Knowledge Management for Environment and Natural Resources

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Wealth Accounting and Valuation of Ecosystem Services in the Philippines – Phil-WAVES

Outline of the presentation

Section 1: Introducing the Phil-WAVES Project

•Objectives of the Project

•What do we expect from the project

•Rationale for mainstreaming Natural Accounts in policy, planning and programming

Section 2: Initial results from the pilot sites

•Southern Palawan

•Laguna de Bay

•Policy Implications

WAVES

The Objective of Phil-WAVES is to...

(i) Develop **macroeconomic indicators** that account for NC values to measure the sustainability of economic development

(ii) Develop **national accounts for minerals and mangroves** based on the UN's 2012 SEEA to analyze the impact of different natural resource & revenue sharing scenarios on shared prosperity

(iii) Develop **ecosystem accounts for Southern Palawan and the Laguna Lake basin** to analyze the trade-offs associated with different resource & ecosystem use scenarios

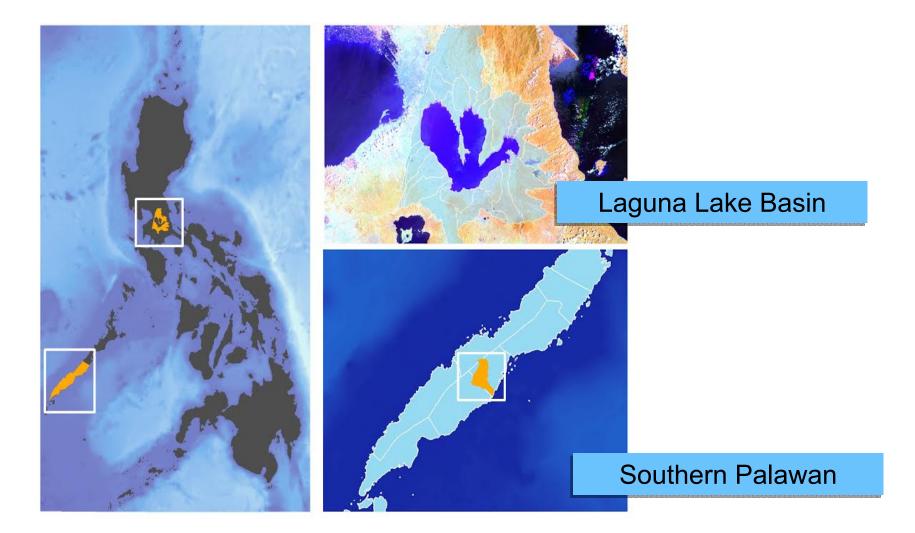(iv) Build **capacity for institutionalization of the prioritized SEEA modules**.

Comprehensive wealth   Uses of Environmental Accounts   WAVES Partnership
Phil-WAVES: Introduction   **Agreed Components**   Achievements to date   Next Steps

WAVES

Pilot Sites

Laguna Lake Basin

Southern Palawan

What will WAVES do in the Philippines?

- **National Mineral Accounts:** What is the mineral wealth of the Philippines & how could it be shared equitably & sustainably?

- **Ecosystem account for Southern Palawan:** What are the social, economic & environmental trade-offs of different resource use scenarios (e.g. minerals vs. ecotourism) & what are the implications for sustainable management?

What will WAVES do in the Philippines?

- **National Mangrove Accounts:** What is the value of mangroves & mangrove reforestation? For coastal zone protection? For fisheries & tourism? For REDD+?

- **Ecosystem account for Laguna Lake basin:** How can water pricing capture the value of other competing water uses (e.g. habitat for fisheries, watershed protection, recreation etc.)?

Philippines

- **Institutional analysis**: assessment of past resource accounting initiatives to identify latent capacity, bottlenecks in implementation & way forward
- Assessment of the **Phil. statistical system**
- **Macro and cross-sectoral analysis** of past uses, policy applications of envtl. acctg. & ID of current & emerging policy issues pertaining to **land based resources & terrestrial ecosystem**
- **Assessment** of studies & available data that account for stocks & flows of eco. services from **coastal & marine ecosystems**: fisheries, invertebrates, sea grasses, aquaculture, mangroves, and coral reefs in municipal & exclusive economic zone (EEZ) waters

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To guide the formulation of development plans and policies towards sustainable development. The country's 2011-2016 PDP stipulated that the environment and natural resources (ENR) policy is critical to achieving the country's twin objectives of poverty reduction and inclusive growth. NCA helps identify more appropriate indicators to inform the three development pillars (i.e., social, economic, and environment).

To guide proper valuation of resources. NCA helps determine benefits and losses from the use of natural resources which should be accounted for in evaluating the performance of the economy. It provides basis in the estimation of the value of ecosystem goods and services (e.g. water pricing, fiscal regime, profit sharing arrangement in the use of resources).

To guide identification of development options/activities vis trade-offs. NCA will be very useful in weighing the trade-offs of alternative development interventions towards properly assigning land uses (e.g. instruments that would guide land use and zoning plans, or help identify most effective pollution control measures).

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Key Policy Questions

(1) What are the economic, environmental and social trade-offs of different development paths based on plantation establishment, agricultural expansion, mineral extraction, ecotourism development, fisheries, and expanding settlement sites?

(2) What are the implications for sustainable management and how should gains be shared with local communities to reduce poverty and create jobs in the medium term?

