Valuing Forest Ecosystem Services:
A Resource Valuation Study for Mt. Nacolod Local Conservation Area in Southern, Leyte Philippines

Presented by:

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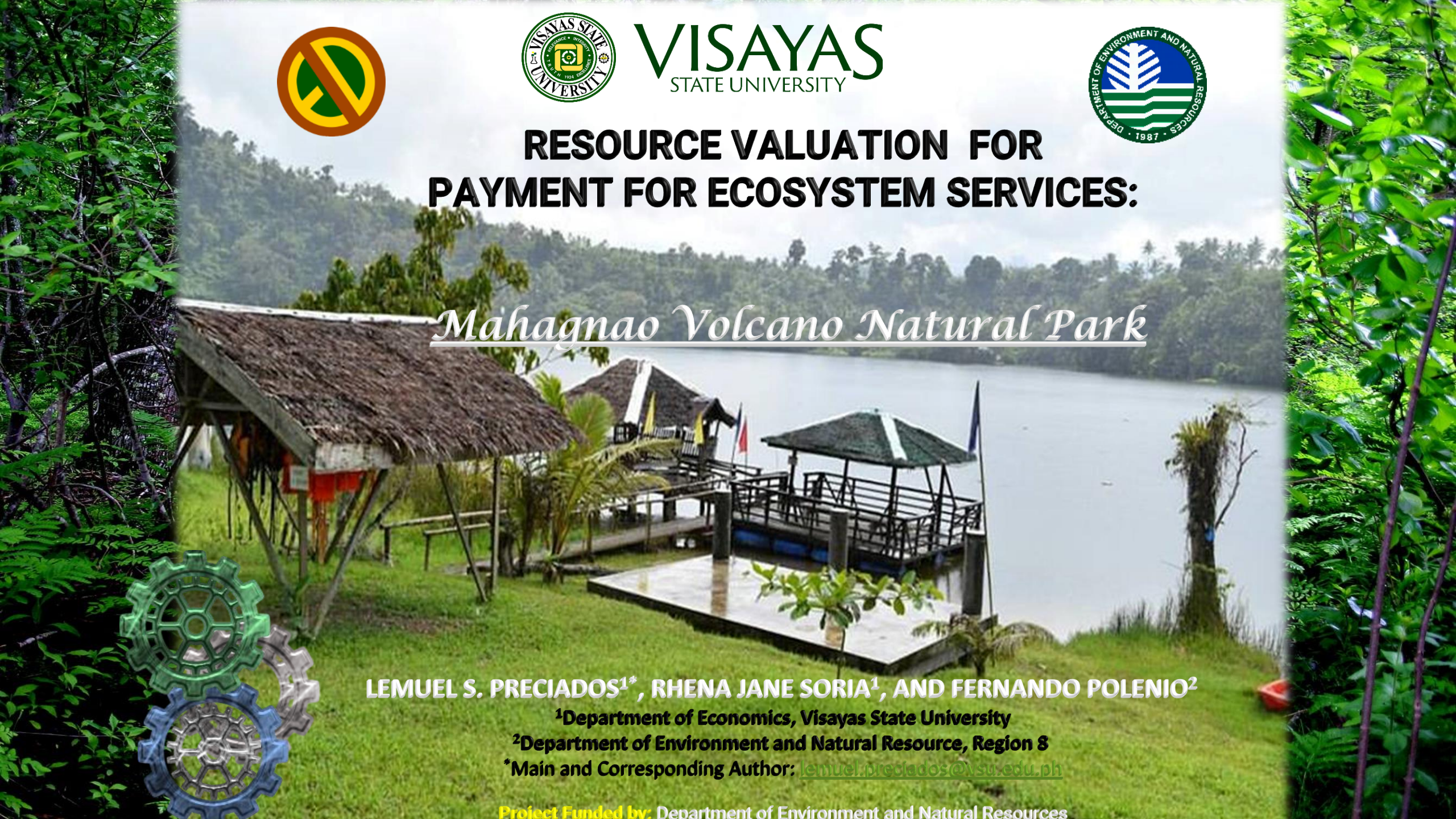
RESOURCE VALUATION FOR PAYMENT FOR ECOSYSTEM SERVICES:

Mahagnao Volcano Natural Park



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RATIONALE

Overview

Financial Sustainability – identified as one of the major barriers to effective Protected Area (PA) management based on earlier assessments

These include:

- inadequate systems for financial planning;
- budgetary management; and
- **revenue generation**

RATIONALE

Overview

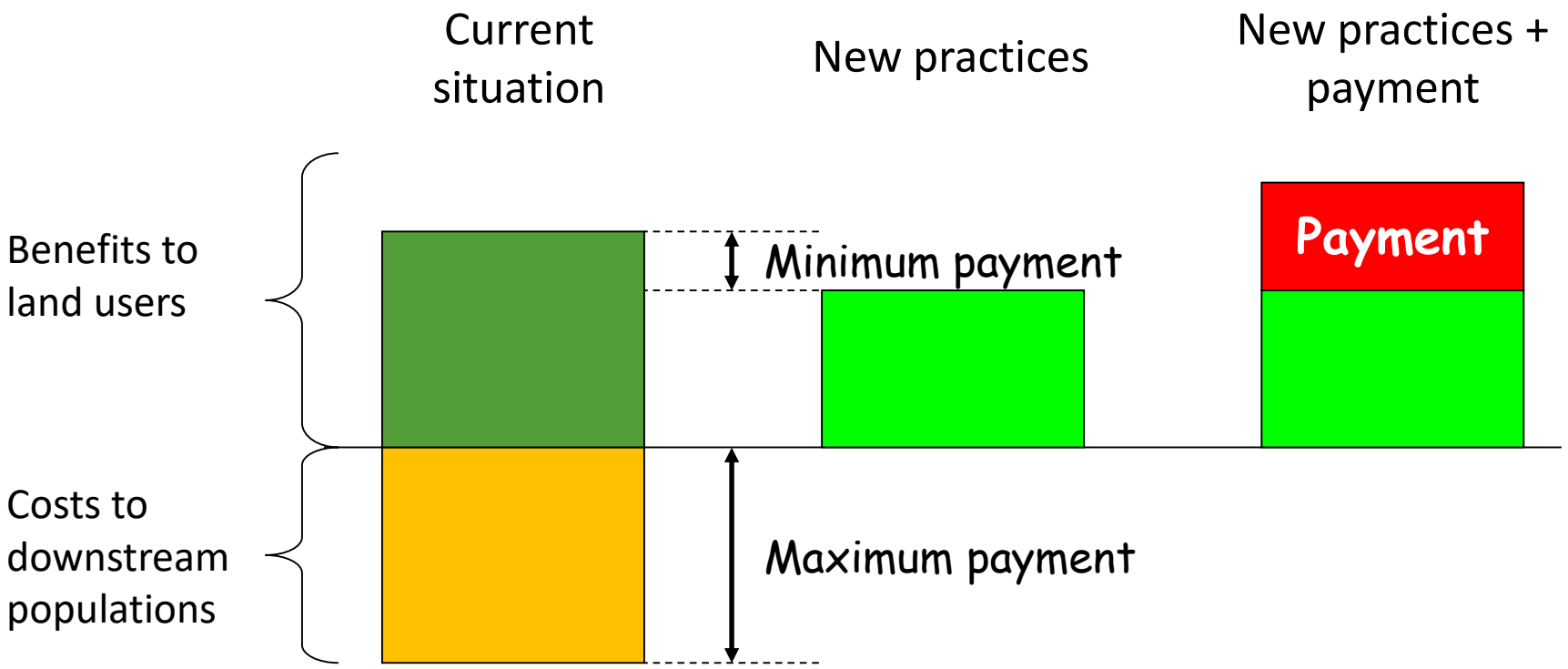
To address the funding gap…

- Increased government appropriation
- Policies and incentives for sustainable financing mechanisms
  - User Fees (DAO 2016-24)
  - Public-Private Partnerships
  - Enterprise Development
  - Damage Fees*
  - **PES**

Efforts Addressing Funding Gaps	Problems
User Charges and Payments for Ecosystems Service (PES) Scheme	very few PA implementation
	no proper documentation of success or potential
	lack of capacity of Mgt. Boards/PA staff
Management Plans	lack of cost assessments of programs and activities
	no standards on the cost to maintain a PA

The basic logic of PES

- **The Opportunity Cost** (minimum acceptable payment for sellers)
- **The Value of Benefits** (maximum acceptable payment for buyers)



ECOSYSTEM VALUATION

1

- Process by which such managers assign a value – monetary or otherwise – to environmental resources and/or ecosystem services (DEFRA, 2007)

2

- Provides a way to justify and set priorities for programs, policies and actions that protect or restore ecosystems and their services (Wall et al., 2012)

3

- Provides protected area managers with information about the protected area's goods and services which values are being captured and which are not, and which groups could derive more benefits through alternative uses of the protected area and are therefore inclined to be a 'threat' to the protected area (IUCN, 1998)

Why do we need to value protected areas?

- Dearth of information on the economic and financial benefits of ecosystems and biodiversity.
- Adverse trend of resource overexploitation.
- Under-investment and under-prioritization.
- If we are able to benchmark the value, some benefits can be captured and plowed back

What do we value?

