"Of politics and nature: boundary conditions, information, and limits to political action"

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Biodiversity policy

- Planning and execution of policy to improve on well defined biodiversity parameters

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Two cases of biodiversity policy

- King Crab (Paralithodes camtschaticus)

- Gyrodactylus salaris
  – Fresh water pest killing young salmon and stressing older
  – Eradication program by poisoning all life in infected rivers

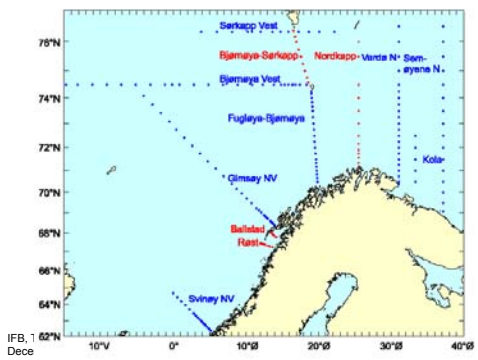## The King Krab
(Paralithodes camtschaticus)

- Introduced by Russians during the 1960ies
- Treaty Russia-Norway 1978
- Creating problems for Norwegian fishers early 1990ies
- First commercial harvesting in Norway 2002

Figur 5.4.1   Antatt utbredelse av kongekrabben i den sørvestlige Barentshavet fra utsettingsperioden på 1960-tallet og fram til i dag.
Approximate distribution of the red king crab in the Southeast Barents Sea at time intervals since the introduction in the 1960ies.

By 2002: Half way to Bjørnøya

Is the King Crab a problem?

- There are some indications that it might be
- There is little research to determine if it is
- It is by definition a problem according to the CBD

- In any case: the political will to do much of anything in this case is lacking
- What does that mean?

Meaning of "Lack of political will"

- The government does not believe there is reason to do anything.
- There is a large gap between what the government says it will do, and what it really does
- The government does not know how to do something it would have done if it was possible

Sources of "political will"

- Lobbying by powerful groups
  - Environmental NGO's are not powerful
- Public opinion
  - Information campaigns competing against all other types of "news"
- Politicians caring about more than their own re-election may be a foundation for informed governance

Informed governance

- Moral appeals do not work
- Sensational stories do not work

- Practical advice on what to do may work
  - Can we give such advice?

Causes of resource depletion

- The unsustainable high rate of human population growth
- The steadily narrower spectrum of traded production from agriculture, forestry and fisheries
- Legal and institutional systems promoting unsustainable exploitation
- Economic systems and policies that fail to put high value on biodiversity
- Habitat destruction
- Introductions of alien/ exotic species

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Focus on "subtle" effects

- The bad
- The good
- The subtle
    - Everyday, repetetive human activities affecting natural processes of ecosystems
    - Marginal changes in such behavior with cumulative impacts
- Business as usual in democratic polities

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Hatfield forest: "The Last Forest"

- Why did birch start to outcompete Ash, Maple, Hazel and Oak from about 1920 onwards?
- Changes in behavior of oak and birch
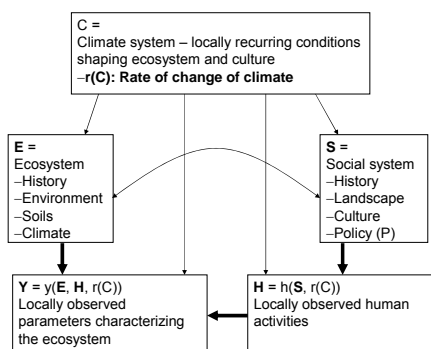- Human activites preparing the way for birch

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Establishing causal relations between policy variables and ecosystem parameters

- Causal forces go through human activities
- Unit of analysis (like Hatfield forest) must link human activities and impacts on ecosystem at a scale where marginal change in behavior can be related to maginal changes in ecosystem characteristics

C =
Climate system – locally recurring conditions shaping ecosystem and culture
−**r(C): Rate of change of climate**

E =
Ecosystem
−History
−Environment
−Soils
−Climate

S =
Social system
−History
−Landscape
−Culture
−Policy (P)

Y = y(**E**, **H**, r(C))
Locally observed parameters characterizing the ecosystem

H = h(**S**, r(C))
Locally observed human activities

Comments 1

- A long line of studies, particularly in anthropology, documents that there are mutual adaptations between the ecosystem and the culture of a local community. Long time interactions between humans and nature will shape both the ecosystem and the practices and beliefs of the people.
- The general conclusion is that because of interactions and feedbacks among various groups of variables, they all need to be included if what we want are true estimates of the impact of specific policy variables. This means that the number of variables will be very large. In order to use regression techniques to determine causal impacts one needs more cases than relevant variables, and one needs variables that vary.
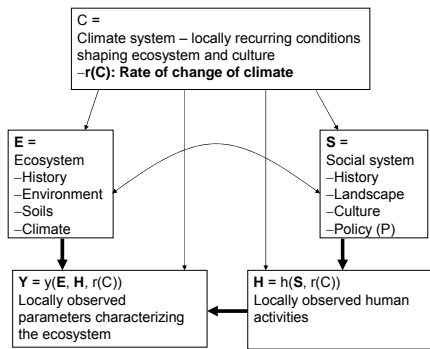
Comments 2

