

Boracay Island: State of Land Resources and Land-Sea-Human Interactions

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Rehabilitation of Boracay Island and Management of
Coastal Environmental Problems
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Outline of Presentation

- Boracay Island Sitios and Barangays
- Boracay's Role in Tourism Industry
- Land-Sea-Human Interactions
- Role of Coral Reef
- Land Cover/Use
- Wastewater Management
- Waste Loadings
- Land Use Allocation
- Policy Issues and Questions

Most of materials in this talk were taken from the slides of Tamoling et al (2014) and Iwai et al (2014).

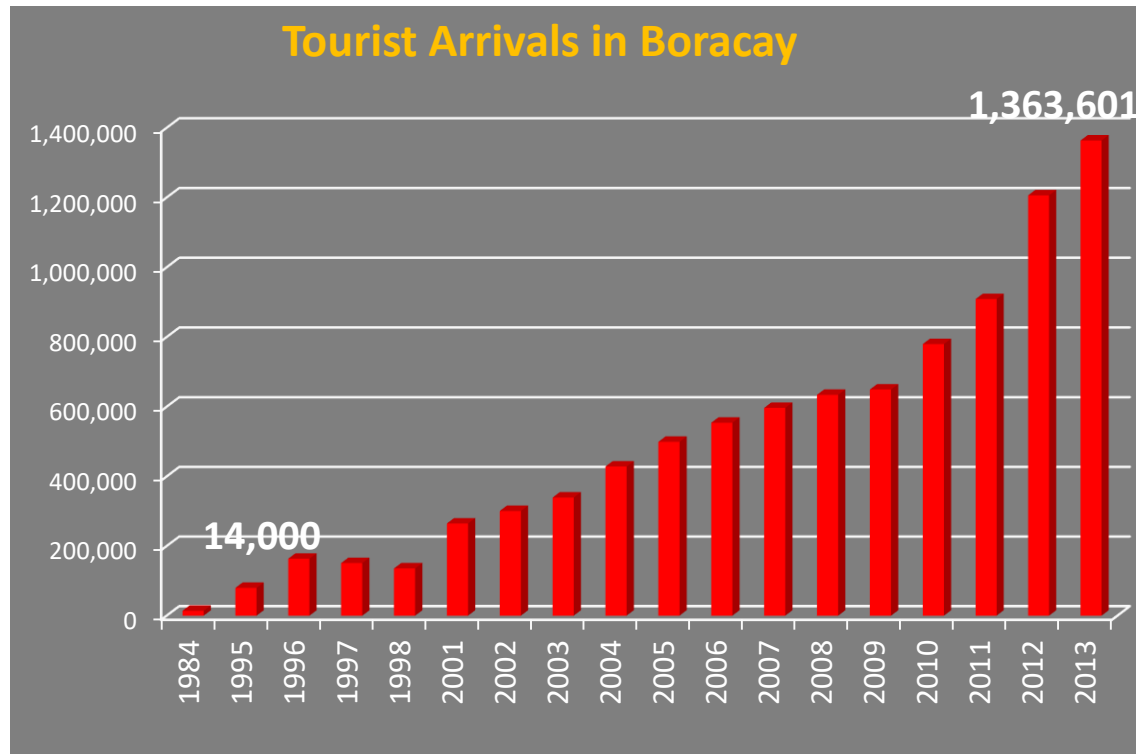


Boracay Island Sitios and Barangays



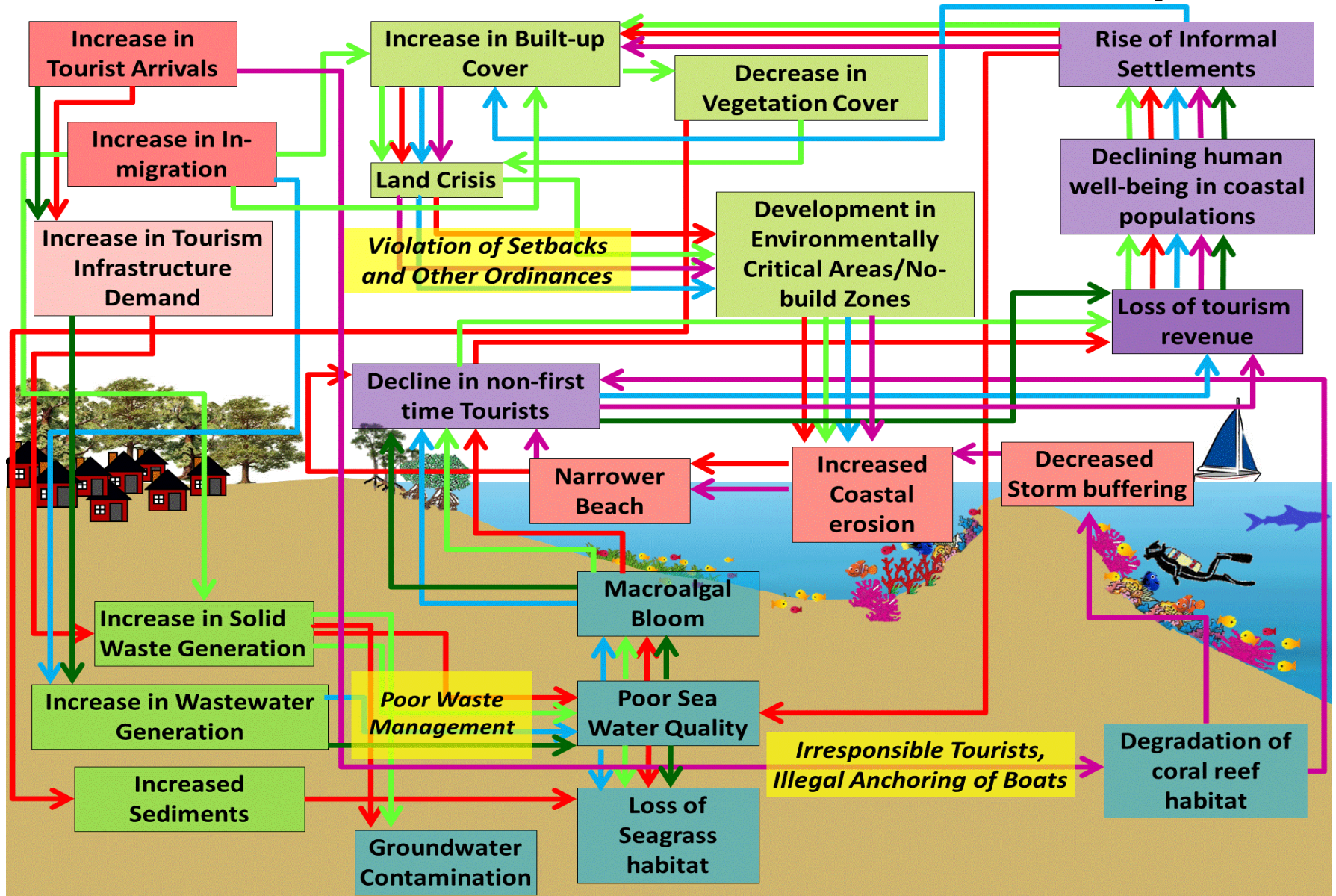
Figures from Tomoling et al (2014)

Boracay's Role in PHL's Tourism Industry



