

INTRODUCTION TO ENVIRONMENTAL ECONOMICS (IKT3620)

VALUING THE ENVIRONMENT: CONCEPT AND METHODS

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VALUING THE ENVIRONMENT

What does economic value mean?

- Economics is often described as the study of allocating scarce resources in the face of unlimited wants
 - Using up resources in one way prevents us from using them in another
 - Opportunity cost is the cost of these forgone uses
 - “the best alternative forgone”
- The idea that the value of something is dependent on what we are willing to give up is a **key** economic principle

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How to express that is being given up?

- Measure the sacrifice in income?
 - E.g., ask poor households whether they would support a local tax on petrol and diesel fuel for cars & trucks with the objective to increase the air quality in the city
 - One way of putting this Q is to ask if their WTP—to give up income—for the increase in the air quality was greater than the cost of tax
 - WTP is the largest amount of money one would be willing to pay in exchange for the resource OR here, it measures the benefits to people coming from a beneficial change in environmental quality

VALUING THE ENVIRONMENT

WTP is affected from the level of income (existing income distribution) and preferences

- If the income distribution changes economic values measured by WTP can change too
- If preferences differ, people with similar incomes will be willing to pay different amounts for the same change in the environmental quality
 - If Ayse has a kid who suffers from asthma while Seda has no kids, and they have equal incomes, then Ayse's WTP for a given increase in air quality would be greater than Seda's

VALUING THE ENVIRONMENT

WTA (Compensation—WTAC) is the smallest amount of money one would accept to forego the resource OR what compensation would you accept to give up something

- Consider the value of working. It can be measurable from the minimum hourly wage workers would accept to work and sacrifice leisure
- Whether we use WTP or WTA matters
- WTA (WTP) is determined from the standpoint of already having the resource (lacking the resource)

VALUING THE ENVIRONMENT

To summarize,

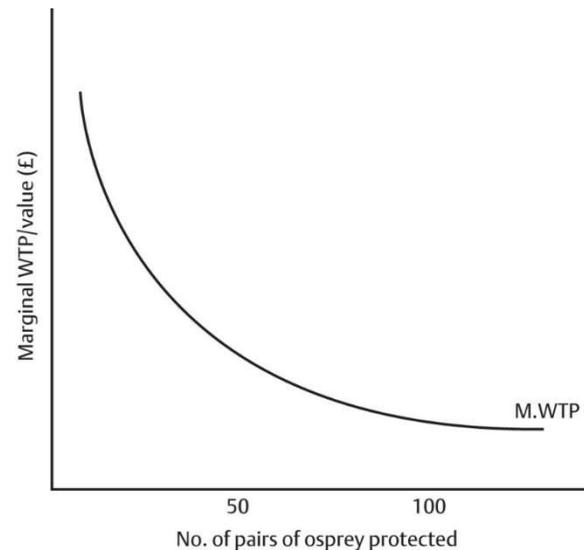
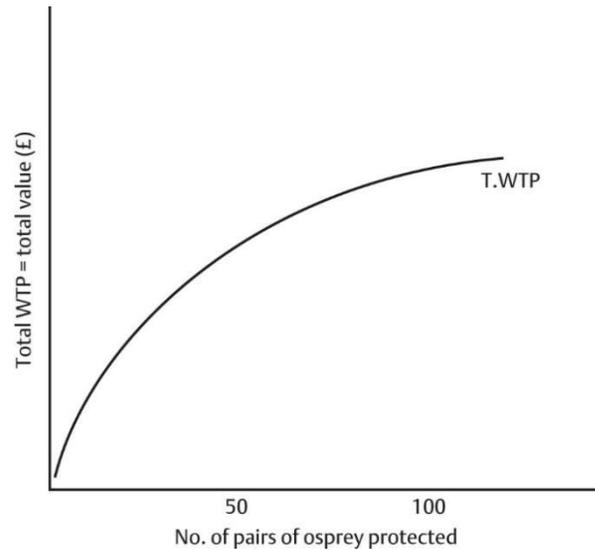
- if an increase in environmental good is valued,
 - measure with what people's maximum WTP is to have this increase OR
 - what their minimum WTA is to forgo this increase
- Suppose a decrease in an environmental good is being valued. We can try to measure
 - WTP to prevent such a reduction
 - WTA to tolerate it
- Either approach allows to assign a monetary value on environmental gain or loss, which is an estimate of the underlying utility gain or loss for an individual (or a set of individuals)