Key Findings 1: Land Conversion (Deforestation)

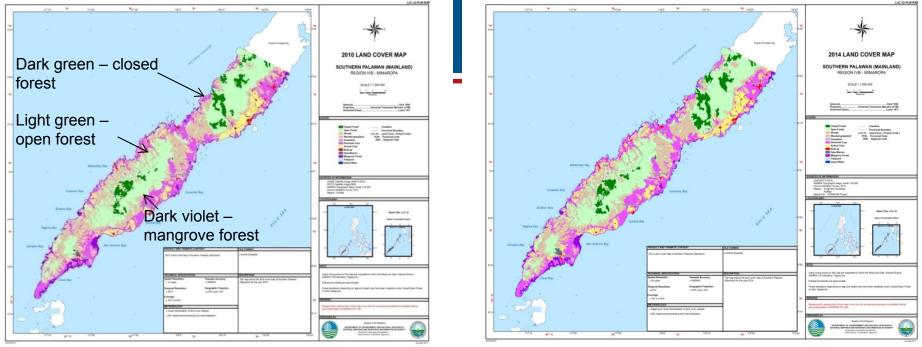The deforestation rate in Southern Palawan has been reversed in the period 2010-2014.

Land Cover	Land cover 2003 (hectares)	Land cover 2010 (hectares)	Land cover 2014 (hectares)
Built-up	709	6,966	7,425
Annual Crop	52,869	47,950	50,340
Perennial Crop	46,130	113,735	115,845
Closed Forest	130,121	28,025	33,206
Open forest, grasslands, shrubs	305,086	334,713	322,817
Open/Barren	1,383	961	1761
Mangrove Forest	16,297	17,020	17,054
Fishpond	720	1440	407
Inland Water	193	2,696	3,653
Grand Total	553,508	553,508	553,508

Dark green – closed forest

Light green – open forest

Dark violet – mangrove forest

2010 Land Cover (NAMRIA)

2014 Land Cover (NAMRIA)

- The net change in the closed forest cover is 5,000 ha in the period 2010-2014.
- The recent increase may be related to the effort of the government, NGOs and local stakeholders to effectively enforce laws such as EO 23 i.e. the total log ban for the entire country and to create anti-illegal logging task forces and EO 26 for the implementation of the National Greening Program (NGP)
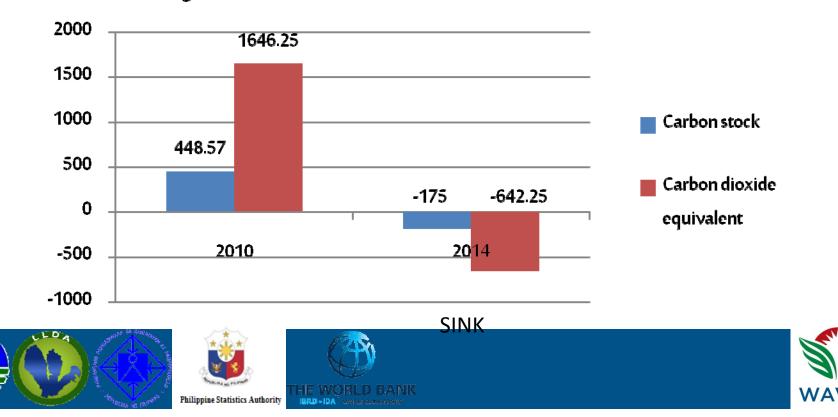
Key Findings 2: Carbon Sink and Climate Change

- Southern Palawan improved from being a forest carbon emitter in 2010 to a carbon sink in 2014

- Forest emissions of 1.6 million tons CO_2/yr in 2010 to sequestration of 642,000 tons CO_2/yr in 2014
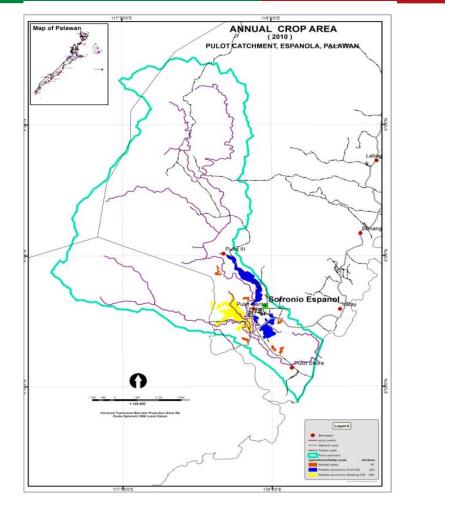

Average Carbon Losses (in thousand tonnes)
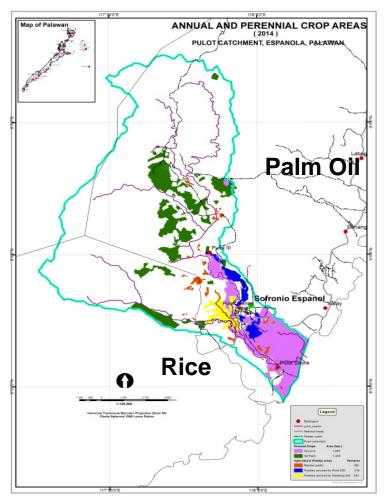
- Pulot watershed has potential to provide around 75 M m3 of water which **can** irrigate as much as 1,018 ha

- Deficit almost doubled at 17,635m^3 daily or 96 ha per cropping from 2006-2010

- Reduced capacity of dam and water supply to rice paddies due to erosion and siltation