In 2013, out of 48.68 M tourist arrivals (domestic and foreign), 1.36M went to Boracay or about 2.55% of the total. However, out of total tourist receipts of 186.15B pesos, Boracay's share is 13.5% or about 25.07B pesos are receipts. In 2017 about 2 M tourist arrivals and 1st quarter of 2018 about 340,000.

Land-Sea-Human Interactions: The Case of Boracay Island



Role of Coral Reef in Boracay Island

Coral Reef Ecosystem

One of the most important tourist attractions in Boracay

Wave damping

Protected

Wave damping

Wave breaking

Corals

Sediment supply to the Beach

Erosion

No wave breaking

Corals

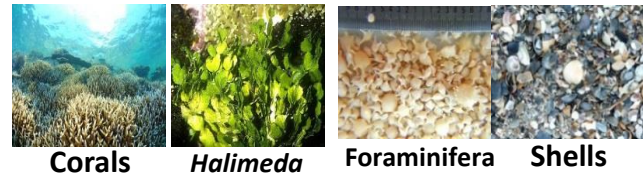
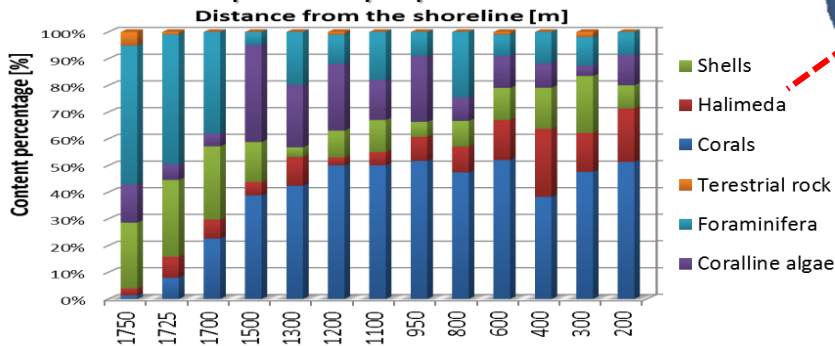
If corals reduce 70cm in height, wave run-up distance increases 7.6m

Coral reef ecosystem contributes not only as one of the important tourism resources but also to **white beach preservation** through its functions of sediment supply and protection from the rough waves

Slide from Iwai et al (2014)