PROVISIONING

products obtained from nature, such as food and timber

REGULATING

services provided by nature that regulate our environment, such as water and air cleaning services

CULTURAL

non material benefits provided by nature which enrich lives such as recreation, learning and tranquillity

SUPPORTING

the underpinning (or supporting) services which enable other services to function, such as soil formation and nutrient recycling

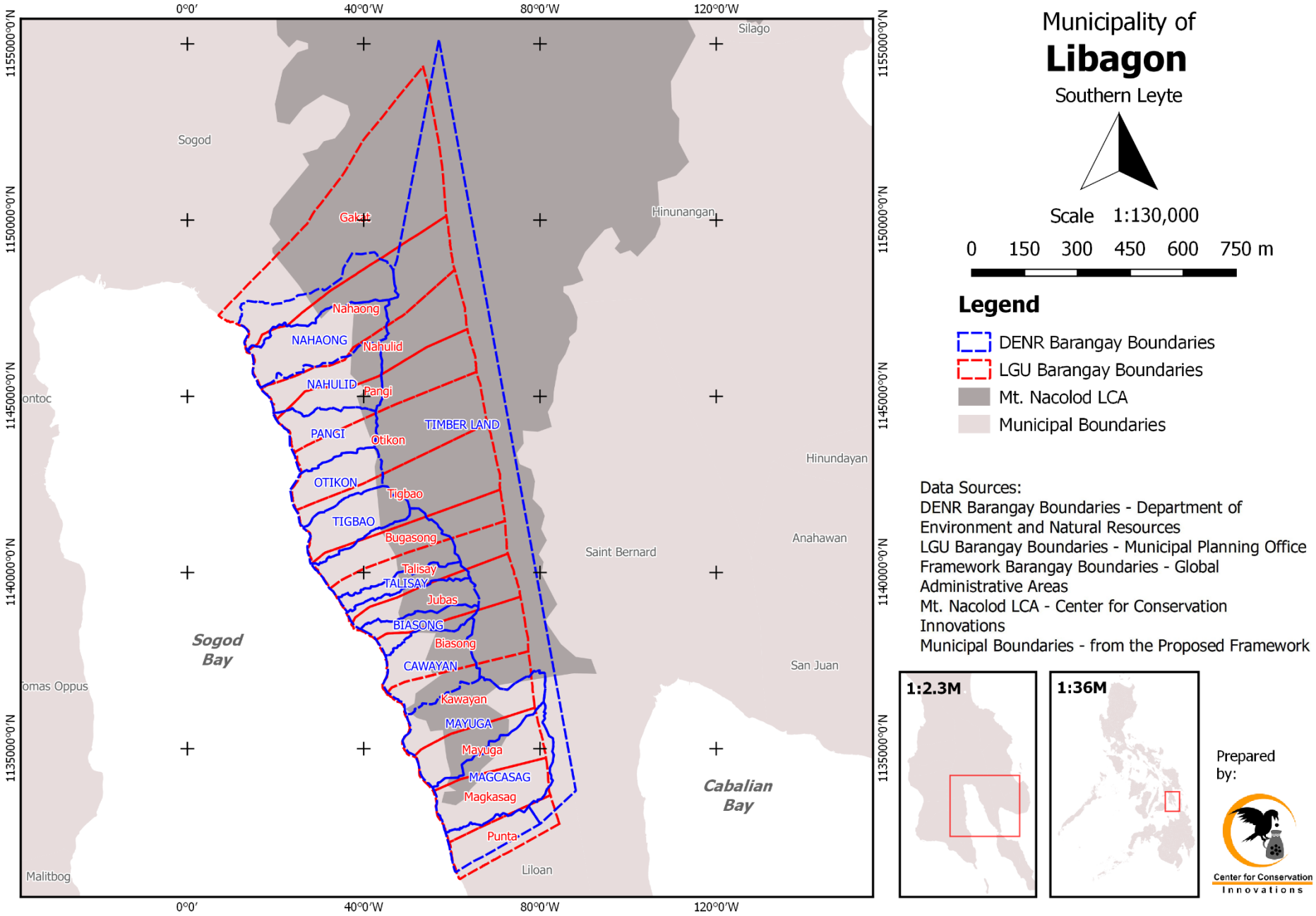
ECOSYSTEM SERVICES

How do we value ecosystem services?

- Ecosystem Valuation:
  - *A suite of methods for assigning a dollar value to ecosystem services to aid in decision-making*
- Market Prices Methods: Revealed Willingness to Pay (WTP)
  - *Value an equivalent product or service on the commercial market and extrapolate to ecosystems*
- Circumstantial Evidence: Imputed WTP
  - *Value based on what people are willing to pay to avoid certain consequences*
- Surveys: Expressed WTP
  - *Value based on direct questions or hypothetical choices*

↙ Categories of Methods ↗

Mt. Nacolod Local Conservation Area (MNLCA)



Municipality of

Libagon

Southern Leyte

Scale 1:130,000

0 150 300 450 600 750 m

Legend

- DENR Barangay Boundaries
- LGU Barangay Boundaries
- Mt. Nacolod LCA
- Municipal Boundaries

Data Sources:
DENR Barangay Boundaries - Department of Environment and Natural Resources
LGU Barangay Boundaries - Municipal Planning Office
Framework Barangay Boundaries - Global Administrative Areas
Mt. Nacolod LCA - Center for Conservation Innovations
Municipal Boundaries - from the Proposed Framework

Prepared by:

Center for Conservation Innovations

“Onsa ka importante ug nganong naay bili ang Mt. Nacolod para ninyo?”

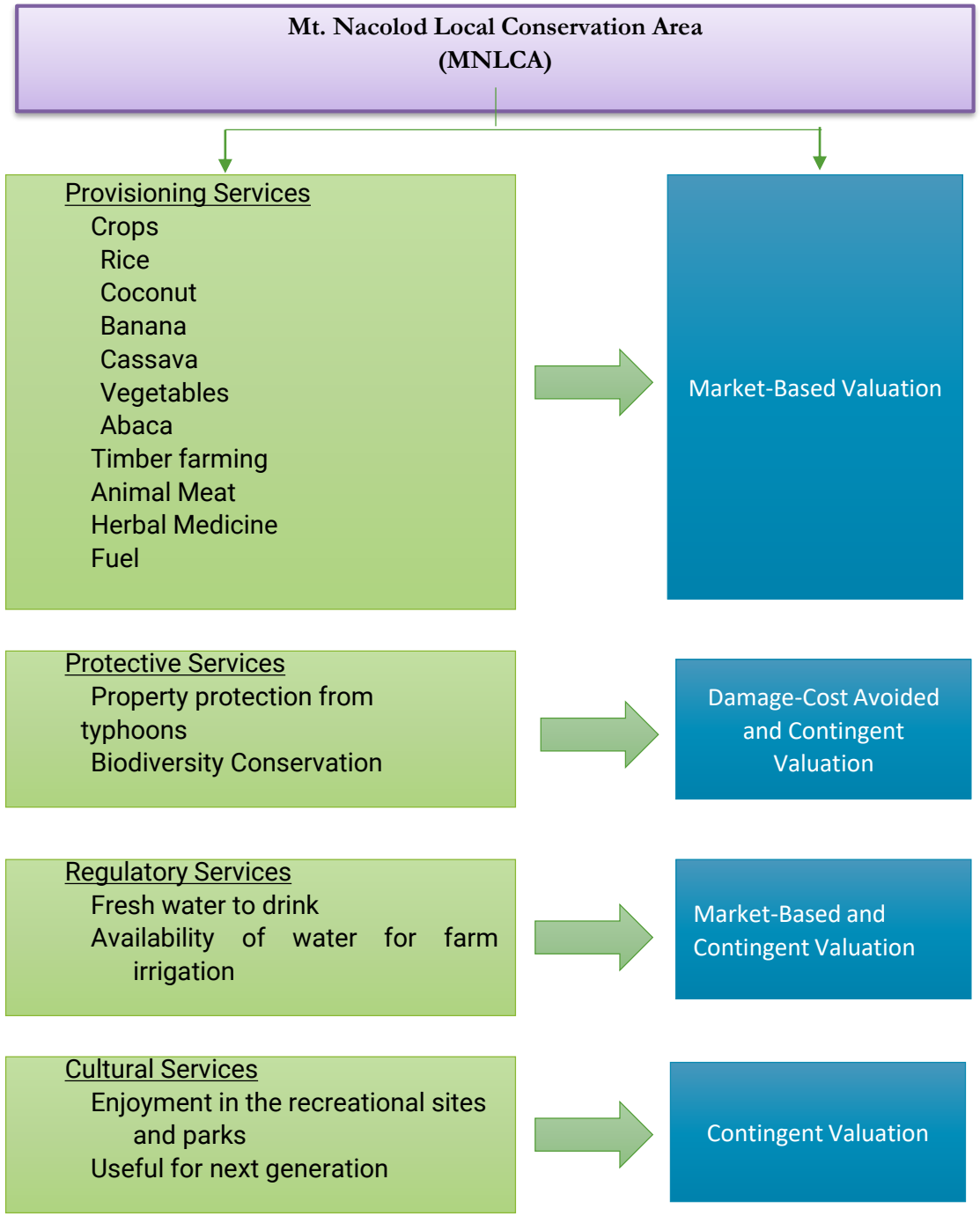
“arang ka nindot nga pangutana, para nako ang akong tubag ana kay tungod unang-una nakaprevent sa flashfloods, landslide, baha, dugang pa ni-ana makahatag sija ug fresh air ug makahatag pud ug supply tubig nga usa nato nga gikinahanglan ug ang presko nga hangin nga nagbuhi nato nga makaginhawa ta mao rana Sir”

“Pinaka importante gyud namo kay maoy gikuhaan sa irrigation, ug kining mainom presko”

“Kini sija dakong gamit tungod kay sample lamang sa bagyo Yolanda, pero tungod sa lasang nilihis ang bagyo”

Research Objectives

- Profile the demographic and socio-economic characteristics of the communities within MNLCA
- Identify the ecosystems services provided by Mt. Nacolod
- Determine the benefits derived and willingness to pay of households from the ecosystem services provided by MNLCA
- Quantification and valuation of ecosystem services in Mt. Nacold
- Provide insights for policy recommendations and implementations addressing environmental degradations


Mt. Nacolod Local Conservation Area
(MNLCA)
Provisioning Services
Crops
Rice
Coconut
Banana
Cassava
Vegetables
Abaca
Timber farming
Animal Meat
Herbal Medicine
Fuel
Market-Based Valuation
Protective Services
Property protection from typhoons
Biodiversity Conservation
Damage-Cost Avoided and Contingent Valuation
Regulatory Services
Fresh water to drink
Availability of water for farm irrigation
Market-Based and Contingent Valuation
Cultural Services
Enjoyment in the recreational sites and parks
Useful for next generation
Contingent Valuation

