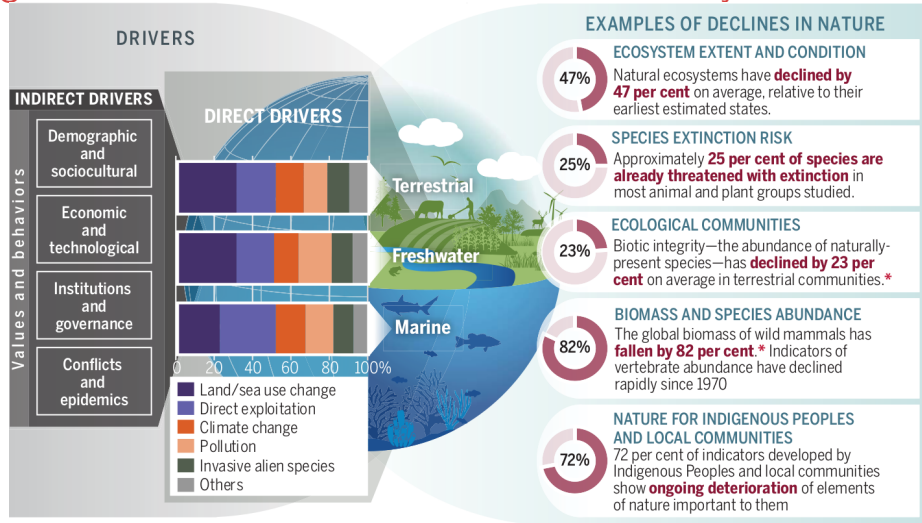


Improving the scientific basis for establishing sustainability in human-nature relationships

Martin F. Quaas

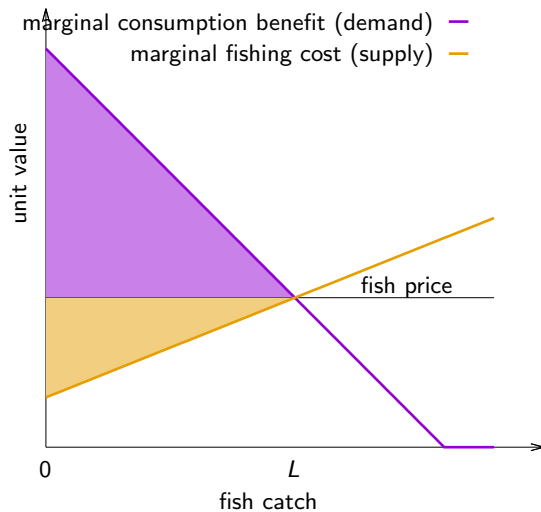
Symposium Biodiversitet of økonomi
Syddansk Universitet, 21. august 2020