- Competition of water use due to diversion to Oil Palm plantation

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Key Findings 4: Agricultural & Plantation Expansion
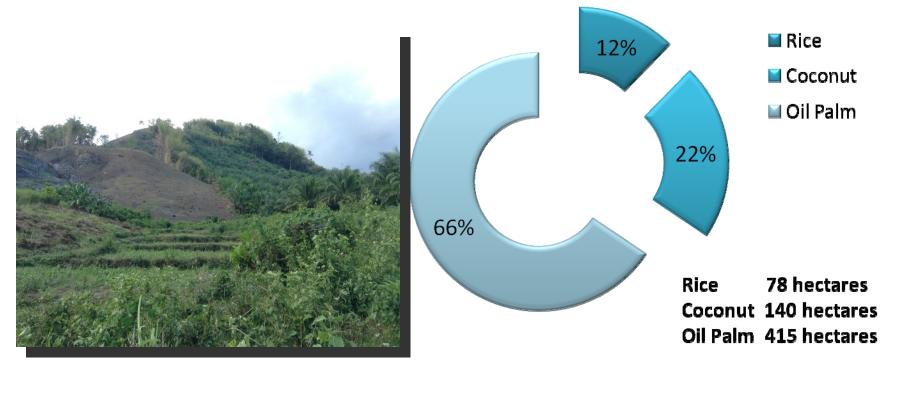
Land Cover Maps : 2010 and 2014
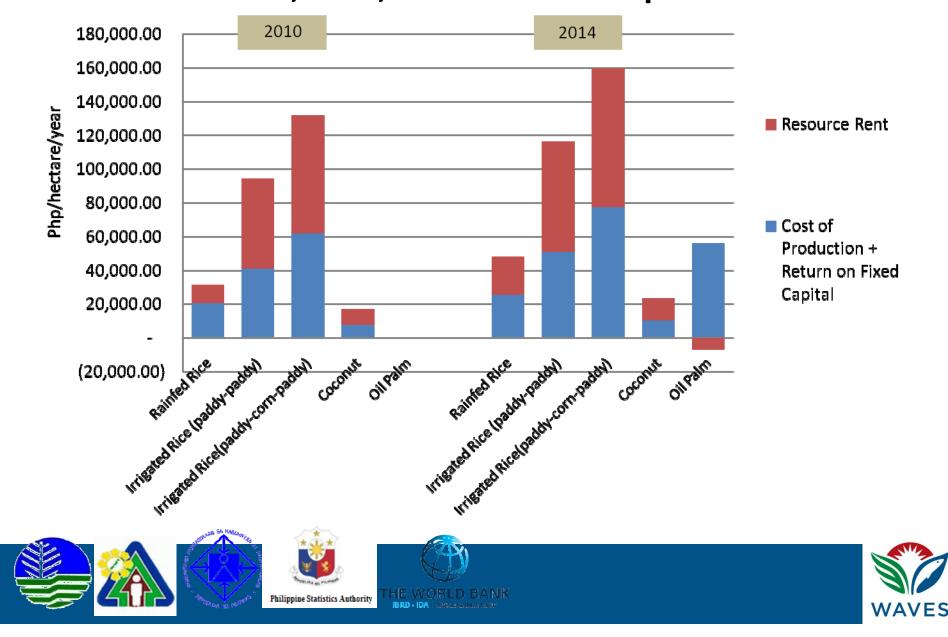
Net expansion of agricultural and industrial plantation areas in Pulot Watershed from 2010-2014

Rice	78 hectares
Coconut	140 hectares
Oil Palm	415 hectares

Legend: Rice, Coconut, Oil Palm

Pie chart: 12% Rice, 22% Coconut, 66% Oil Palm
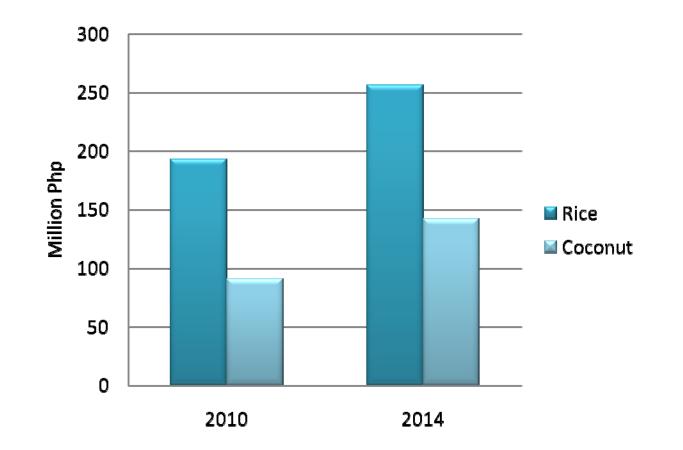
Value of ecosystem services used in the production of rice, corn, coconut and oil palm

Monetary value of ecosystem asset in Pulot Watershed

Extent and Volume of Mangrove
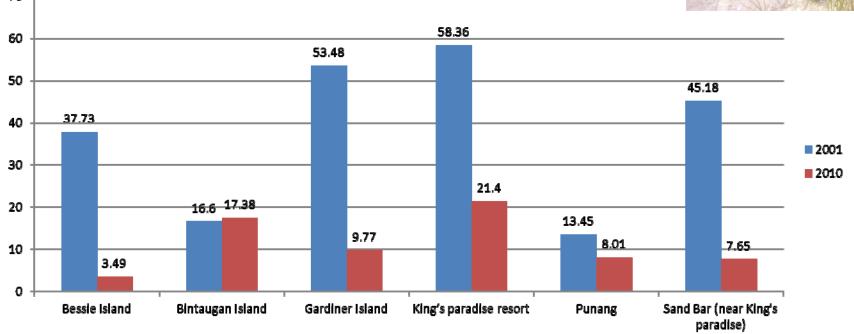
	2001	2010	STATUS
EXTENT (hectares)	1776.09	1092.34	⬇
VOLUME (m³)	337,053.18	189,652.49	⬇

