TEEB: The Philippine Country Study

CBD COP 13 Cancun, Mexico December 2016

UNEP REECS

Goal of the Study

1. Focus on Planned coastal areas conversion projects
2. Estimate direct and indirect impacts on ecosystem services and biodiversity
3. Highlight Economic benefits of ecosystem and biodiversity
4. Mainstream ecosystem and biodiversity in development planning

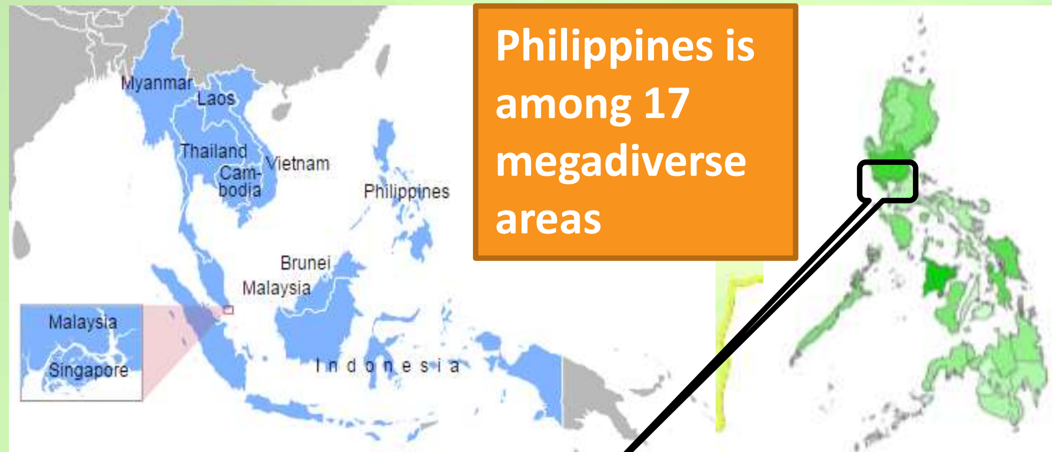
Objectives

- Compare alternative scenarios in terms of costs and benefits and impacts on ES of reclamation
- Develop policy recommendations and policy instruments
- Contribute to awareness-raising of environmental, social, and economic impacts of land reclamation
- Capacitate key individuals in the Biodiversity Management Bureau and Regional offices on TEEB methodologies and approaches

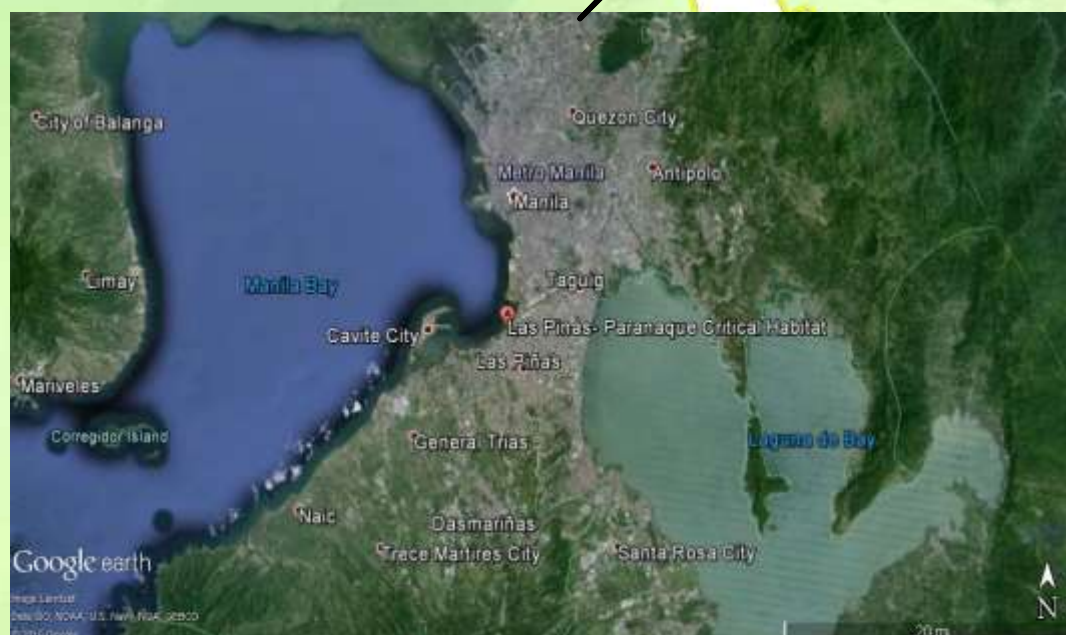
Project Scope

Manila Bay

- Manila Bay is an important historical, cultural and economic resource
- 30 % of the country's population (of 100+ M) is in Manila Bay watershed area,
- Contributes as much as 52% of GDP
- Economic value estimated at PhP 8 Billion/year (PEMSEA, 2005) – focused on losses due decline in water quality losses
- Supreme Court December 18, 2008 writ of continuing mandamus to rehabilitate, restore, and conserve the Manila Bay at the earliest possible time



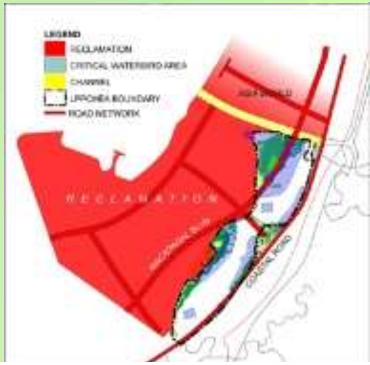
Philippines is among 17 megadiverse areas



Project Scope

Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA)

"Critical Habitat" by virtue of Presidential Proclamation No. 1412 dated April 22, 2007



