



Coastal Lagoon Goods and Services and Human Development

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Joint Masters in Water and Coastal Management

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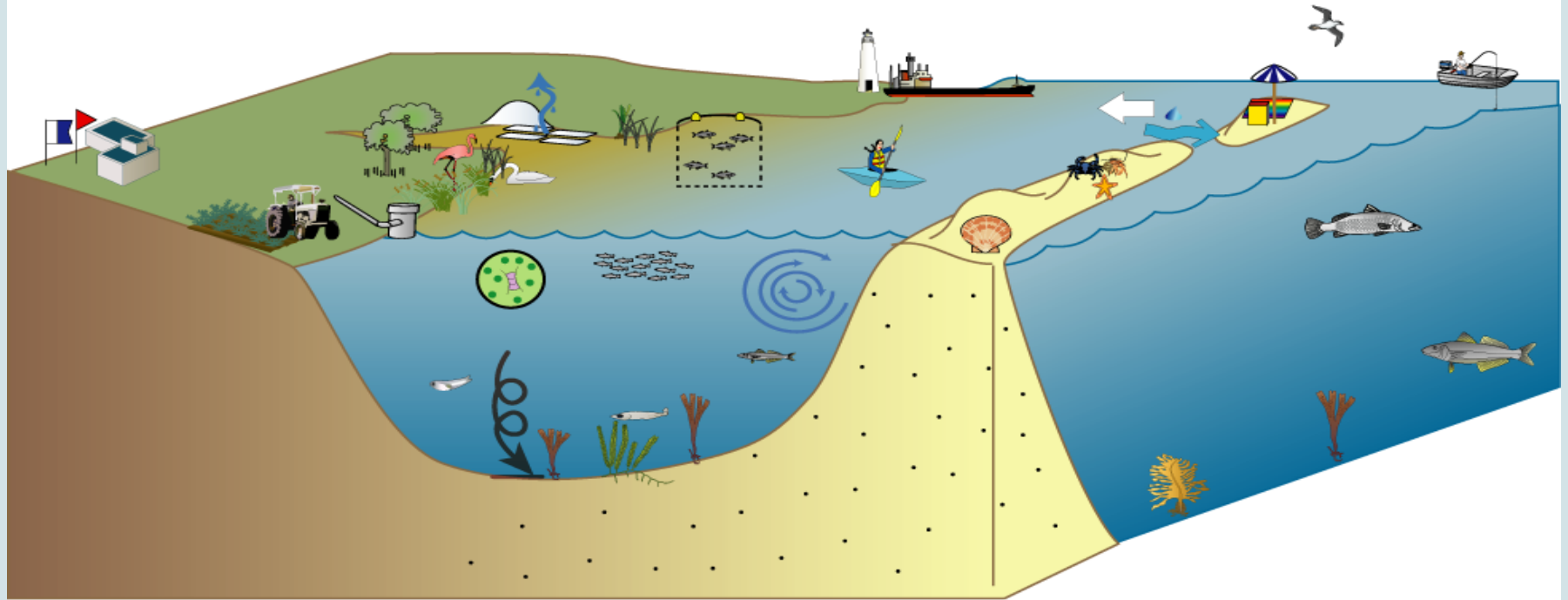
Research Objectives

- To assess the ecosystem goods and services derived from coastal lagoons based on the level of human development
- To demonstrate the importance of lagoon management in a developing country








Introduction

- Goods: those which are used directly by humans
- Services: those which indirectly support human welfare
- Coastal Lagoons: *'shallow coastal water bodies separated from the ocean by a barrier, connected at least intermitently to the ocean by one or more restricted outlets...'* (Kjerfve,1994)

Coastal Lagoon Ecosystems



Goods

-   Food resources
-  Minerals
-  Water supply
-  Provision of agricultural land
-  Wildlife
-  Water transport

Services

-   Tourism/recreation
-  Nutrient mixing
-  Maintains biodiversity
-  Nursery for fisheries
-  High primary productivity
-  Hydrological maintenance
-  Educational opportunities
-  Sediment retention
-  Habitat provision