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Seagrass Ecosystem Condition in S. Espanola
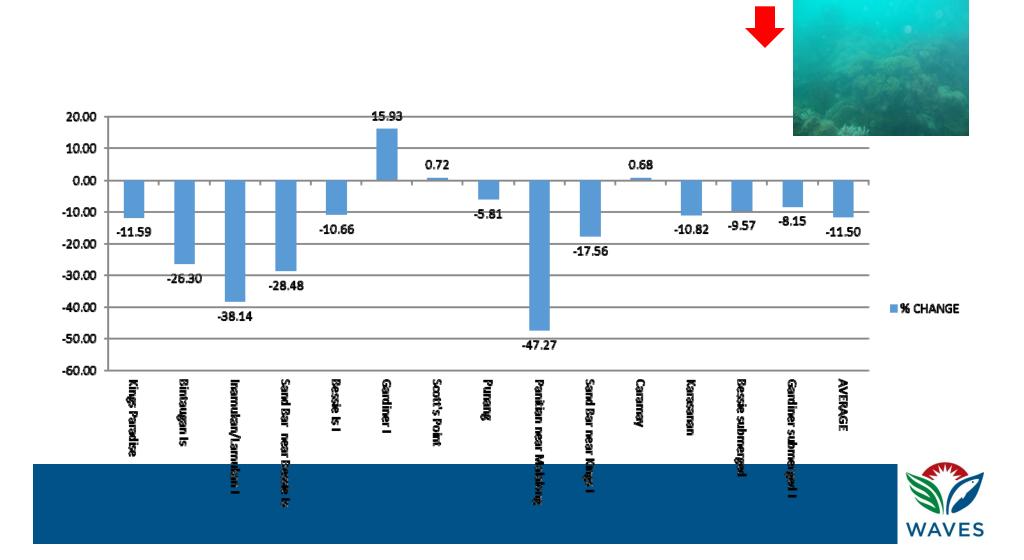
Percent Change in Live Coral Cover
in S Espanola, 2001 and 2010

Philippine Wealth Accounting and Valuation of Ecosystem Services (Phil-WAVES)

September 2015

Laguna de Bay, Philippines

LAGUNA LAKE: POLICY ISSUES

Pollution

Domestic

Industrial

Agricultural

Siltation

…link to Flooding

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Land Cover Change – LdB Basin

2003

Perennial Crop , 57,704

Built-up , 30,469

Open Forest , 21,504

Closed Forest , 4,350

Annual Crop , 91,245

2010

Perennial Crop 43,734

Built-up , 65,687

Open Forest 20,768

Annual Crop 52,291

Closed Forest 2,831

Annual Crop	-43%
Perennial Crop	-24%
Built-up	116%
Open Forest	-3%
Closed Forest	-35%

Sediment Loading

Marikina Sub Basin

Sta. Cruz Sub Basin

Los Banos Sub Basin
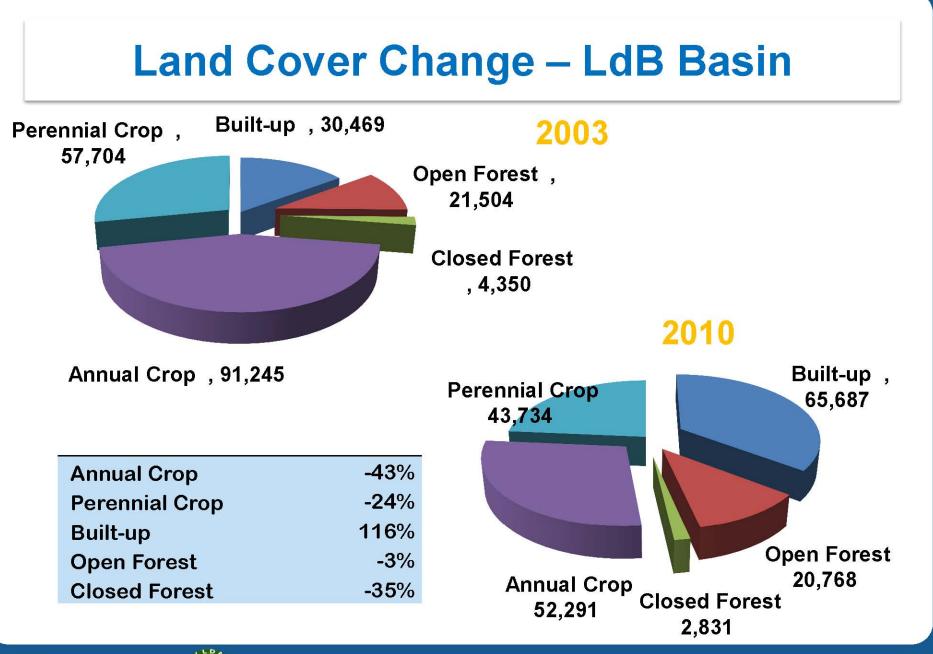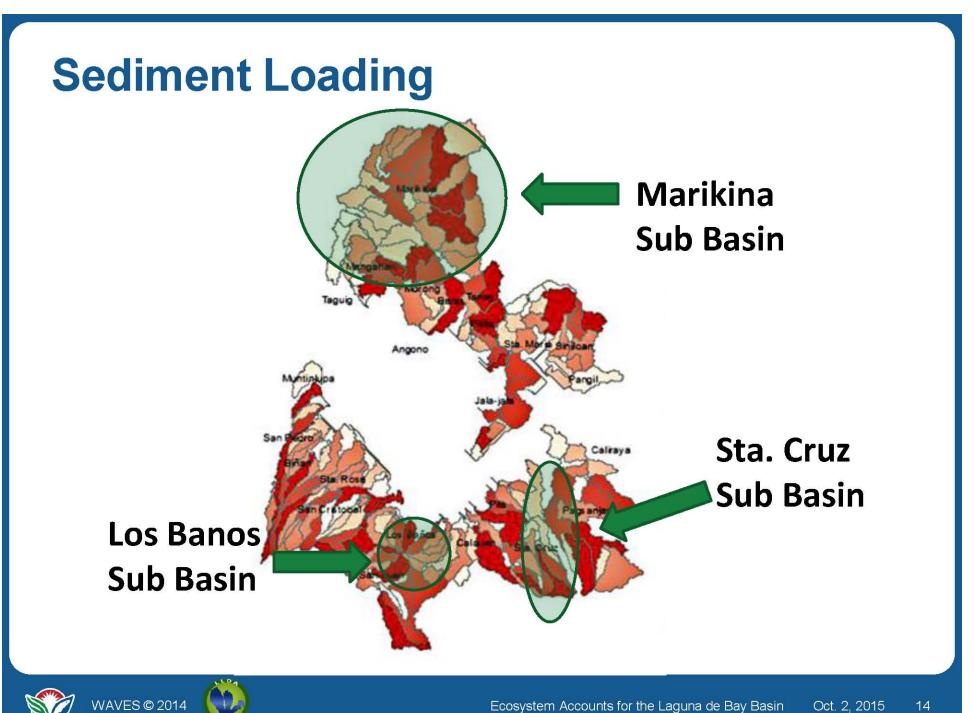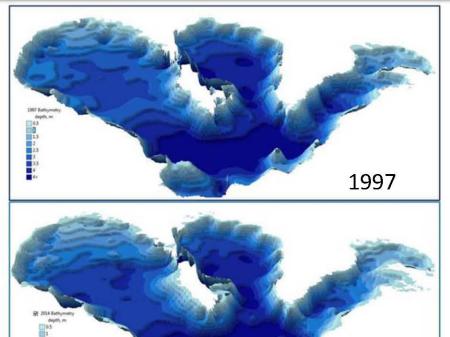
Change in Bathymetry

