



The Regional Training Workshop
Economic Valuation of the Goods and Services of Coastal Habitats
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ECOLOGICAL FUNCTIONS AND ECONOMIC VALUES

By

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ECOSYSTEMS FUNCTION, DEFINED

- **ECOSYSTEM FUNCTION IS “THE CAPACITY OF NATURAL PROCESSES AND COMPONENTS TO PROVIDE GOODS AND SERVICES THAT SATISFY HUMAN NEEDS.”***

***Lifted from: Katherine Hawkins, Economic Valuation of Ecosystems, October 2003 (In turn taken from de Groot, et. al. A Typology for the Classification, Description and Valuation of Ecosystem Functions, Goods and Services. *Ecological Economics* 41)**

CLASSIFICATION OF FUNCTIONS

- **There are four types of functions, namely:***
 - **Regulation**
 - **Habitat**
 - **Production**
 - **Information**

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REGULATION FUNCTION*

- **CONSIST OF BIOGEOCHEMICAL CYCLE (I.E., CHEMICAL/ ELEMENT/NUTRIENT RECYCLING– E.G., WATER CYCLE) THAT ARE IMPORTANT TO ALL LIVING ORGANISMS.***
- **INCLUDES:***
 - ***GAS REGULATION* : MAINTENANCE OF CHEMICAL COMPOSITION OF AIR AND OCEAN AND RESULTS TO PROVISION OF CLEAN AIR, PREVENTION OF DISEASE SUCH AS SKIN CANCER, AND GENERAL HABITABILITY OF THE EARTH**
 - ***CLIMATE REGULATION* – PROVISION OF FAVORABLE CLIMATE WHICH ENABLES US TO MAINTAIN HEALTH, PRODUCE CROPS, HAVE RECREATION**

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REGULATION FUNCTIONS*

- ***DISTURBANCE PREVENTION*** – PROVISION OF BUFFER TO NATURAL HAZARDS SUCH AS STORMS, FLOODS AND DROUGHTS
- ***WATER REGULATION*** : PROVISION OF IRRIGATION, DRAINAGE, RIVER DISCHARGE, CHANNEL FLOW AND TRANSPORTATION MEDIUM
- ***WATER SUPPLY*** : PROVISION OF WATER FOR HUMAN CONSUMPTION, INCLUDING FILTRATION OF POLLUTANTS
- ***SOIL RETENTION***: PREVENTION OF SOIL EROSION
- ***SOIL FORMATION***: PROVISION OF MEDIUM FOR PRODUCTION OF CROPS

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REGULATION FUNCTION*

- ***NUTRIENT REGULATION:*** PROVISION OF NUTRIENTS SUCH AS *NPK*, SULFUR, CALCIUM, MAGNESIUM AND CHLORINE THRU RECYCLING
- ***WASTE TREATMENT:*** ASSIMILATION, DILUTION AND CHEMICALLY RECOMPOSE ORGANIC AND ORGANIC HUMAN WASTES
- ***POLLINATION:*** PROVISION OF SERVICES TO ENABLE PLANTS TO REPRODUCE
- ***BIOLOGICAL CONTROL:*** INTERACTION AND FEEDBACK MECHANISM WHICH MAKE POPULATION OF VARIOUS SPECIES STABLE THEREBY PREVENTING OUTBREAKS OF PESTS AND DISEASES

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HABITAT FUNCTIONS*

- **CONSIST OF THE PROVISION OF HABITAT FOR VARIOUS LIFE CYCLES OF PLANTS AND ANIMALS WHICH MAINTAINS BIOLOGICAL AND GENETIC DIVERSITY AND THE EVOLUTIONARY PROCESS***
- **THESE INCLUDE***
 - ***REFUGIUM FUNCTION*: PROVIDES LIVING SPACE, COVER AND FOOD SOURCES THAT ALLOW A DIVERSE NUMBER OF PLANTS AND ANIMALS TO THRIVE AND EVOLVE**
 - **NURSERY FUNCTION: PROVISION OF BREEDING AND NURSERY GROUNDS FOR SPECIES THAT ARE HARVESTED ELSEWHERE AS ADULTS**

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PRODUCTION FUNCTION*

- **CONSIST OF THE PROCESSES THAT COMBINE AND CHANGE ORGANIC AND INORGANIC SUBSTANCES INTO FOODS THAT CAN BE DIRECTLY USED BY HUMANS***