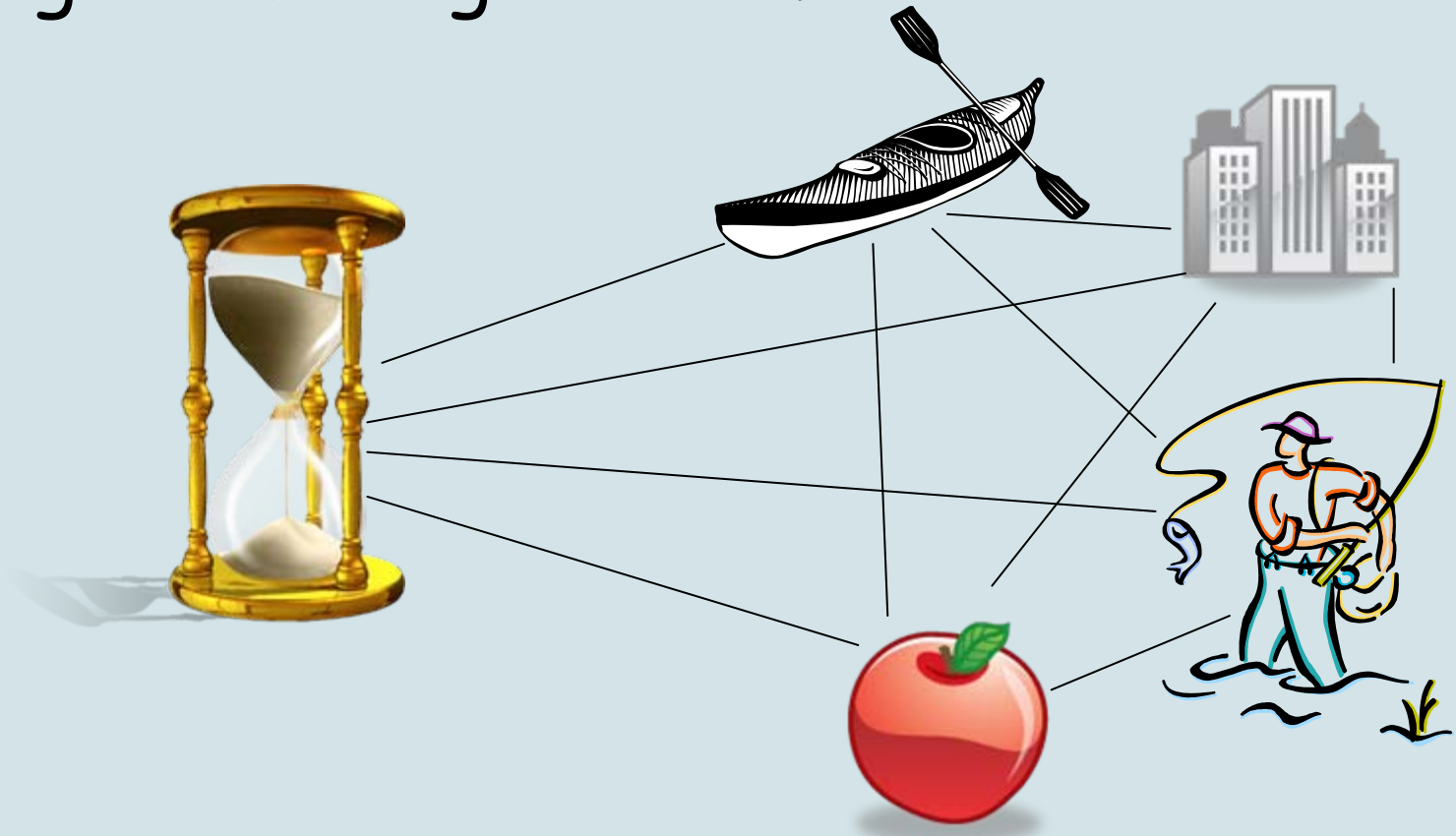
Why value?

- Dependent upon by man
- Helps in managing link between human and natural systems
- Decisions are usually based around economy