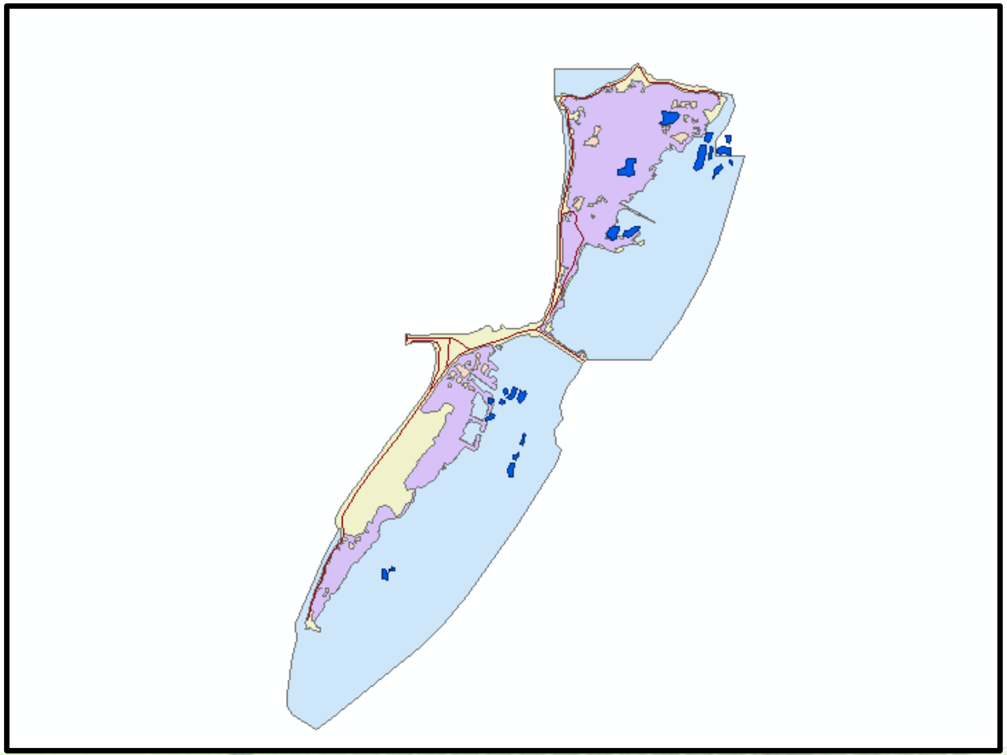
Declared Ramsar Site in 2013

42 hectares of mangroves

1.92 hectares of lagoons

2.7 hectares of ponds

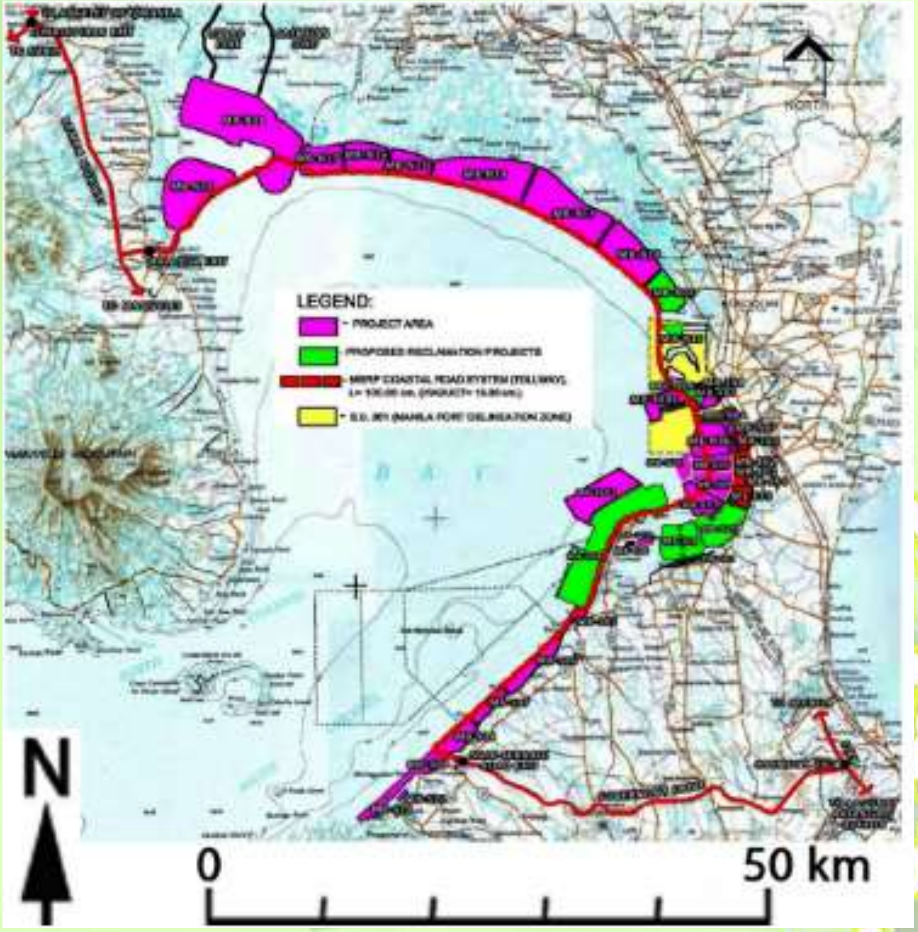
5.14 kilometers of roads



Why topic was chosen..

- National Reclamation Plan (NRP), 102 reclamation projects nationwide have been identified with an aggregate area of 38,272 hectares

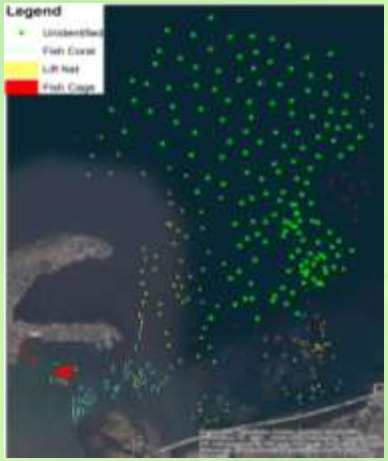
- Thirty eight (38) of these reclamation projects encompassing 26,234 hectares, or 70% of target scope of reclamation will be implemented in Manila Bay.