Data Collection

- **Focus Group Discussion – 7 Municipalities**

- **Household Survey – 537 Respondents**

Data Analysis

- **Descriptive Statistics**
- **Financial Analysis/Benefit-Cost Analysis**
- **Market-Based Valuation Method**
- **Contingent Valuation Method**
- **Multiple Regression Analysis**

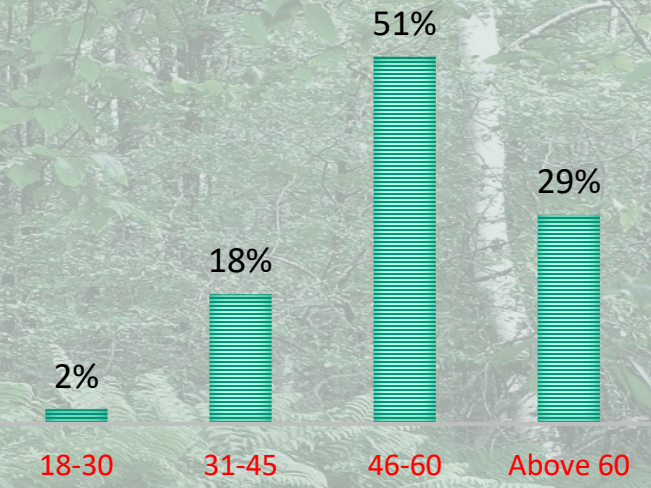
- To determine factors explaining variations of WTP

Socio-demographic Characteristics Libagon Respondents

Number of Respondents

131 household respondents

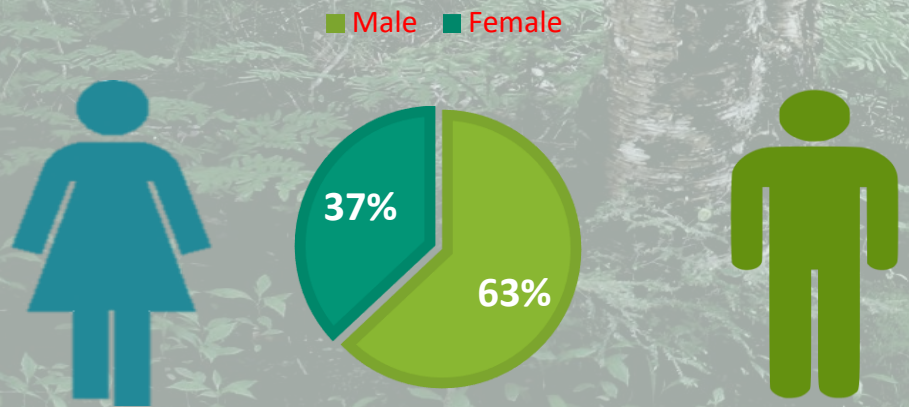
Age of Respondents (%)



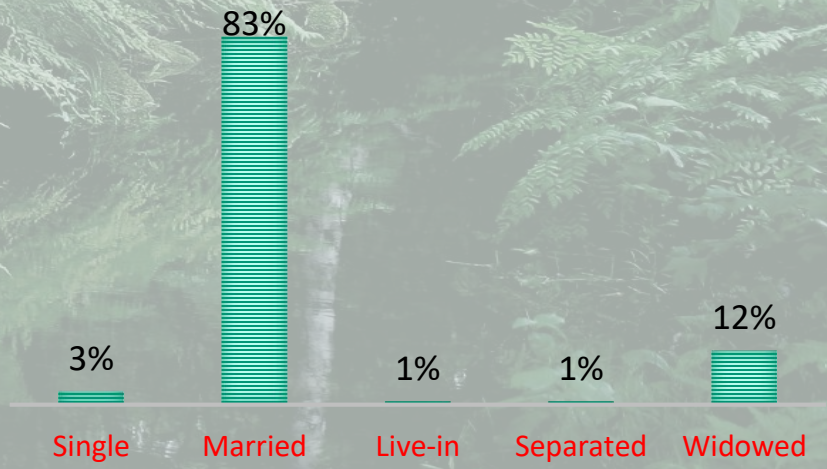
Mean age

54 years old

Gender of Respondents (%)



Civil Status of Respondents (%)



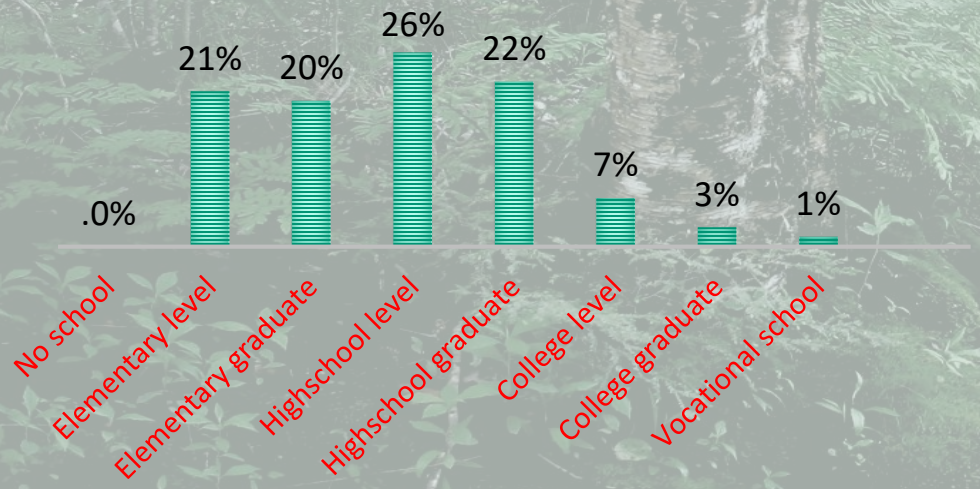
Socio-demographic Characteristics Libagon Respondents

Mean household size:
Five (5)

Average monthly income of respondents (PhP)

P9,736.00

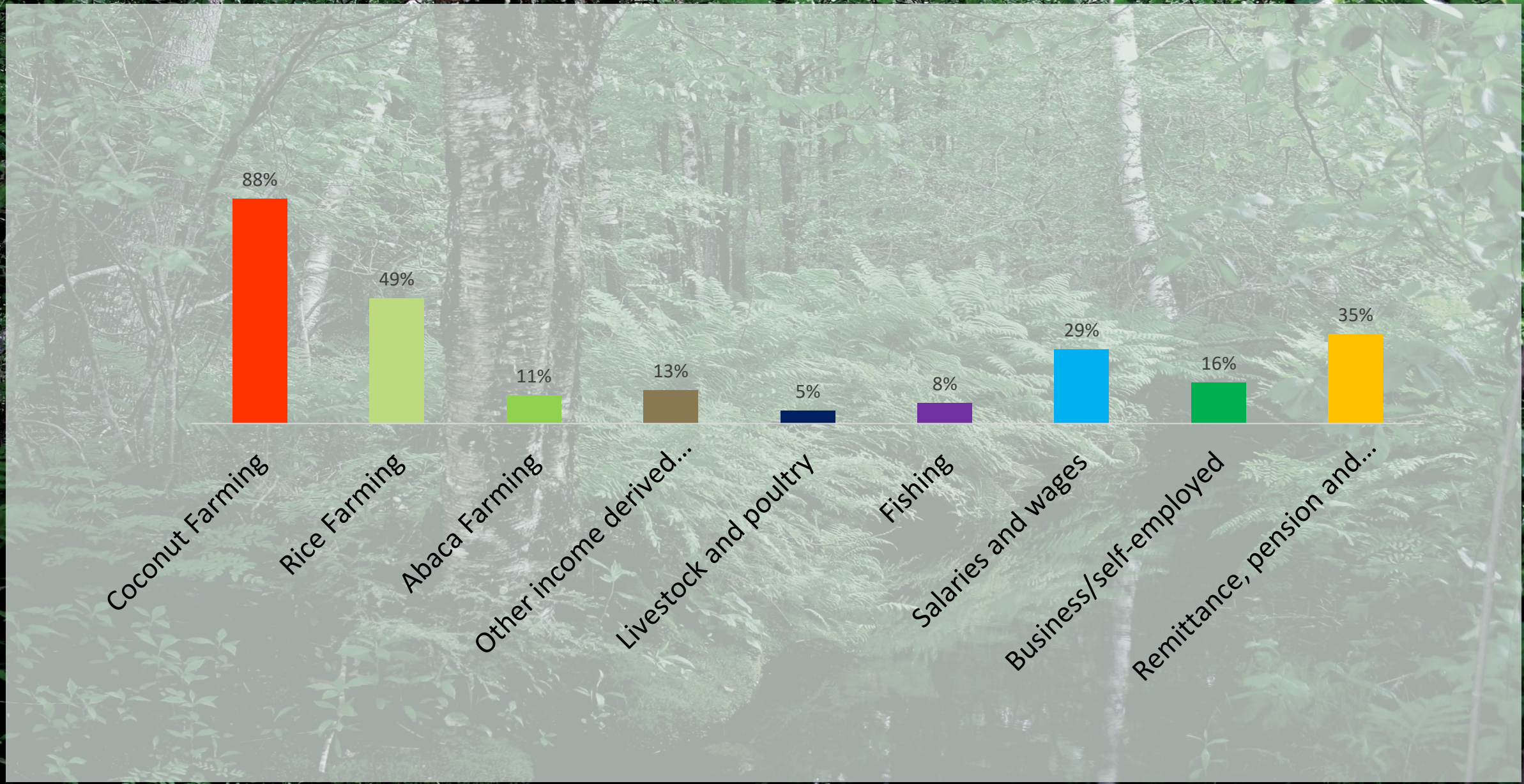
Educational Attainment of Respondents (%)