Lake Level		1997 Bathymetry				2014 Bathymetry			
			Area				Area		
LLDA datum	MASL	Volume (m³)	m²	km²	Ave Depth	Volume (m³)	m²	km²	Ave Depth
13.8	3.3	5,075,090,000	1,000,000,000	1,000	5.08	5,474,930,000	1,119,000,000	1,119	4.89
13.5	3	5,123,900,000	1,098,000,000	1,098	4.67	4,776,950,000	988,000,000	988	4.84
12.5	2	4,078,920,000	1,025,000,000	1,025	3.98	3,810,850,000	944,000,000	944	4.04
11.5	1	3,098,710,000	942,000,000	942	3.29	2,893,000,000	891,000,000	891	3.25
10.5	0	2,194,390,000	865,000,000	865	2.54	2,029,230,000	835,000,000	835	2.43

1997
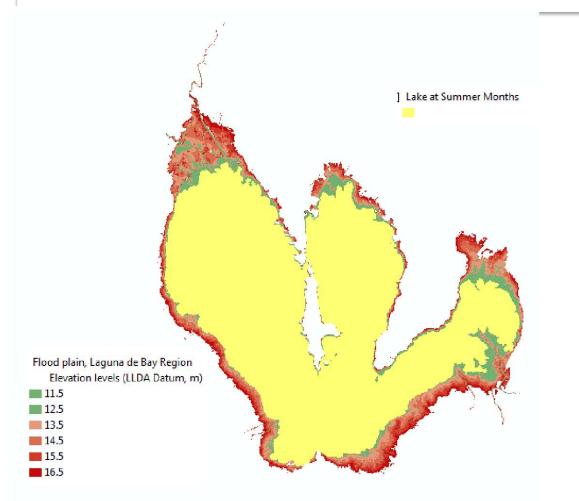
2014

Sedimentation is decreasing the areal surface of the lake

Declining flood (or water) retention capacity

Flood Retention

Flood plain, Laguna de Bay Region
Elevation levels (LLDA Datum, m)
- 11.5
- 12.5
- 13.5
- 14.5
- 15.5
- 16.5