Kelvin Rodolfo, 2014. Commentary: On the geological hazards that threaten existing and proposed reclamations of Manila Bay. Philippine Science Letters Vol. 7 No. 1 2014

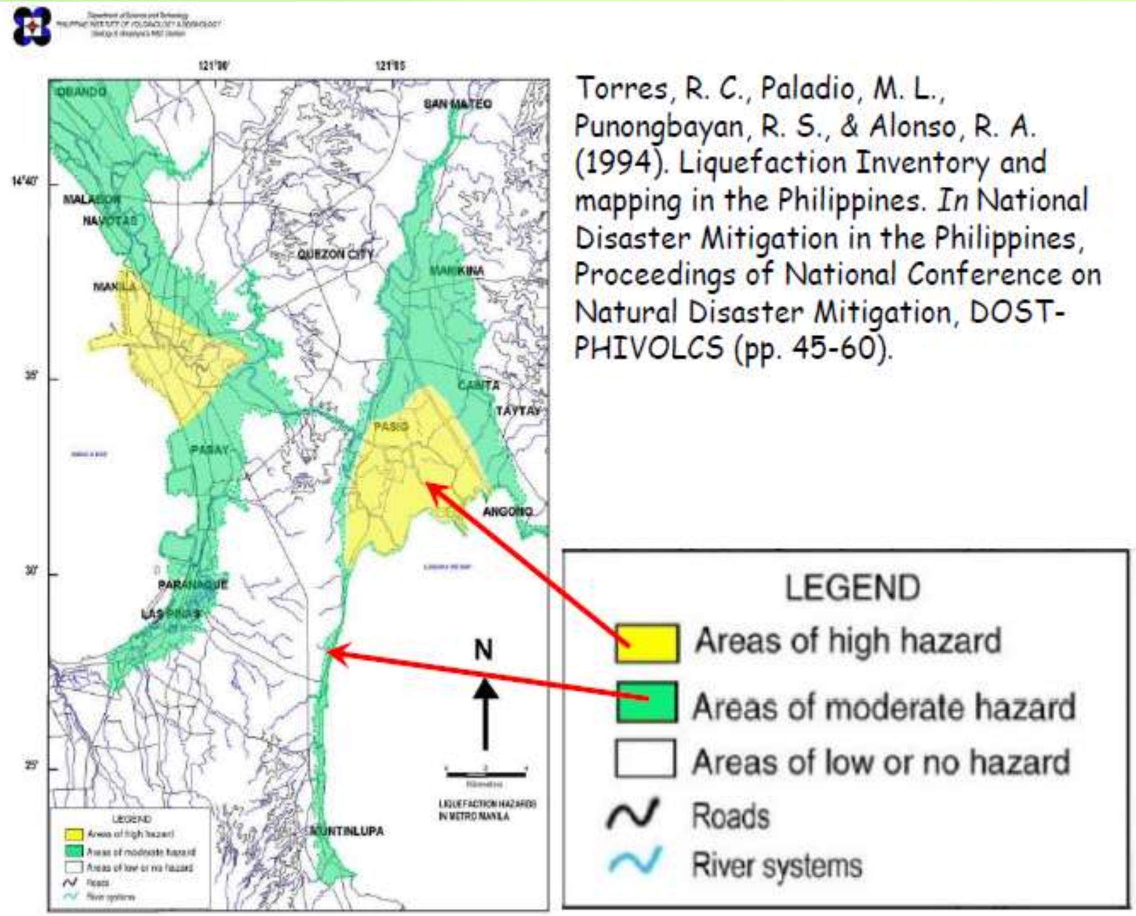
Why topic was chosen..

- Coastal ecosystems conversion including reclamation, particularly in the Manila Bay coastlines
- Increasing pollutants causing algal blooms and fish kills
- Rapid loss of ecosystems and biodiversity
  - Rapid expansion of settlements,
  - infrastructure development,
  - coastal developments



Why topic was chosen..

- Reclaimed coastal areas are susceptible to **liquefaction and enhanced ground-shaking during earthquakes** (Torres et al., 1994).

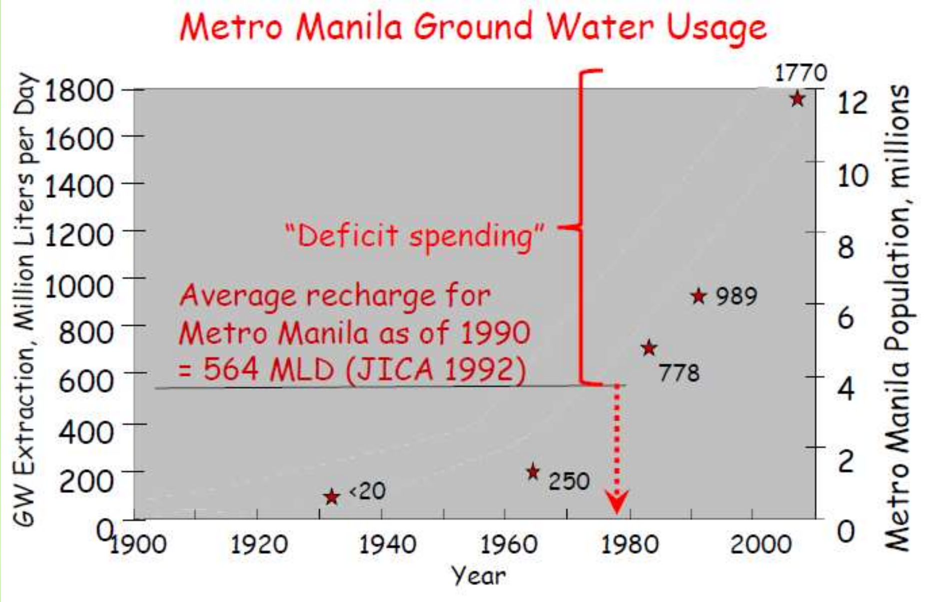


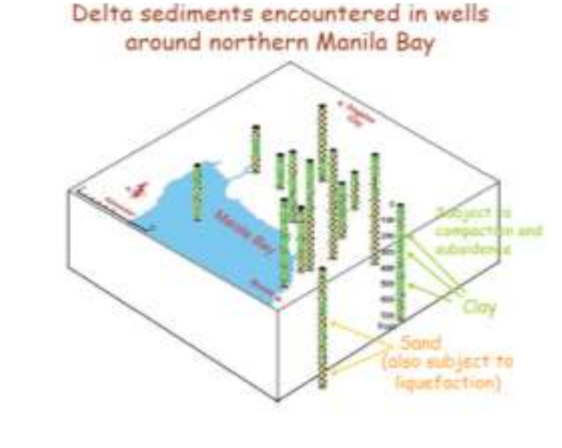
Torres, R. C., Paladio, M. L., Punongbayan, R. S., & Alonso, R. A. (1994). Liquefaction Inventory and mapping in the Philippines. *In* National Disaster Mitigation in the Philippines, Proceedings of National Conference on Natural Disaster Mitigation, DOST-PHIVOLCS (pp. 45-60).

Why topic was chosen..