VALUING THE ENVIRONMENT

WTP FOR WILDLIFE PROTECTION

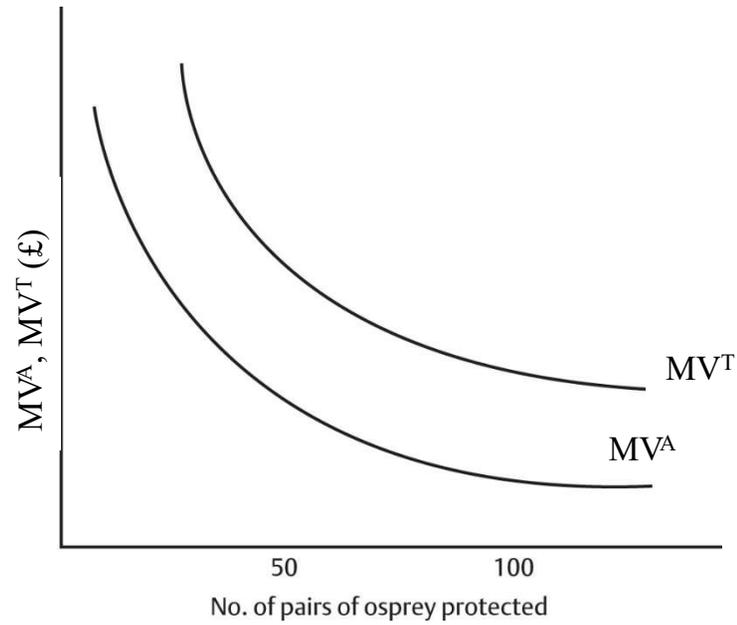


BALIK KARTALI

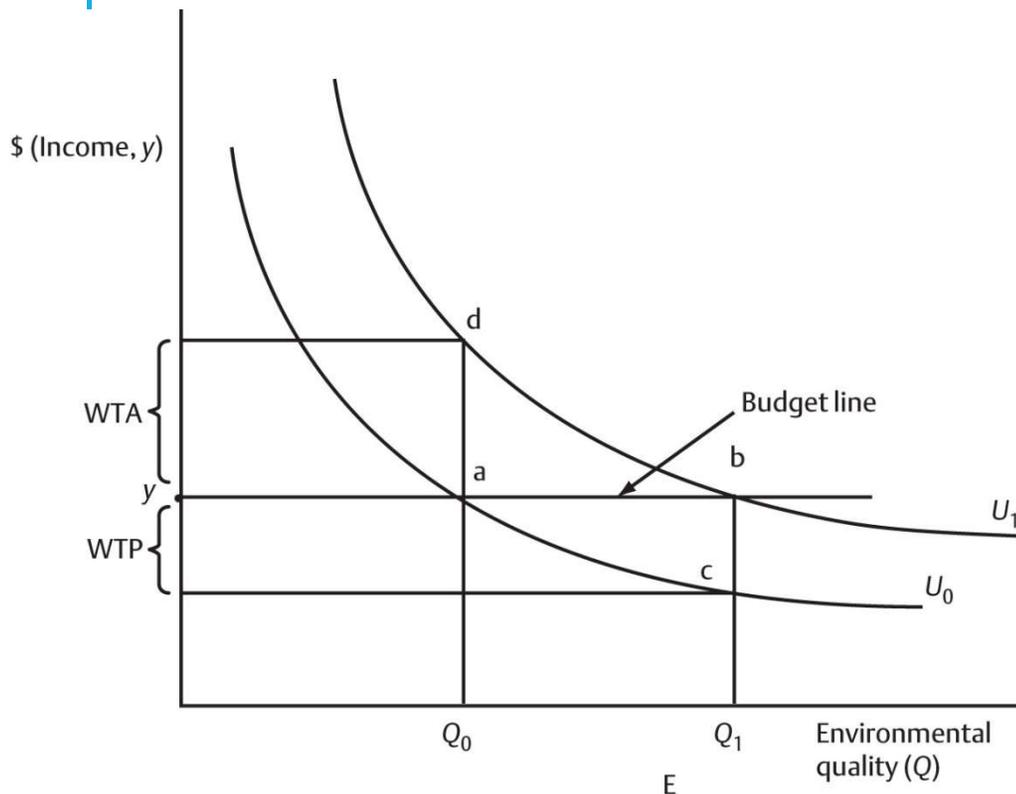


TURAN'S TOTAL WTP INCREASES WITH THE QUANTITY OF OSPREYS PROTECTED. YET, HIS TOTAL WTP INCREASES WITH A DECREASING RATE
M.WTP FALLS AS Q RISES DUE TO DIMINISHING MARGINAL UTILITY