IPBES global assessment: Direct drivers of biodiversity decline

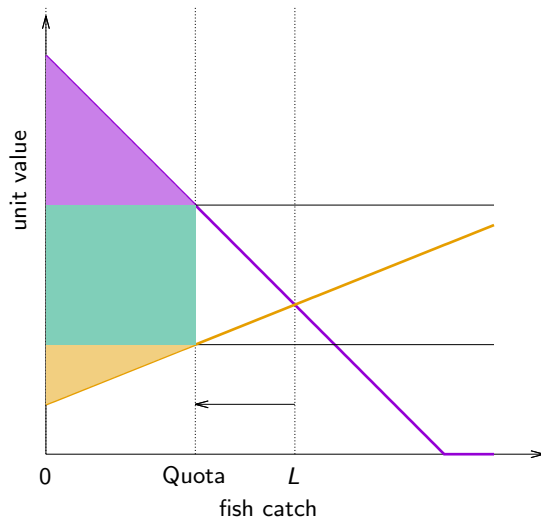


* Since prehistory

Renewable resource markets



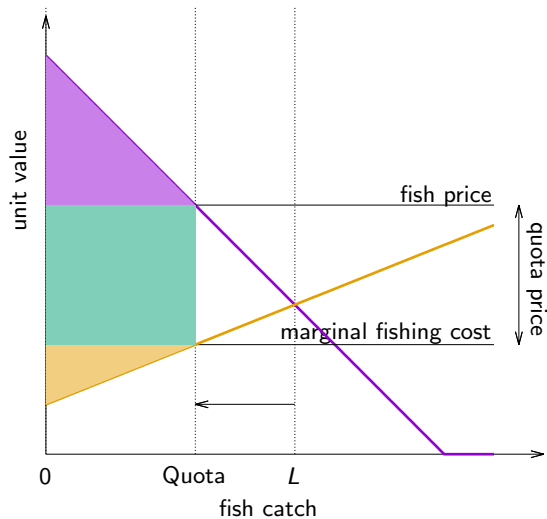
Renewable resource markets



- Restricting resource use $\hat{=}$ investment in natural capital



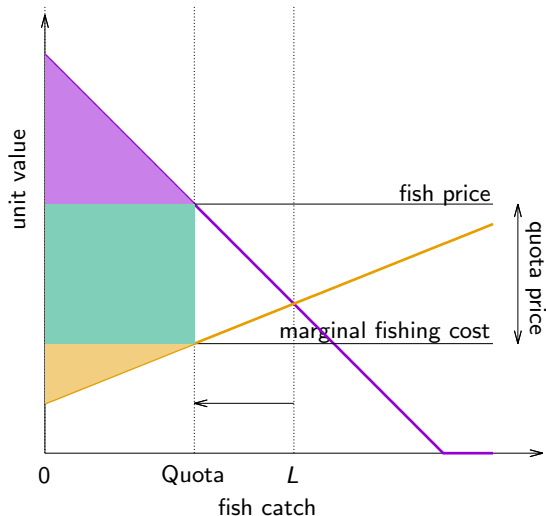
Renewable resource markets



- Restricting resource use $\hat{=}$ investment in natural capital
- Quota market price $\hat{=}$ marginal value of natural capital



Renewable resource markets

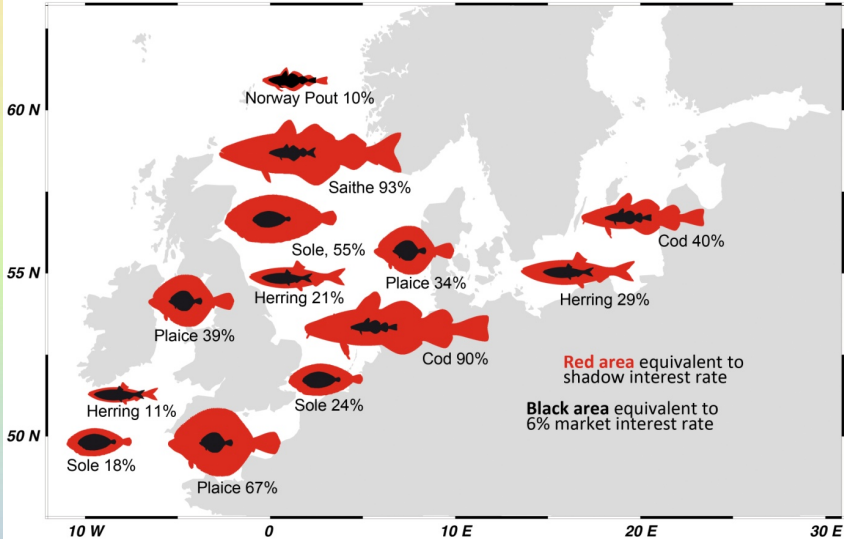


- Restricting resource use $\hat{=}$ investment in natural capital
- Quota market price $\hat{=}$ marginal value of natural capital $\hat{=}$ value of living fish
- Values in the fishery

	marginal fishing cost	value of living fish
unregulated fishery	100%	0%
efficient fishery	40%	60%