- **THESE INCLUDE***

- ***FOOD*: INCLUDE FISH, FOWL, MAMMALS, VEGETABLE, FRUIT**
- ***RAW MATERIALS*: INCLUDE WOOD AND FIBERS, CHEMICALS AND COMPOUNDS (EG LATEX, GUMS), ENERGY SOURCES AND ANIMAL FEED**
- ***GENETIC RESOURCES*: PROVIDE SOURCE OF GENES TO IMPROVE CHARACTERISTICS (TASTE, PEST RESISTANCE) OF CULTIVATED CROPS**
- ***MEDICINAL RESOURCES*: PROVIDE CHEMICALS THAT ARE USED AS DRUGS OR AS MODELS FOR SYNTHETIC DRUGS**
- ***ORNAMENTAL RESOURCES*: PROVIDE MATERIALS FOR FASHION, CRAFTS, CULTURAL OBJECTS, DECORATION, ETC.**

INFORMATION FUNCTION*

- ***CONSIST OF ASPECTS OF THE ECOSYSTEM THAT CONTRIBUTE TO HUMAN MENTAL AND SPIRITUAL WELL-BEING****
- ***THESE INCLUDE****
 - ***AESTHETIC INFORMATION: PROVIDE SCENERY AND LANDSCAPE FOR HUMAN ENJOYMENT; CAN INFLUENCE REAL ESTATE PRICES***
 - ***RECREATION: PROVIDE VENUE FOR RECREATION SUCH AS CAMPING, HIKING AND OTHER ECO TOURISM ACTIVITIES***
 - ***CULTURAL AND ARTISTIC INFORMATION: NATURE OFTEN BASIS FOR CULTURAL TRADITIONS; PROVIDES INSPIRATION FOR ARTISTIC PIECES***
 - ***SPIRITUAL AND HISTORIC INFORMATION: PROVIDE SENSE OF CONTINUITY AND PLACE AND CAN BE IMPORTANT PART OF RELIGION***
 - ***SCIENCE AND EDUCATION: RESEARCH VENUES AND REFERENCES FOR MONITORING ENVIRONMENTAL CHANGES***

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ECOSYSTEM FUNCTIONS IDENTIFIED BY THE RTF-E

- THE RTF-E IDENTIFICATION PROCESS WAS BASED ON ACTUAL GOODS AND SERVICES OF THE HABITATS**
- THESE GOODS AND SERVICES CAN, HOWEVER BE CLASSIFIED UNDER THE FRAMEWORK OF ECOSYSTEMS FUNCTIONS PREVIOUSLY DISCUSSED**

MANGROVE FUNCTIONS

- **REGULATION FUNCTION**
 - **Gas Regulation**
 - **Oxygen production**
 - **Climate regulation**
 - **Carbon sequestration**
 - **Disturbance Regulation**
 - **Windbreak**
 - **Coastal protection**
 - **Water supply**
 - **Water Purification**

MANGROVE FUNCTIONS

- **Soil Retention**
 - **Sediment Retention**
- **HABITAT FUNCTION**
 - **Nursery function**
 - **Fish nursery**
- **PRODUCTION FUNCTION**
 - **Food**
 - **Fish fry** **shellfish**
 - **Eel** **insect**
 - **Crab** **worms**
 - **Prawn**

MANGROVE FUNCTIONS

- **PRODUCTION FUNCTION**
 - **Raw materials**
 - **Firewood**
 - **Poles**
 - **Charcoal**
 - **Leaves/fronds**
 - **Propagules**
 - **Bark**
 - **sap**

MANGROVE FUNCTIONS

- **PRODUCTION FUNCTION**
 - **Medicinal Resource**
 - **Medicine**
 - **Genetic Resources**
 - **Wildlife**
- **Option Value – though not a function, usually included as “catch all” for service or good that may be availed of in the future**

SEAGRASS FUNCTIONS

- **REGULATION FUNCTION**
 - **Gas Regulation**
 - **Oxygen Production**
 - **Climate Regulation**
 - **Carbon Sequestration**
 - **Water Supply**
 - **Water purification**

SEAGRASS FUNCTIONS

- **HABITAT FUNCTION**
 - **Nursery**
 - **Fish Nursery**
 - **Refugium Function**
 - **Turtle Nesting Beach**
- **PRODUCTION FUNCTION**
 - **Raw Materials**
 - **Fertilizer**
 - **Cosmetics**

SEAGRASS FUNCTIONS

- **Ornamental**
 - **Handicraft**
- **INFORMATION FUNCTION**
 - **Recreation**
 - **Ecotourism**
 - **Research**
 - **Research/Instructions**
- **Option Value** – though not a function, usually included as “catch all” for service or good that may be availed of in the future

WETLANDS FUNCTIONS

- **REGULATION FUNCTION**
 - **Climate Regulation**
 - **Carbon Sequestration**
 - **Disturbance Regulation**
 - **Windbreak**
 - **Coastal Protection**
 - **Water Supply**
 - **Water purification**
 - **Nutrient Regulation**
 - **Nutrient cycling**