- **Groundwater withdrawal causing land subsidence**

- Metro Manila's coastal areas are sinking as fast as 9 cm/y (Rodolfo et al. 2003, Siringan and Rodolfo 2003, Rodolfo and Siringan 2006)





Rodolfo, K., 2014. On the geological hazards that threaten existing and proposed reclamations of Manila Bay. Philippine Science Letters. Vol 7 No.14 pp 228-240.

Why topic was chosen..

- **Subsidence, liquefaction and seismic ground acceleration are critical hazard factors in near shore reclamations**
- Accelerating subsidence of the coastal lands bordering the bay is worsening both floods and high - tide invasions.
- Global warming has raised sea level by about 3 mm/y from 1993 - 2009

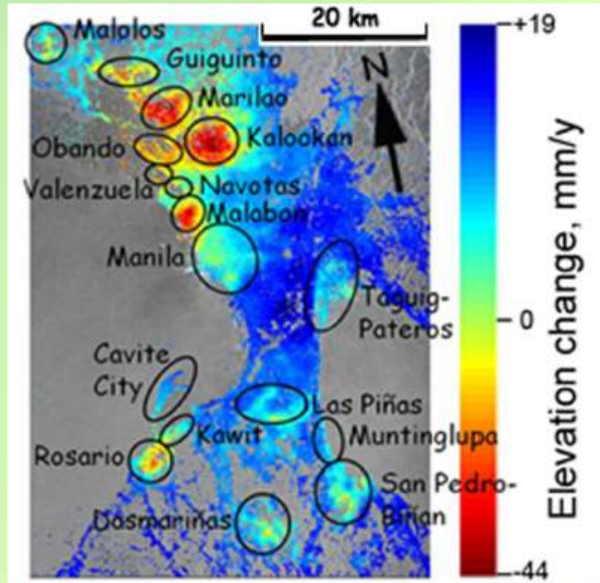
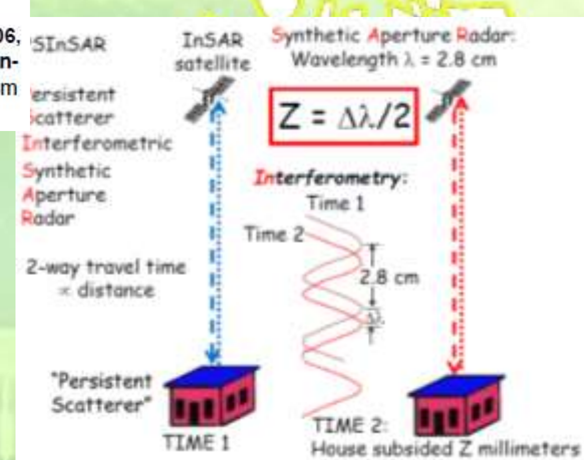


Figure 3. Manila Bay subsidence in mm/y from 2003 to2006, as determined from satellite-borne Permanent Scatterer Interferometric Synthetic-Aperture Radar (PSInSAR). From Lagmay (2011) and Eco et al. (2013).



Rodolfo, K., 2014. On the geological hazards that threaten existing and proposed reclamations of Manila Bay. Philippine Science Letters. Vol 7 No.14 pp 228-240.

Why topic was chosen..

- Coastal land conversion
- Expansion of informal settlers and unabated waste disposal

(A) Wastes and Informal Settlers within the Mangrove Area in LPPCHEA. (B) Fishermen making a boat made of wood in their so called "bahay pahingahan". (C) Informal settlers in LPPCHEA

Policy relevance

- Integration of ES and biodiversity assessment and accounts in local land use and climate change related action planning
- Inclusion of ES sustainability and biodiversity enhancement among indicators of national wealth and natural capital
- Inclusion of ecosystem services impacts in the implementation of the EIA
- "TEEB Philippines Country Study would inform planned coastal land reclamation projects in Philippines"

Climate Change Commission · Philippines

Philippine Economic-Environmental and Natural Resources Accounting

LAWS AND POLICIES
Environmental Impact Assessment

PHILIPPINE RECLAMATION AUTHORITY
We increase our nation's resources and accelerate its development for future generations by creating new frontiers reclaimed from the sea.

TEEB Country Study SCENARIOS

SCENARIO 1

Business as Usual

- No PRA Approved Reclamation;
- Current Implementation of Site Management Plan not approved by PRA and partial Enforcement of Policy EO 1412-A

SCENARIO 2

Without Approved PRA Reclamation

- Site Management Plans Fully Enforced and Implemented (EO 1412-A)

SCENARIO 3

With Approved PRA Reclamation

- All PRA planned reclamations push through
- With infra development (residential areas) right on the buffer zone