] Lake at Summer Months

Lake showing flood retention service vis a vis flood plain areas (2014)
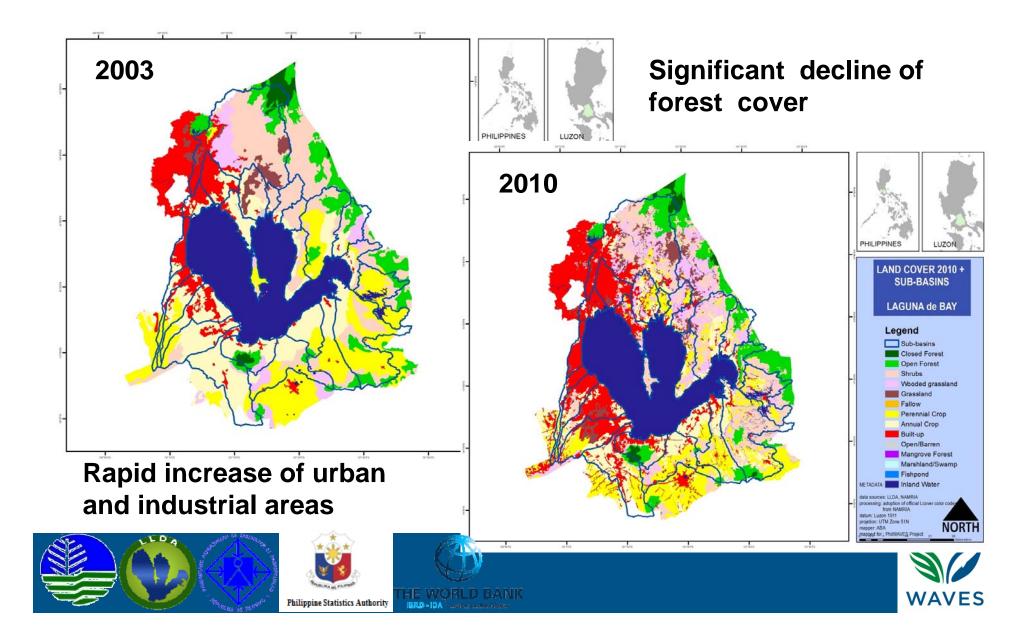
Year	Damage costs (billion pesos)
2000	4.5
2005	5.3
2010	6.1
2015	6.9
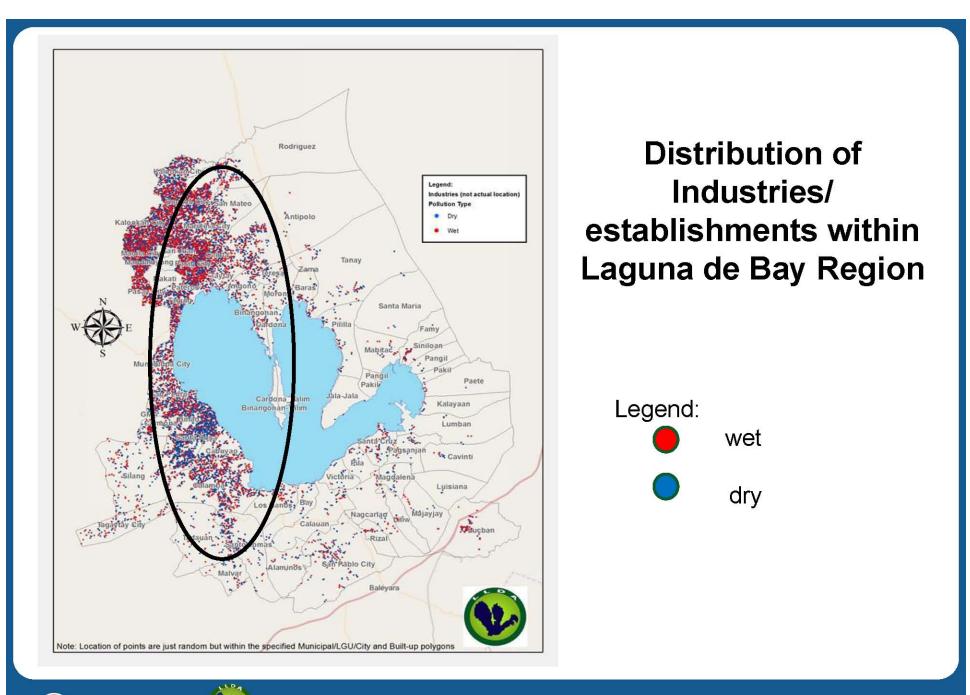
Damage costs of 13.8m flood in Laguna de Bay area
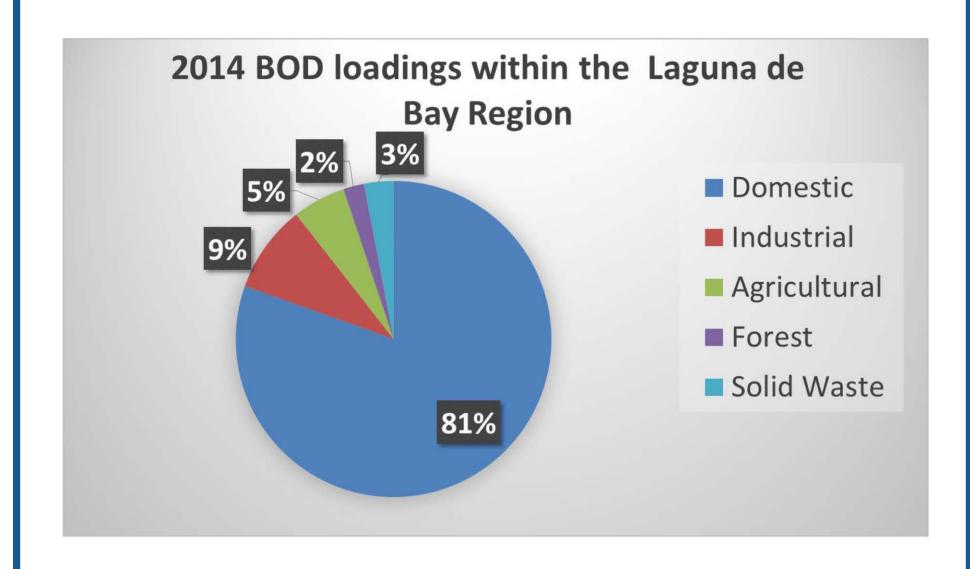
LAGUNA LAKE: FOREST COVER DECLINE

