

# Anthropogene Beeinflussung & Nachhaltige Nutzung von Ökosystemen (OP1,OG2 )

für Geoökologie Master (ÖS-Analyse &  
Umweltmanagement)

Th. Koellner, B. Trancón y Widemann, M. Hauhs  
Ecosystem Services, Ökologische Modellbildung

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# Anthropogene Beeinflussung von Ökosystemen

- **Michael Hauhs**

1. Überblick
2. Grundlagen des Kulturvergleichs
3. Klassifikation Güter
4. Vererbung von Reichtum

- **Thomas Koellner**

5. Ökonomische Bewertung von Natur
6. Ökologische Bewertung von Produkten
7. Bewertung von Mensch-Umwelt Systemen

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# **Economic Valuation of Nature II**

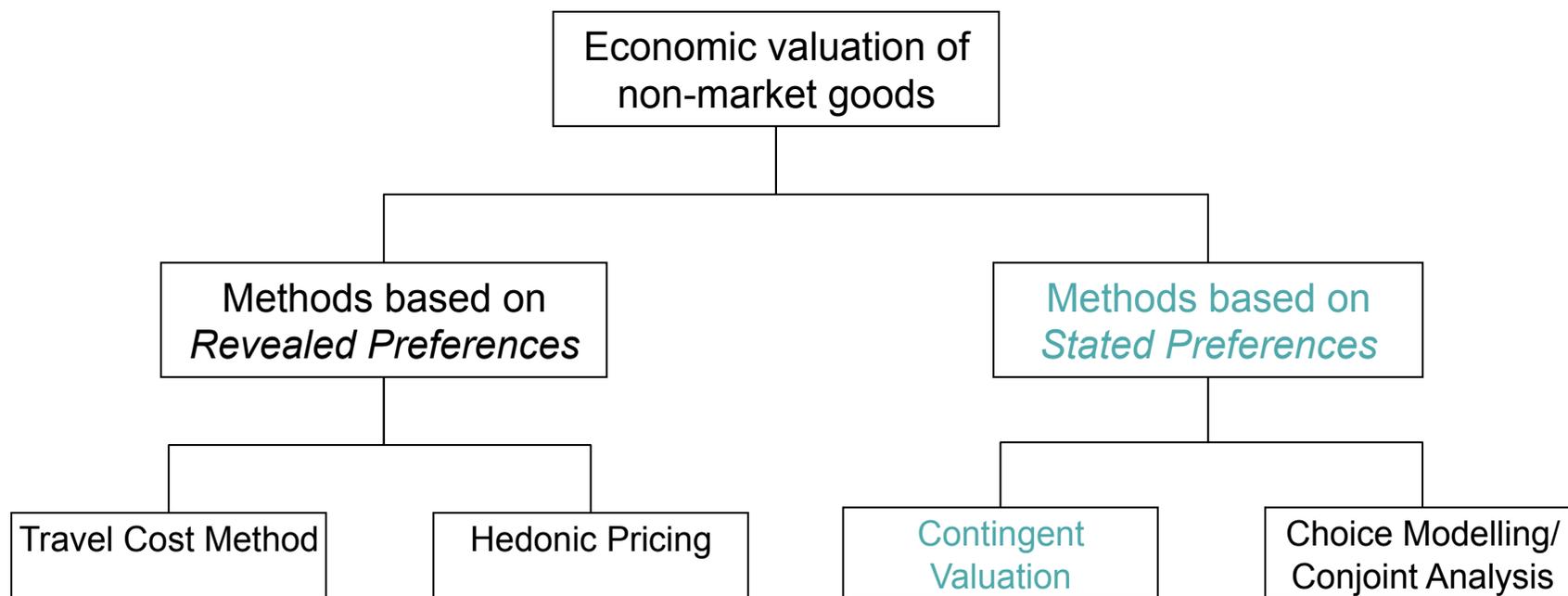
**Anthropogene Beeinflussung von Ökosystemen,  
MSc Geoökologie, Summer term 2010**

Prof. Dr. Thomas Köllner

Professorship of Ecological Services (PES), University of Bayreuth

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# Economic valuation methods based on preferences



Source: based on Bateman et al. (2002: 30)

# CONTINGENT VALUATION METHOD APPLIED

## Basic idea of CVM

- Assess the willingness to pay (WTP) for the provision of an environmental good or service, which has no market value
  - Intact forest in watershed, scenic beauty, species diversity, water purification service of swamp
- WTP is *contingent* on the specific circumstances described in the CV scenario
  - Amount of environmental good
  - Programme to provide good
  - Payment mechanism