SCENARIO 4

With Approved PRA Reclamation, Restoration of Ecosystems and Habitats

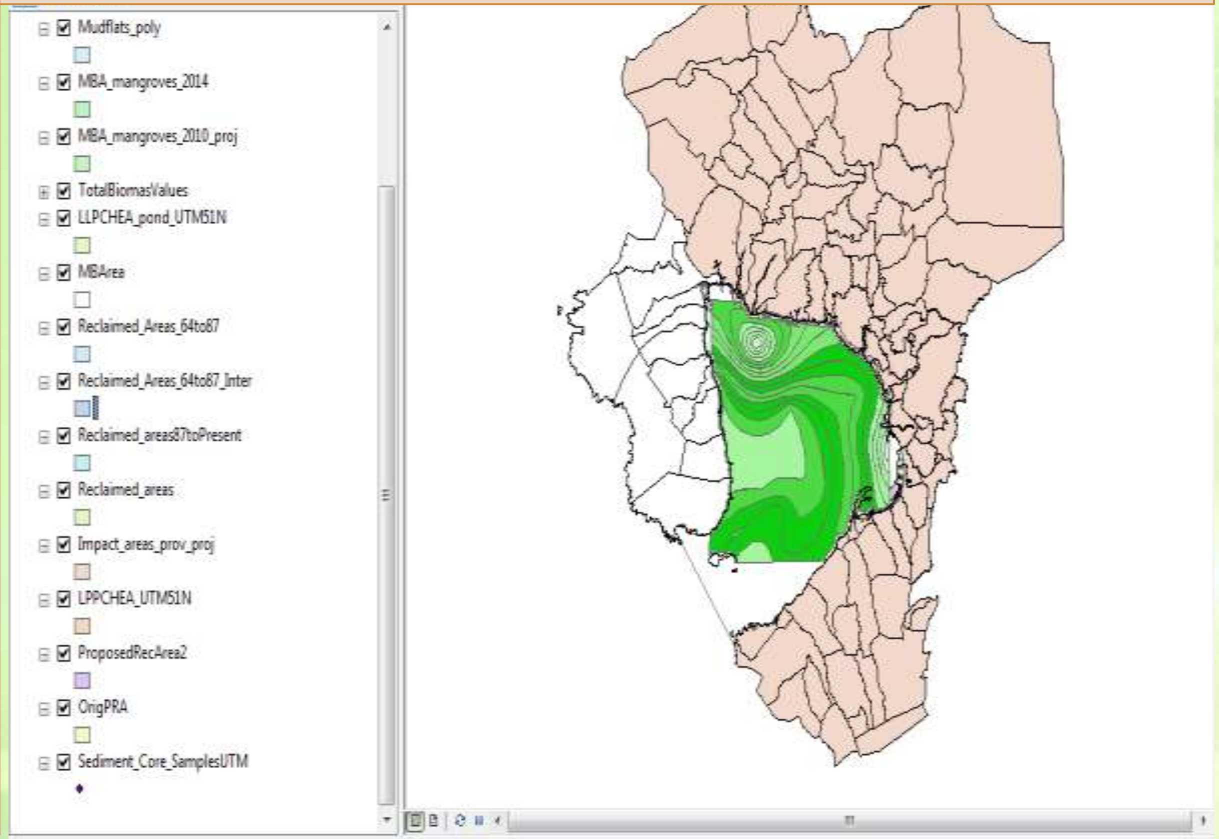
- With integrated on-site enhancement of biodiversity
- Restoration of ecosystem functions to enhance DRR potentials and local fishery production

→ Impact on Coastal and Marine Ecosystems and the Economy

Current and Historical Data on Ecosystems

- Mudflats
- Mangroves
- Open waters
- Fishponds
- Fish pens and fish cages
- Critical Habitat and Ecotourim Area
- Completed, on-going and proposed reclamation
- Ponds
- Lagoons
- Sand and Beach areas
- Coral reefs and seagrasses
- Bathymetry data
- Prior years topographic maps

Compilation of Spatial Data with corresponding biophysical and socio-economic attributes



Input process for the Study

- ❑ Workshops with stakeholders
- ❑ Meeting with data generators
- ❑ Meeting with BMB – spatial and historical data on Manila Bay and LPPCHEA
- ❑ Meeting with PRA – costs of reclamation (pending)
- ❑ Communications and meeting with DA Bureau of Fisheries and Aquatic Resources
- ❑ Meeting with Manila Bay Coordinating Office
- ❑ Field visits, FGDs, Aerial Survey (On-going)
- ❑ Literature reviews on Manila Bay, on-line searches

Project Data Inputs

Data Sources	Maps	Socio-demographic	Monetary Values	Cost Data	Biophysical Data	Legal Documents	Management and Regulatory Information	Other Information
Department of Environment and Natural Resources - National Capital Region								Manila Bay Project reports, thesis, surveys, assessments
DENR-Biodiversity Management Bureau								
DENR-Manila Bay Coordinating Office	Manila Bay Atlas			Dikes and Breakwaters	Manila Bay Atlas		Management plan, informal settlers	
Metro Manila Development Authority		Informal Settlers						
Department of Agriculture - Bureau of Fisheries and Aquatic Resources					Fish Biomass Study			
National Mapping and Resources Information Administration	Bathymetry, Land Cover Map, Topographic Map							
Department of Public Works and Highways			Damage data				Flood Management Master Plan	
Laguna Lake Development Authority					Hydrodynamic modeling			
Department of Interior and Local Governments		Informal Settlers						
Philippine Reclamation Authority	Sketch maps of existing and proposed reclamation areas						National Reclamation Plan	
Philippine Statistical Authority		Demographic data			Fishery production			
REECS	Site visits, Google earth digitization	Focus group discussion	Focus group Discussions, estimates of mangrove carbon	Focus group discussion	Birds Census, fishers interviews, Aerial surveys			
Exiting Literatures, Reports, Journals	Earthquakes, subsidence, water supply			Research Reports				Modeling

How the Project Developed and Progressed

1. Meeting with BMB and other stakeholder for scope finalization
2. Scenario building workshop
3. Workshop with stakeholders on assessing extent and condition of ecosystem services and collecting biophysical data
4. Meetings with institutions generating data on ecosystems and biodiversity
5. Mapping of ecosystem services
6. Interaction with on-site users of coastal areas
7. Aerial survey of habitats (on-going)
8. Focus group discussions with various users of the Manila Bay (on-going)
9. Review of literature, R&D and development projects in Manila Bay
10. Discussion with Ecosystem Research and Development Bureau on institutionalizing valuation of ecosystems and biodiversity
11. Workshop with WAVES project on linkage and formulating a common framework to institutionalize ES and Biodiversity valuation and accounting


Experts site visit in LPPCHEA

Scenario building workshop

TEEB Site Visit in Cavite Area

WAVES Steering Comm Meeting

Stakeholder Engagements

Training/Workshop on scenario development March 30, 2016, Hotel Jen.

Metro Manila Development Authority (MMDA),
Department of Public Works and Highways (DPWH),
Philippine Reclamation Authority (PRA),
Local Government Unit of Paranaque,
Biodiversity and Management Bureau (BMB),
Environmental Management Bureau (EMB),
Ecosystems Research and Development Bureau (ERDB),
National Mapping and Resource Information Authority (NAMRIA),
Manila Bay Coordinating Office (MBCO) and more

Workshop on Biophysical Data Assessment Photo Documentation, June 6, 2016

Selection of Ecosystem Services

- Criteria for selection – (1) used in economic and other human activities; (2) Extent/Area covered by the analysis, (3) clear provision from an ecosystem and based on agreed classification, (4) availability of primary and secondary data, (5) identified and agreed upon by experts

- Selection process – (1) review of literature and pre-identification based on prior knowledge of Manila Bay and verification with government agencies; (2) the review of reports on Manila Bay, (3) collection of historical maps of Manila Bay, (4) site visits in selected areas of the Bay, (5) conduct of rapid ground survey in selected sites, and aerial survey, (5) focus group discussions, (6) scoping meeting and consultations with stakeholders

Ecosystem Services Identified

Provisioning Services

1. Fishes, Invertebrates, other fishery products from open waters
2. Seaweeds from open waters
3. Wood raw materials from mangroves
4. Sea Salt?