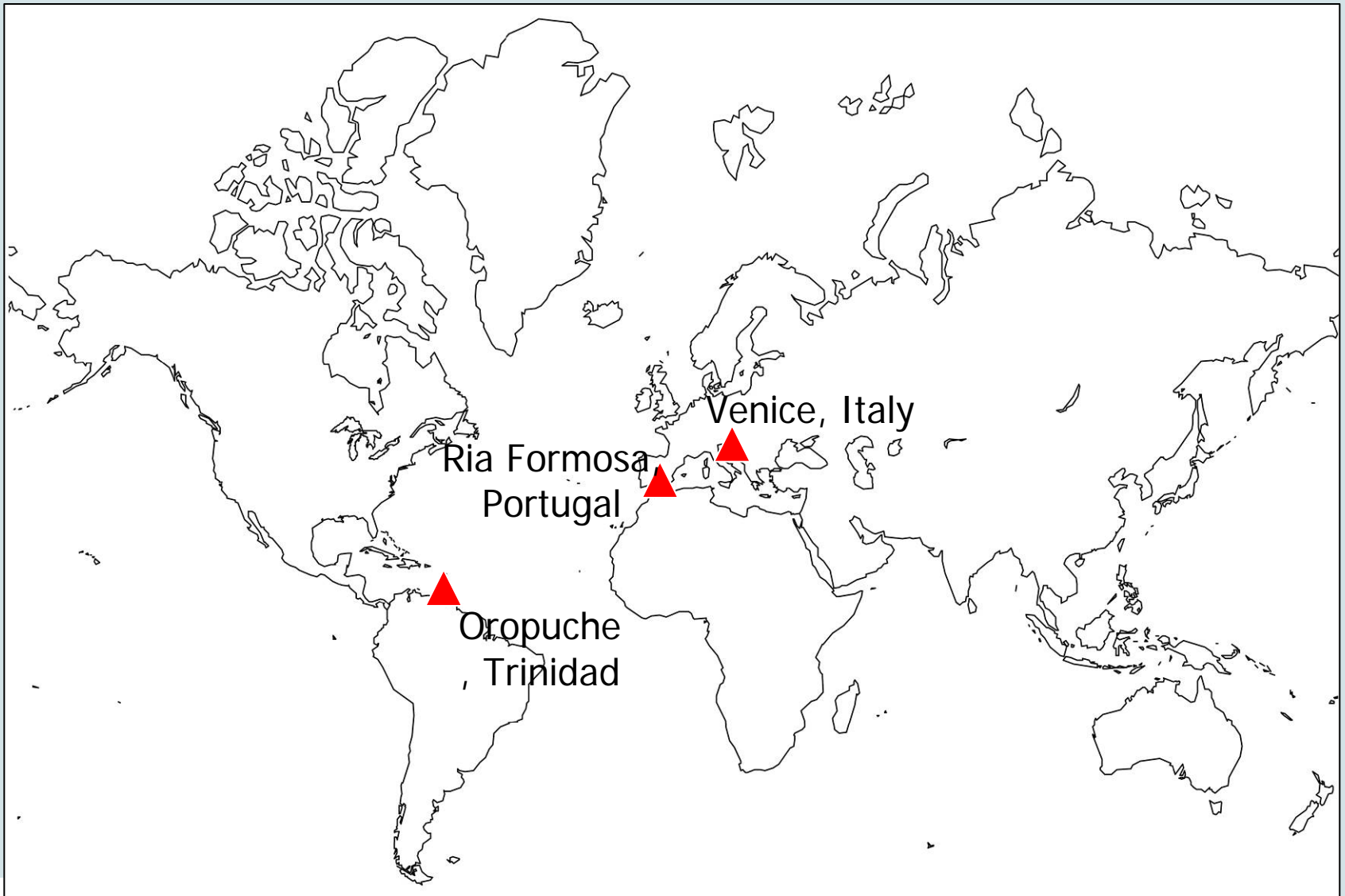


Human Development

- Defined according to a combination of length and degree on use

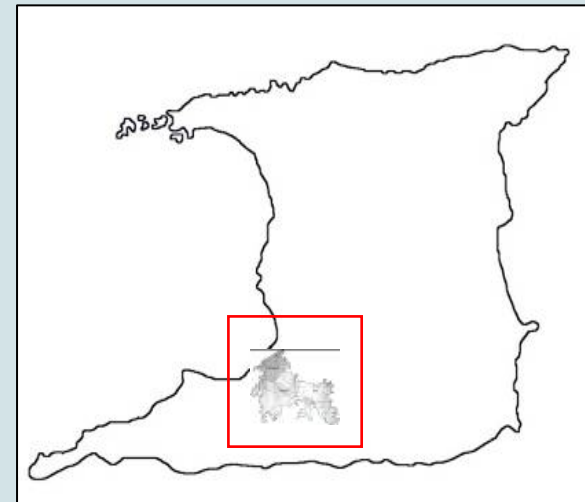
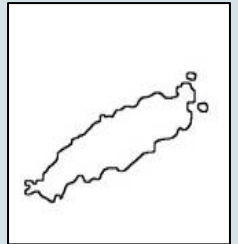


Main Study sites

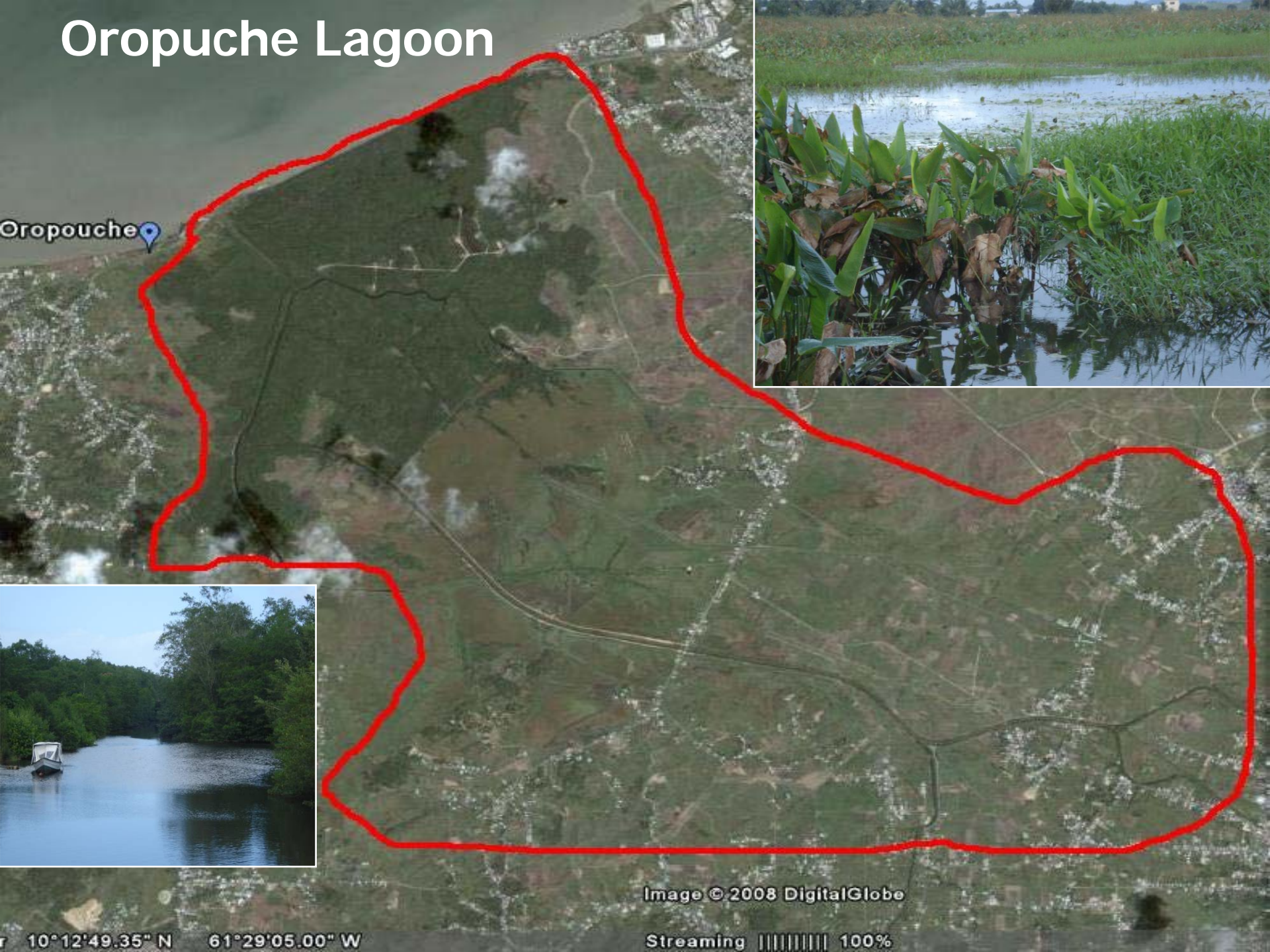


Oropuche Lagoon, Trinidad

- Used since 1852
- Hydrology modified for oil explorations and rice farming
- Limited research conducted on it



Oropuche Lagoon



Oropouche

Image © 2008 DigitalGlobe

10°12'49.35" N 61°29'05.00" W

Streaming ||||| 100%

Field Survey

- a survey was conducted which determined the goods and services derived
- 153 households were interviewed.
- Quantity of goods were also asked



