

Introduction to valuing ecosystem services with InVEST

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## **International Agreements**

#### BUSTAINABLE GOALS



Enviroped in unineventor with **TROUGHER + CONFAMY** (The Reveal Association Reveal and 2012) 101-101. For spanse on usage, contact, docump agreements





### Why value coastal wetlands?



## **Applications to Value Ecosystems** Corporate policy, **Public** strategy and sector management NGOs

Business for Social Responsibility. 2012

#### Natural Capital Stock of natural assets

Ecosystem Services Benefits that people obtain from nature





#### Food, fuel, fiber



#### Recreation

### Climate regulation







# Coastal protection



#### **Clean water**





Spiritual fufilment



## **Ecosystem Service Assessment**

#### A THEORETICAL FRAMEWORK



From Rosenthal et al. 2015, IJBSESM



integrated valuation of environmental services and tradeoffs



Quantify, map and value the benefits provided by terrestrial, freshwater and marine systems



integrated valuation of environmental services and tradeoffs

## **Coastal and Marine Modules**

- Recreation
- Aquaculture
- **Fisheries**
- **Coastal Protection**
- **Coastal Blue Carbon**
- **Scenic Quality**
- **Ecological Risk Assessment**
- Renewable Energy (waves and wind)





### **Ecological Production Functions (EPF)**

**EPF:** an equation that relates the physical outputs of a production process to physical inputs





#### **Global Applications**



Sustainable development planning Liveable cities Ensuring clean water Resilient coastal communities



### Case study: Wetlands of Galveston Bay





## Define...

- Roles and responsibilities
- Goals/objectives
- Scale (space/time)
- Prioritize ecosystem services and beneficiaries







# Wetlands provide many benefits to people, including...







Coastal protection

**Fisheries** 

Blue carbon storage & sequestration



#### Insumos...

- Coastal land use
- Bathymetry
- Habitats
- Storms (duration, frequency)
- Key fisheries



**Multiple Futures** 



Habitat management scenarios under sea level rise:

- marsh migrates
- marsh cannot migrate

Marsh distributions: 2004; 2050; 2100



#### Scenarios $\rightarrow$ ecological changes $\rightarrow$ changes in services

## InVEST

integrated valuation of environmental services and tradeoffs





## Valuing Coastal Protection





#### Damges =

*f*(waves + value of property)



#### Wetlands provide...







## Coastal protection

#### **Fisheries**

Blue carbon storage & sequestration

Marsh distributions: 2004; 2050; 2100

## **Coastal protection**



- Damages increase with rising sea levels
- Wetlands reduce damages by 5%



#### Wetlands provide...







## Coastal protection

#### **Fisheries**

Blue carbon storage & sequestration

### Carbon sequestration and emissions



- Galveston Bay emits carbon with 1 meter rise in sea level
- Emissions increase without wetland migrations

#### Wetlands provide...







## Coastal protection

#### **Fisheries**

Blue carbon storage & sequestration







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Food, fuel, fiber



## Recreation

### Climate regulation

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# Coastal protection



InVEST

integrated valuation of environmental services and tradeoffs





#### Spiritual fufilment



## Discussion