Average Years Residing in the Area

46 years

Sources of income of Libagon Respondents



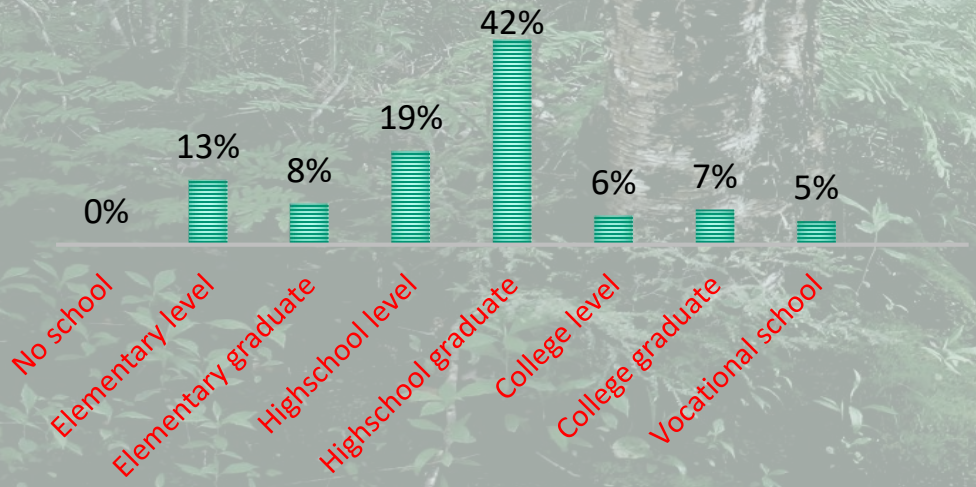
Socio-demographic Characteristics Silago Respondents

Mean household size:
Five (5)

Average monthly income of respondents (PhP)

P6,888.00

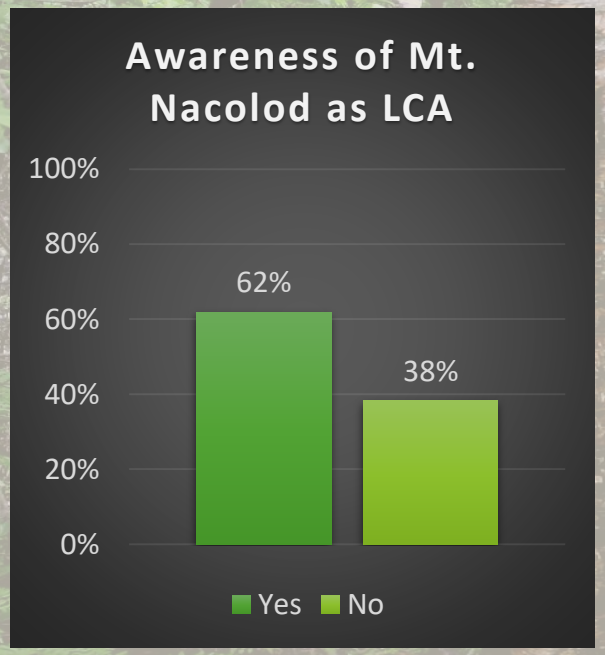
Educational Attainment of Respondents (%)

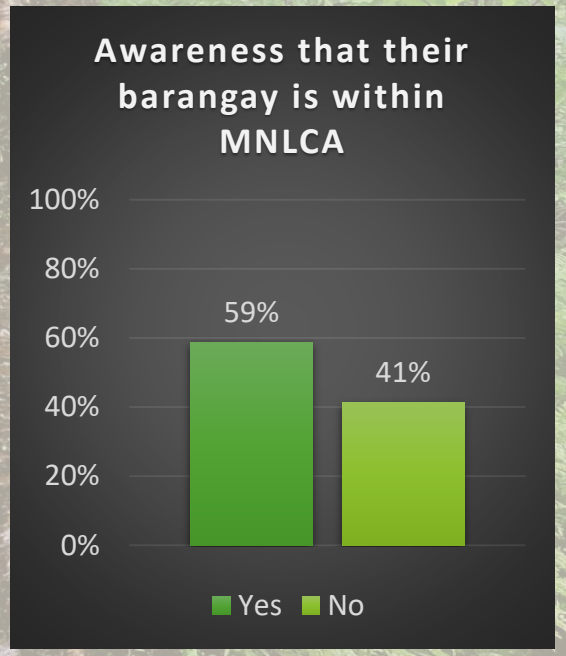


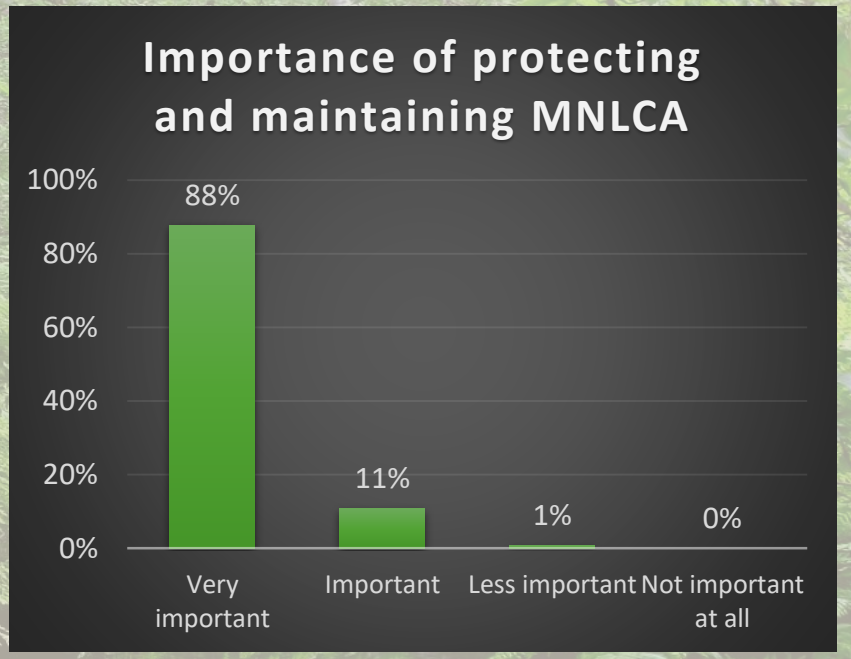
Average Years Residing in the Area

39 years

Awareness and Attitude Towards Mt. Nacolod Among Libagon Respondents





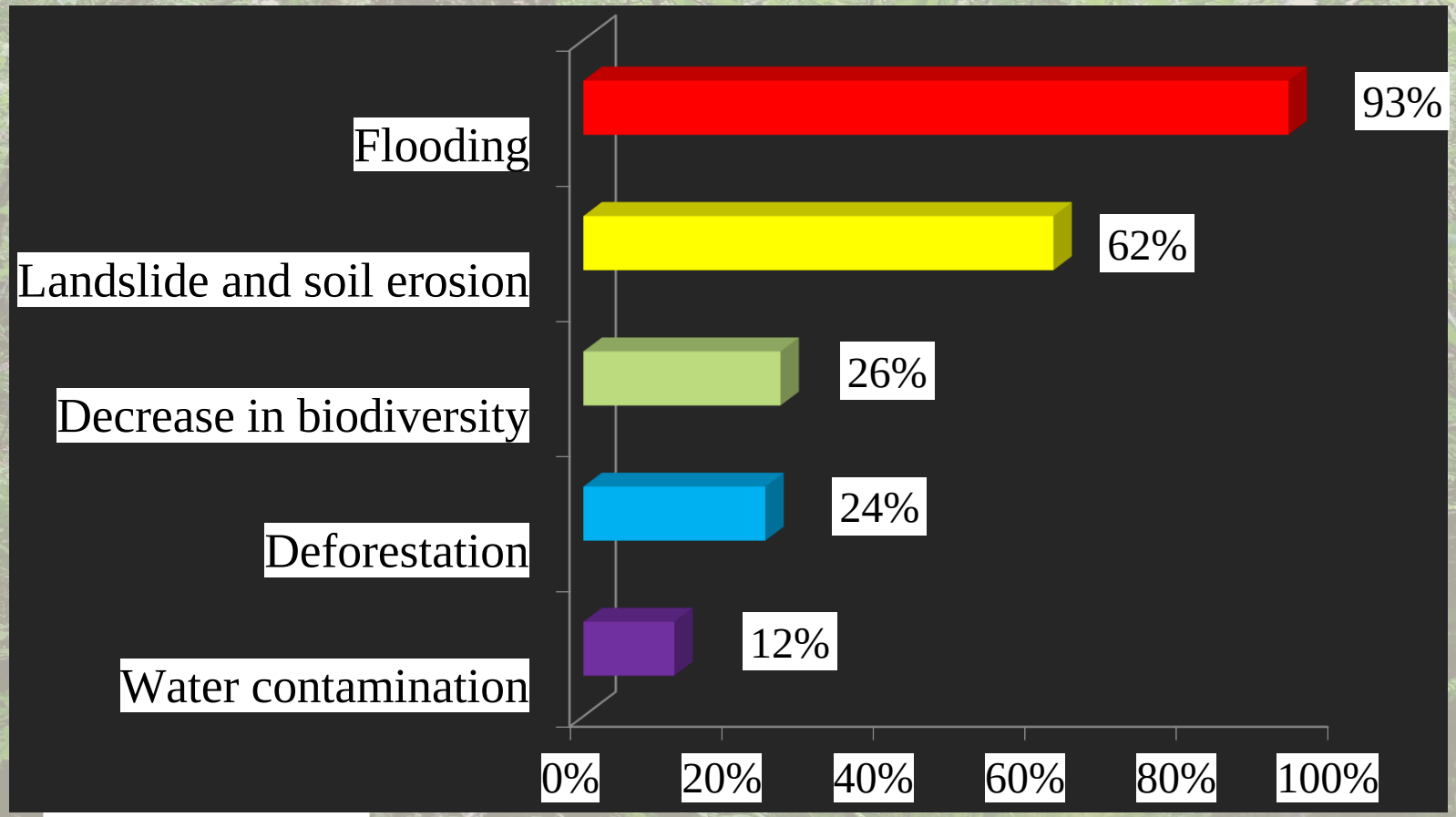


Benefits Derived from Mt. Nacolod Among Libagon Respondents

	Frequency	Percentage
Base	131	131
Local water source	119	91%
Source of livelihood	93	71%
Great source of wood fuel	70	53%
Potential place for residence	24	18%
Helps prevent/minimize calamities (e.g. typhoon, flashfloods,landslide)	17	13%
For collecting of wild species	11	8%
For research and education	11	8%
Great source of timber	6	5%
Good source of timber	2	2%
Crops	2	2%
A place for recreation and leisure	1	1%
Fresh air	1	1%
Aesthetic value (e.g. natural scenery)	1	1%
Habitat for diverse species	1	1%