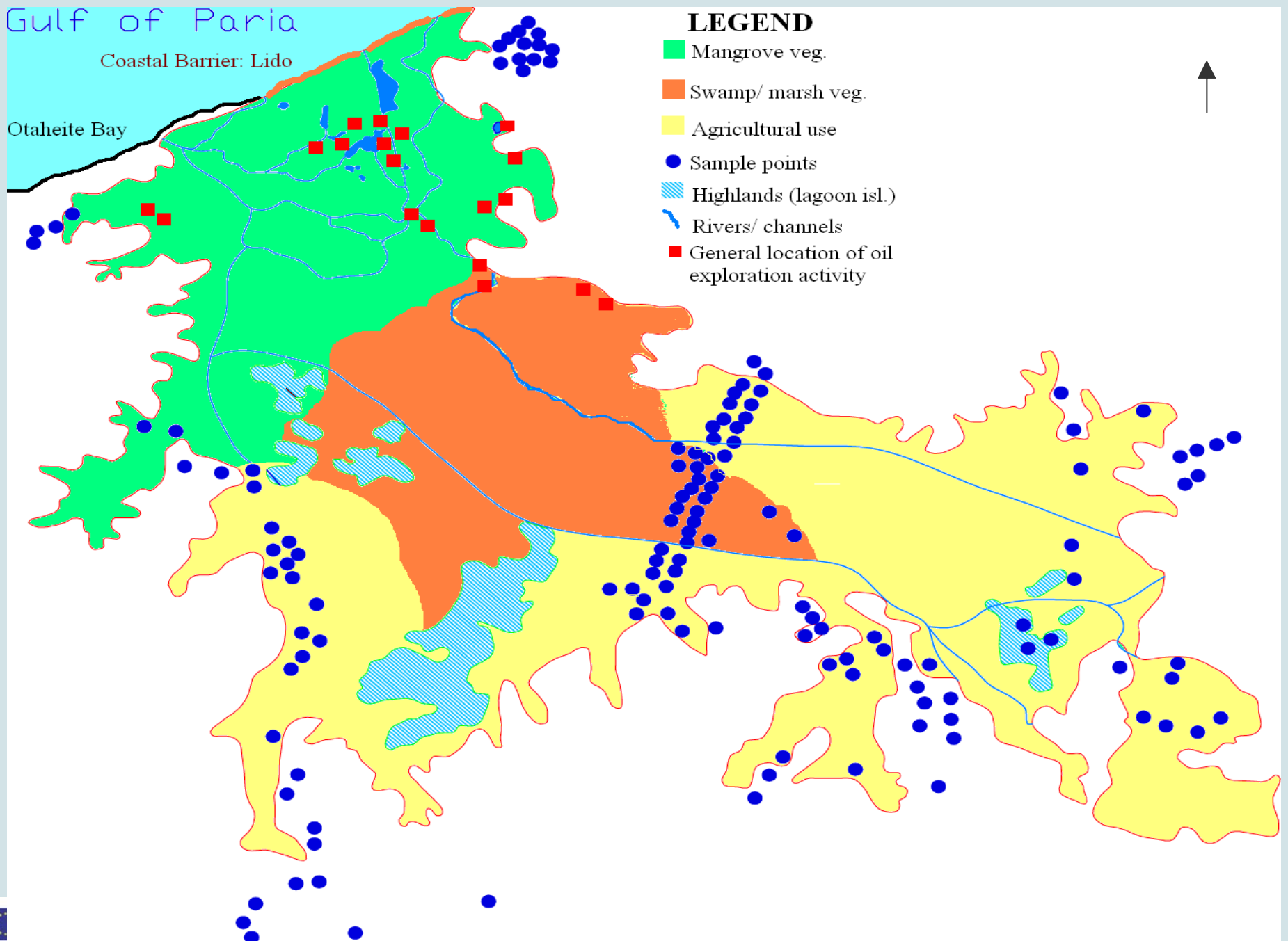
Gulf of Paria

Coastal Barrier: Lido

Otaheite Bay

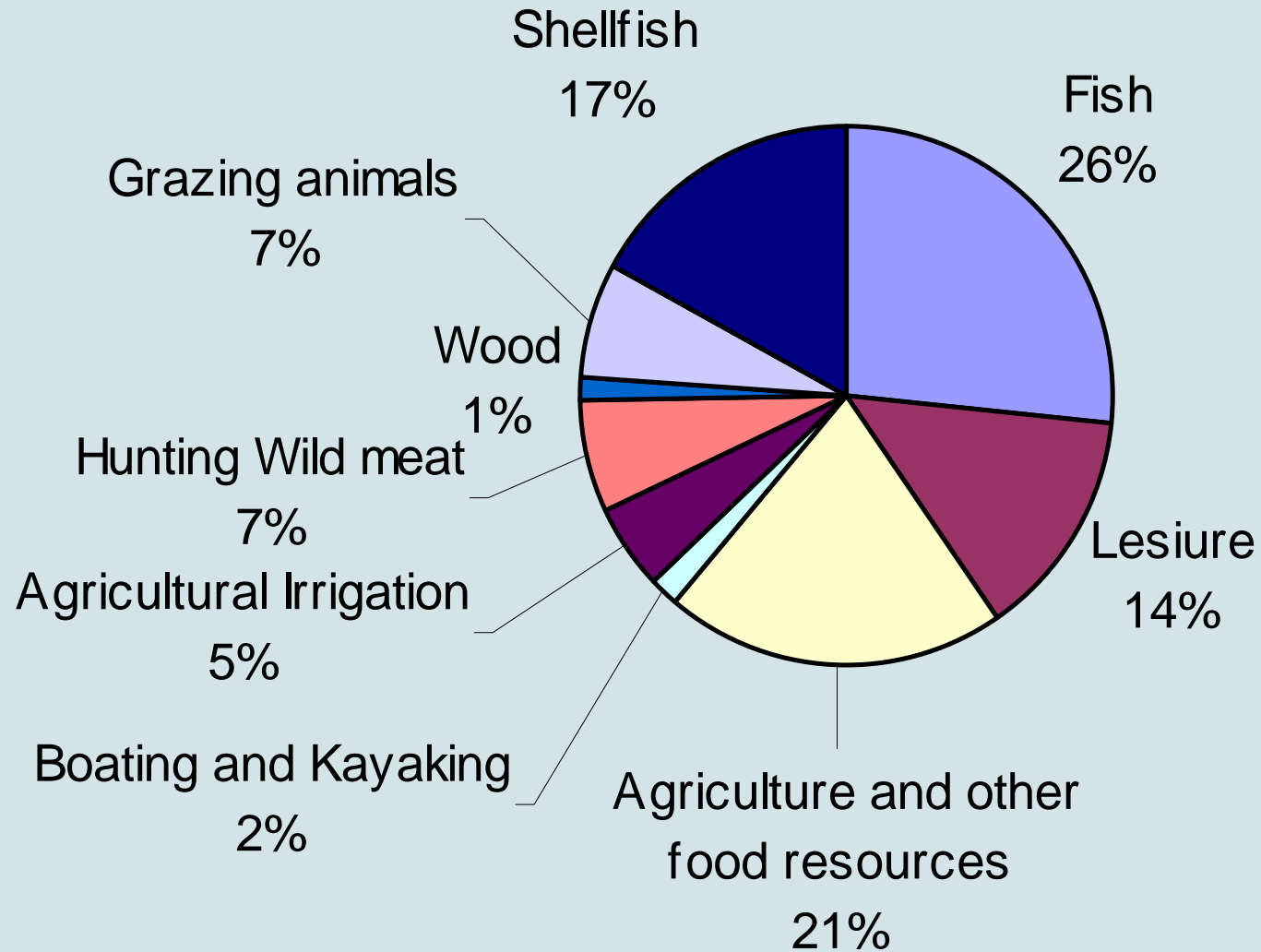
LEGEND

- Mangrove veg.
- Swamp/ marsh veg.
- Agricultural use
- Sample points
- Highlands (lagoon isl.)
- Rivers/ channels
- General location of oil exploration activity



1/29/2000