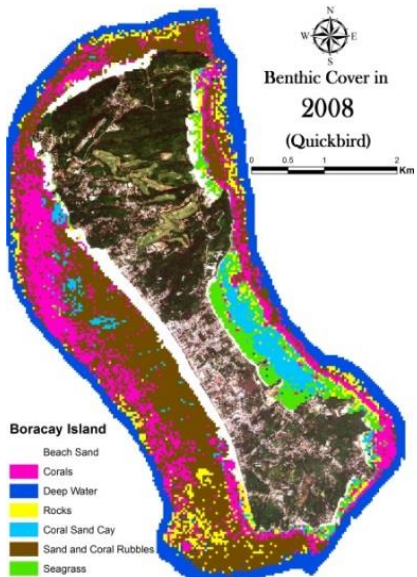
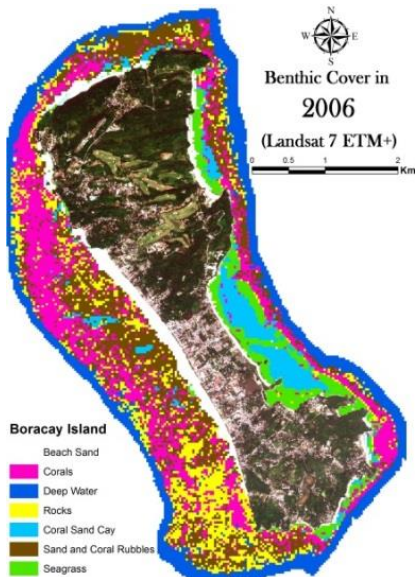
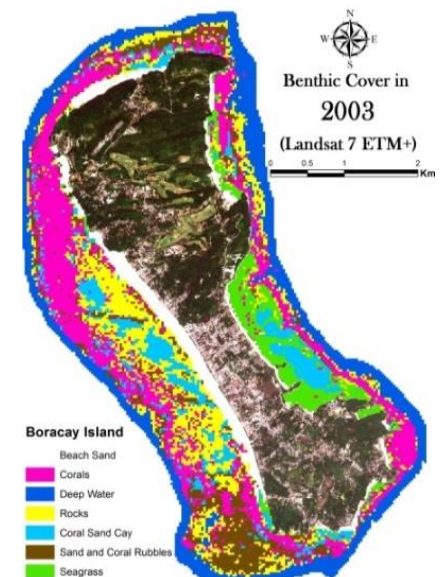
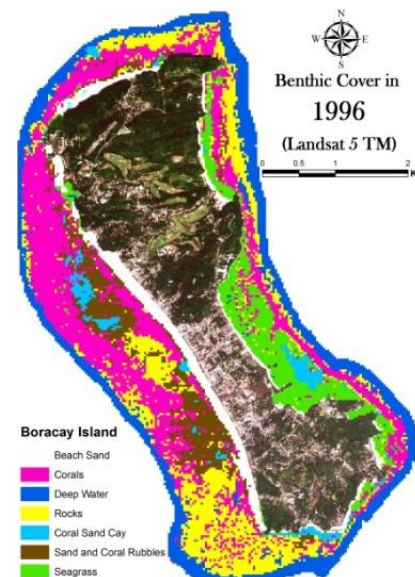
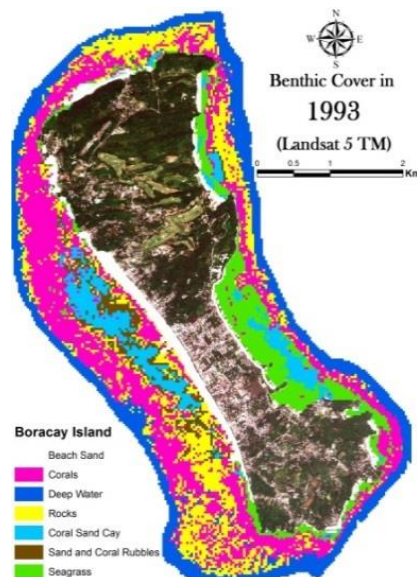
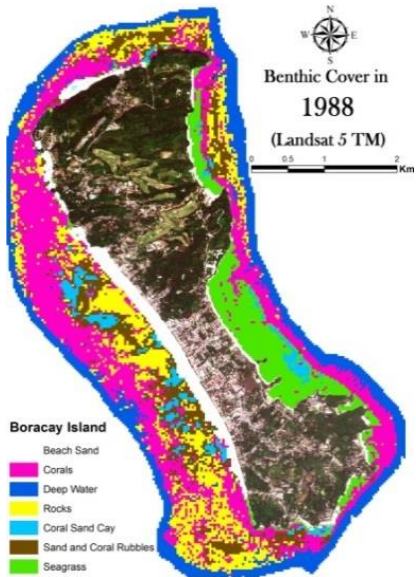
Sediment components perpendicular to shoreline