Cultural Services

1. Recreation services of beach areas
2. Ecotourism of mangrove and mudflats
3. Aesthetic of the habitats and the bay
4. Scientific Value of bay ecosystems
5. Educational Value of bay ecosystems
6. Heritage and cultural services of the Bay
7. Spiritual Value(?)

Regulating Services

1. Water quality maintenance of open waters
2. Habitat for migratory and local birds
3. Flood regulation of mangroves
4. Storm urge protection by coral reef, seagrasses and mangroves
5. Sea Level Rise protection my coastal habitats (coral reef, seagrasses and mangroves)
6. Waste dilution and assimilation services open waters and mudflats
7. Carbon sequestration and storage by mangroves
8. Sediment retention by mangroves
9. Filtering values of mudflats and ponds

Valuation Methods: Provisioning Services

Ecosystem Service	Units of Measure	Valuation Methods
1. Fishes, Invertebrates, other fishery products from open waters and aquaculture	Kg, tons, per ha	Direct Use Valuation: Exchange value approach; estimation of resource rent in fishery
2. Seaweeds from open waters	Kg, tons, per ha	Direct Use Valuation: Exchange value approach
3. Wood raw materials by mangroves	Cubic meters, per ha	Direct Use Valuation: Exchange values approach
4. Sea Salt?	Kg, tons, per ha	Direct Use Valuation: Exchange values approach

Valuation Methods: Regulating Services

Ecosystem Service	Unit of Measure	Valuation method
<u>Water quality maintenance of open waters</u> 1. Increases in levels of nutrients that lead to algae blooms can reduce swimming and boating services 2. Reductions in dissolved oxygen that lead to fish kills can reduce fishing and property value benefits. 3. Reductions in aquatic species populations or diversity caused by sedimentation or toxic chemical discharges can reduce stewardship, altruistic, bequest, and existence values.	1. Number of on-site use services: water sports, swimming, fishery, aesthetic value for picnickers 2. Number of on-site non-use services (option values, altruistic, bequest, and existence values)	1, 2 will use cost-based methods, travel cost method 3 will use non-market valuation method (through benefit transfer approach)

Christopher F. Dumas and Peter W. Schuhmann, 2005. Measuring the Economic Benefits of Water Quality Improvement with Benefit Transfer: An Introduction for Non-economists. American Fisheries Society Symposium, X:xxx–xxx, 2005

Valuation Methods: Regulating Services

Ecosystem Service	Unit of Measure	Valuation method
Habitat for migratory and local birds	Net Economic Value; Budgetary outlay for resource improvement	1. Contingent valuation: create a hypothetical market through survey (Use benefit transfer values – from studies of LPPCHEA) 2. Legislatively designated values such as penalties 3. Cost-based method: (a) Breeding costs such as captive breeding - the costs of captive breeding divided by the number of healthy individuals produced defines a value for the species (e.g., Bodenchuk et al. 2002); (b) restoration cost of habitat, (c) Expenditures for mitigation of habitat

Engeman, Richard M.; Shwiff, Stephanie A.; Smith, Henry T.; and Constantin, Bernice, "Monetary valuation of rare species and imperiled habitats as a basis for economically evaluating conservation approaches " (2004). USDA National Wildlife Research Center -Staff Publications. Paper 121. http://digitalcommons.unl.edu/icwdm_usdanwrc/121

Valuation Methods: Regulating Services

Ecosystem Service	Unit of Measure	Valuation method
Storm urge protection by coral reef, seagrasses and mangroves	Per hectare value of coral reef, seagrasses and mangroves	Cost-based method Valuation: Avoided damage cost
Sea Level Rise protection my coastal habitats (coral reef, seagrasses and mangroves)	Per hectare value of coral reef, seagrasses and mangroves	Cost-based method Valuation: Avoided damage cost
Filtering Values of Wetlands (Waste dilution and assimilation services open waters and mudflats)	Per hectare of wetlands	Cost-based methods
Carbon sequestration and storage by mangroves	Sequestration value, ktons/ha/year	Cost-based methods
Sediment retention by mangroves		Cost-based method: Avoided damage cost

Valuation Methods: Cultural Services

Ecosystem Services	Unit of Measure	Valuation Method
Recreation services of beach areas	Hectares of beach areas	1. Direct use values: recreation demand method 2. Non-use values
Ecotourism of mangrove and mudflats	Hectares of mangroves	1. Direct Use values: recreation demand method (travel cost method) 2. Non-use values: contingent valuation method
Aesthetic appreciation of the habitats and the bay;	Hectares of bay views	1. Non-use values: Contingent valuation method
Scientific and educational values of bay ecosystems	Hectares of bay ecosystems	1. Cost-based methods

Biophysical Modeling

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Fish Biomass Trend Modeling

Manila Bay Sedimentation Modeling

Habitat and migratory bird population dynamics

Climate change, Storm surge and sea level rise models

Wetlands, Other Habitats and Water Quality Modeling

RISK MODELING: LIQUEFACTION AND LAND SUBSIDENCE

Systems Modeling

Spatial Assessment of Economic Values of Marine and Coastal Ecosystem Services

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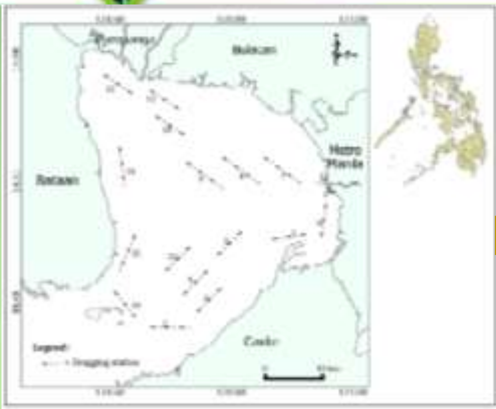
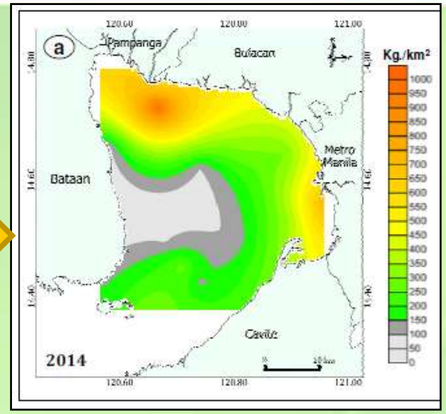
- Fish Biomass Trend Modeling
- Manila Bay Sedimentation Modeling
- Habitat and migratory bird population dynamics
- Climate change models : Storm surge and sea level rise
- Wetlands, Other Habitats and Water Quality Modeling