Uses of the lagoon



Goods & Services of Oropuche

GOODS

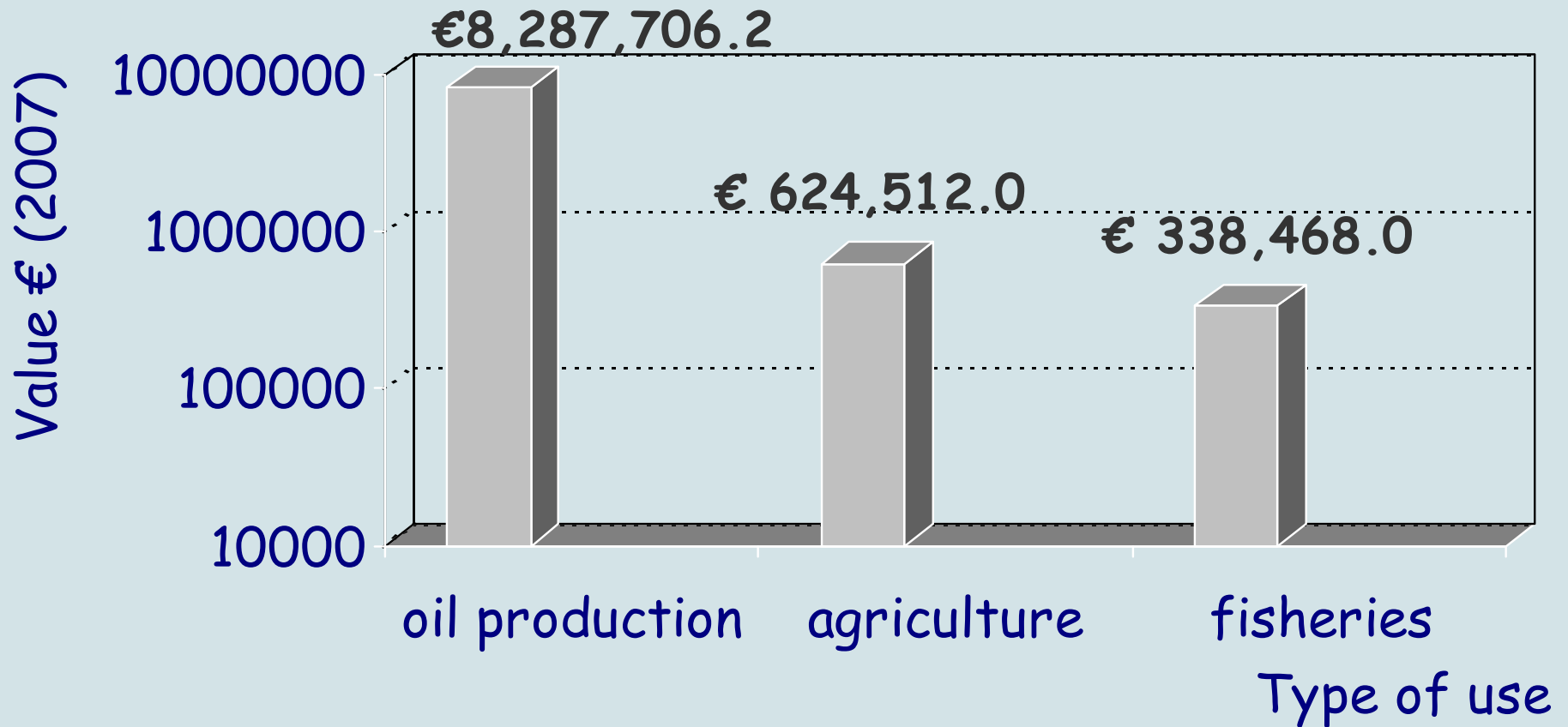
- Oil
- Agriculture
- Fisheries
- Wildlife
- Water

SERVICES

- Supports biological diversity
- Water transport
- Recreation
- Cultural, historical and traditional
- Flood and flow control
- Supports a productive fishing environment