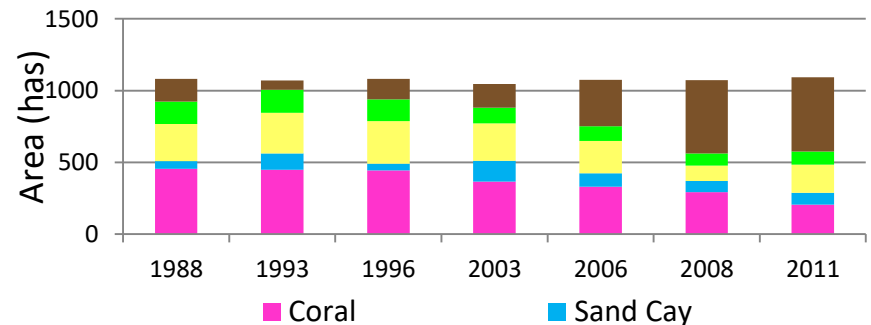
- Terrestrial rocks are very few
- Coral** and **Halimeda** are the main components of the white beach sediment

Land Cover and Benthic Cover Change from 1988 to 2008 (Satellite Imagery)

(Corals occupied 454.77 ha in 1988 and reduced to 204.75 ha in 2011)



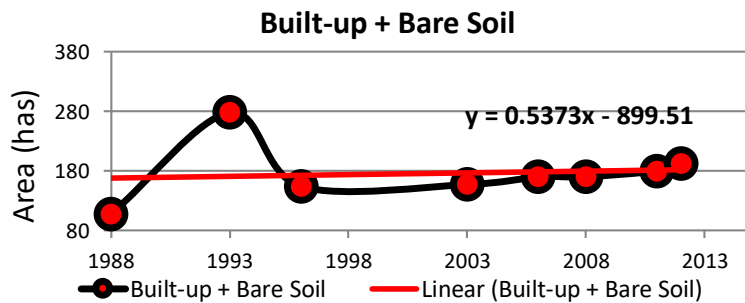
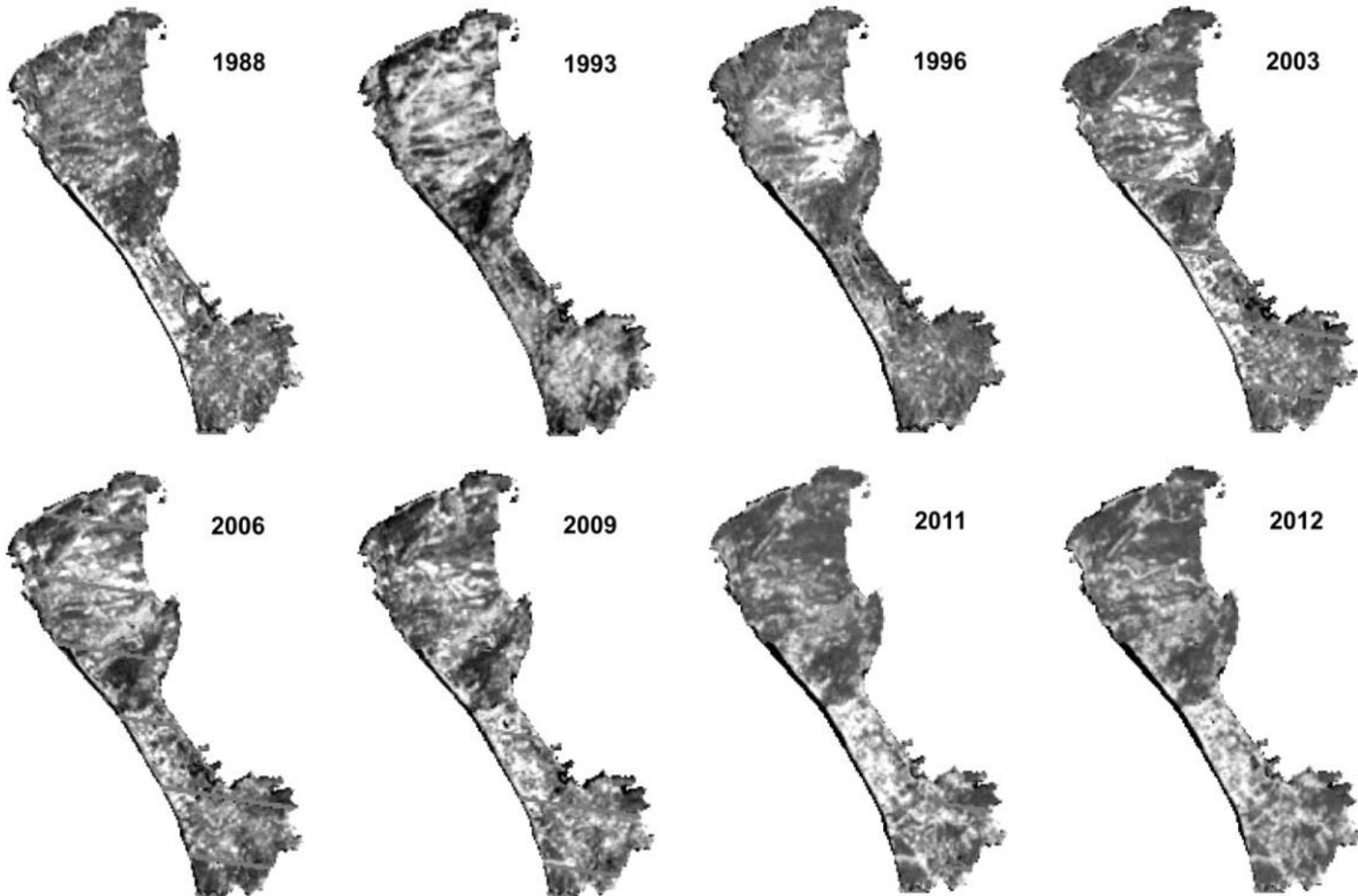
Benthic Cover Change (1988 - 2011)