*Multiple response

Common environmental problems and human destructions observed in MNLCA in Libagon Respondents



*Multiple response

Market-based Valuation

Market-Based Valuation

Products/Services from Mt. Nacolod	Value
Crops	
Rice	322,803,135
Coconut	218,301,948
Banana	5,312,265
Cassava	336,486
Vegetables	11,856,324
Abaca	26,056,763
Other crops	4,525,347
Timber farming	6,224,381
Animal Meat	1,030,068
Herbal Medicine	12,824,336
Fuel	96,357,731
Water	9,742,039
Total Value of Mt. Nacolod (annual)	**PhP 715,370,822**

Contingent Valuation

Question: Suppose a program to maintain the conservation of Mt. Nacolod will be strengthened. This aims to protect the habitats of indigenous species especially the endemic species (e.g. bat, frog, birds and etc.,) and establish a system for sustainable forestry management for the next generation. To do this program, this will entail community funds that will be used exclusively for the maintenance. If this project will be implemented, are you willing to pay for this program?

✓ **Yes - 82%**

✗ **No - 18%**

Annual Average WTP:

PhP690.00

Question: Suppose a program for watershed protection will also be implemented to provide good water quality and ensure water safety. If a scenario will happen that you will have your own meter connection at home and water will be available everyday and this project will be put into action, are you willing to avail this program?

Yes - 89%

No - 11%

Annual Average WTP:

PhP674.00

Question: Suppose a recreational activity will be established in Mt. Nacolod which will enable you to enjoy its natural scenery and its richness in biodiversity. However this requires you a payment/fee for you to enjoy and have access to Mt. Nacolod. Are you willing to pay for the entrance fee?

✓ **Yes - 86%**

✗ **No - 14%**

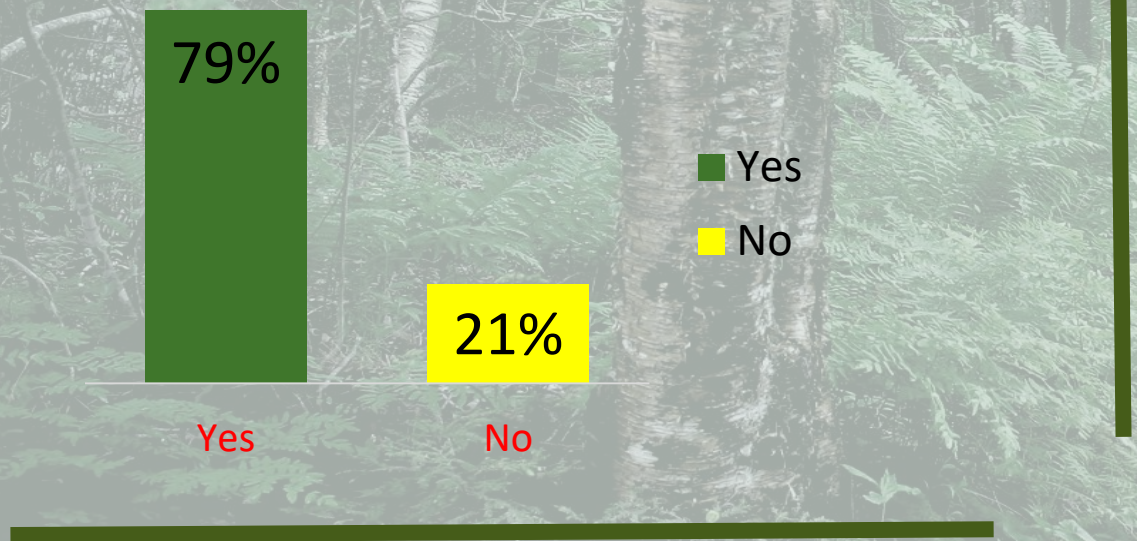
Average Annual WTP

PhP 59.00

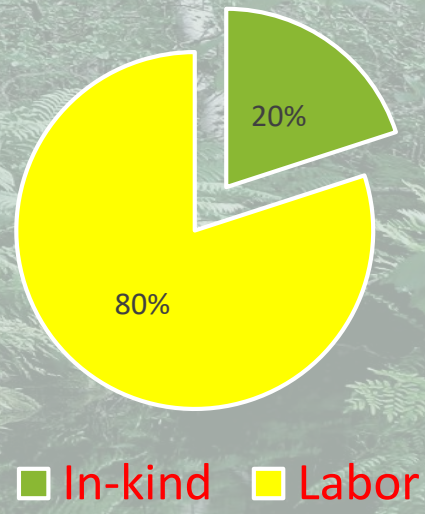
Willingness to Pay for Non-cash contribution

Question: "Suppose a program to maintain the conservation of Mt. Nacolod will be strengthened. This aims to protect the habitats of indigenous species especially the endemic species (e.g. bat, frog, birds and etc.,) and establish a system for sustainable forestry management for the next generation. If this project will be implemented and suppose your donation will be in kind (e.g. labor for tree planting), are you willing to contribute?

WTP for non-cash contribution (%)



Non-cash contribution (%)



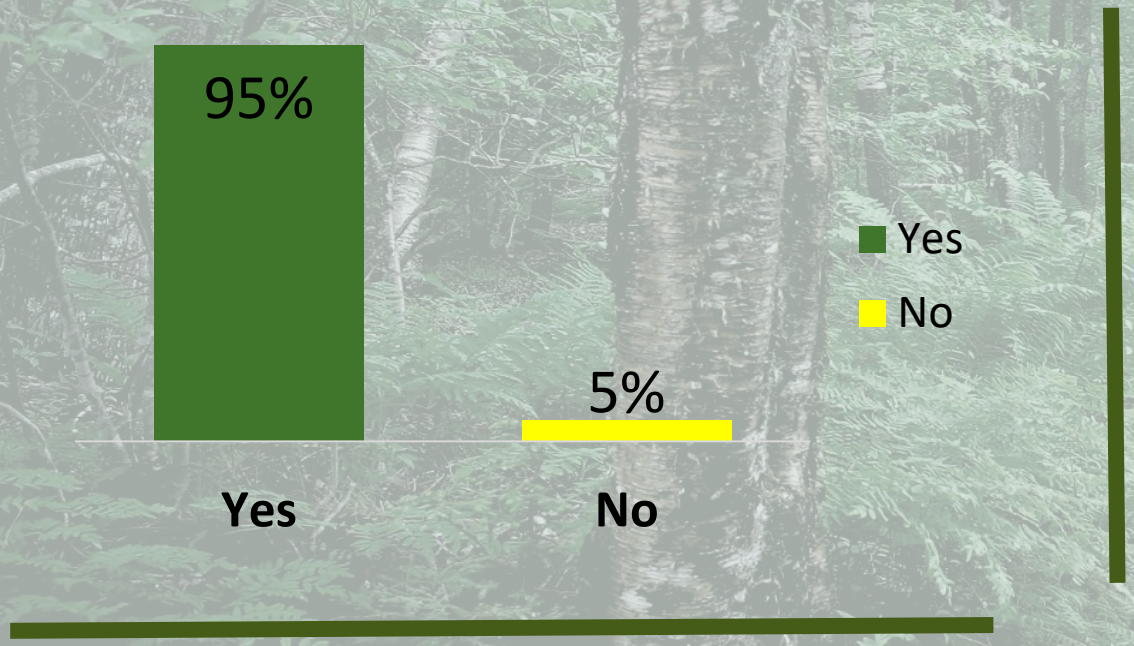
Mean WTP (PhP) (Value of non-cash contribution)

PhP 572.00 per household annually

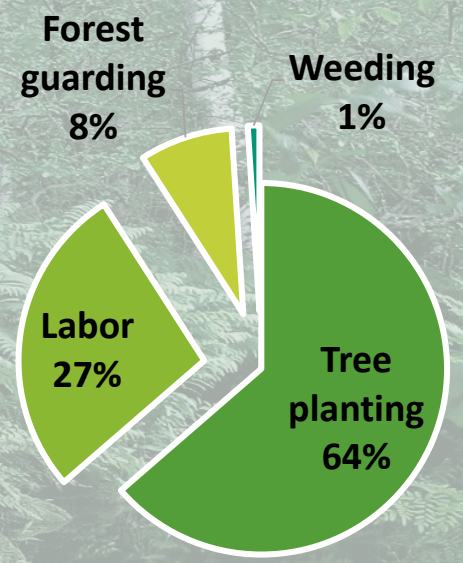
Willingness to Accept for Cash-for-work Program

Question: "If there is cash for work program or activities that would improve forests productivity and other services, are you willing to participate? What activity and wage rate per day are you willing to accept?

