. Human Resources		
1. Local community/Barangay groups	3.27	Available
2. NGO's	3.15	Available
3. Academe (PSU Dep Ed Private Schools)	3.17	Available
4. LGU's	3.17	Available
5. Religious Groups	3.3	Available
6. Technical Assistant from DENR	2.99	Available
7. Military	2.72	Available
Average Weighted Mean	3.11	Available
C. Financial Resources		
1. Proceeds from income generating projects ...	2.89	Available
2. Counterpart of municipality of Lingayen & MENRO	2.97	Available
3. Donation from NGO and other environment groups	2.86	Available
Average Weighted Mean	2.91	Available

All the Physical (3.03), Human (3.11), and financial (2.91) resources are all available in all of the barangays involved in the study.

The highest mean response recorded was on "Preserve coastal margin of Lingayen" (3.67). Other benefits known to the stakeholders that might have encourage them to give favorable rating to the miniforest are (trees are important in CO₂ sequestration (3.62), provide shoreline protection (3.58) and Bio-diversity conservation (3.51)

Table 5: Possible Benefits of the Mini Forest

POSSIBLE IMPACT	Weighted Mean	Descriptive Equivalent
1. Forests mitigate Flooding	3.3	Needed
2. Prevent soil erosion and landslides	3.46	Moderately Needed
3. Provide habitat for some animals	3.47	Moderately Needed
4. Support resources conservation	3.6	Moderately Needed
5. Trees are important in CO ₂ sequestration	3.62	Moderately Needed
6. Preserve coastal margin of Lingayen	3.67	Moderately Needed
7. Biodiversity conservation/restoration	3.51	Moderately Needed
8. Provide other ecological function/services	3.46	Moderately Needed
9. Improve aesthetic values of the site	3.44	Moderately Needed
10. Provide shoreline Protection	3.58	Moderately Needed
Average Weighted Mean	3.51	Moderately Needed

Table 6: Possible Reasons why Barangay Chairmen are Interested in Mini Forest

Reasons why Barangay Chairmen Interested in Mini Forest	Frequency	Percentage
1. If given enough resources, support and assistance by LGU	147	90.74
2. Our barangay is prone to flood	132	81.49
3. Our barangay prioritize environment-friendly projects	144	88.89
4. Our barangay has available area	114	70.37
5. Our barangay has available resources	86	53.09
6. Our barangay has available people for the project	108	66.67
7. Our barangay is aware of the numerous benefits of the project	140	86.42
8. Help buffer commercial from encroaching ...	94	59.02

As far as the barangay captains in each barangays are concerned, majority of them are amenable to the idea of having a mini forest in their area “if given enough resources, support and assistance by LGU” (90.74). Also, many of them says that they are interested in having a mini forest because” their barangay is prone to flood” (81.49) “our barangay prioritize environment friendly projects” (88.89).

CONCLUSION AND RECOMMENDATION

Within the scope of the study, the following conclusions were drawn;

1. All respondents perceived the favorability of putting up these types of mini forest in terms of climatope, tropotope, hydrotape and physiographic factors.

2. Barangay Balangobong and Domalandan West were ranked as the most favorable barangay where the three types of miniforest, agroforest, beach forest and bakawan/swamp forest can be established. These two barangays are near the river making it favorable to host the three forests.

3. Mango, Ipilipil, santol, Mahogany and Caimito were considered to have high potentiality, adaptability and sustainability as trees to be planted in the miniforest while Bignay and Agoho are considered to have average potentiality.

4. Shrubs such as Bayabas, Gayubano, Calamansi and Papaya were identified to have high potentiality while Tupang Bakod, Anonas, Kadios and Orange have low potentiality to be planted in the miniforest.

5. The establishment and Management of Mini Forest, the following strategies are considered to be important and of high priority: mobilize active participation of various sectors is important, while the needed strategies such as to conduct research, community organizing and development, planning and monitoring, and information education campaign were considered to be of average priority.

6. Physical, Human and Financial Resources are all available in all barangays of Lingayen in the establishments of mini forest.

7. Preserving the coastal margin of Lingayen is the main benefit the residents considered in putting up miniforest, followed by believing that the trees are important in CO2 sequestration, for shoreline protection and biological diversity conservation.

8. All barangay residents of Lingayen believed on the importance of establishing a mini forest especially if they are given enough resources, support and assistance by local government unit. They are also interested to have a mini forest because their barangays are prone to flood and they believe in promoting environment friendly projects.

Recommendations:

1. The establishment of Mini Forest as agroforest, beach forest and bakawan/swamp forest in Lingayen especially in Barangay Balangobong and Domalandan West is a must and must be considered as top priority project. The mini forest is envisioned to be a strategy to mitigate climate change.

2. The provincial and local government unit must provide the necessary financial support in the establishment of mini forest in Lingayen, Pangasinan.

3. The Department of Environment and Natural Resources (DENR) must help in the supply of trees and shrubs to be planted in the establishment of the mini forest.

4. The residents of each barangay as well as the town of Lingayen in particular must maintain and sustain the management and maintenance of the mini forest to be established.

5. Pangasinan State University (PSU) will coordinate with government agencies such as DENR and Local Government Unit and assist the barangay residents in the establishment, maintenance and management of the mini forest in Lingayen.

6. The following is the proposed Mini Forest Development and Management Plan to be put up in



Lingayen especially in Barangay Balangobong and Domalandan.

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Farmers strategies for Adapting to and Mitigating

Climate Variability

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