College of Forestry and Natural Resources
University of the Philippines Los Baños

Economic Valuation for Sustainable Mangrove Ecosystems Management in the Philippines

Leni D. Camacho, Dixon T. Gevaña Sofronio C. Camacho
CFNR-UPLB

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Rationale

- Mangroves and other coastal forest ecosystems in the Philippines play important roles to the environment and local economy of dependent communities.

- If sustainably managed, mangroves provide an endless array of productive and protective benefits.

Benefits from Mangroves

- *Improvement of harvest of marine products – provide/ replenish nutrients beneficial to the marine food chain*
- *Accumulation of wood biomass in stem of trees that is beneficial in mitigating proliferation of greenhouse gasses by being a carbon sink*
- *Protection of coastal areas from erosion*
- *Protection of communities from strong winds and waves*
- *Provision of habitat and nesting place for wildlife and migratory birds/spawning grounds for fishes*
- *Enhancement of aesthetic and ecotourism value of the area*

Distribution of Mangroves in the Philippines

- From an original area of 450,000 ha in 1918, estimates show the country has only 310,531 ha (total mangrove cover) (Phil. Forestry Statistics, 2013)
- Mangrove areas reforested through National Greening Program: 45,554 ha
- Largest natural/old-growth mangrove cover is in Palawan Island (63,800 ha)

Gaps

Failure to apply sustainable management principles and practices due to:

- Lack of science-based tools for resource assessment, monitoring and evaluation, that could provide accurate data base for effective management of mangrove ecosystems on a sustainable basis
- Lack of appreciation of the full value for mangrove forest resources due to the scarcity of information of the full economic value of mangrove systems

Objectives

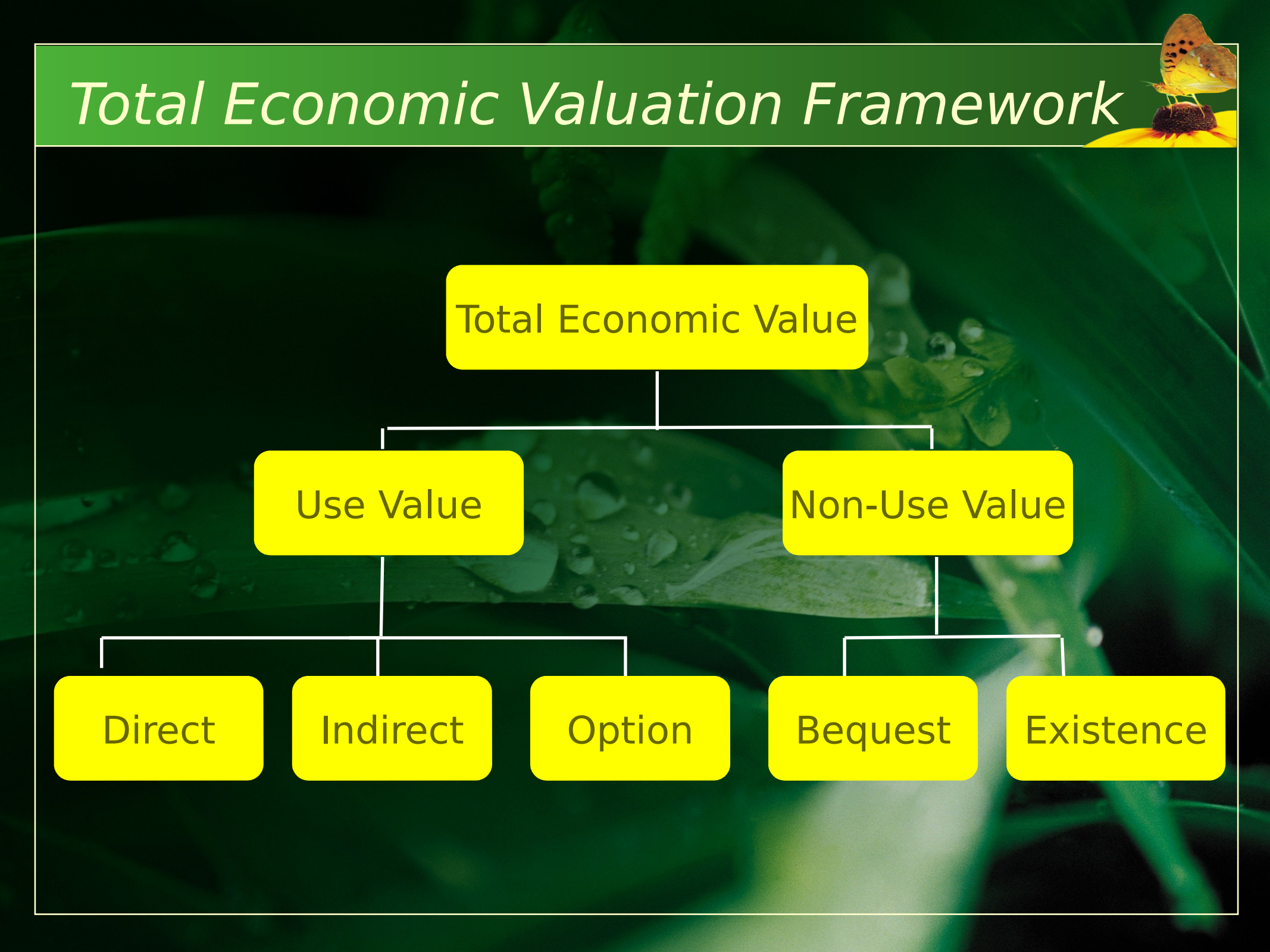
General:

- Determine the total economic value of mangrove ecosystem services of selected sites in the Philippines.

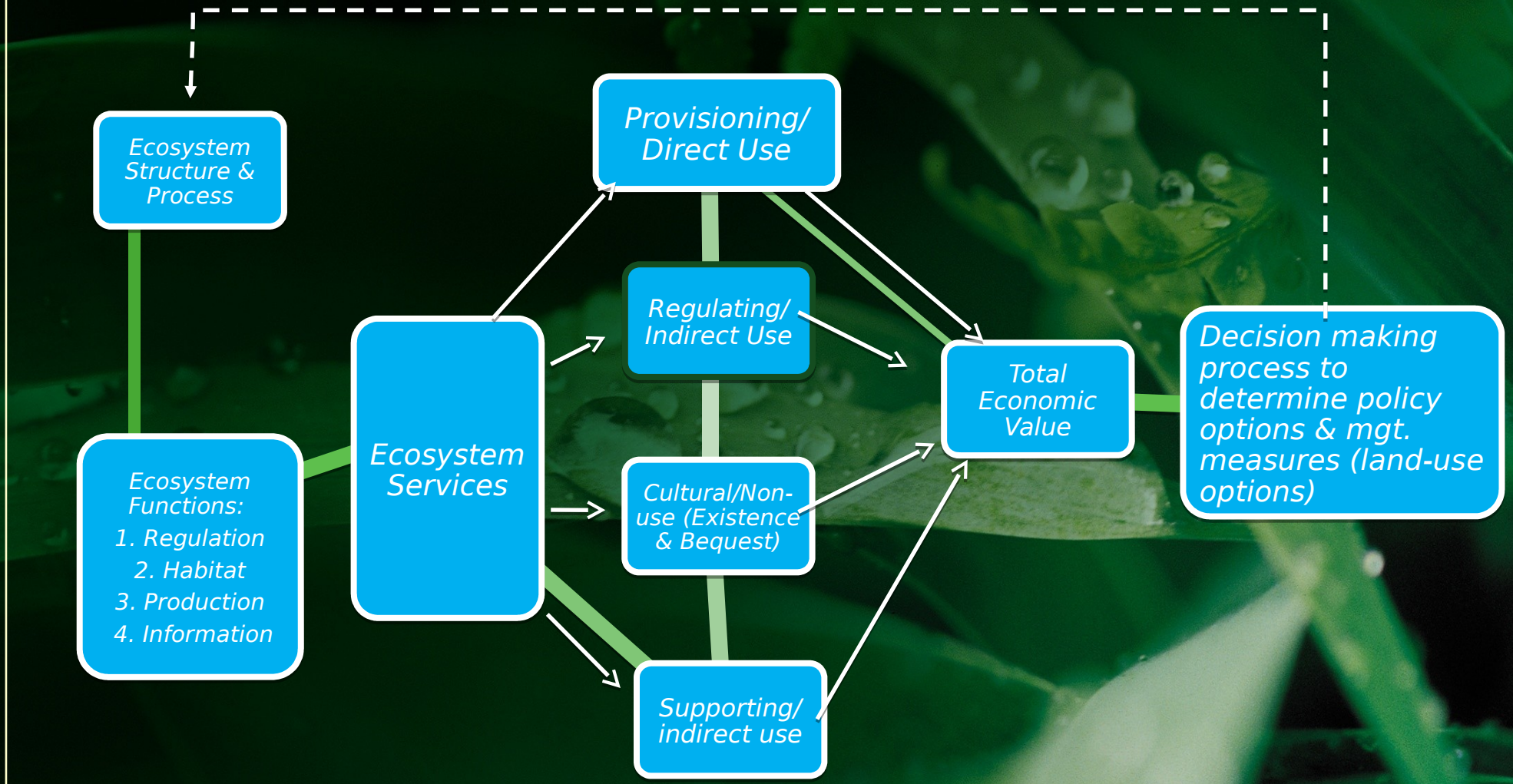
Specific:

- Identify the ecosystem services and uses of mangrove forests
- Determine the economic value of these services & uses using appropriate tools
- Assess livelihood opportunities in the proper management & restoration of mangrove ecosystems
- Recommend policies & management options to safeguard & realize the important values of manrove ecosystems.

Total Economic Valuation Framework



Assessment and Valuation of Flow of Mangrove Ecosystem Services



Adapted from Bennagen, 2006

Types of Uses/Valuation Techniques for Mangrove Forest Ecosystems

Use	Use Value	Valuation Method
Extractive uses like timber, firewood, charcoal, fish, worms, medicine, poles, charcoal, leaves/palm fronds, fruits/propagules, bark, sap, wood tar, crab, prawn, insect & larvae, shellfish, wildlife, jellyfish, zooplankton, bees, honey, seaweed, etc.	  *Direct Use*	 Market prices, Opportunity cost method

Based on UNEP/GEF, 2006

Types of Uses/Valuation Techniques for Mangrove Forest Ecosystems

Use (Non-extractive)	**Use Value**	**Valuation Method**
Tourism/recreation		Travel cost/CVM
Transport		Substitute price approach
Research and education	 Direct use	Actual costs
Aesthetic		Contingent Valuation Method (CVM), Hedonic Price Method

Based on UNEP/GEF, 2006

Types of Uses/Valuation Techniques for Mangrove Forest Ecosystems

Use (Environmental Services)	**Use Value**	**Valuation Method**
Shoreline/erosion prevention, flood protection, windbreak, carbon sequestration, water purification, oxygen release	**Indirect Use**	Replacement cost (replanting and re-establishing of mangroves), preventive expenditure, damage cost avoided
Aquaculture (pearl)	*Indirect Use*	Market price (difference with & without mangrove), opportunity cost method
Nursery feeding		Market price (value of off-shore catch)