Slide from Tomoling et al (2014)

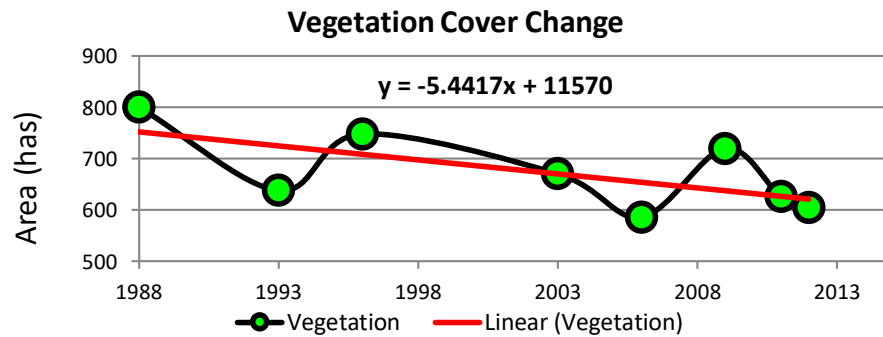
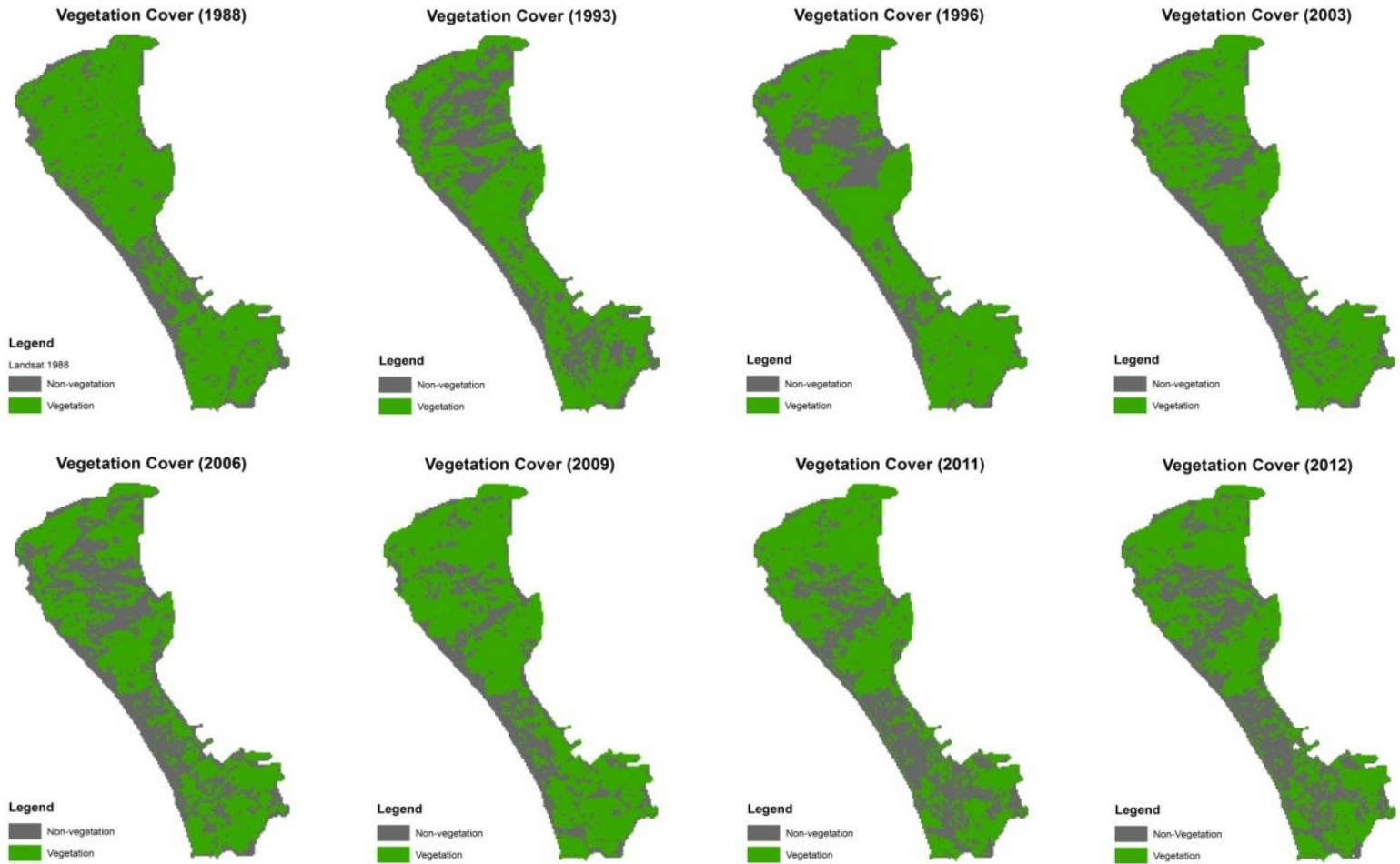
Built-up + Bare Soil