RISK MODELING: LIQUEFACTION AND LAND SUBSIDENCE

Fishery Biomass Modeling with Economic Valuation



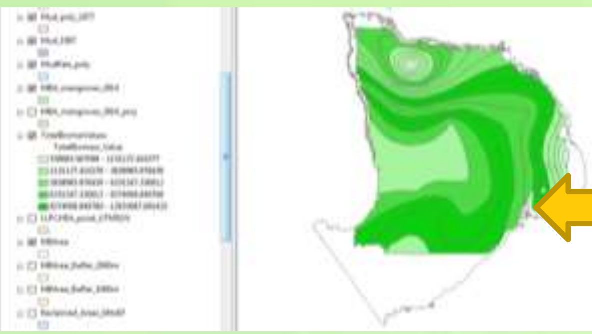
Manila Bay Fish Trawling Survey Locations



Demersal Fish biomass distrib. in Manila Bay

Species	Type	Biomass (kg/km2)	Relative Abundance Estimate
1 *Encrasicholina devisi*	P	59.85	15.2%
2 *Sardinella gibbosa*	P	51.16	13.0%
3 *Sardinella fimbriata*	P	40.25	10.2%
4 *Rhabdamia cypselurus*	D	39.63	10.1%
5 *Sardinella lemuru*	P	25.69	6.5%
6 *Photololigo edulis*	I	23.7	6.0%
7 *Johnius belangerii*	D	19.77	5.0%
19 *Parastromateus niger*	D	3.38	0.9%
20 *Stolephorus indicus*	P	3.31	0.8%
Other species (126)		39.43	10.0%
Total		392.86	100.0%

Rel. abundance estimate of demersal and pelagic fish



Spatial dist. of fish biomass values per biomass range, kg/km2

2014 Data, kg		Demersal Fishes		Pelagic	Invertebrate	Other
Biomass Range, kg/km2	Total Biomass, 2014	Swallow tail cardinal fish	Belanger's croaker	Devi's anchovy	Swordtip squid	Species
	100%	10.1%	5.0%	15.2%	6.0%	11.7%
0-100	23,750	2,398	1,195	3,610	1,423	2,780
100-150	26,500	2,675	1,434	4,342	1,719	3,336
150-200	40,000	4,035	2,015	6,094	2,413	4,662
200-250	47,500	4,792	2,380	7,256	2,888	5,559
250-300	38,900	3,722	1,837	5,622	2,228	4,319
300-350	30,800	3,107	1,550	4,692	1,858	3,605
350-400	36,800	3,712	1,852	5,606	2,220	4,307
400-450	42,750	4,312	2,151	6,513	2,579	5,003
450-500	38,500	3,884	1,937	5,865	2,323	4,506
500-550	34,100	3,440	1,716	5,195	2,057	3,991
550-600	27,600	2,784	1,389	4,205	1,665	3,230
600-650	34,803	3,511	1,751	5,302	2,100	4,073
650-700	30,727	3,100	1,546	4,681	1,854	3,596
700-750	14,250	1,437	717	2,171	860	1,668
750-800	9,600	968	483	1,463	579	1,124
800-850	7,592	766	382	1,157	458	888
850-900	8,516	859	429	1,297	514	997
900-950	2,512	253	126	383	152	294
Total	495,300	49,954	24,920	75,441	29,874	57,958

Total value of fish biomass per biomass range, kg/km2

					Total	Pelagic	Demersal	Invertebrates
Biomass Range, kg/km2	Area, hectares	Biomass, kg/km2, max of range	Total Demersal Biomass based on max of range	Biomass, mt/km2	2014 Biomass Total Based on demersal fish data	51%	40%	9%
0-100	19,000	50	9,500	0.05	23,750	12,113	9,500	2,138
100-150	19,000	150	28,500	0.15	71,250	36,338	28,500	6,413
150-200	20,000	200	40,000	0.20	100,000	51,000	40,000	9,000
200-250	19,000	250	47,500	0.25	118,750	60,563	47,500	10,688
250-300	12,300	300	36,900	0.30	92,250	47,048	36,900	8,303
300-350	8,800	350	30,800	0.35	77,000	39,270	30,800	6,930
350-400	9,200	400	36,800	0.40	92,000	46,920	36,800	8,280
400-450	9,500	450	42,750	0.45	106,875	54,506	42,750	9,619
850-900	946	900	8,516	0.90	21,289	10,858	8,516	1,916
900-950	264	950	2,512	0.95	6,280	3,203	2,512	565
Grand Total	158,248		480,950		1,202,375	613,212	480,950	108,214

Total fish biomass distribution per biomass range, kg/km2

Based on Bendaño AP, FSB Torres Jr., GDV. Lopez, MA Perez and M.D. Santos. 2016. Biomass trends, species composition, distribution and exploitation of dominant fisheries species in Manila Bay using experimental trawl survey . National Fisheries Research and Development Institute Corporate 101 Bldg., Mo. Ignacia Ave. South Triangle, Quezon City 1103 Philippines

Mangroves in 2010 and 2014

Manila Bay LGUs	Mangroves 2010	Mangroves 2014	Change in Area	Status
Bataan				
Abucay	20.7	24.6	3.9	Increase
Balanga City	26.1	32.7	6.6	Increase
Hermosa	10.6	6.8	(3.7)	Decrease
Limay	3.7		(3.7)	Decrease
Orani	66.7	70.4	3.7	Increase
Orion	29.9	17.7	(12.2)	Decrease
Pilar	16.1	15.9	(0.1)	Decrease
Samal	13.7	12.0	(1.7)	Decrease
Bulacan				
Bulacan	27.2	46.4	19.2	Increase
Hagonoy	9.2	6.8	(2.5)	Decrease
Malolos City	8.6	8.3	(0.3)	Decrease
Obando	48.2	0.3	(47.9)	Decrease
Paombong	9.1	9.9	0.8	Increase
Cavite				
Bacoor	8.3	21.8	13.5	Increase
Cavite City	16.6	53.7	37.1	Increase
Kawit	37.0	33.1	(3.9)	Decrease
Noveleta	4.5	16.9	12.3	Increase
Ternate		50.4	50.4	Increase
Metropolitan Manila				
Las Pinas	43.0	59.9	16.9	Increase
Malabon	0.7		(0.7)	Decrease
Navotas	13.3		(13.3)	Decrease
Pampanga				
Lubao	27.2	36.5	9.3	Increase
Masantol	16.0	11.5	(4.5)	Decrease
Sasmuan	33.1	33.5	0.4	Increase
Grand Total	489.6	569.2	79.6	Increase