WTA for cash for work (%)



Cash for work activities (%)

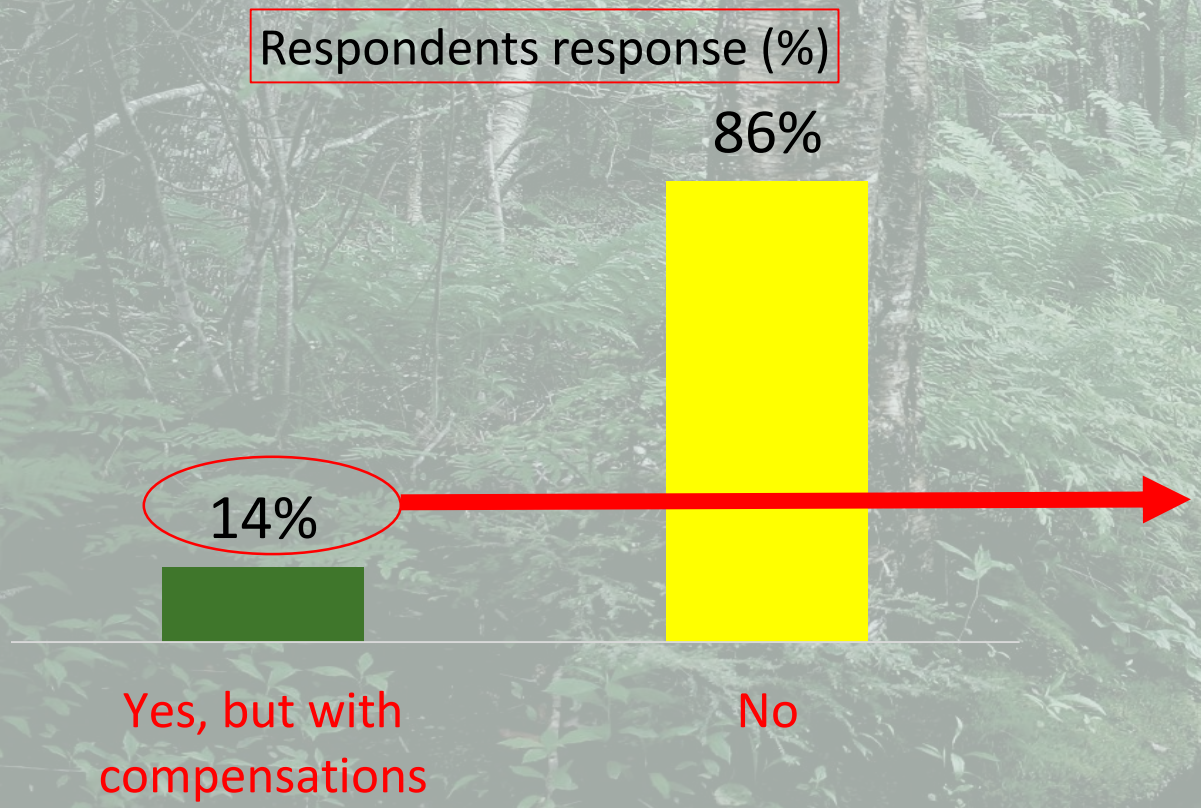


Mean WTA (PhP)

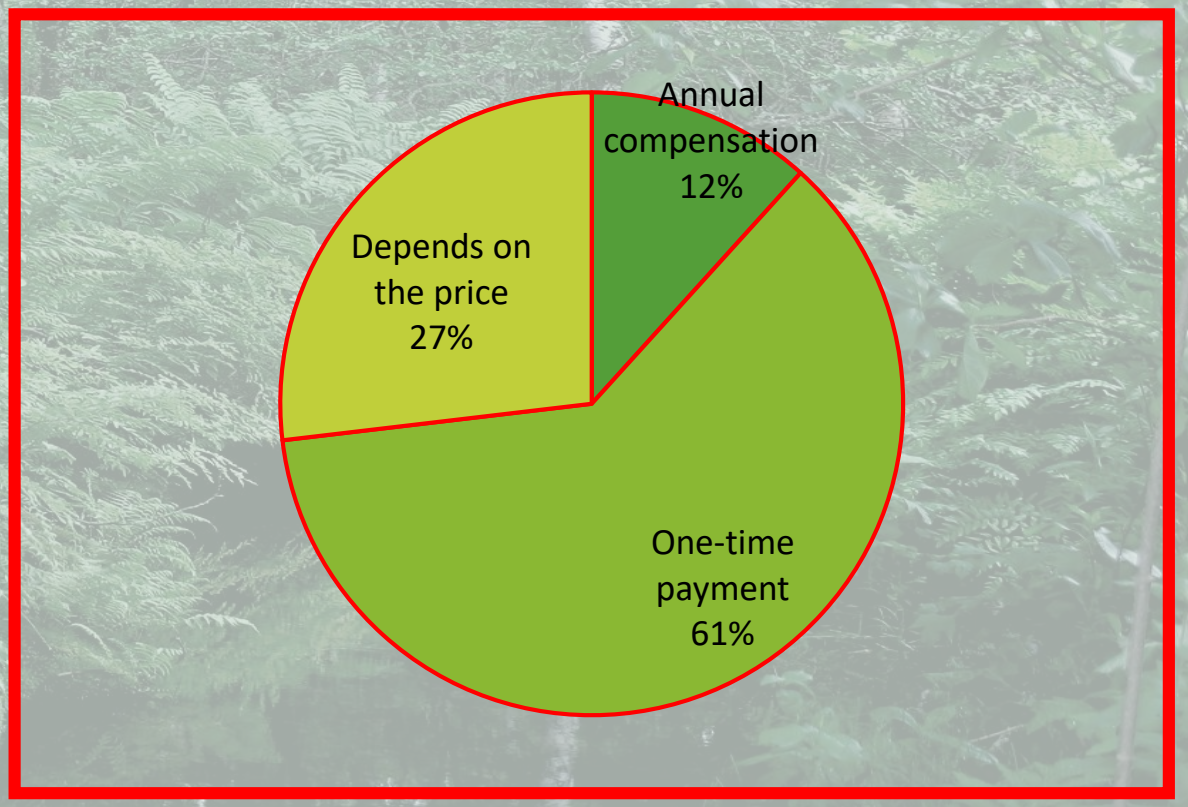
PhP 7,026.76 per household monthly

Willingness to Accept for Interventions Prohibiting Farming

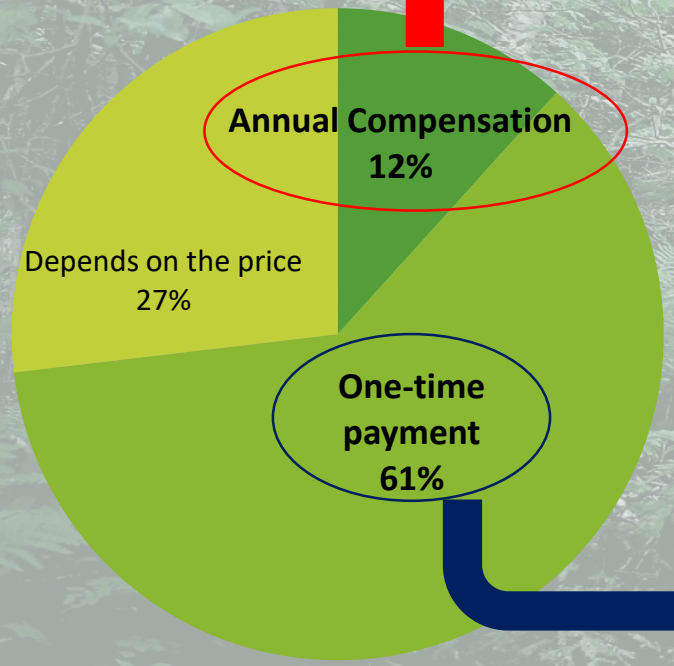
Question: "Suppose a private company has interest on Mt. Nacolod that will lead to a great deforestation and damage to the environment. All residents relevant to the mountain will be prohibited from farming and other activities. In exchange to that, residents will be compensated to their income loss. If this will happen, are you willing to be compensated and abide to this action?