## Basic assumptions

- Individuals have true, but hidden preferences
- They can express their values for environmental goods in monetary units
- The sum of the individual preferences in \$ equals the societal preference

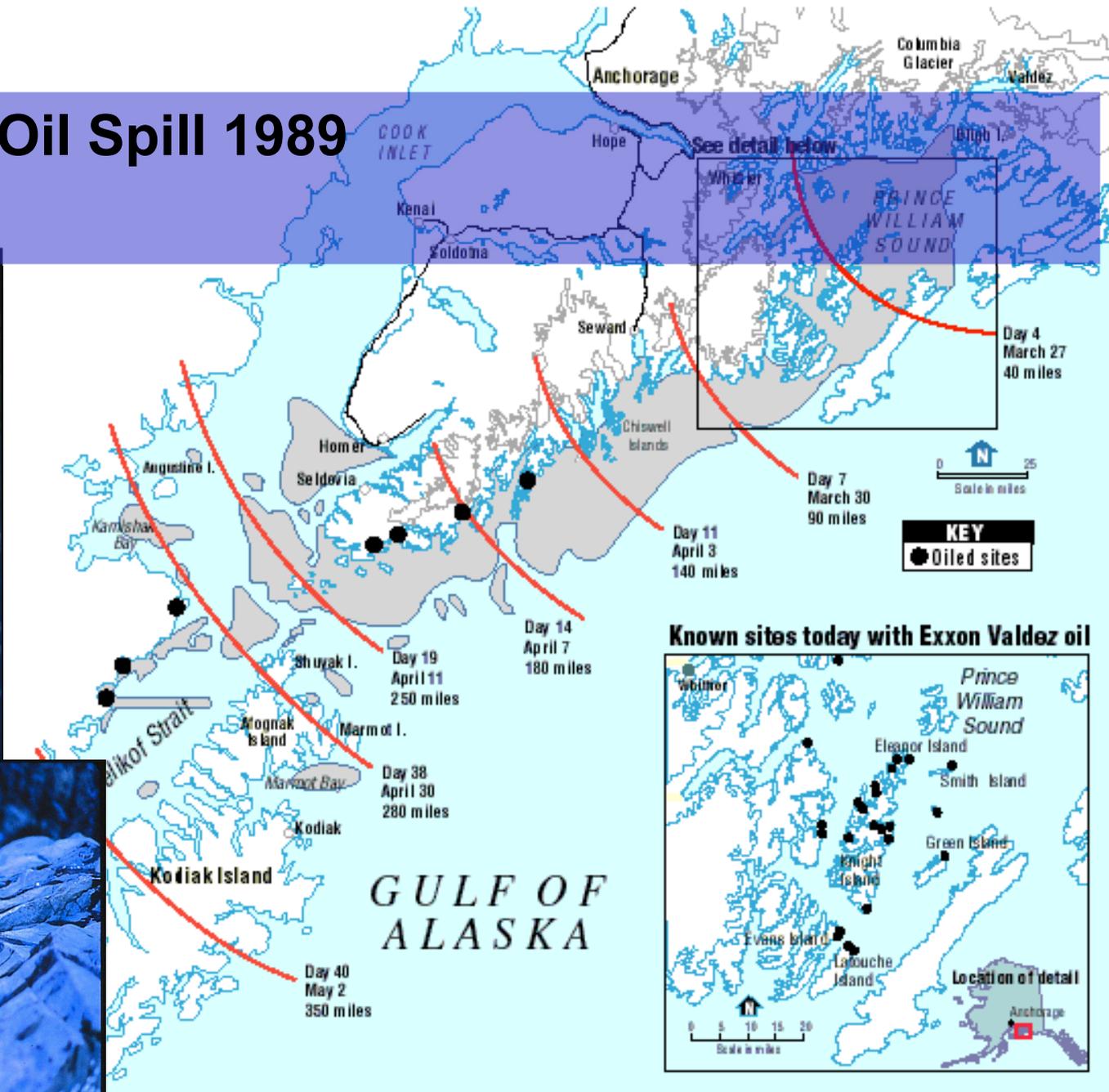
# Exxon Valdez Oil Spill 1989



[www.adn.com/evos/](http://www.adn.com/evos/)

