FUNGSI EKOLOGI & METODE PENILAIAN EKONOMI

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Tujuan Instruksional Khusus

Setelah mengikuti perkuliahan ini diharapkan mahasiswa dapat menjelaskan tentang:

1. Fungsi ekologis sumberdaya perikanan
2. Metode penilaian ekonomi
3. Monetary valuation
4. Cost-benefit analysis (CBA)

Choose the chosen choices..

Fisheries management: an economic problem

→ Sea has many uses and functions

Economic questions:

1. How can we protect the fisheries environment at minimum costs?
2. How can we find the right balance between different interests?

Values and valuation!

What trade-offs exist with regard to the sea?

How can we analyze those trade-offs?

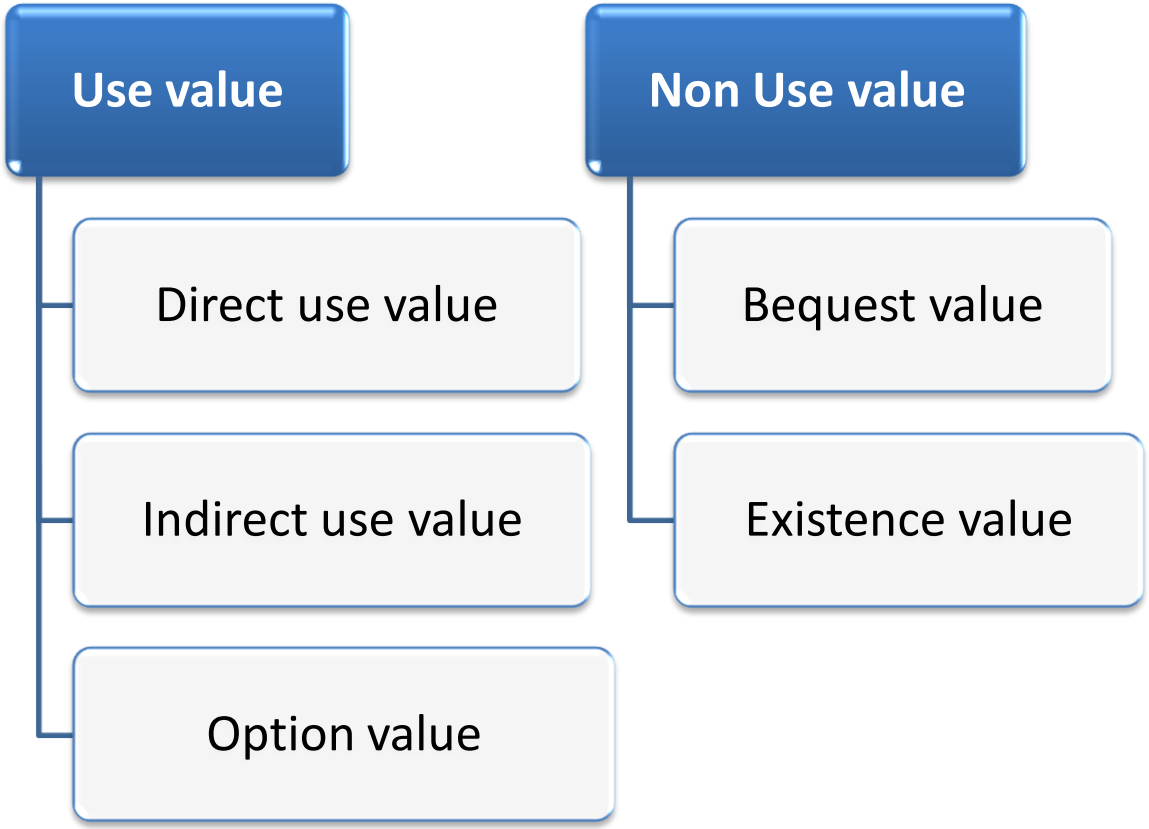
Can we measure the economic value of the sea?

Value of the sea

- Laut Indonesia memiliki nilai ikan sebesar 700 miliar ?
- Apakah Laut Indonesia berharga senilai 700 miliar?

Economic value of the environment

"Does it make human beings happy or unhappy?"



Direct use value

- Value derived from direct use
  - Fish from ocean
  - Wood from forest
  - A walk in the park
  - Whale watching
- Some may have a market price
- Some may not → use valuation method

Indirect use value

- Value derived from indirect use
  - Inedible fish has indirect use value if edible fish depends on it
  - Ecosystem process like nutrient cycling
- Seldom has market price
  - Insufficient information
  - Market price attached to direct use
  - needed models for quantification

Option value

- The exact value of some environmental goods maybe uncertain

  → eg. Medicinal value of a species
- WTP (willing to pay) for species A with a certain value 100,000 rupiah?