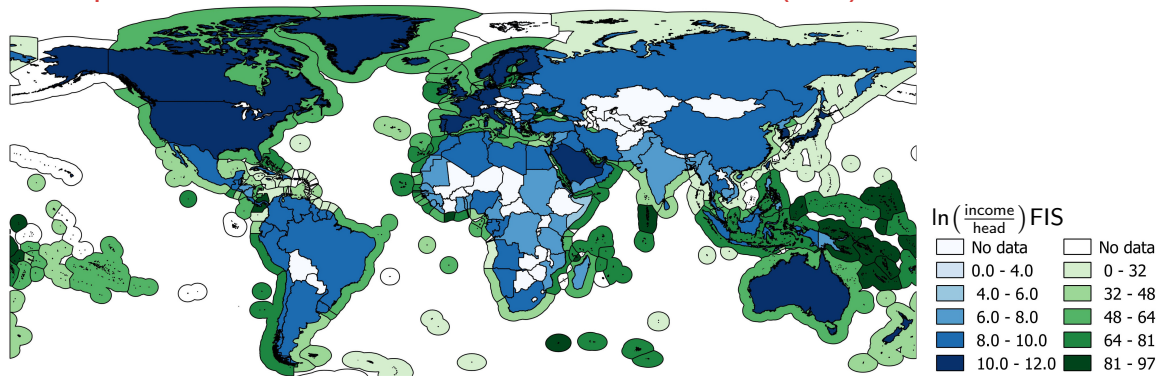


Shadow interest rates in European fisheries



- 'Shadow interest rate': rate of return for reducing fishing quota
- European fish stocks are an extremely attractive investment opportunity

Per capita income and state of marine fish stocks (FIS)



$$\text{FIS} = -0.45^{***}_{(0.16)} \text{ number of neighboring countries} - 2.6 \ln \left(\frac{\text{income}}{\text{head}} \right)_{(1.6)} + \text{controls}$$

state of mariculture (MAR):

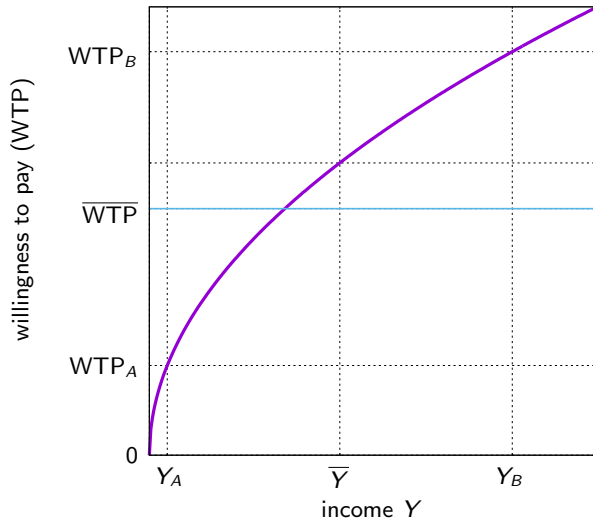
$$\text{MAR} = -0.10_{(0.19)} \text{ number of neighboring countries} + 6.7^{***}_{(2.0)} \ln \left(\frac{\text{income}}{\text{head}} \right) + \text{controls}$$

Markets and the economics of ecosystems and biodiversity

- Markets for private goods:
 - Market equilibrium: marginal production cost (supply) = marginal consumption benefit (demand)
 - Economic theory: Markets are efficient for private goods, i.e. goods which benefit only the customer
- Nature's goods and services benefit many
 - A fish population can sustain catches for many generations of fishers
 - A biodiverse forest provides recreational opportunities for many
- Economic theory: For natural goods and services, efficiency requires marginal cost of natural capital investment
$$= \text{sum of marginal benefits for all who benefit}$$