Applying a value

Value of the main economic uses

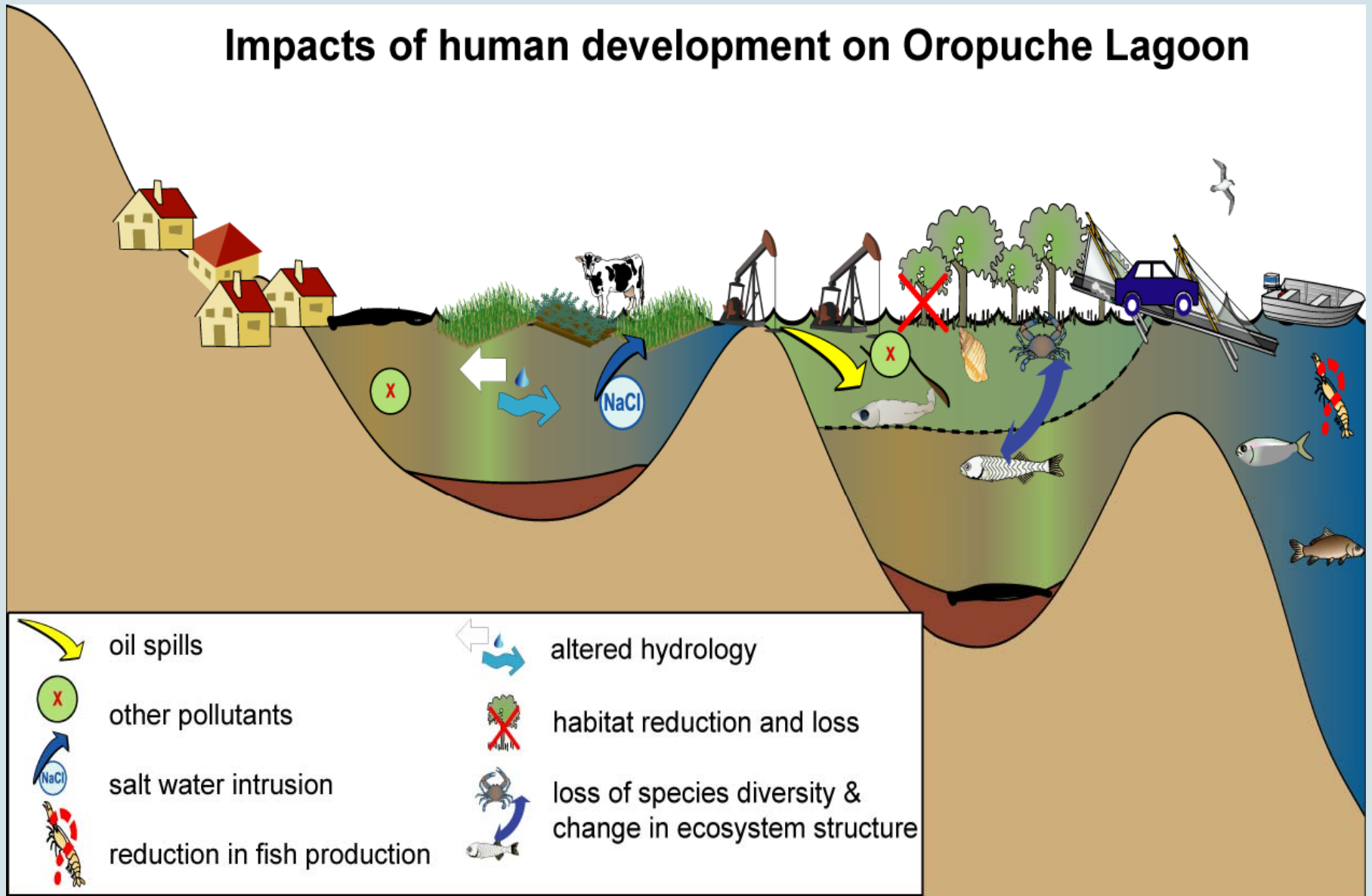


- Value of direct use goods were used based on 2007 market prices.

- Oropuche lagoon valued at **€9,250,686.**
in 2007 (€165,190.83 / km²)

And now what?

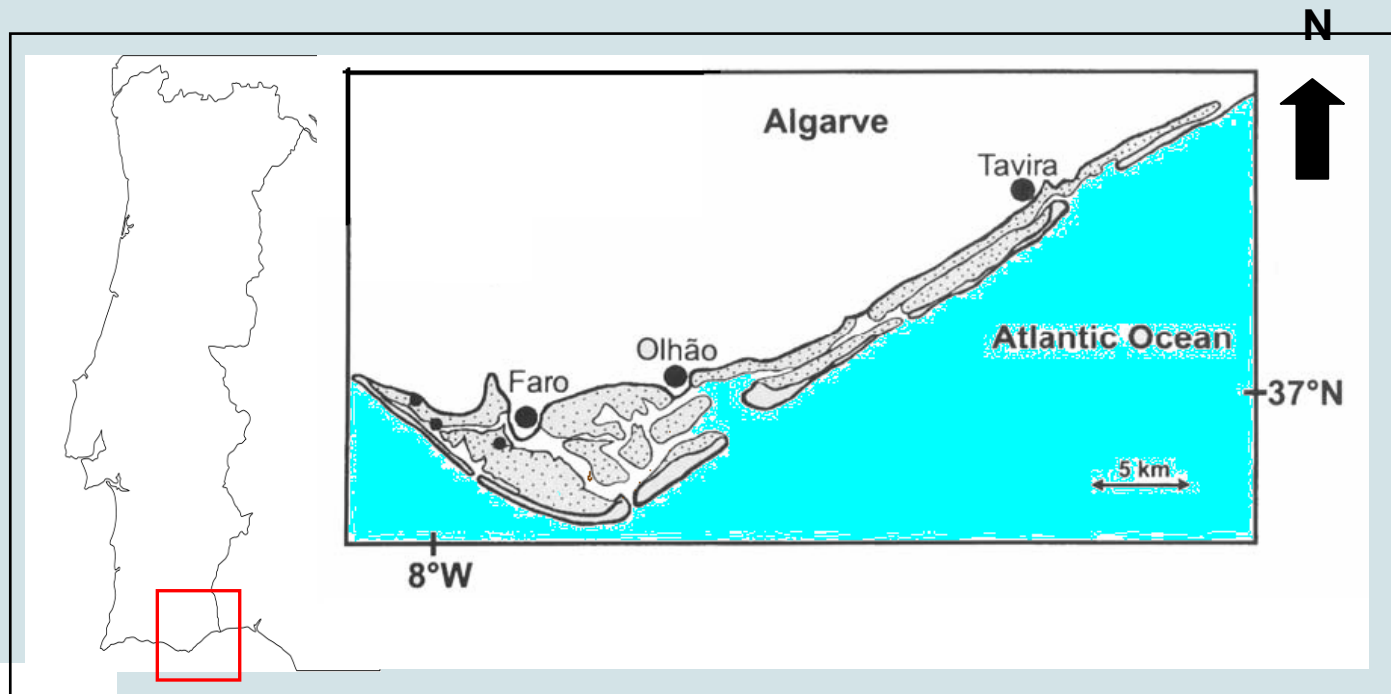
Impacts of human development on Oropuche Lagoon