# Spread of oil from the Exxon Valdez

## Exxon Valdez Oil Spill 1989



Sheries Service

RON ENGSTROM / Anchorage Daily News

## Legal framework

- Oil Pollution Act of 1990 (OPA) and the regulations that National Oceanic and Atmospheric Administration (NOAA) enacted under it for natural resource damage assessments.
- The regulations stated: “NOAA believes that the trustee(s) should have the discretion to include passive use values as a component within the natural resource damage assessment determination of compensable values
- Passive use values in the sense of non-use values

# The survey: Information about the region

## BOX A

### SHOW PHOTO A

This photograph shows Valdez from the air. This is the town (POINT) and across from the town is the terminal where the oil is piped onto tankers (POINT). These are some tankers (POINT).

The tankers go through the narrows here (POINT) into Prince William Sound. The Exxon Valdez tanker went aground on an underwater reef about here (POINT).

This whole area (POINT) is Prince William Sound.

### SHOW PHOTO B

The next photo shows a view of part of the Sound.

As you can see, it is ringed with high mountains. In many areas there are glaciers that break up and produce small icebergs. This photo shows the Columbia Glacier which is more than 100 feet high (POINT TO GLACIER WALL). Icebergs from this glacier sometimes float into the shipping lanes.

### SHOW PHOTO C

As you can see in the next photo, the area is largely undeveloped.

Most of the land has been set aside as national forest and state parks. People use the area for fishing, boating, camping and other recreation. In the whole area there are only a few small towns.  
(PAUSE)

Carson 2003

## The survey: Information about the costs of clean-up

### **SHOW PHOTO J**

The next photo shows some of the cleanup activity that took place in the summer after the spill. One of the cleanup techniques was to wash as much of the oil as possible off the shore into the water where it was scooped up by special equipment and taken away. It was not possible to remove all the oil from the rocky beaches in this way because some had already soaked into the ground and couldn't be washed out. Scientists believe that natural processes will remove almost all the remaining oil from the beaches within a few years after the spill. (PAUSE)

Carson 2003

## The survey: Information about nature

### BOX B

During the period of the spill there were about one and a half million seabirds and sea ducks of various species in the spill area inside and outside Prince William Sound. (POINT)

As you can see from this card, 22,600 dead birds were found. (POINT)

The *actual* number of birds killed by the oil was larger because not all the bodies were recovered. Scientists estimate that the total number of birds killed by the spill was between 75,000 and 150,000.

About *three-fourths* of the dead birds found were *murre*s, the black and white bird I showed you earlier. This is shown on the first line of the card. (POINT)

Because an estimated 350,000 murre live in the spill area, this death toll, though high, does *not* threaten the species.

One hundred of the area's approximately 5,000 bald eagles were also found dead from the oil.

The spill did *not* threaten any of the Alaskan bird species, including the eagles, with extinction. (PAUSE)

Bird populations occasionally suffer large losses from disease or other natural causes. Based on *this* experience, scientists expect the populations of all these Alaskan birds to recover within 3 to 5 years after the spill. (PAUSE)

Carson 2003

## The survey: Information about a program to prevent oil spills in the future

- Respondents were told that if the program were put into effect, two large Coast Guard ships would escort each tanker throughout its journey in Prince William Sound.
- The escort ships would help prevent an accident and, if an accident occurred, they would keep even a very large spill from spreading beyond the tanker.