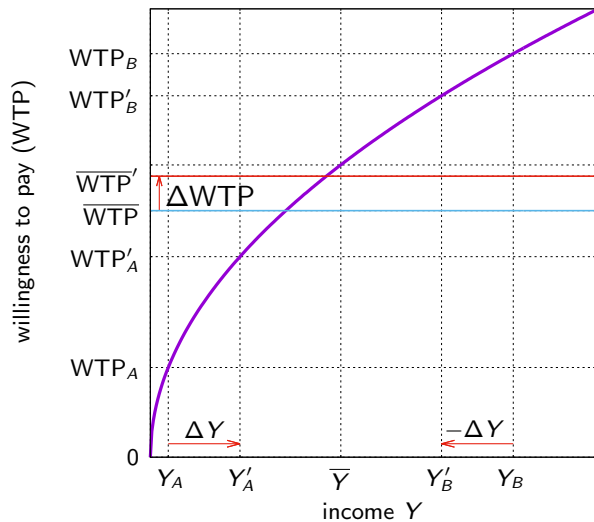


Economic inequality decreases the value of biodiversity



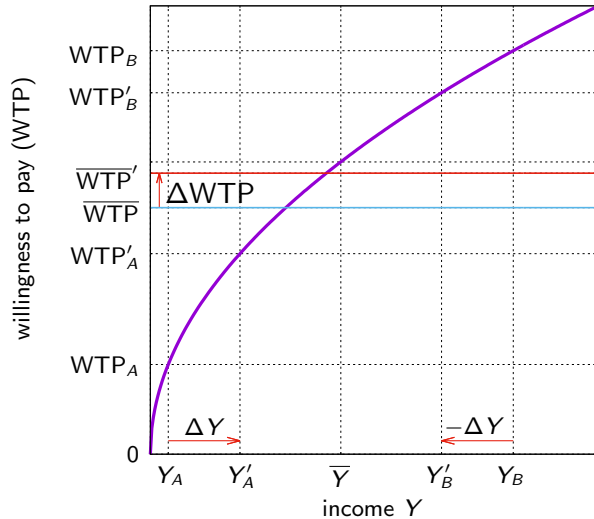
- empirical estimates of willingness to pay for biodiversity from Jacobsen/Hanley, ERE, 2009

Economic inequality decreases the value of biodiversity



- empirical estimates of willingness to pay for biodiversity from Jacobsen/Hanley, ERE, 2009
- a reduction of income inequality increases per-capita WTP for biodiversity

Economic inequality decreases the value of biodiversity

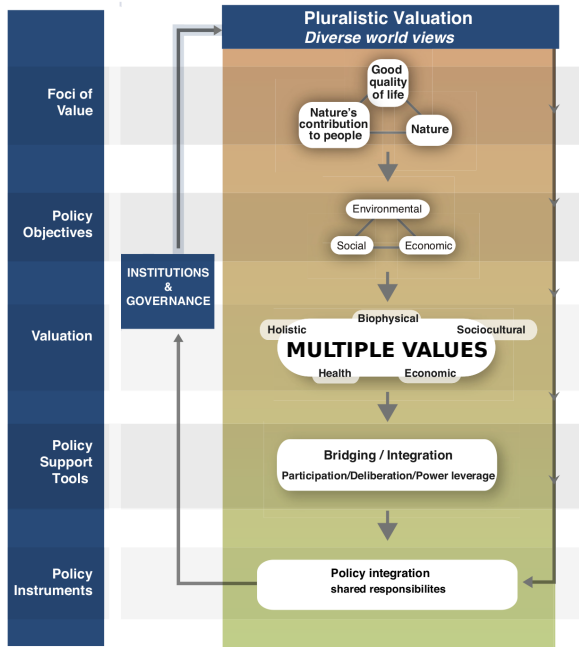


- empirical estimates of willingness to pay for biodiversity from Jacobsen/Hanley, ERE, 2009
- a reduction of income inequality increases per-capita WTP for biodiversity
- globally, income inequality reduces WTP for biodiversity conservation by 16%

Valuing nature's contributions to people: the IPBES approach

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Erik Gómez-Baggethun^{24,33,34}, David González-Jiménez^{4,35},
Joël Houdet³⁶, Hans Keune^{37,57}, Ritesh Kumar³⁸, Keping Ma³⁹,
Peter H May⁴⁰, Aroha Mead⁴¹, Patrick O'Farrell⁴², Ram Pandit⁴³,
Walter Pengue⁴⁴, Ramón Pichis-Madruga⁴⁵, Florin Popa⁴⁶,
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Bernardo B Strassburg^{50,51,52}, Marjan van den Belt⁵³,
Madhu Verma⁵⁴, Fern Wickson⁵⁵ and Noboyuki Yagi⁵⁶