Compensations



Average willingness to accept of respondents



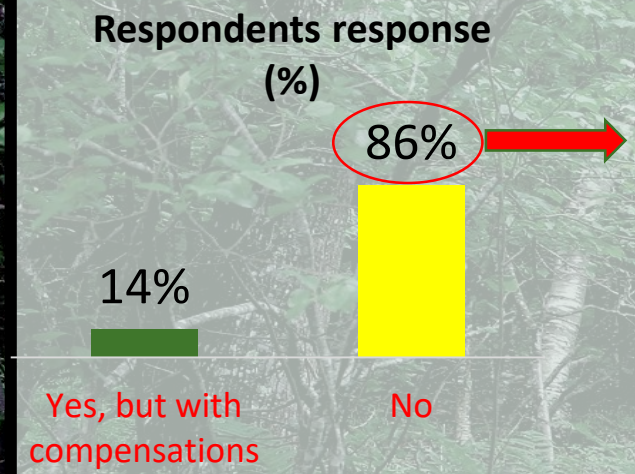
Mean WTA per household

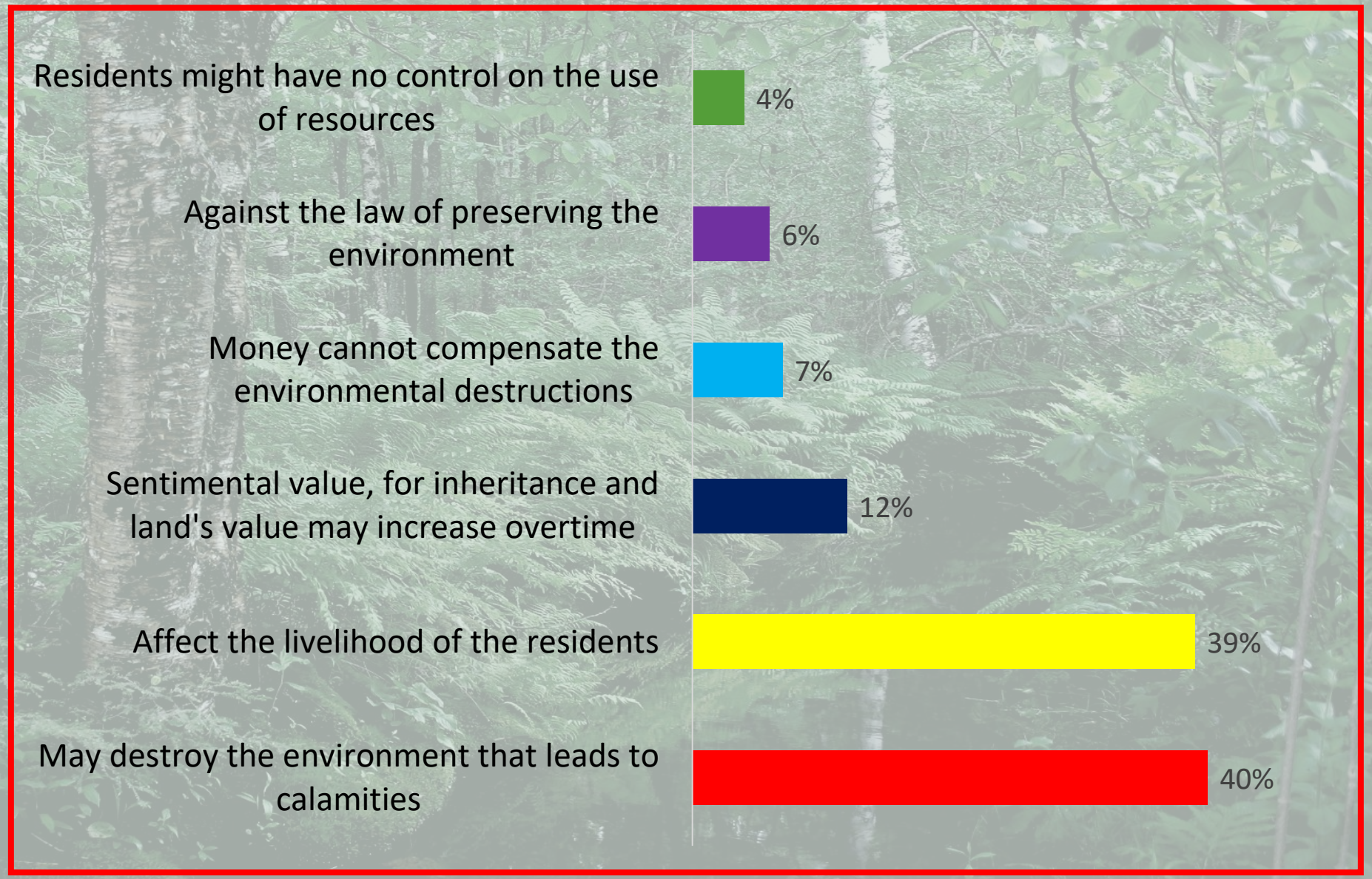
P 79,144.00 annually

Mean WTA per household

P 206,273.00

Reasons for negative response





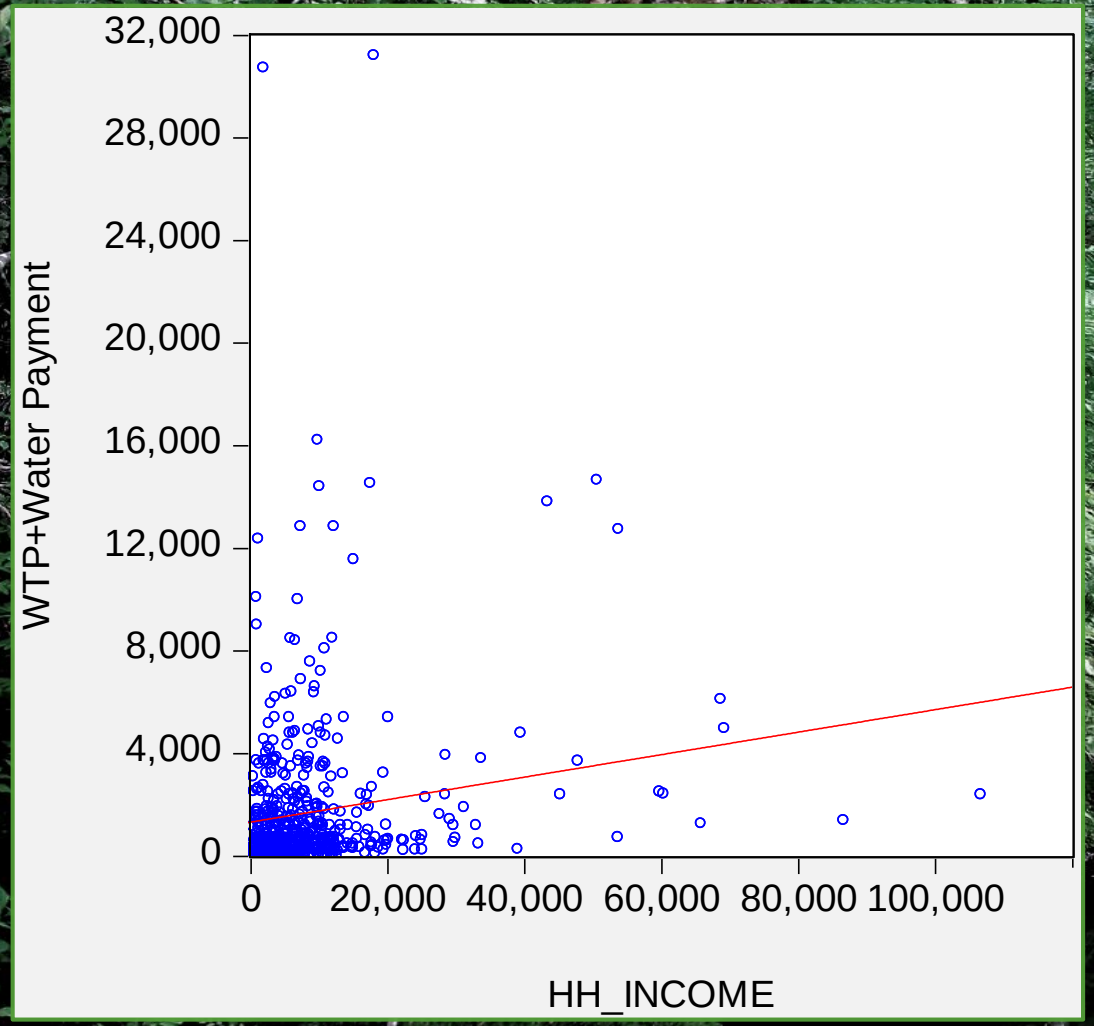
Determinants of WTP for Improved Protection of Mt. Nacolod's Water Services

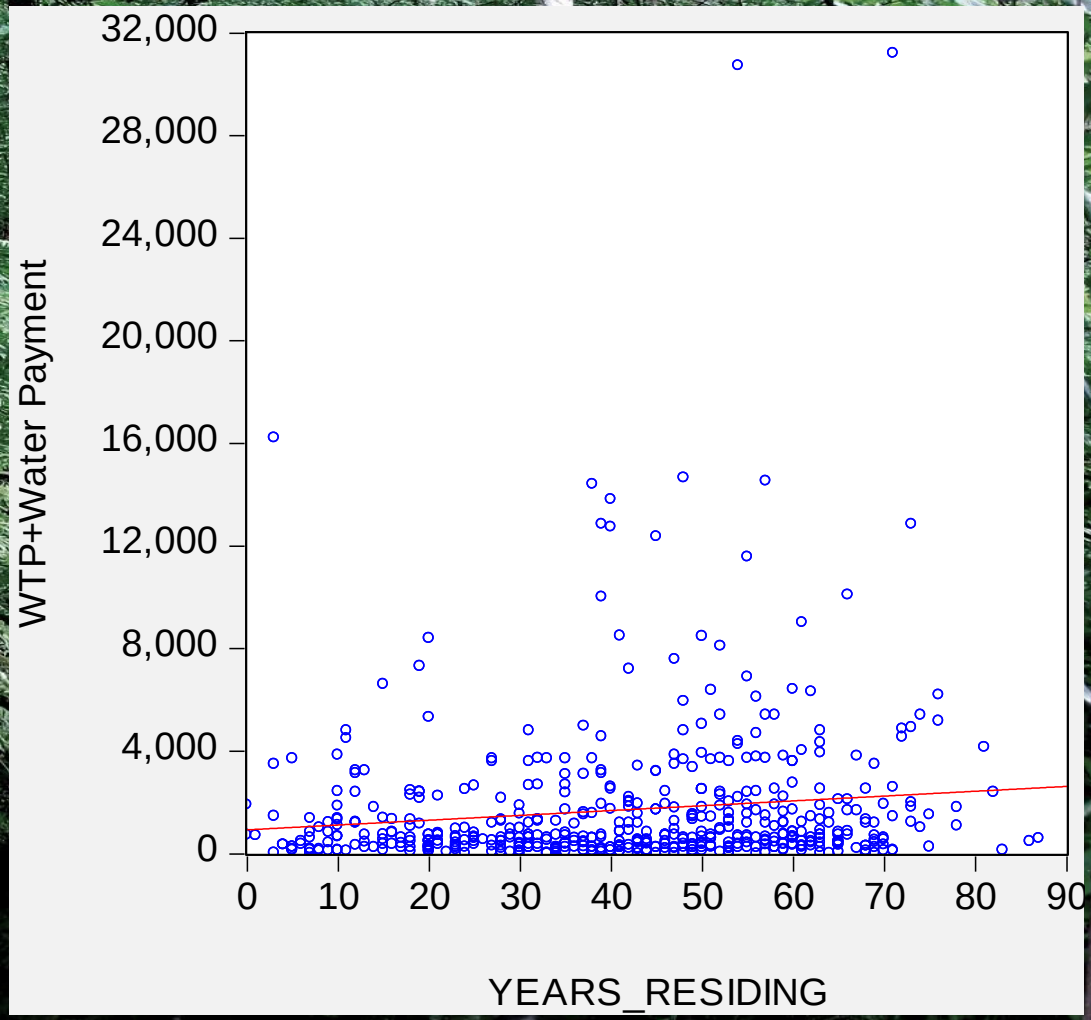
Econometric Model for the value of Water Services in MNLCA:

$$WTP_i = \beta_o + \beta_1 With\_Rice_i + \beta_2 YrsFarming_i + \beta_3 YrsResiding_i + \beta_4 Sex_i + \beta_5 HHIncome + \beta_6 HouseSize_i + \beta_7 HouseOwn_i + \beta_8 WaterDrinkVol_i + \beta_9 Age_i + \beta_{10} EducLevel_i + \varepsilon_i$$