(1988-
2012)



Slide from Tomoling et al (2014)

Vegetation Cover (1988-2012)



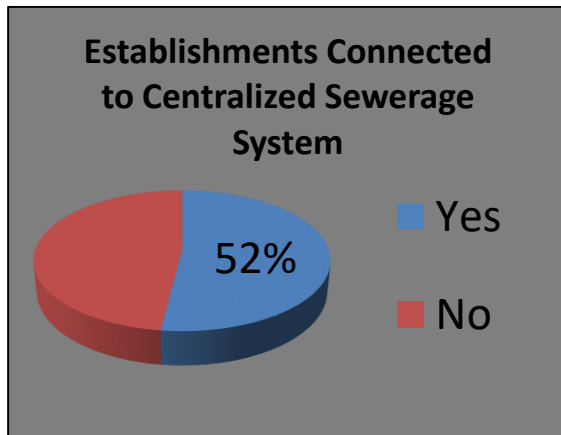
Slide from Tomoling et al (2014)

Boracay Island's Wastewater Management

14% of the households have no septic tanks. Most of the wastewater coming from houses without septic system goes directly to the ground.

Wastewater Drainage for Households without Septic Tanks					
Toilet		Kitchen		Shower	
Public drainage	Directly to the ground	Public drainage	Directly to the ground	Public drainage	Directly to the ground
45%	55%	28%	72%	30%	70%

46.3% of the residents without septic systems do not know where the wastewater that goes to the public drainage/canals ends up.



Less than 50% of daily water supply is treated by BIWC

Direct wastewater discharge from houses and establishments to public canals ends up in the sea through the three marine outfalls or storm drains located in Bulabog Beach.



Slide from Tomoling et al (2014)

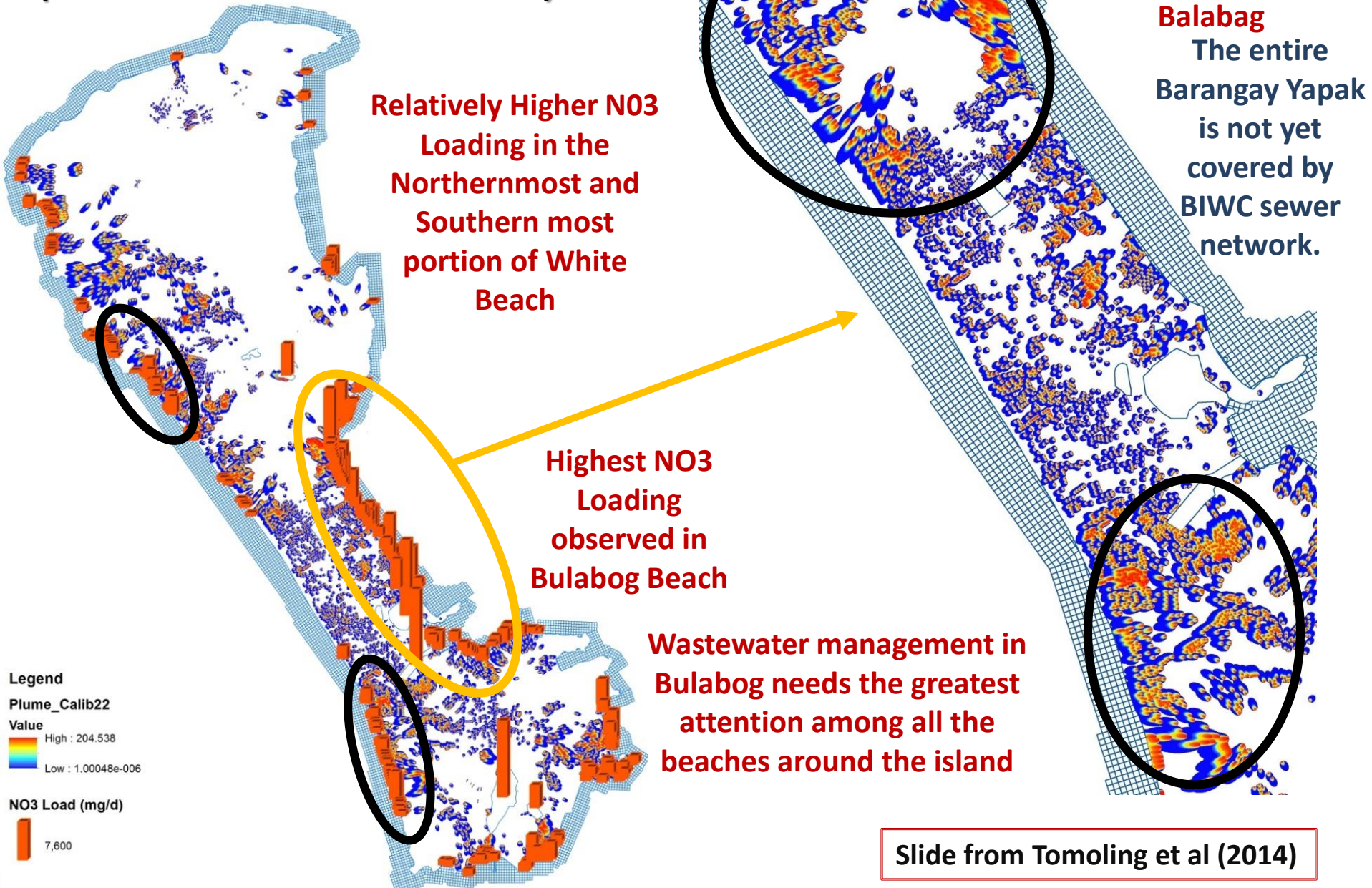
Boracay Island Sewerage Treatment Plant and Sewage Connection Status