Symbols for diagrams courtesy of the Integration and Application Network (ian.umces.edu/symbols), University of Maryland Center for Environmental Science.

Ria Formosa, Portugal

- Used since 17th century
- Fishing, shell farming, salt extractions were main uses



Ria Formosa



Goods & Services of the Ria

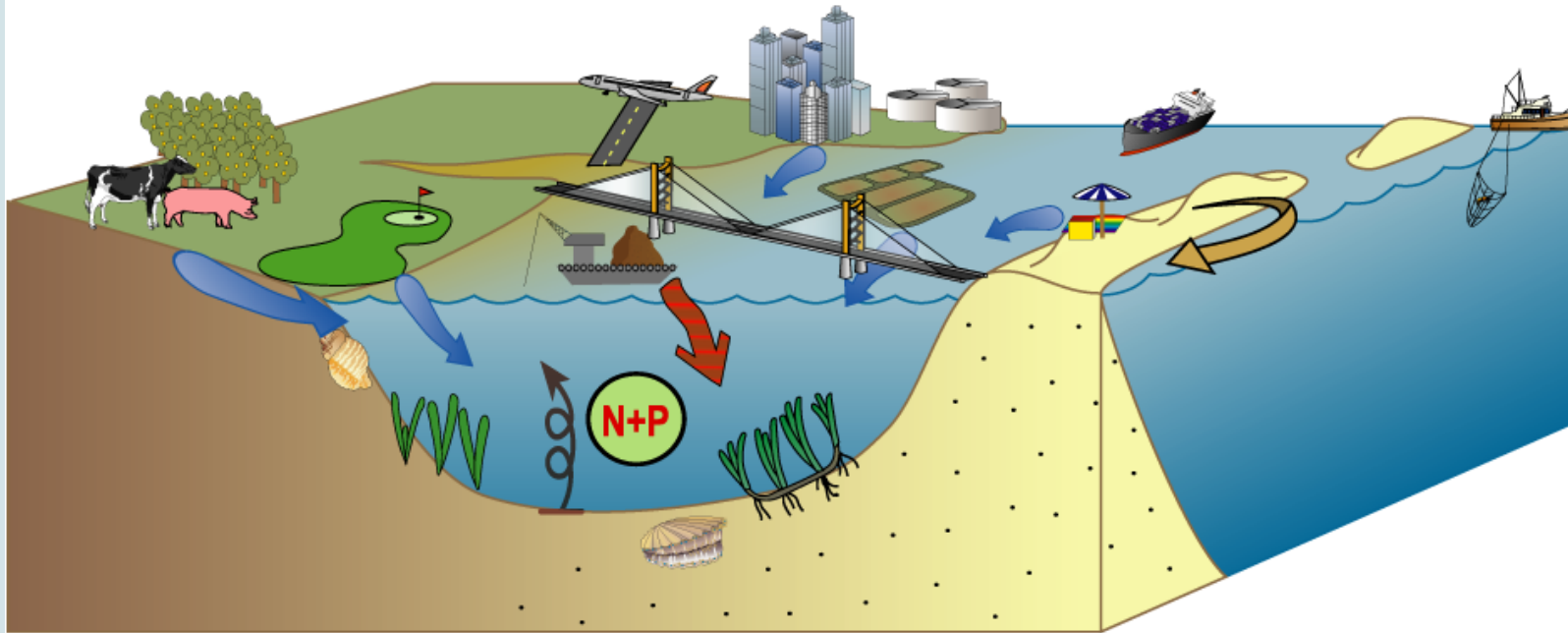
GOODS
















- Shellfish
- Salt and sand extraction
- Fisheries

SERVICES

- Water purification
- Nutrient retention
- High primary productivity
- Supports biological diversity and habitat
- Water transport
- Recreation/ Tourism
- Cultural, historical and traditional
- Protection against action of sea
- Research and education opportunities

