

# Introduction to Environmental Economics (IKT3620)

**19.09.2019**

**Dr. Tunç Durmaz**

# Discussion will be on...

- CONNECTIONS BETWEEN THE ECONOMY AND THE ENVIRONMENT
  - REVIEW OF 10 KEY INSIGHTS FROM ENVIRONMENT AND RESOURCE ECONOMICS THAT
    - ENVIRONMENTAL SCIENTISTS
    - MANAGERS
    - POLITICIANS
- } SHOULD BE AWARE OF

# THE ECONOMY AND THE ENVIRONMENT

- ECONOMY IS NOT JUST ABOUT FINANCIAL COMINGS AND GOINGS WITHIN MARKETS
  - THE UNPRICED OR NON-MARKET SERVICES THAT THE NATURAL ENVIRONMENT PROVIDES US ARE EQUALLY ITS CONCERN!
- THE VALUE OF
  - PROTECTING WETLANDS FOR THEIR BIODIVERSITY
  - FLOOD DEFENSE
  - POLLUTION TREATMENT FUNCTIONS

} IS JUST AS MUCH AN ECONOMIC VALUE AS THE PRODUCTION OF OIL
- WE CAN ALL BENEFIT FROM A BETTER UNDERSTANDING OF HOW THE ECONOMY AND THE ENVIRONMENT ARE RELATED

# THE ECONOMY AND THE ENVIRONMENT

- THE ECONOMY OPERATES FROM INSIDE THE ENVIRONMENTAL SYSTEM
  - WITH CONDITIONS IN THE TWO SYSTEMS BEING SIMULTANEOUSLY DETERMINED IN AN **EVOLVING AND DYNAMIC WAY**
- WHAT DO WE MEAN BY THE ECONOMY?
- WHAT DO WE MEAN BY THE ENVIRONMENT?

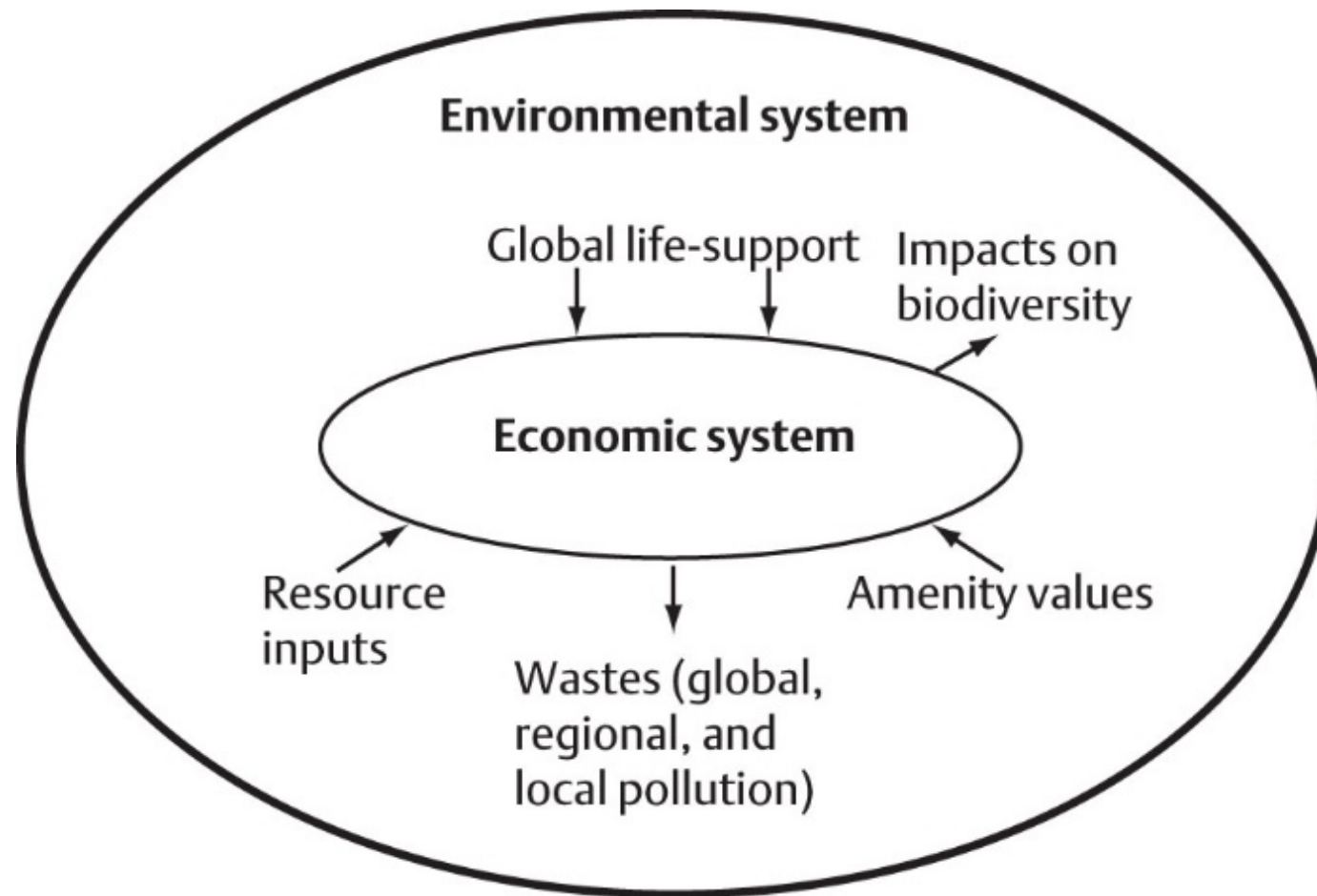
# WHAT DO WE MEAN BY THE ECONOMY?