WETLANDS FUNCTIONS

- **HABITAT FUNCTION**
 - **Nursery**
 - **Fish nursery**
 - **Refugium**
 - **Migratory bird sanctuary**
- **PRODUCTION FUNCTION**
 - **Food**
 - **Fish**
 - **Crab**
 - **Honey/wax**

WETLANDS FUNCTIONS

- **Genetic Resources**
 - **Wildlife**
- **Medicinal resources**
 - **Medicine**
- **Raw Materials**
 - **Timber**
 - **Firewood**
 - **Charcoal**
 - **Leaves**

WETLANDS FUNCTIONS

- **INFORMATION FUNCTION**
 - **Recreation**
 - **Ecotourism**
 - **Aesthetic**
 - **View, Landscape, Seascape**
 - **Research**
 - **Research/Instruction**
- **Option Value – though not a function, usually included as “catch all” for service or good that may be availed of in the future**

CORAL REEF FUNCTIONS

- **REGULATION FUNCTION**

- **Disturbance Regulation**

- **Beach Protection**

- **HABITAT FUNCTION**

- **Nursery**

- **Nursery**

- **PRODUCTION FUNCTION**

- **Food**

- **Fish**

Mollusc

Sea Urchin

- **Shrimp**

Sea Cucumber

CORAL REEF FUNCTIONS

- **PRODUCTION FUNCTION**

- **Raw Materials**

- **Building materials**

- **Ornamental**

- **Curio**

- **INFORMATION FUNCTION**

- **Recreation**

- **Ecotourism**

- **Option Value – though not a function, usually included as “catch all” for service or good that may be availed of in the future**

CONVERTING ECOLOGICAL FUNCTIONS TO ECONOMIC VALUES

- AS DEFINED, ECOLOGICAL FUNCTIONS PROVIDE GOODS AND SERVICES THAT PEOPLE AVAIL OF**
- USE OF THESE GOODS AND SERVICES GENERATES VALUE FOR THEM, BASED ON THE PREFERENCES OF THE PEOPLE (I. E., THE GOODS AND SERVICES THAT ARE MORE PREFERRED BY THE PEOPLE HAVE HIGHER VALUE)**

CONVERTING FUNCTIONS TO VALUES

- **THE PROCESS OF DETERMINING THE VALUES OF THE VARIOUS GOODS AND SERVICES IS USUALLY CALLED RESOURCE VALUATION**
- **BELOW IS THE REGIONAL STANDARDIZED VALUES GIVEN TO THE GOODS AND SERVICES ON VARIOUS RESOURCE VALUATION ACTIVITIES WITHIN THE SOUTH CHINA SEA REGION**

VALUES OF VARIOUS GOODS AND SERVICES (US\$/ha/yr; 1995)

- **MANGROVE** (2872.27)
 - **REGULATION FUNCTION** - 528.12
 - (Gas, Disturbance, Soil retention, Climate)
 - **HABITAT FUNCTION** - 573.23
 - (Nursery)
 - **PRODUCTION FUNCTION** - 1584.98
 - (Food, raw materials, medicinal genetics)
 - **INFORMATION FUNCTION** - 54.21
 - **OPTION VALUE** - 50.73

VALUES OF VARIOUS GOODS AND SERVICES (US\$/ha/yr; 1995)

• SEAGRASS	(1,182.70)		
– REGULATION FUNCTION		-	59.59
• (Gas, climate, water supply)			
– HABITAT FUNCTION		-	244.33
• (Nursery, refugium)			
– PRODUCTION FUNCTION		-	712.38
• (Food, Raw materials, Ornamental)			
– INFORMATION FUNCTION		-	154.74
– OPTION VALUE		-	11.6

VALUES OF VARIOUS GOODS AND SERVICES (US\$/ha/yr; 1995)

- **WETLANDS**

– REGULATION FUNCTION	-	0.683
• (Nutrient cycling, carbon sequestration)		
– HABITAT FUNCTION	-	1.8
• (Migratory Species)		
– PRODUCTION FUNCTION	-	167.01
• (Food, Raw Materials, Genetic, Medicinal)		
– INFORMATION FUNCTION	-	125.66
• (Recreation, Aesthetic, research)		
– OPTION VALUE	-	.01

VALUES OF VARIOUS GOODS AND SERVICES (US\$/ha/yr; 1995)

- **CORAL REEF (1542.56)**
 - **REGULATION FUNCTION - 383.80**
 - (Nutrient cycling, carbon sequestration)
 - **HABITAT FUNCTION - n/v**
 - (Migratory Species)
 - **PRODUCTION FUNCTION - 133.59**
 - (Food, Raw Materials, Genetic, Medicinal)
 - **INFORMATION FUNCTION - 1024.62**
 - (Recreation, Aesthetic, research)
 - **OPTION VALUE - 0.55**

Thank you
for your attention!!!