  WTP for species B with an expected value 100,000 rupiah?

Bequest value

→ A good for the use of others

→ Use for the next generations: biodiversity, monuments

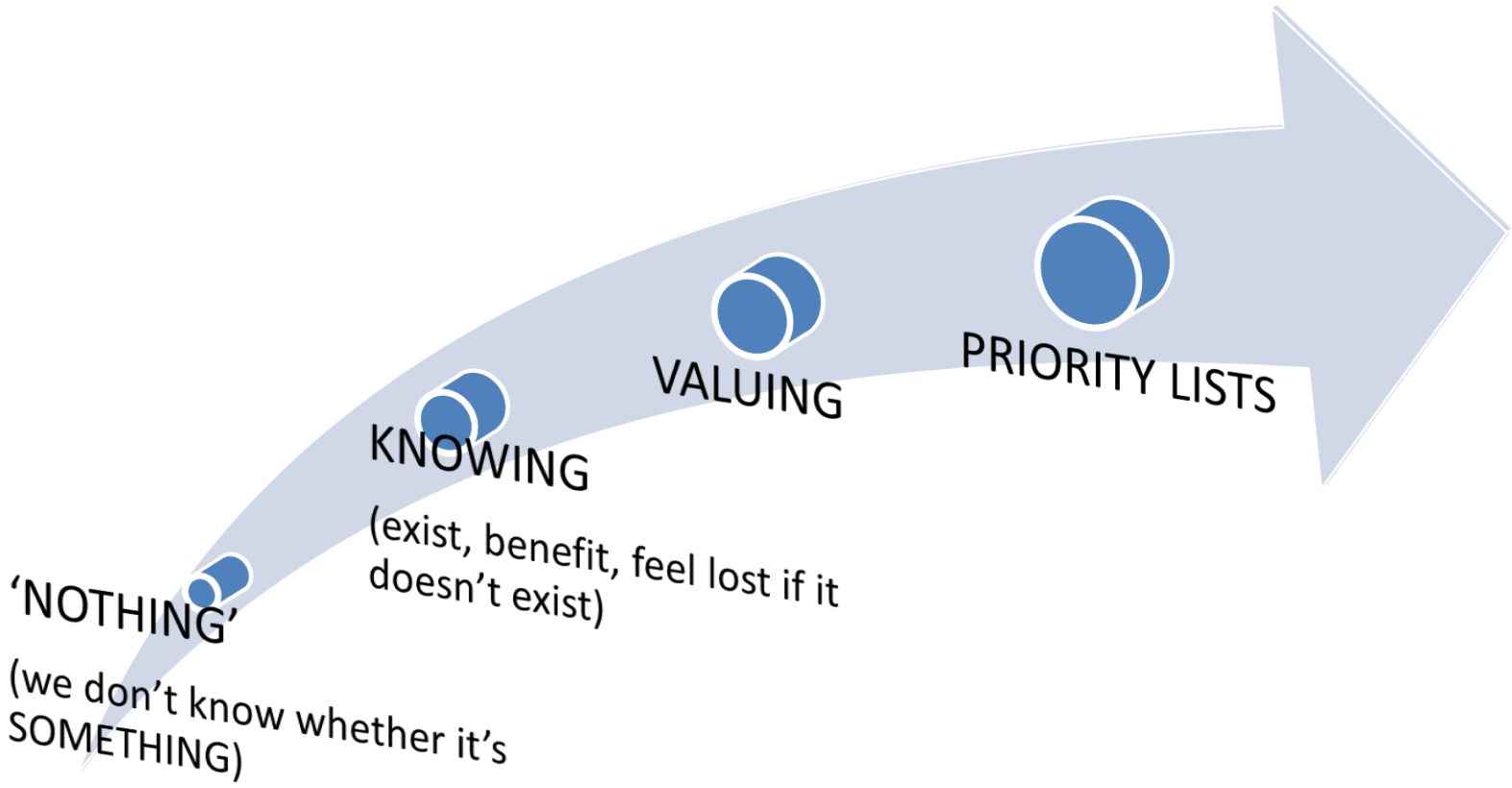
Existence value

→A good by itself

→Problems with existence value:

- Everything can have existence value
- Existence is difficult to measure
- Can something have a value if you don't know it?