Variables	Coefficient	p-value.
WITH_RICE	548.2361**	0.0327
YEARS_FARMING	0.655678	0.9500
YEARS_RESIDING	19.08312**	0.0242
SEX	711.0758***	0.0049
HH_INCOME	0.031330***	0.0079
HH_SIZE	152.2336***	0.0149
HOUSE_OWNERSHIP	-90.92795	0.7968
DRINKING_VOLUME	-0.330353	0.1271
AGE	-2.775721	0.8389
EDUC_LEVEL	262.7695***	0.0017

Correlation of household Income and Years residing to Value of Water





Estimation of Economic Net Benefit of Improved Protection of Mt. Nacolod

Net Economic Benefits per household:	Total Net Value (₱)
Benefits gained from the Resource, Annual	53,444.58
Cost willing to contribute for the Resource, Annual	1,423.00
Net Benefits, Annual	52,021.58
Benefits gained from the Resource, Monthly	4,453.71
Cost willing to contribute for the Resource, Monthly	118.58
Net Benefits, Monthly	4,335.13
Benefits gained from the Resource, Weekly	1,113.43
Cost willing to contribute for the Resource, Weekly	29.65
Net Benefits, Weekly	1,083.78
Benefits gained from the Resource, Daily	159.06
Cost willing to contribute for the Resource, Daily	4.24
Net Benefits, Daily	154.83
Benefit-Cost Ratio per household	37.56

Quantification and Valuation of Ecosystem Services

Resource Valuation for MNLCA Ecosystem Services		
Ecosystem Services	Type of Values	Economic Value (Annual PhP)
A. <u>Provisioning Services</u>		
• **Crops**		
Rice	Income	322,803,135
Coconut	Income	218,301,948
Banana	Income	5,312,265
Cassava	Income	336,486
Vegetables	Income	11,856,324
Abaca	Income	26,056,763
Other crops	Income	4,525,347
• **Timber farming**	Income	6,224,381
• **Animal Meat**	Savings	1,030,068
• **Herbal Medicine**	Savings	12,824,336
• **Fuel**	Savings	96,357,731
Total Provisioning Value		**705,628,784**

Quantification and Valuation of Ecosystem Services con't..

A. Protective Services		
• **Property protection from Typhoons**	Damage-cost avoided - House value	80,889,440
• **Improved Protection of Water Source[1]**	Willingness-To-Pay	8,898,822
Total Protective Value		**89,788,262**
A. Regulating Services		
• **Fresh water to drink**	Savings	9,742,039
• **Minimized risk on loss of income due to El-Nino**	Damage-cost avoided – production loss	129,121,254
Total Regulating Value		**138,863,293**
A. Cultural Services		
• **Enjoyment in the recreational sites and parks[2]**	Willingness-To-Pay (WTP) by households	778,977
• **Biodiversity Conservation[3]**	Existence Value WTP	9,110,070
Total Cultural Value		**9,889,047**
Total Economic Value of MNLCA Ecosystem Services		**944,169,386 PhP/Year**

Financial Analysis for the improved protection of MNLCA

Discount Rate	0.1					
	NOMINAL			REAL (2018 P)		
Year	Benefits	Costs	Net Benefit Flow	Discounted Benefits	Discounted Costs	Discounted Net Benefits
Initial cost		650,000	- 650,000	-	650,000	- 650,000
1	705,628,782.67	18,787,869	686,840,914	641,480,712	17,079,881	624,400,831
2	705,628,782.67	18,787,869	686,840,914	583,164,283	15,527,164	567,637,119
3	705,628,782.67	18,787,869	686,840,914	530,149,348	14,115,604	516,033,744
4	705,628,782.67	18,787,869	686,840,914	481,953,953	12,832,367	469,121,586
5	705,628,782.67	18,787,869	686,840,914	438,139,957	11,665,788	426,474,169
6	705,628,782.67	18,787,869	686,840,914	398,309,052	10,605,262	387,703,790
7	705,628,782.67	18,787,869	686,840,914	362,099,138	9,641,148	352,457,991
8	705,628,782.67	18,787,869	686,840,914	329,181,035	8,764,680	320,416,355
9	705,628,782.67	18,787,869	686,840,914	299,255,486	7,967,890	291,287,596
10	705,628,782.67	18,787,869	686,840,914	272,050,442	7,243,537	264,806,905
11	705,628,782.67	18,787,869	686,840,914	247,318,584	6,585,033	240,733,550
12	705,628,782.67	18,787,869	686,840,914	224,835,076	5,986,394	218,848,682
13	705,628,782.67	18,787,869	686,840,914	204,395,524	5,442,176	198,953,347
14	705,628,782.67	18,787,869	686,840,914	185,814,112	4,947,433	180,866,679
15	705,628,782.67	18,787,869	686,840,914	168,921,920	4,497,666	164,424,254
16	705,628,782.67	18,787,869	686,840,914	153,565,382	4,088,788	149,476,594
17	705,628,782.67	18,787,869	686,840,914	139,604,893	3,717,080	135,887,813
18	705,628,782.67	18,787,869	686,840,914	126,913,539	3,379,163	123,534,376
19	705,628,782.67	18,787,869	686,840,914	115,375,945	3,071,967	112,303,978
20	705,628,782.67	18,787,869	686,840,914	104,887,222	2,792,697	102,094,525
	Present Value			**6,007,415,604**	**160,601,720**	
	Net Present Value (NPV)					**5,846,813,884**
	Benefit Cost Ratio (BCR)					**37**

CONCLUSION AND RECOMMENDATION

- Based from the analysis it is found that the total provisioning value of MNLCA is 705,628,784, the total protective value is 89,788,262, the total regulating value is 138,863,293, and the total cultural value is 9,889,047. These quantified values for each ecosystem services translate to the total economic value of MNLCA's ecosystem services by 944,169,386 PhP/Year which basically almost a billion worth.

- Through the improved protection it is expected MNLCA can provide sustainable benefits to its relevant communities.

- This result highlights the need to re-examine the current efforts and policies that aims to improve the protection of MNLCA. In relation to this, though there were seen significant improvements already in the reduction of illegal cutting of trees and deforestation, this still needs enhancing and strengthening in order to make this policies more inclusive and sustainable. This requires expanding of participation of actors not just with the concerned government agencies and non-government organizations, but as well as the households being the direct beneficiaries of the ecosystem services of MNLCA.

CONCLUSION AND RECOMMENDATION

- This research recommends that interventions to be made should aim for an inclusive growth integrating the support for environmental conservation at the same time support for better livelihood option.

- In addition, in most cases, a resource valuation study is an input for establishing “Payment for Ecosystem Services” where PES scheme could provide compensation and reward for the conservation and delivery of ecosystem services which can be in a form of direct payment, financial incentives, or in kind PES has many attractive characteristics relative to other conservation approaches provided that transaction costs are low and other favorable conditions apply.

- Lastly, Mt. Nacolod Local Conservation Area (MNLCA) realizing its huge and diverse ecosystem services for biodiversity and with its significant economic contribution to society, this study believed that making this MNLCA become an officially proclaimed protected area in southern, Leyte will open up more opportunities to establish mutually beneficial relationship among people, the protected area, and the ecotourism potential of Mt. Nacolod. This initiative is believed to provide local economic benefits while maintaining ecological integrity through low-impact, non-consumptive use of natural resources.

Photo Documentation

Provincial Meeting at Hinunangan, Southern Leyte

Site visit at Brgy. Calinao, Hinunangan, Southern Leyte

Photo Documentation

Courtesy Calls

Focus Group Discussions

Photo Documentation

Field interviews

Initial Payment Scheme Design: Mahagnao Case

PES ACTORS → PES PAYMENTS AND REVENUES → Benefits – Transferred and Shared

MVNP Ecosystem Service Users

Households
Tourists

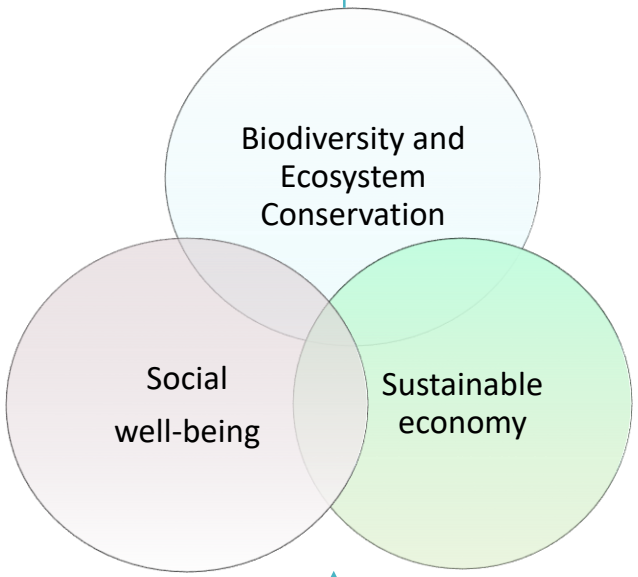
For Households:
₱9.50/Week Mahagnao
₱4.50/Week Bocawon

For Tourists:
₱75/visitor
(Entrance Fee + Environmental Fee)

Revenues
- ₱85,755/Year from Households
- ₱244,050/Year from Tourists

MVNP Ecosystem Service Providers

PAMB/POs
DENR




Thank You
PES be with you ☺