- ALL THE FIRMS THAT MAKE UP THE INDUSTRY
- HHs BOTH AS CONSUMERS AND SUPPLIERS OF LABOR FORCE
- GOVERNMENTS
- INSTITUTIONS THAT GOVERN THE INTERACTIONS BETWEEN THESE GROUPS,
  - SUCH AS MARKETS
- THE STATE OF THE TECHNOLOGY
- STOCKS OF PRODUCED AND HUMAN CAPITAL (ROADS, BUILDINGS, MACHINERY, SATELLITES ETC.)

# WHAT DO WE MEAN BY THE ENVIRONMENT?

- ALL NATURAL RESOURCES FOUND IN THE BIOSPHERE
  - PLANET'S MANY ECOSYSTEMS
    - FORESTS
    - DESERTS
    - WETLANDS (BATAKLIK, SULAK ALAN)
  - THE PLANTS (FLORA) AND ANIMALS (FAUNA) FOUND THEREIN
  - RESOURCE DEPOSITS UNDER THE LAND SURFACE (E.G., COAL AND IRON ORE)
  - THE WORLD'S OCEANS AND ATMOSPHERE

# FIG. INTERACTIONS OF THE ECONOMY AND ENVIRONMENT



# FOUR SERVICES FLOWS FROM THE ENVIRONMENT

## 1. ENVIRONMENT PROVIDES THE ECONOMIC SYSTEM WITH INPUTS OF VARIOUS MATERIALS AND ENERGY SOURCES

- MINERALS
- METALS
- FOOD
- HYDROCARBONS
- FIBRES, SUCH AS WOOD AND COTTON

These resources may

- Non-renewable (coal or iron ore)
- Renewable (fisheries or forests)

These resources are transformed by the economic system into outputs that consumers demand

- Wood → Paper
- Oil → Petrol (or gasoline)
- ...