Based on UNEP/GEF, 2006

Types of Uses/Valuation Techniques for Mangrove Forest Ecosystems

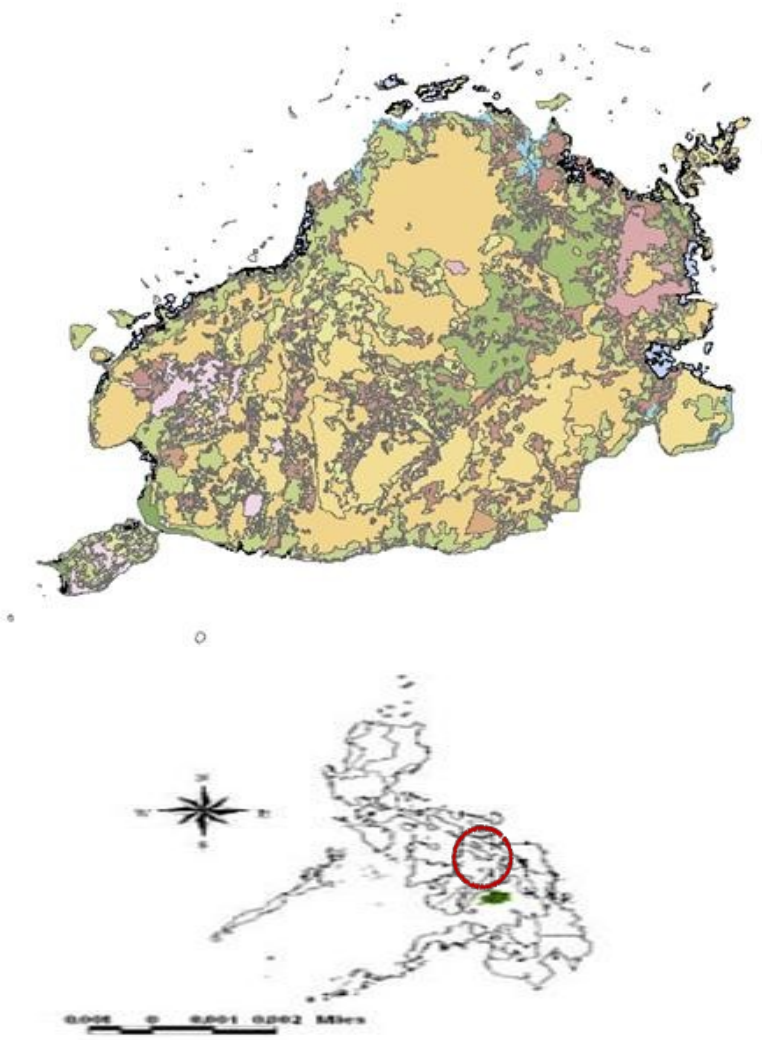
Use (Biological Diversity Services)	**Use Value**	**Valuation Method**
Biodiversity	Option	CVM
Migratory species	Indirect use	CVM
Endangered species	Bequest	CVM
Mangrove ecosystem	Existence	CVM

Based on UNEP/GEF, 2006

Ecosystems Services Valued in this Study

Use	Use Value	Valuation Technique
Extractive uses like timber, firewood, charcoal, fish, crabs, shrimps, mollusks, etc.	Direct use	Market prices
Non-extractive uses Tourism/recreation	Direct use	Travel cost
Biological Diversity Conservation	Indirect Use	Contingent valuation method (CVM)

Study Site 1: Banacon Island, Bohol Province



Location: *Bohol Province, Philippines*
10° 03' 30" to 10° 15' 30" N and
124° 03' 30 to 124° 14' 30" E
Central part of the country (10th largest island)

Area: *660 ha*

Climate: *No distinct dry season*
(Mean annual rainfall: 1500mm)

Unique features:

a. forms part of Danajon Double Reef

b. one of the largest man-made mangrove plantations in Asia

Population: *325 households*

Major livelihoods: *fishing, seaweed farming and shrimp catching*

Name of People's Organization: *Banacon Fisherfolks and Mangrove Planters Assoc.* ***(BAFMAPA)***

Study Site 2: Puerto Princesa, Palawan Province

Location: *Palawan, Philippines*
9° 42' 53" N and 118° 45' E
5th largest island (western part of the archipelago)

Area: *40,597 ha*

Climate: *No distinct dry season*
(Mean annual rainfall: 1500mm)

Unique features:

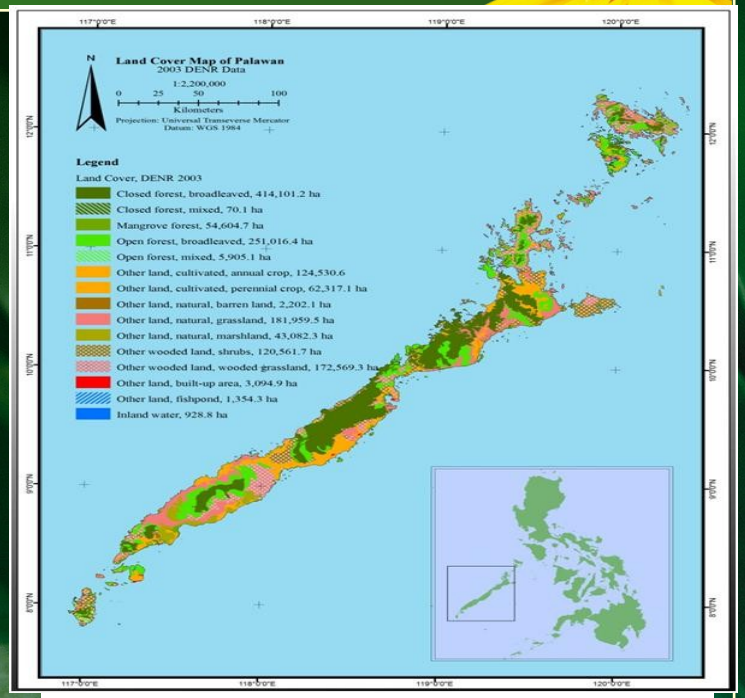
a. forms part of the Sulu Sulawesi Seascape