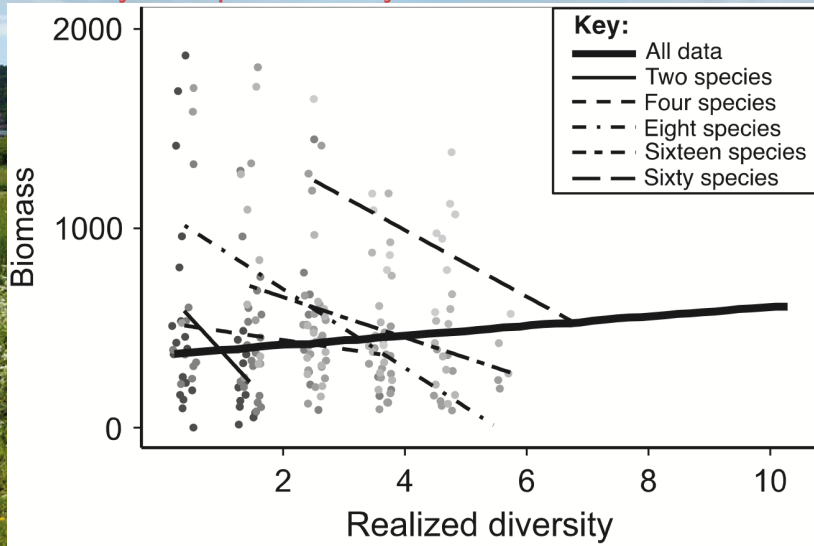


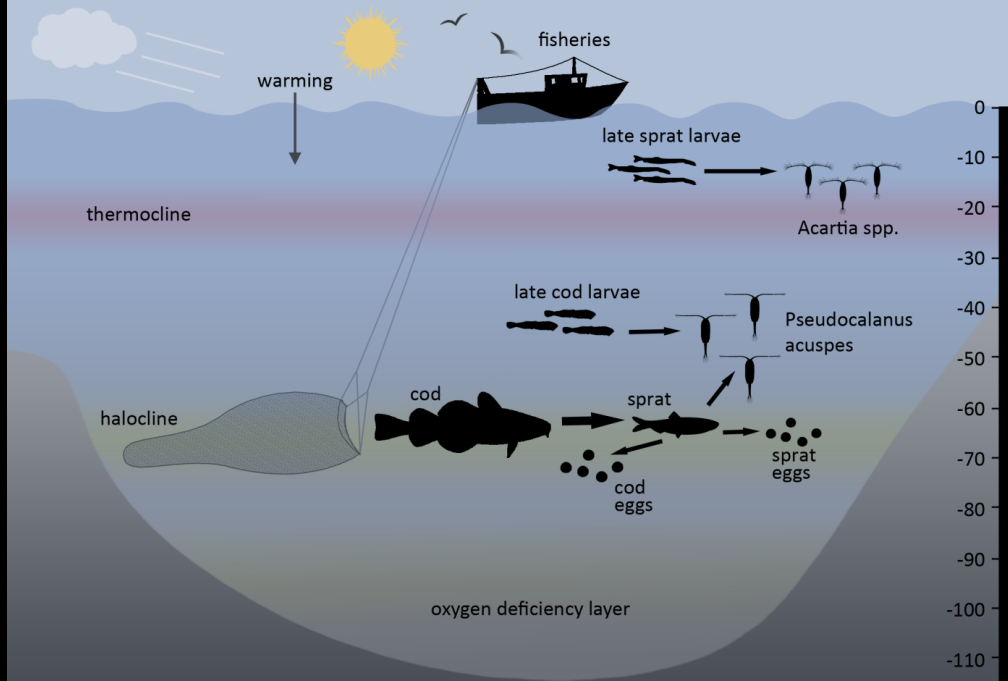


Biodiversity and productivity: Jena Experiment



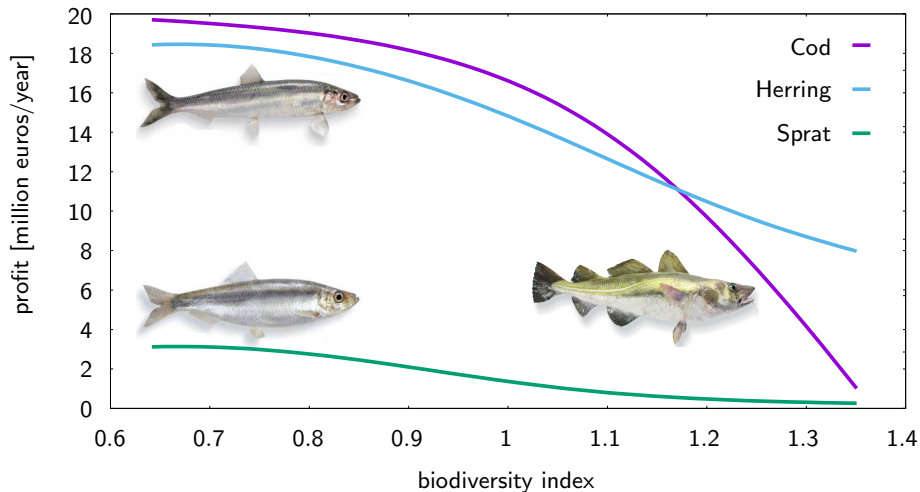
Biodiversity and productivity





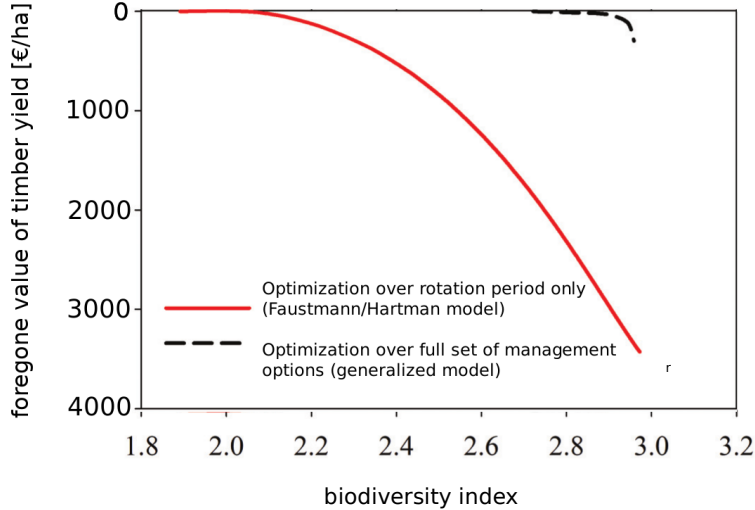
Biodiversity-profitability trade-off

optimal management of Baltic Sea fisheries



Biodiversity-profitability trade-off

optimal management of Boreal forestry

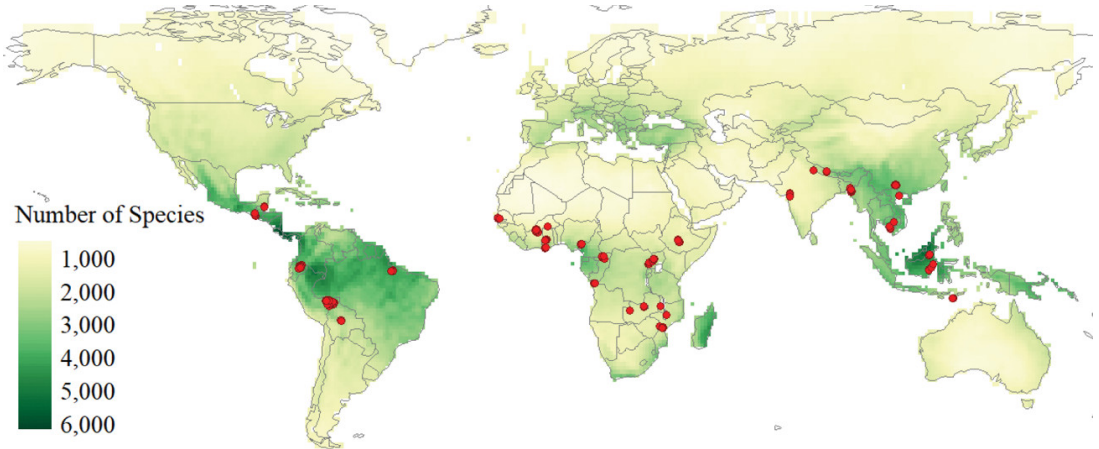


Biodiversity as natural insurance against drought

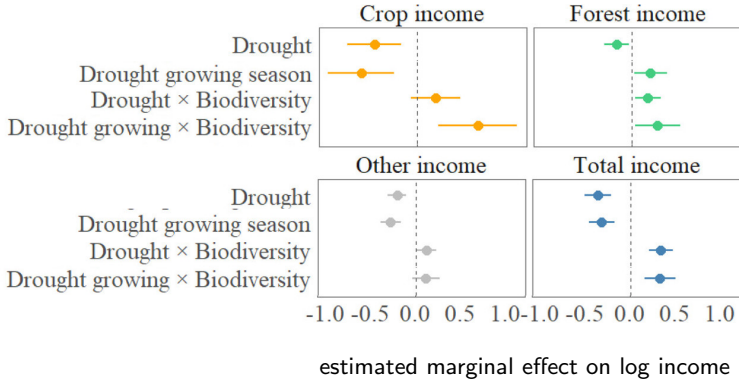


Biodiversity as natural insurance against drought

Panel data on 7,556 households in 23 countries