2003

2010

Significant decline of forest cover

Rapid increase of urban and industrial areas

LAND COVER 2010 + SUB-BASINS

LAGUNA de BAY

Legend

- Sub-basins
- Closed Forest
- Open Forest
- Shrubs
- Wooded grassland
- Grassland
- Fallow
- Perennial Crop
- Annual Crop
- Built-up
- Open/Barren
- Mangrove Forest
- Marshland/Swamp
- Fishpond
- Inland Water

METADATA:

data sources: LLDA, NAMRIA
processing: adoption of official Lcover color codes from NAMRIA
datum: Luzon 1911
projetion: UTM Zone 51N
mapper: ABA
mapped for : PhilWAVES Project

PHILIPPINES   LUZON

NORTH

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Distribution of Industries/ establishments within Laguna de Bay Region

Legend:
🔴 wet
🔵 dry

2014 BOD loadings within the Laguna de Bay Region

- Domestic — 81%
- Industrial — 9%
- Agricultural — 5%
- Forest — 2%
- Solid Waste — 3%

Water Quality – Biochemical Oxygen Demand

2010

Legend
- Tributary River Stations
- Idb_stations
- Laguna de Bay Basin
- Inland Water
- Built-up

Water Quality Classification
A – Drinking Water
B - Recreation
C – Fisheries
D - Irrigation
BD - Worse than D

	2003	2010	2014
Marikina	C	BD	BD
Bagumbayan, Taguig		BD	BD
Buli , Muntinlupa		BD	BD
Mangangate, Muntinlupa	BD	BD	BD
Tunasan, Muntinlupa	BD	BD	BD
San Pedro	BD	BD	BD
Binan			BD
Sta. Rosa			BD
Cabuyao	C	D	BD
San Cristobal, Calamba	D	BD	BD
San Juan, Calamba	C	A/B	C
Los Banos			A/B
Bay	A/B	A/B	C
Pila			A/B
Sta. Cruz	A/B	A/B	A/B
Pagsanjan	AA	A/B	A/B
Pangil	A/B	A/B	A/B
Sta. Maria			A/B
Siniloan	C	C	A/B
Jalajala			A/B
Pililla			C
Tanay	C	A/B	A/B
Baras			C
Morong	C	D	D
Sapang Baho, Cainta	BD	BD	BD
Manggahan Floodway,Taytay		D	BD

1999 ZOMAP

LEGEND:
- ■ Fishcage
- ■ Fishpens
- ■ Fishpens

WAVES © 2014

Percentage (%) of Annual Fish Catch From Open Water in Laguna de Bay

% Contribution of Each Bay to the Total fish Catch in the Open Water of LdB in Terms of Total Sales per Bay
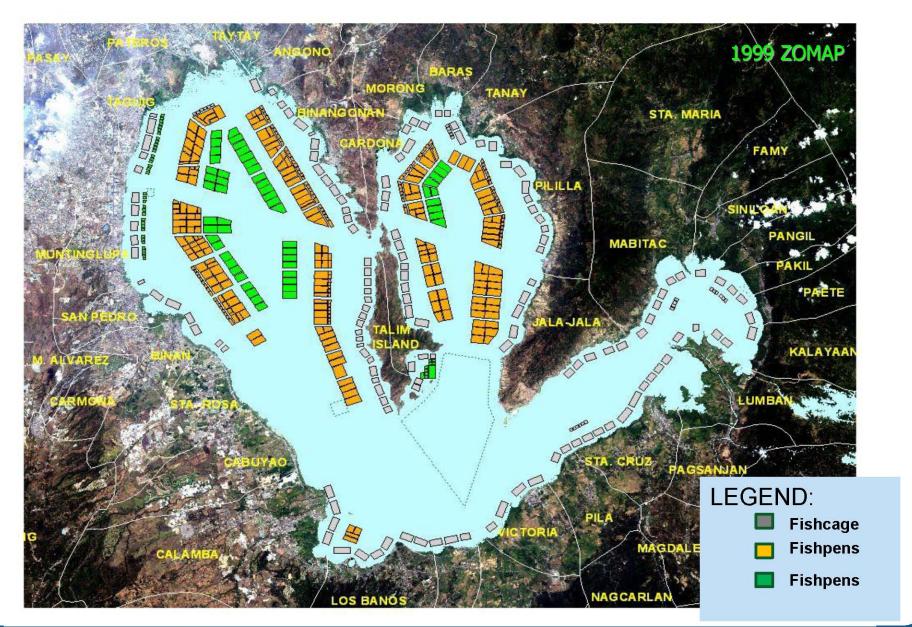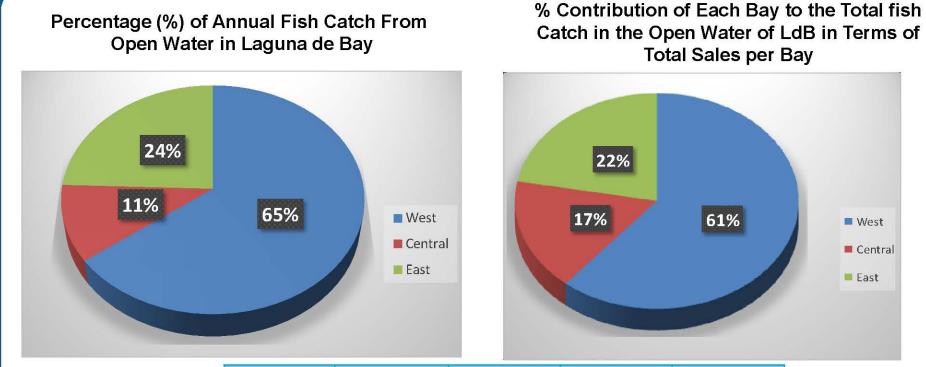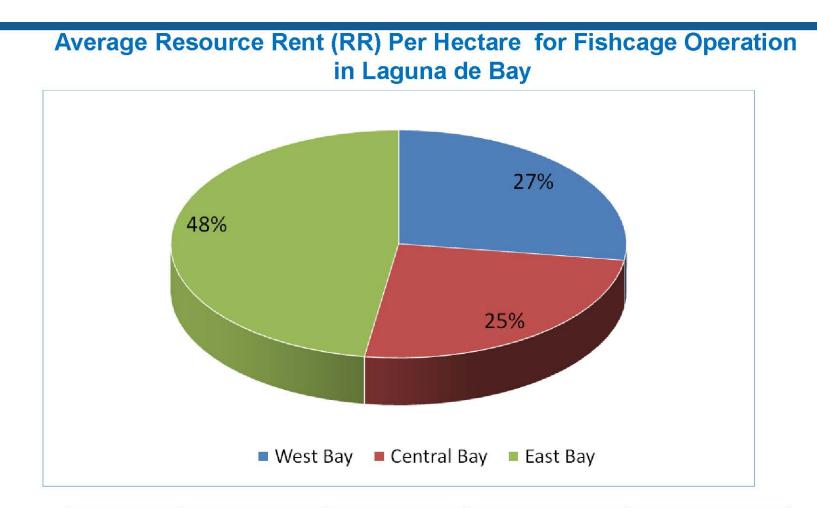
Location	Open Water Area (ha)	No. Of Fisher (2010 Data)	Average Catch (kg)	Total Catch (kg)
West Bay	43,983	6, 839	10, 607	72,541,273
Central Bay	29, 574	3, 211	3, 766	12,091,556
East Bay	14, 069	3, 747	7, 309	27,386,407
Laguna de Bay	78, 627	13, 797	7, 227	112,019,235