# FOUR SERVICES FLOWS FROM THE ENVIRONMENT

## 2. THE ECONOMY USES THE ENVIRONMENT AS A WASTE SINK

- can originate from
  - production processes, such as CO<sub>2</sub> from elec. generation
  - Consumption activities, such as when people drive to work, garbage
- Types of waste: solid, air-, or water-borne (transported by air or water)
- Note that the environment has a limited assimilative capacity to absorb and transform some wastes into harmless substances
- Pollution is said to occur when emissions exceed the assimilative capacity leading to undesirable outcomes

## 3. ENVIRONMENT PROVIDES HHs WITH A DIRECT SOURCE OF AMENITY

***AMENITY: STHG THAT HELPS TO PROVIDE COMFORT, CONVENIENCE, OR ENJOYMENT***

- We derive utility (happiness, satisfaction) from
  - the contemplation (action of looking thoughtfully at something for a long time) of scenic beauty and wildlife
  - hiking and fishing
- These impacts of the env. on well-being are both important and relevant from an economics point of view

## 4. ECOSYSTEM SERVICES

# FOUR SERVICE FLOWS FROM THE ENVIRONMENT

## 4. ECOSYSTEM SERVICES

- THE ENVIRONMENT PROVIDES THE ECONOMIC SYSTEM WITH BASIC LIFE SUPPORT SERVICES
  - CLIMATE REGULATION
    - THE INFLUENCE OF LAND COVER AND BIOLOGICAL PROCESSES THAT REGULATE ATMOSPHERIC PROCESSES AND WEATHER PATTERNS THAT, IN TURN, CREATE THE MICRO CLIMATE IN WHICH DIFFERENT PLANTS AND ANIMANLS LIVE AND FUNCTION
  - THE OPERATION OF THE WATER CYCLE
  - REGULATION OF ATMOSPHERIC COMPOSITION
  - NUTRIENT CYCLING (BESIN DONGUSU)

# FOUR SERVICE FLOWS FROM THE ENVIRONMENT

## 4. ECOSYSTEM SERVICES

Forests contribute to well-being by

- supplying us with timber to produce furniture or firewood (a provisioning service)
- by storing and sequestering carbon (regulating service)
- by being a place where we can go walking, bird watching (cultural service)

# FOUR SERVICE FLOWS FROM THE ENVIRONMENT

## 4. ECOSYSTEM SERVICES

Ecosystem service classification	Ecosystem service	Economic benefit
Regulating	Carbon storage and sequestration (e.g. by salt marsh plants)	Avoided climate change damages; less spending needed on other greenhouse gas control
Regulating	Storm and flood mitigation	Avoided flooding damages to nearby houses, farmland and commercial property
Cultural	Habitat for birds	Value of bird watching trips
Cultural	Educational resource	Value to school children of learning about how wetlands function
Provisioning	Supporting fish populations	Value of commercial fish catch due to wetland function

### Ecosystem services

### Explanations on values

#### Provisioning services:

Carbon sequestration and storage

The value of natural uptake, storage and burial of organic material within the canyon.

Food provision

The canyon's value of providing marine organisms for human consumption.

Genetic resources and chemical compounds

The option value of using canyon organisms in biotechnological, pharmaceutical, or industrial applications.

#### Regulating services:

Biological control

The value of controlling diseases and invasive species.

Waste absorption and detoxification

The value of burial, decomposition and transformation of waste within the canyon ecosystem.

#### Cultural services:

Aesthetic and spiritual

The value of the canyon ecosystem for inspiring religion, arts, movies, documentaries, books and folklore.

Bequest and existence

The value of maintaining the canyon ecosystem for future generations and the intrinsic value of its marine species.

Scientific and educational

The cognitive value of the canyon ecosystem for science and education.

#### Intermediate services:

Biologically mediated habitat

The value of canyon habitats formed by marine organisms.

Nutrient cycling

The value of storage and recycling of nutrients by canyon organisms.

Resilience and resistance

The value of the amount of disturbance that the canyon ecosystem can cope with and its ability to regenerate after disturbance.

Water circulation and exchange

The value of currents, such as up-and down-welling, dense shelf water cascading and mixing of water masses.