VALUING THE ENVIRONMENT



DERIVATION OF WTP AND WTA



NOTE THAT $WTA > WTP$: POSITIONS OF GREATER WEALTH (HAVING VS NOT HAVING THE RESOURCE) LEAD INDIVIDUALS TO PLACE HIGHER VALUATIONS ON GOODS THEY DESIRE

WTP: THE MOST INCOME YOU WOULD GIVE UP FROM POINT A AND STILL HAVE UTILITY EQUAL TO U_0 (BC)

WTA: THE MINIMUM COMPENSATION REQUIRED TO FOREGO THE IMPROVEMENT IN ENVIRONMENTAL QUALITY (DA)

VALUING THE ENVIRONMENT

- THE ECONOMIC VALUE OF ANY ENVIRONMENTAL GOOD CAN BE THOUGHT OF AS THE INCREASE (DECREASE) IN UTILITY IF THAT ENVIRONMENTAL GOOD IS INCREASED (DECREASED) BY A GIVEN AMOUNT
- CONSIDERING AN ENVIRONMENTAL BAD, WE ARE INTERESTED IN THE AMOUNT BY WHICH UTILITY INCREASES IF THE ENVIRONMENTAL BAD IS REDUCED
- THESE TYPES OF ENVIRONMENTAL VALUES ARE CALLED **DIRECT BENEFITS**
 - DIRECT EFFECT ON UTILITY RATHER THAN INDIRECTLY THROUGH THEIR ROLE IN THE PRODUCTION OF CONSUMPTION GOODS & SERVICES

FOUR SERVICE FLOWS FROM THE ENVIRONMENT

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

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

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 CO₂ 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 A **DIRECT SOURCE OF AMENITY**

- We derive utility from
 - the contemplation 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