Average Resource Rent (RR) Per Hectare for Fishcage Operation in Laguna de Bay

Location	Areas Occupied by Fishcages (hectares)	Average Gross Sales Per Hectare (PhP)	Average Expenses Per Hectare (PhP)*	Average Resource Rent Per Hectare (PhP)
West Bay	1,190.00	437,214.29	591,138.39	272,135.45
Central Bay	437.00	160,806.25	101,887.44	249,889.50
East Bay	51.00	419,500.00	219,138.75	474,227.82

Policy Implications

- Land conversions are, at present, not aligned with development plans or planning laws and better enforcement of such regulations is crucial.

- Efforts should be made to improve the soil erosion control services and further prevent further degradation of land cover to alleviate the siltation in the lake basin.

- Improve water-retention capacity of the lake to reduce vulnerability of shoreland populations to future extreme weather events. A key issue is that more new homes are being built close to the 12.5-meter water level.

Policy Implications

- There is a need to further strengthen water resources management and development through an integrated and holistic approach to water use and allocation.

- Maintain an optimum volume of lake water and craft a policy for water allocation for different types of water use for different types of water users;

- Prioritize preferential use of water

- Treating household sewage yields major benefits for lake water quality and increasing the rate of treatment thereof has a lot of potential to improve the water quality of the Laguna Lake.
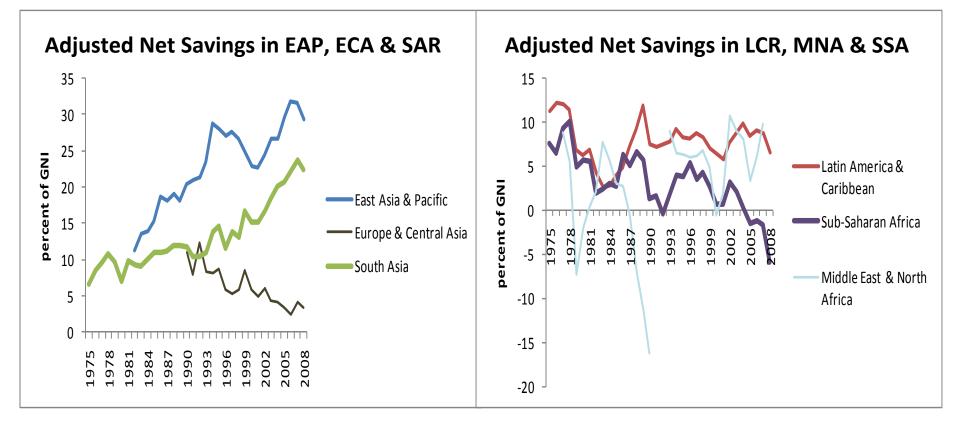
It can tells us whether wealth is growing or declining…

Building wealth ensures sustainable development

Depleting wealth – what will be left for future generations?

Adjusted Net Savings in EAP, ECA & SAR

Legend: East Asia & Pacific, Europe & Central Asia, South Asia

Adjusted Net Savings in LCR, MNA & SSA

Legend: Latin America & Caribbean, Sub-Saharan Africa, Middle East & North Africa

Comprehensive wealth   Uses of Environmental Accounts   WAVES Partnership
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WAVES

… and help make informed decisions about land use

Asset Accounts for Mangroves in Thailand

Value of mangrove	Value if converted to shrimp farm
• Accounting only for marketed goods (timber and NTFPs): $864 per ha	• $9,632 per ha
• Accounting also for coastal protection: $16,861 per ha	

Decision: Do NOT convert

Source: Barbier, 2011