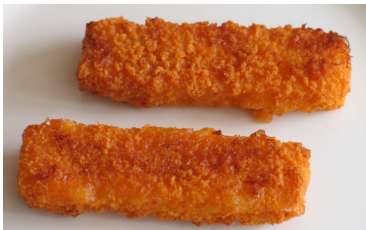
Biodiversity as natural insurance against drought



- biodiversity mitigates adverse effect of drought on income

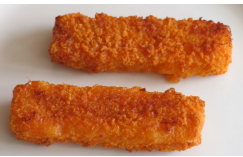
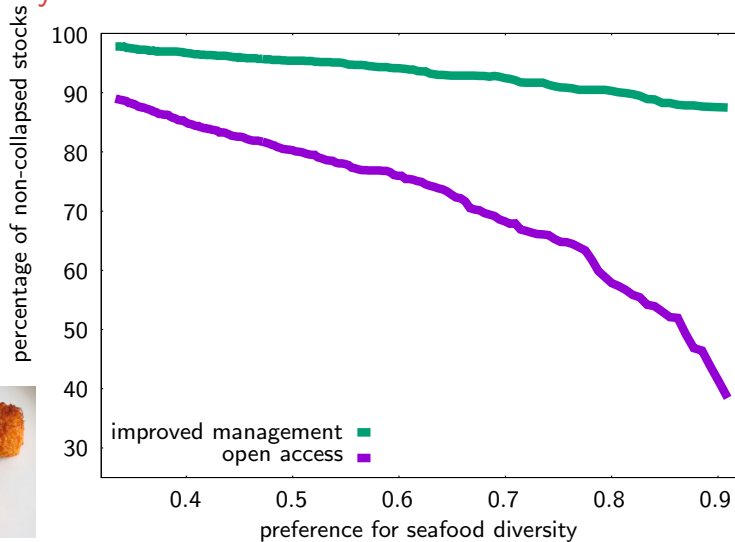
'Love of variety' on resource markets

- Marine biodiversity has an economic value, as consumers value seafood diversity



- How does this 'love of variety' affect ocean fish diversity?

'Love of variety' on resource markets



- Nature has multiple values for many, which need to be taken into account
 - Economic equality increases value of environmental public goods

- Investment in biodiversity conservation comes at a cost
 - Anticipated cost of conservation are often exaggerated
 - Optimal management can go a long way protecting biodiversity with small economic losses

- Conservation generates long-run economic benefits
 - Investment in natural capital generates high rates of return for fisheries
 - Biodiversity provides natural insurance
 - Preventing fish stocks from collapsing serves consumer 'love of variety' for seafood

- Integrated ecological-economic research can help
 - Valuing natural capital and costs of conservation
 - Assessing sustainability of resource use
 - Evaluating policy instruments

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