Mangroves in 2010 and 2014

Direct Use Values	Quantity	Unit of Measure	USD	Price Measure	Valuation method	Year of Publication	Author
On-site fisheries							
commercial harvest by small, medium and large scale fishermen of fish, trash fish, prawns and shrimp			0.35	/kg	Market Price	1982	**Christensen (1982)**
Commercial	147	kg/hectare/year	2.61	/kg	weighted average I	1990	Lal (1990)
Subsistence	184	kg/hectare/year	2.61	/kg	weighted average I	1990	Lal (1990)
Aquaculture							
shrimp farming	184	kg/ha/year	1.1	/kg	Market Price	1982	**Christensen (1982)**
shrimp farming	541	kg/ha/year of bet	3.9	/kg	Market Price	1982	**Christensen (1982)**
shrimp harvest			6.25	/kg	Shadow price	1992	Ruitenbeek(1992)
shrimp harvest	5.5	kg/ha	14	/kg	Market Price	1994	**Gammage (1994)**
Forestry							
Charcoal	1	m3/ha/year	42	US$/ha/yr	Market Price	2000	**White, A.T., M. Ross and M. Flores**
Construction Materials							
Wood (timber volume)							
Nipa for roofing			230	/ha/year	Market price	1982	**Christensen (1982)**
Indirect Use Values							
Off-site fisheries							
Mangrove related shrimp	80	kg/ha			Market price	1982	**Christensen (1982)**
Erosion control	253	ha	672	USD/ha/yr	Replacement cost	2007	Samonte-Tan, G.P.B., A. T. White, M. A. Tercero, J. Diviva, E. Tabara and C. Caballes
Sediment retention							
Nursery values			59,645	/ha/yr		1999	Nickerson, D.J.
Nursery values			243	USD/ha/yr			
Non-use Values							
Nutrient (waste) filtering service							
Biodiversity							

Filtering Value Per Hectare of Intertidal Mudflats

As for intertidal mud, *spartina anglica*-covered salt marsh and *spartina alterniflora*-covered salt marsh, pollution control value is calculated by:

$$ESV_{pc\ i} = S_i \times (Q_N \times Cost_N + Q_P \times Cost_P) \qquad (4)$$

Si = reclamation area		1	ha		Retention effect (g/m2)				
Si = reclamation area		10,000	m2		phragmites	artemisia	spartina	Intertidal mud	
Qn = amount of N removed per unit area of wetland (g/m2) =					3	0.9965	22.066	0.0385	
Qp = amount of P removed per unit area of wetland =					0.1	0.047	3.6754	0.0042	
CostN = cost to remove N			0.0054	USD/g	0.0162	0.0053811	0.119156	0.0002079	
CostP= cost to remove P			0.0437	USD/g	0.00437	0.0020539	0.160615	0.00018354	
					162	53.811	1191.564	2.079	
ESV = pollution control value (US$10000 per year)					43.7	20.539	1606.15	1.835	
								$18,354	USD per year
USD to Peso	48							₱880,992	PHP per year

Non-use and Non-market Valuation Freedom Island in LPPCHEA

- Non-use value of Freedom Island: Willingness to pay for biodiversity conservation
- Non-use values
  - Off-site community: Bequest value
  - Bird watchers: Existence Value
  - On-site communities: Direct use values (shield against natural calamities and it serves as a breeding area for aquatic organisms)

(Turnbull) Mean Willingness to Pay Per Group (PhP)

Respondents' Groups	Mean WTP (Turnbull WTP)	Sample Size	YES response to WTP
1. Barangay Tambo (On-Site respondents)	**350**	**100**	**70** *(70%)*
2. Barangay Baclaran (Off-site respondents)	**270**	**100**	**54** ***(54%)***
3. Birdwatchers	**385**	**100**	**77** *(77%)*
All Respondents	**335.1**	**300**	**201** *(67%)*

Source: Arapoc, J. A., (Undated). Economic Valuation of the Freedom Island in Parañaque City

Ecosystems, ES, Economic Uses and Values

Ecosystems	Hec-tares	Ecosystem Services	Ecosystem Uses/Economic Activities	Value/ha	Total Value (BAU)
Open Waters		Fish biomass, invertebrates, others	Fishery, Water Sports, Aquaculture	(Based on fish biomass, shellfish and invertebrates	
Mangroves		Direct: Fuelwood, Indirect: Breeding Non-use	Household cooking, aquaculture. Fishery, harvesting non-timber mangrove products		
Mudflats		Direct: Indirect: Non-use: Filtering values; habitat	Bird watching		
Sands		Direct: Recreational services Indirect: Filtering and groudn water recharge Non-use	Recreational activities		
Beach		Direct: Recreation services; Indirect: Fry habitat Non-use:	Recreational activities; fish fry gathering		
Lagoons		Direct: Recreation Indirect: Non-use: Filtering of pollutants	Picnic and bird watching;		
Ponds		Direct: Indirect: Non-use	Recreation and bird watching		

Key Messages for Policy

- (Will focus on the economics contribution of ecosystem services to local economic and other human activities)
- (Provide policy guidance in assessing coastal development projects)
- (Investment financing for ecosystem restoration and maintenance

Sectoral policy processes being targeted

- Improvement of the EIA process
- Revision of the EIA Law
- Integration of Ecosystem and Biodiversity considerations in local land use planning by accounting for ES and Biodiversity and estimating its direct and indirect contribution to economic and other human activities
- Institutionalizing Ecosystem and Biodiversity Accounting in the Philippine Statistical Authority

What are the most Significant Results of your TEEB Initiative so far?

- Providing evidence(s) of the positive and negative impacts of ES and biodiversity loss on economic and other human activities
- Stakeholder engagement
- Engagement with WAVES on NCA for the Creation of Steering Committee

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