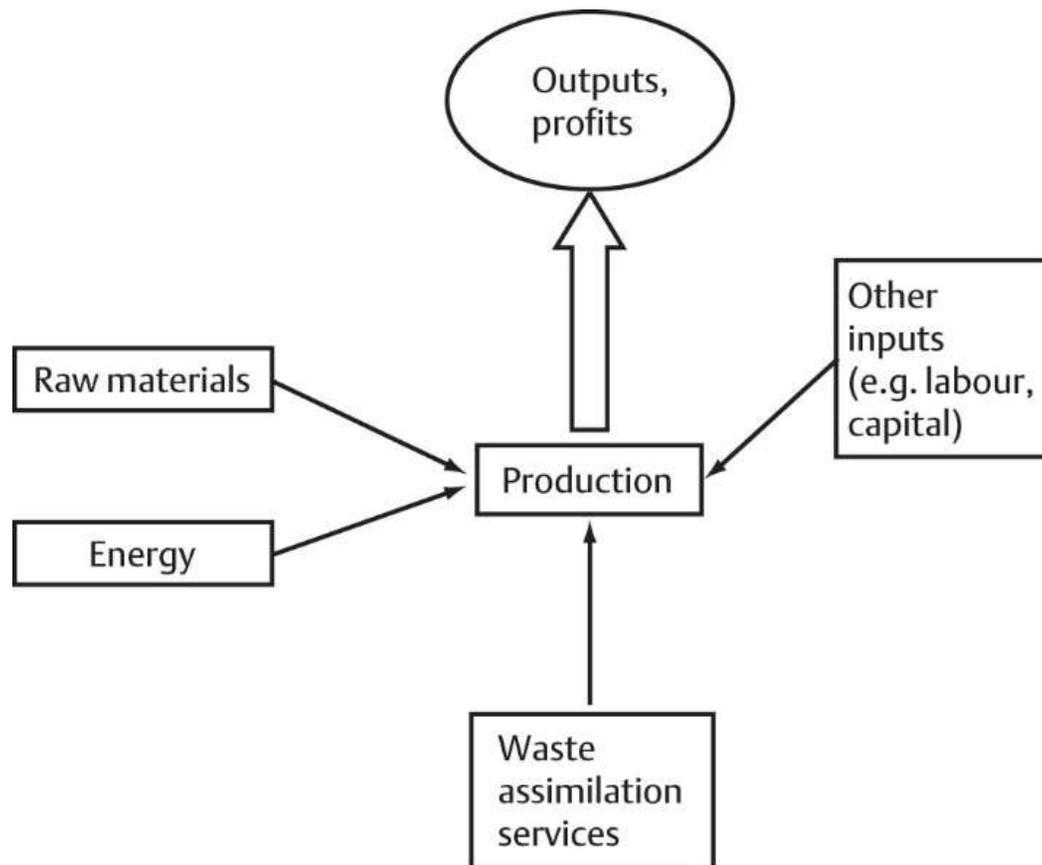
FOUR SERVICE FLOWS FROM THE ENVIRONMENT

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)

INDIRECT BENEFITS

INDIRECT ENVIRONMENTAL VALUES



INDIRECT BENEFITS

INDIRECT ENVIRONMENTAL VALUES

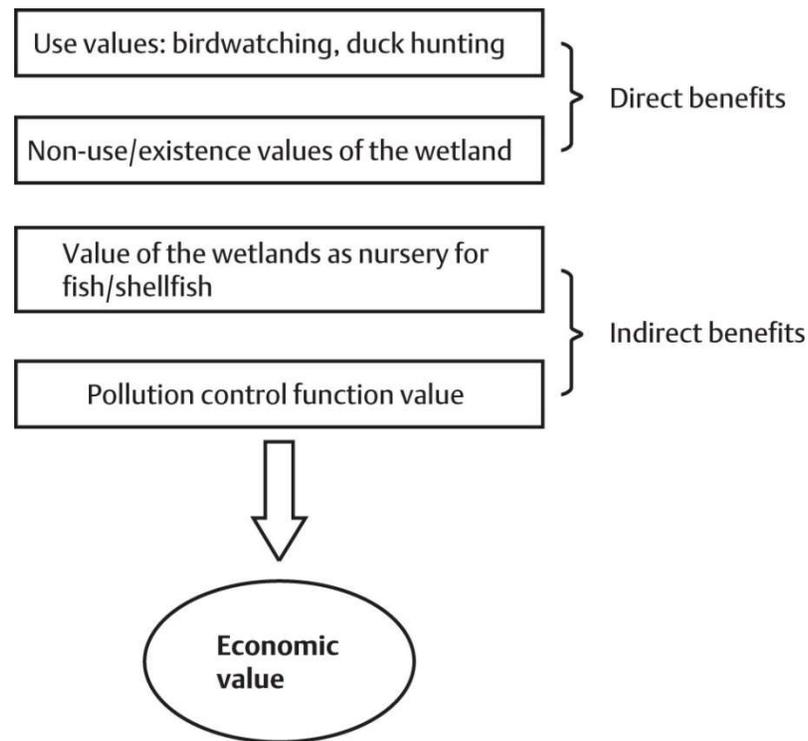
- The value of a change in the level of a change in the level of environmental and resource inputs for the production of any good can be approximated by the change in profits
- Thus, the value of the environmental in service flows 1, 2, 4 can be partly determined as the changes in the value of profits for a change in the value of environmental inputs
- *E.g.*,
 - if bauxite decreases by one ton, what is the value of the associated reduction in the profit?
 - Waste assimilation services: what is the drop in the profit associated with a unit decrease in emissions
- This **marginal productivity approach** is no different from the approach used to determine the value of other inputs to production, such as Labor & Capital

INDIRECT BENEFITS

INDIRECT ENVIRONMENTAL VALUES

- Indirect benefits: let's call these types of environmental values indirect benefits since the environment is valued indirectly, through its role in the production

ENVIRONMENT CAN HAVE BOTH AN INDIRECT AND DIRECT VALUE, EVEN IF IT HAS NO MARKET VALUE OR PRICE



ENVIRONMENT CAN HAVE BOTH AN INDIRECT AND DIRECT VALUE, EVEN IF IT HAS NO MARKET VALUE OR PRICE

THEREFORE, ECONOMIC AND MARKET VALUES ARE NOT GENERALLY THE SAME THING

E.G., LANDSCAPE QUALITY/CLEAN AIR/WILDLIFE

- THEY CAN HAVE ZERO MARKET PRICE. YET, THEY WILL HAVE ECONOMIC VALUE AS LONG AS AT LEAST ONE PERSON DERIVES UTILITY