- Let Y denote the observed ecosystem characteristics within the unit of investigation no matter how this is delineated
- Within the same area we can also observe human activites in many ways, ranging from observing and talking to people in the area to archaeological and historical investigations of past activities.
- The human activites will be considered as having an observable impact on the ecosystem in the area.
- The unit of investigation is embedded in larger systems. This applies equally for the observed characteristics of the ecosystem and for the locally obseved human activites.

Comments 3

- The ecosystem has an internal dynamic. Its history and locally observed characteristics are shaped by the total configuration within a more inclusive environment as well as climate and soil charateristics.
- The social system also has a history embedded in a landscape where a system of governance, cutural values and the local traditions go together to shape the local activites of people.
- While the recurrent and natural fluctuations of climate can be assumed to have shaped the dynamic of ecosystems for a long time, the more recent, and probably, humanly induced trends in climate change represents a new stress on the ecosystem. The impact of this stress will vary systematically from area to area and in order to get true estimates of the impacts of policy, it is necessary to keep the impact of the rate of change in climate separate from other human impacts.

Comments 4

- It is also worth noting the this new trend in climate change also makes human societies change. New adaptive behavior emerge and new political forces appear. Climate change thus introduces a correlation between ecosystem characteristics and human behavior which is not causal in nature. In social science it is called a spurious correlation as distinct from a causal correlation.
- The rate of change in climate cannot be assumed to have an impact only on the more large-scale units of ecosystems and societies. Also locally the impact will be felt. Interacting with soils and environmental characteristics, the rate of change may have very specific outcomes locally.
- Also humans will change their behavior. Adapting to changes, using resources in new ways, and revising values and priorities will have observable outcomes on behavior.

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Linking ecosystem and policy

Assuming impacts can be seperated

$$Y = y(E, H, r(C), \varepsilon)$$

$$Y = f(E, P, S\text{-}P, r(C), \varepsilon)$$

- P = variables that can be manipulated politically $H = h(S, r(C)) = h(\{P \cup [S\text{-}P]\}, r(C))$

Regression analysis

- We need to establish whether a change in policy variable p_j implies a change in any of the ecosystem variables y_k

- Is it true that $\rho(p_j, y_k) \neq 0$?

- And if so, which β_j is the largest?

Difficulties

- problems related to the use of regression techniques
- problems of correcting for ecosystem dynamics and impacts of climate change
- practical problems of actually finding a sample and collecting data

Assumptions for using regression

- simple random sample of localities where both ecosystem parameters and human activities are observed.
- all relevant variables have to be observed
- across the sample, all relevant variables have to have sufficient variation

Relevant variables (1)

- Correlations
  - If an excluded variable correlates with both dependent and independent variables (like rate of climate change) estimates will be biased.
- Interactions
  - If the impact of one variable depends on what value a third variable has, both variables have to be included and the interaction modelled

For example:

- **Correlations of Ecosystem and Culture**: A long line of studies, particularly in anthropology, documents that there are mutual adaptations between the ecosystem and the culture of a local community. Long time interactions between humans and nature will shape both the ecosystem and the practices and beliefs of the people. If cultural practices also correlate with policy, leaving cultural variables out of the analysis will confound the estimate of the impact of policy.
- **Interaction of Climate and Culture**: In addition to, and maybe independent of, the adaptations between ecosystem and culture there will be a cultural adaptation to climate. Communities will adapt to changes in climate by using resources in new ways and by revising values and priorities. These changes will have observable outcomes on behaviours. It also seems reasonable to assume that the size of impact of a given practice (for example clear cutting forest) will be contingent on the climate. If climate variables are left out of the model the estimates of the impact of culture will be confounded with those of climate.

Relevant variables (2)

- The implications are that all groups of variables are needed

This means that

- The number of variables will be large
- The number of cases needed will be large
- The cost of the study will be high

To establish Causality

- Intitial and boundary conditions must be listed completely

- This is not feasible either for social systems of ecosystems

- Analytical conclusions are contingent and applicable locally and in the sort term

Conclusions

- Effective biodiversity policy needs "causal" theories
- These theories must be empirically established
- Results are applicable locally and in the short term
- Policy actions needs to be conducted in a learning environment and revised continuously