Carson 2003

## The valuation question

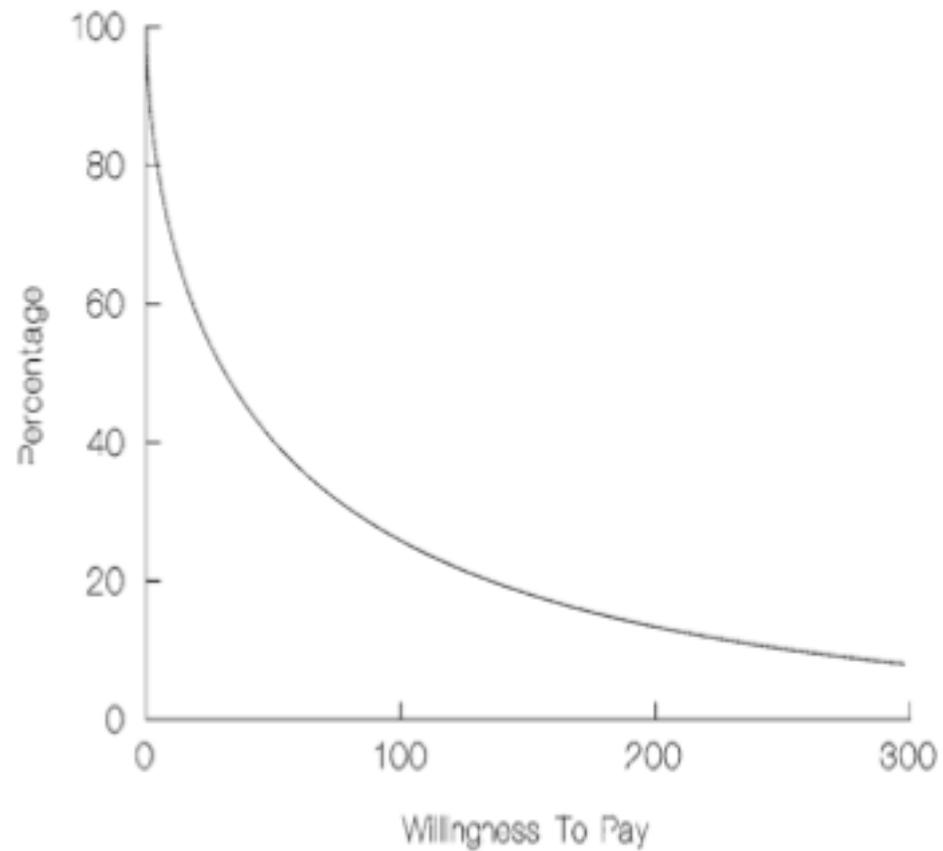
- Discrete-choice referendum elicitation format
- It asks whether the respondent would vote for the program if it cost a specified amount that would be paid by a one-time federal tax payment.

*Table III. A-15 response by version*

Version	No	Not sure	Yes
A (\$10)	29.92%	2.65%	67.42%
B (\$30)	39.33%	8.99%	51.69%
C (\$60)	43.53%	5.88%	50.59%
D (\$120)	59.14%	6.61%	34.24%

Carson 2003

# Agreement in % as a function of WTP



*Figure 1.* Percent willing to pay as a function of program cost.

Carson 2003

## Implication of CVM Study on Exxon Valdez oil spill

- American public's willingness to pay to avoid an Exxon Valdez type oil spill was \$2.8 billion (Carson et al. 1992)
- Exxon had to pay this amount of money as a compensation

### A CONTINGENT VALUATION STUDY OF LOST PASSIVE USE VALUES RESULTING FROM THE EXXON VALDEZ OIL SPILL

Richard T. Carson

Robert C. Mitchell

W. Michael Hanemann

Raymond J. Kopp

Stanley Presser

Paul A. Ruud

November 10, 1992

A Report to the Attorney General of the State of Alaska

## Limitation of CVM

- Scale error
- Embedding
- Warm-glow
- Vehicle bias
  
- Extrapolation of WTP to total population
  
- Limits of monetary techniques to echo intrinsic or ethical values

## Other examples based on CVM

- Meta-study on the world's ecosystem services and natural capital (Costanza 1997)
  - partly based on WTP
  - The value of the entire biosphere was estimated to be in the range of 16-54 trillion ( $10^{12}$ ) US \$
- Fair trade coffee at ETH
  - 90% of 1500 Persons are willing to pay 10 Rappen per cup more for fair trade coffee

## Two survey approaches

- CVM study
  - Preferences
  - Give precise information
  - Allow informed decision of programm
  - Similar to referendum
- Psychological study
  - Preferences
  - Do not influence interviewee with information
  - Reveal hidden preferences

# CONCLUSION

# Conclusion

- CVM is one of a suite of valuation techniques
- Application of CVM
  - Liability: Damage assessment of environmental accidents
  - Marketing: for assessing consumers' willingness-to-pay for organic food, fair trade coffee, FSC wood, ecosystem services
  - Public programmes: Planning of programmes to provide ecosystem goods and services
- However, severe methodological limitations

## Literature

- Bateman, I.J., Lovett, A.A. and Brainard, J.S., 2003. Applied environmental economics: A GIS approach to cost-benefit analysis Cambridge University Press: Cambridge.
- Carson et al. Contingent valuation and lost passive use: damages from the Exxon Valdez oil spill. Environmental and Resource Economics (2003) vol. 25 (3) pp. 257-286
- Freeman III, A.M., 2003. The Measurement of Environmental and Resource Values. Theory and Methods. Resources for the Future: Washington DC.