In 2011 survey, BIWC treats 4.8 MLD sewage water corresponding to 40% of total water used. The remaining 60% of water used (i.e., wastewater) may have been directly discharged into the sea.



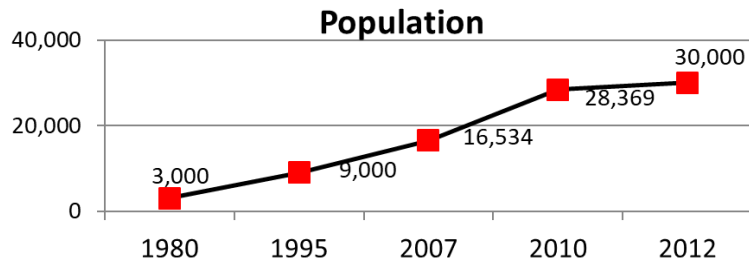
In the Boracay Island,
3523 households,
1048 tourism facilities (2011)

Nitrate (NO3) Loading (Based on 1.3 Tourist Arrivals)



Land Needed for Urban Expansion/Tourism Development

Boracay's Population



Year	Population
2013	30,837
2014	31,697
2015	32,581
2016	33,490
2017	34,425
2018	35,385

FAO Urban Land Distribution Formula

Urban Land Use	Hectares (for every 1000 population)
Residential	6
Industrial	1.5
Commercial	0.5
Administrative	0.5
Educational	0.6
Health	0.2
Open Space	3
Total	12.3

From Boracay Island's 2008 CLUP, the Land Allocated for Urban Expansion/Tourism Development is 248.39 hectares out of the island's total area of 1032 hectares.

From FAO's formula, with the 2018 projected 35,385, the total urban land required is about 435 hectares (from 35.385×12.3).

Should Boracay Island modify its urban land allocation?