# FOUR SERVICES FLOWS FROM THE ENVIRONMENT

- IF ECONOMY INCREASES ITS DEMAND ON THE ENVIRONMENT WITH REGARD TO ANY OF THESE FOUR SERVICE FLOWS, THIS CAN IMPACT THE ENVIRONMENT'S ABILITY TO PROVIDE OTHER SERVICES

# FOUR SERVICES FLOWS FROM THE ENVIRONMENT

- AN INCREASE IN THE USE OF ENVIRONMENT AS A WASTE SINK DUE TO INCREASE IN EMISSION OF POLLUTANTS...
  - CAN DECREASE THE ENVIRONMENT'S ABILITY TO SUPPLY BASIC LIFE SUPPORT
    - BY INTERFERING WITH CLIMATE REGULATION
  - OR, CAN DECREASE THE AMENITY VALUE OF THE ENVIRONMENT BY DEGRADING WILDLIFE POPULATIONS
- AN INCREASE IN THE DEMAND ON ENVIRONMENT FOR RESOURCE INPUTS CAN MEAN
  - A DECREASE IN AMENITY FLOWS IF
    - QUARRIES ARE DEVELOPED IN NATIONAL PARKS
    - LOGGING ACTIVITIES LEAD TO THE LOSS OF RAINFORESTS

# FOUR SERVICES FLOWS FROM THE ENVIRONMENT

- ECONOMY AND BIODIVERSITY (SEE THE FIGURE)
  - ECONOMIC ACTIVITY CAN AFFECT NATURAL DIVERSITY AND ABUNDANCE OF WILD ANIMALS AND PLANTS, MOST NOTABLY BY TAKING OVER HABITATS
    - *E.G.*, WHEN A FOREST IS TURNED INTO A GOLD MINE
- DIVERSITY IS AN IMPORTANT PROPERTY OF NATURAL SYSTEMS
  - ESPECIALLY, IT CAN PROVIDE SERVICES
    - THE ABILITY TO WITHSTAND SHOCKS (KNOWN AS RESILIENCE), SUCH AS DROUGHT AND FIRE
  - THUS, REDUCTION IN DIVERSITY CAN DIRECTLY AND INDIRECTLY AFFECT HUMAN WELL-BEING

# WHAT DO ECONOMISTS HAVE TO SAY ABOUT THESE INTERACTIONS BETWEEN THE ECONOMY AND THE ENVIRONMENT?

*KEY INSIGHTS FROM ECONOMICS OF WHICH ENVIRONMENTAL SCIENTISTS, ENVIRONMENTAL MANAGERS AND POLITICIANS SHOULD BE AWARE OF:*

1. ECONOMIC AND ENVIRONMENTAL SYSTEMS ARE DETERMINED SIMULTANEOUSLY
2. THE BEHAVIOURAL UNDERPINNINGS OF ECONOMICS MATTER FOR ENVIRONMENTAL POLICY
3. ENVIRONMENTAL RESOURCES ARE SCARCE, AND USING THEM IN ONE WAY HAS AN OPPORTUNITY COST
4. THE FREE MARKET SYSTEM CAN GENERATE THE WRONG LEVEL OF ENVIRONMENTAL QUALITY



# WHAT DO ECONOMISTS HAVE TO SAY ABOUT THESE INTERACTIONS BETWEEN THE ECONOMY AND THE ENVIRONMENT?

5. HOWEVER, MARKETS BELIEVED TO BE THE BEST WAY OF ALLOCATING A VAST RANGE OF RESOURCES
6. GOVERNMENT INTERVENTION DOES NOT ALWAYS MAKE THINGS BETTER
7. ENVIRONMENTAL PROTECTION IS COSTLY
8. CHOSING THE MAXIMUM SUSTAINABLE YIELD RARELY OPTIMAL
9. ECONOMIC GROWTH IS GOOD BUT WHAT ABOUT THE ENVIRONMENT?
10. SERIOUS ENVIRONMENTAL PROBLEMS ARE GLOBAL IN NATURE