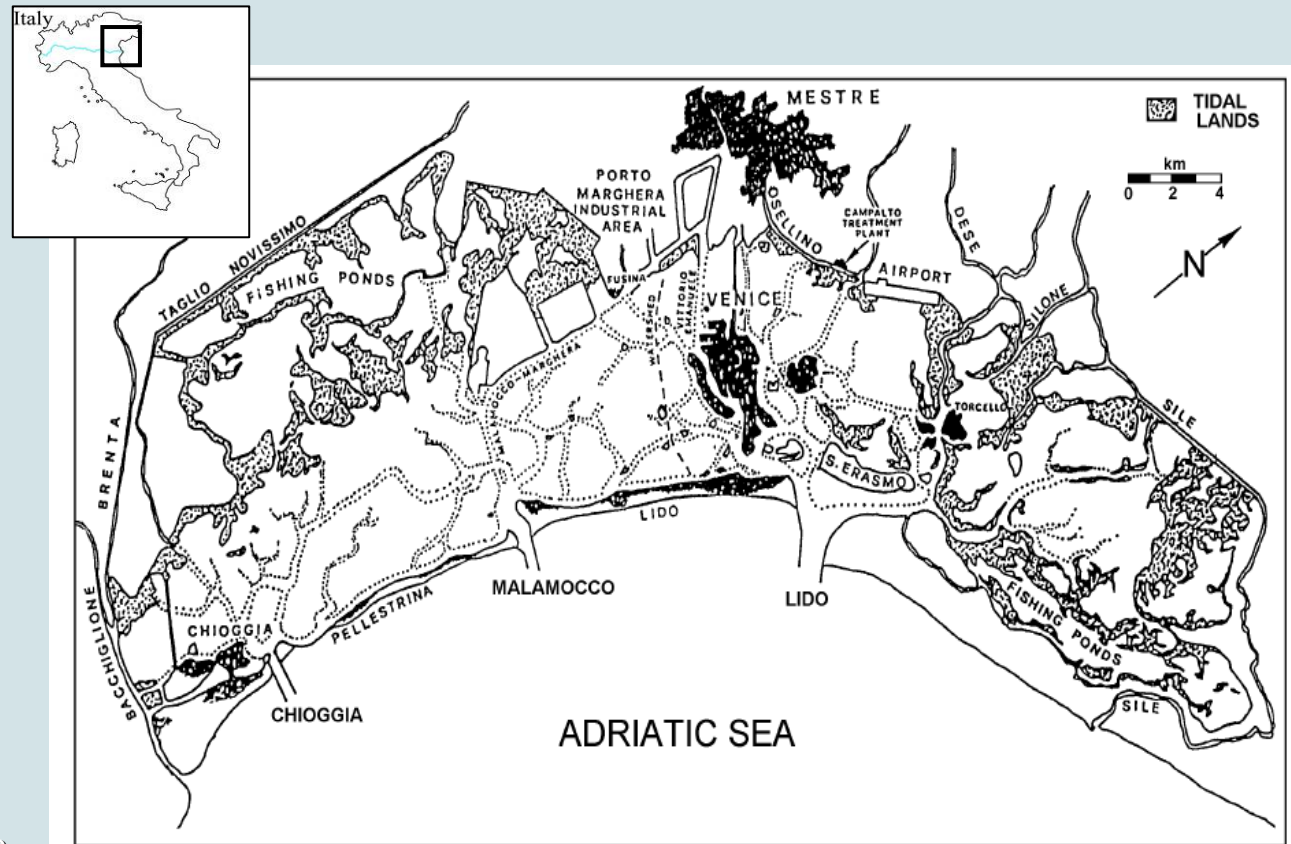
Impacts of Human development in Ria Formosa



-  Input of nutrients, and contribution to eutrophication .
-  Shipping activities,  fishing,  aquaculture, contribute to the introduction of alien species. .
-  Dredging damages veg. structure  and causes sediment resuspension  and turbidity . It also affects bivalves  increased vulnerability for erosion .
- Increased  and  results in potential changes in the species diversity and interactions .

Venice, Italy

- Use dates back to about 1000 yrs ago
- Protection against enemies, fisheries and transport



Venice Lagoon



Goods & Services of Venice

GOODS

- Fisheries
- Clam production
- Wildlife
- Agriculture

SERVICES

- Supports a productive fishing area
- Sediment and Nutrient retention
- High primary productivity
- Supports biological diversity and habitat
- Water and other transport
- Recreation/ Tourism
- Cultural, historical and traditional
- Protection against storms and flooding
- Research and education opportunities

Impact of human development in Venice

Tourism



Urbanisation



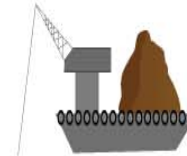
Shipping



Land reclamation



Dredging



Agri.



Clam fishing/
farming



Species changes,
habitat destruction



Nutrient increases



Alien species



Sediment
resuspension

Social impacts



Increase in erosion








Chemical pollution



Results and Discussion

- Comparison of the goods and services in each lagoon studied
- Not many differences, but differences in quality and quantity of goods and services in each

KEY

- Oropuche 
- Ria Formosa 
- Venice 
- Present 
- Lacking or not utilised 

**Human Development Level
Impact to Lagoon**

Low High	Med Med	High High
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Goods

- Minerals (oil, salt, sand)
- Agriculture
- Fisheries
- Wildlife (hunting)
- Shellfish

Services

- Water and other Transport
- Tourism/Recreation
- Research and Education
- High biological diversity
- Wildlife habitat
- Protects against storms & floods
- Traditional, historical, cultural
- Supports a productive fishing environment
- Sediment and nutrient retention
- Water purification

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Further justification

- Further interviews of scientists
- Results from a recent scientific workshop of coastal areas (SPICOSA)
- Based on expert judgement



- Shows that coastal lagoons have multiple uses
- Main uses: fish/ shellfish, tourism, agriculture
- Great potential for Oropuche

Management in Oropuche Lagoon

- Lessons can be adopted from other lagoons
- Now that it is known how the lagoon may change with human development, management must intervene

Recommendations for improved management of Oropuche Lagoon

- Integrated management plan
- Engage and educate the locals
- Increase potential for eco-tourism
- Fisheries management
- Agriculture and Aquaculture
- Encourage research and education

Conclusion

- Coastal lagoons have ability to adapt to impacts of human development
- But management must intervene to sustain the goods and services, and also be adaptive
- Oropuche lagoon has a great potential to increase its present economic value....

And finally.....

Indeed, human development is important, but it is in the best interest of humankind to respect, appreciate, and maintain the goods and services of coastal lagoons.

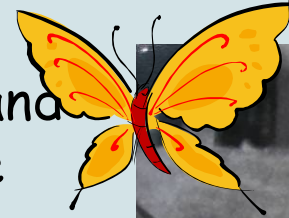
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A toast!

**Obrigada
a todos!!!**

?? Questions ??

Questions

- What papers will you be publishing from this? Which journal, and why, which formatting... etc.
- How is this related to WCM? How as a manager can I relate to this.. And which would I prefer, the social manager or the scientific managerial aspect