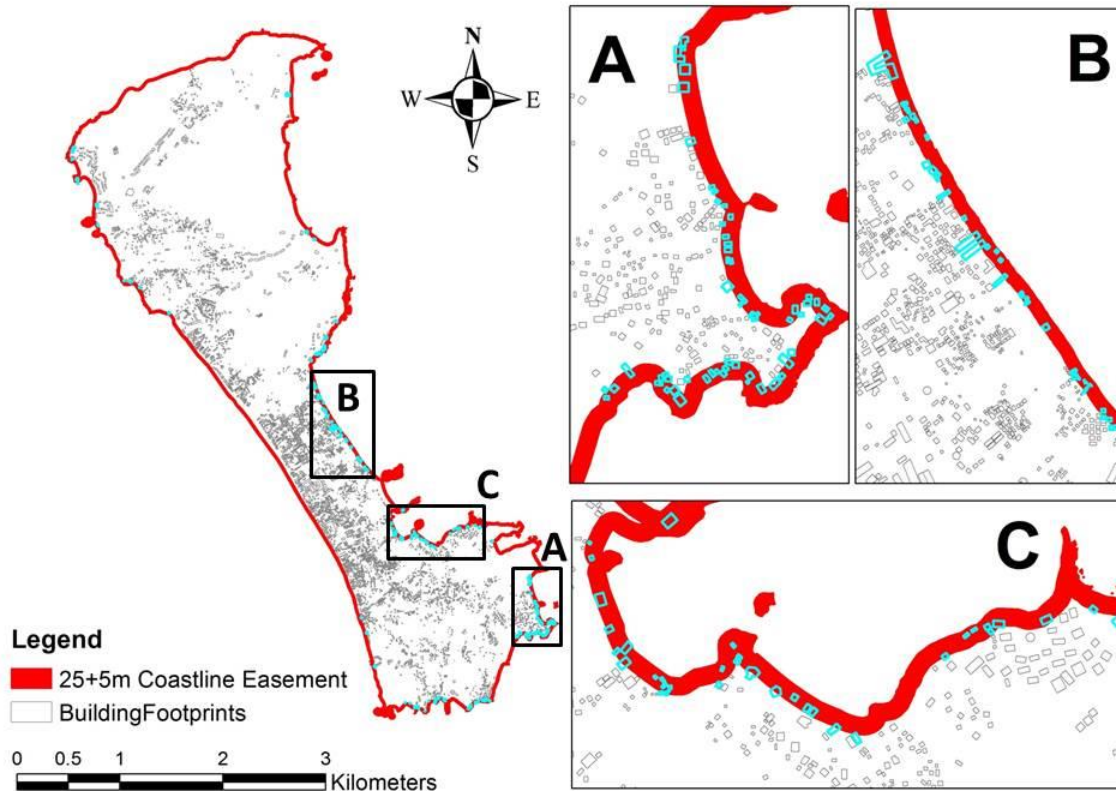
How to account for tourist arrivals especially that the target is almost doubled now from 1.36 to 2M?

Issue of Agrarian Reform Land to Farmers

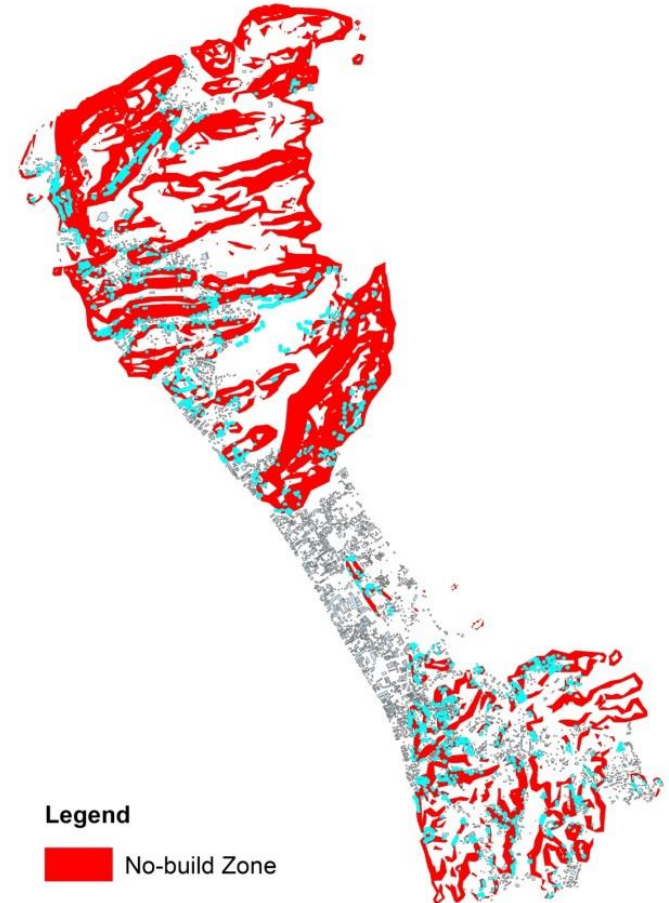
- Pres. Marcos' Proclamation No. 1801 declaring Boracay and other areas as tourist spots and marine zone
- Pres. Arroyo's Proclamation No. 1064 classified land 400 ha protected forest land and 600 ha alienable and disposable agricultural land
- Possible land to be placed under DAR: (total of 170 ha)
 - 102 ha in Manoc-Manoc
 - 32 ha in Balabag
 - 36 ha in Yapak



25+5 M Coastline Buffer Zone Encroachment Ordinance (Implemented in January 2014)



25+5 M Coastline Buffer Zones



No-build zones

Policy Issues and Questions

- **Need to reassess land use allocation considering the interplay of tourism, land-sea ecological integrity, agriculture and island living and livelihood.**
- **Solid waste and wastewater management in terms of septage, sewerage and stormwater drainage.**
- **Governance structure as far as enforcement of laws and regulation (e.g., buffer zone and sewage disposal) as well as business permits**
- **Coastal erosion management and coral reef management.**
- **Management of land and water to coastal zone and near shore as land-to-sea continuum.**
- **Finally, questions on upcoming 6-month closure: Objectives, timelines, spatial extent, efforts and ability of socio-ecological system of Boracay Island to recover/rehabilitate.**

Last Slide. Thank you.