b. one of the oldest mangrove stands in the country

Population: *at least 400 households (in Brgy Kamuning)*

Major livelihoods: *fishing, shrimp and crab catching*

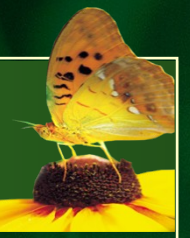
Name of People's Organization: *Kamuning Coastal Residence Development Association, Inc.*



Revenue from Mangrove Products (USD)

Extractive Direct Use	Banacon, Bohol			Kamuning, Palawan		
	Revenue attributed to mangroves	% of Total Revenue	% of HH Users	Revenue attributed to mangroves	% of Total Revenue	% of HH Users
Shrimps	179,200	37	80	96,000	17	3
Crabs	147,000	30	35	13,440	2	2
Fish	70,933	15	80	3,680	1	2
Mollusks	52,500	11	30	392,231	69	100
Timber (house construction posts)	25,820	5	70	838	0.15	80
Firewood	8,640	2	50	-	-	-
Fence posts/poles	3,120	1	40	-	-	-
Charcoal	-	-	-	7,200	1	5
Nipa thatch	-	-	-	53,760	10	17
TOTAL	484,093			567,149		

Mangrove Protection: Biodiversity Conservation



CVM VALUES – Bohol

Variables significantly affecting willingness to pay
- Education
- Gender
- Income

Average WTP Amount = USD 1.23/month

Total Biodiversity conservation value:USD 8,622.9

CVM Values: Palawan

Variables significantly affecting willingness to pay
- *Information is new*
- *Education*
- *Income*

Average WTP Amount = USD 1.10/month

Total Biodiversity conservation value: USD 12,327.8

Recreation and Ecotourism Value

Banacon, Bohol

- *Ave. annual visitors = 300*
- *Ave. travel cost (USD) = 6.2*
- *Estimated Value = USD 1,850*

Kamuning, Palawan

- *Ave. annual visitors = 100*
- *Ave. travel cost (USD) = 0.62*
- *Estimated value = USD 62*

Total Economic Value in USD (Annual)

Economic Values	Banacon, Bohol	Kamuning, Palawan
Area (ha)	470.0	836.0
Total Market Value	484,093.0	567,149.0
Estimated CVM Value	8,622.9	12,327.8
Recreational Value	1,850.0	62.0
Total Value	494,565.9	579,538.8
Value/ha	1,052.3	693.2

Conclusions and Policy Recommendations

hence, local needs and capacities should be taken into consideration in their management.

- *From the point of view of biodiversity conservation as a distinct service mangroves provide, even local people are willing to pay for their conservation.*

- *Ecotourism is one of the potentials of mangroves that can be developed by the local stakeholders and managed by the local people because of mangroves' inherent beauty & wonderful*

onclusions and Policy Recommendations

- *Policies that provide incentives for sustainable mangrove plantation development should be encouraged .*
  - *An enabling policy and legal environment that take into consideration land tenure security and incentives in community-based mangrove management*
  - *Support on mangrove management for community ecotourism as a source of livelihood*

- *An existing policy in the country of banning all kinds of cutting of mangroves serves as disincentives to sustainable management and use of mangroves.*
  - *A careful review of the provision/possibility of putting a cutting*

management may include, among others:

onclusions and Policy Recommendations

**More economic valuation of mangrove ecosystem values such as carbon sequestration, tsunami & storm surge buffers, etc.*

**Sustainable thinning management options for mangrove plantations*

**Improving tenure security in community-based mangrove management*

**Effectiveness of mangroves as storm surge buffers.*

Thank You and Mabuhay!

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