Valuing Scheme



Priority list: Cost Benefit Analysis

CBA "…a decision making tool to evaluate and compare project and policies by systematically:

- Identifying;
- Quantifying;
- Valuing; and
- Comparing

the positive (benefits) and negative (costs) effects".

It explicitly aims to express **all** effects in monetary terms

Steps in Cost Benefit Analysis

1. Identify alternatives
2. Identify incremental effects of alternatives
3. Quantify incremental effects
4. Monetize incremental effects
5. Discount all future effects
   - Calculate Present Value of benefits and costs
6. Compare discounted benefits and costs
   - Net Present Value
   - Internal Rate of Return
   - Benefit Cost Ratio

Example: Wind energy

On shore wind farm

Offshore wind farm

- CO2 Neutral
- Costs
- Onshore: Effects on birds
- Offshore : Effects on benthos, birds

Three (or four) alternatives

The alternatives

- Do nothing
- Conventional power plant
- Onshore wind farm
- Offshore wind farm

Do Nothing

Year	1	2	3	4	5
Increase in energy production	0 Peta Joule	0 PJ	0 PJ	0 PJ	0 PJ
Costs	0 €	0 €	0 €	0 €	0 €
Change in bird collision	0	0	0	0	0
Change in benthos species richness	0	0	0	0	0
Change in CO2 emission	0	0	0	0	0

Conventional Power plant

Year	1	2	3	4	5
Increase in energy production	1 PJ	1 PJ	1 PJ	1 PJ	1 PJ
Costs	300 €	100 €	100 €	100 €	100 €
Change in bird collision	0	0	0	0	0
Change in benthos species richness	0	0	0	0	0
Change in CO2 emission	50	50	50	50	50

Onshore wind farm

Year	1	2	3	4	5
Increase in energy production	1 PJ	1 PJ	1 PJ	1 PJ	1 PJ
Costs	500 €	50 €	50 €	50 €	50 €
Change in bird collision	2000	2000	2000	2000	2000
Change in benthos species richness	0	0	0	0	0
Change in CO2 emission	0	0	0	0	0

Offshore wind farm

Year	1	2	3	4	5
Increase in energy production	1 PJ	1 PJ	1 PJ	1 PJ	1 PJ
Costs	1200 €	200 €	200 €	200 €	200 €
Change in bird collision	4000	4000	4000	4000	4000
Change in benthos species richness	50	50	50	50	50
Change in CO2 emission	0	0	0	0	0

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Monetary value of effects

Effect	Value	Possible methods
Energy production	€ 300 million per PJ	Market value of energy
Bird collision	€ 40,000 per bird	Contingent valuation survey
Number of benthic species	€ 400 million per year for the entire change	Contingent valuation survey Use value of nursery function
CO2 emissions	€ 2 per tonne	Expected damage from climate change

Calculate monetary of all incremental effects! (See excel file)

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Discounting

..Calculate PVB, TPVB, PVC, TPVC of all incremental effects of the alternatives at an interest rate of 5%!

Suatu nilai Vo akan bernilai:

$Vo(1+p)$	pada tahun depan (tahun pertama)
$Vo(1+p)(1+p)=Vo(1+p)^2$	pada tahun ke-2
$Vo(1+p)^t \rightarrow Vt$	pada tahun ke-t

Maka $Vo=Vt/(1+p)^t$

Discounted benefits in year t

$$PVB_t = \frac{B_t}{(1+\rho)^t}$$

Total discounted benefits in year t

$$TPVB = \sum_t PVB_t = \sum_t \frac{B_t}{(1+\rho)^t}$$

Discounted costs in year t

$$PVC_t = \frac{C_t}{(1+\rho)^t}$$

Total discounted costs in year t

$$TPVC = \sum_t PVC_t = \sum_t \frac{C_t}{(1+\rho)^t}$$

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Comparing costs and benefits

- Net Present Value (NPV)

  → Absolute differences between benefit and cost
- Benefit-cost ratio

  → Benefit divided by cost
- Internal rate of return

  → Interest rate at which PVB=PVC (NPV=0)

A project worthwhile if…:

- NPV > 0
- BCR > 1
- IRR > market interest rate

Notes

1. IRR is insensitive to interest rate
2. BCR depends on cost definition
3. Point 1 and 2 can't use for comparing projects
4. NPV is the only measure to compare projects

   When positive → project is worthwhile

   Choose project which the largest NPV

Thank you...

Choose the worth choices
for your generation!