

Economic Impacts of Climate Change

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Outline

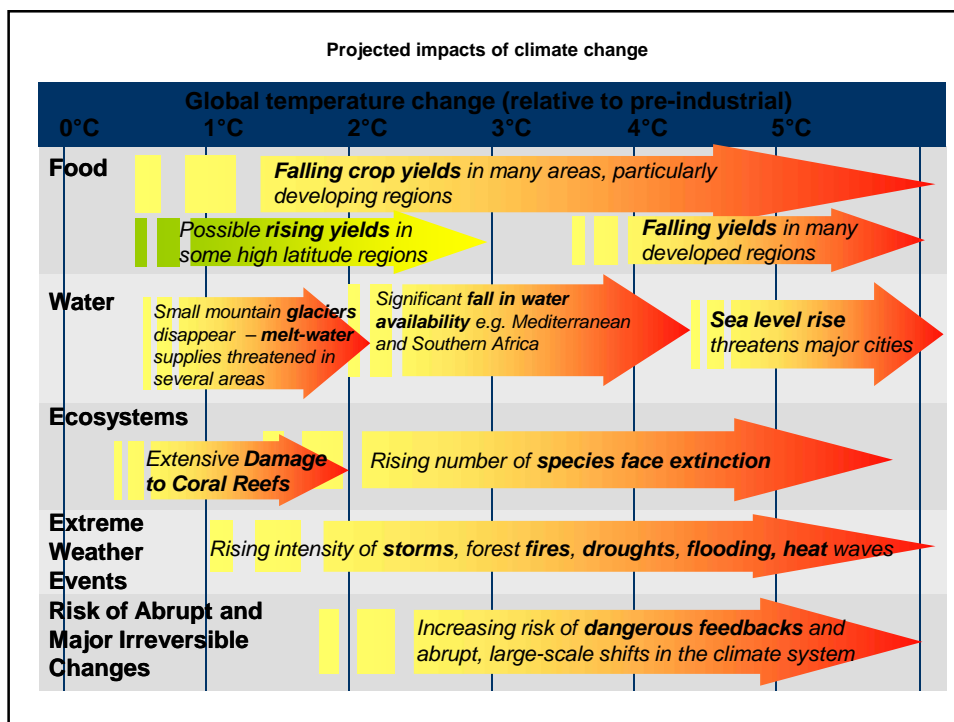
- Economic impacts of climate change
 - Integrated Assessment Models (IAM)
 - Environmental valuation of non-market goods
 - Impacts of ocean acidification
 - Conclusion
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Impacts of Climate Change

- ❑ Changing temperatures, precipitation and atmospheric composition affect plants and animals, both in managed and in unmanaged systems
 - ❑ The specialised are likely to loose, as are the marginalized
 - ❑ Climate change affects water (for drinking, irrigation, cooling), droughts and floods
 - ❑ Climate change affects energy production and consumption; tourism; construction; transport; labour productivity and so on
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Impacts of Climate Change - 2

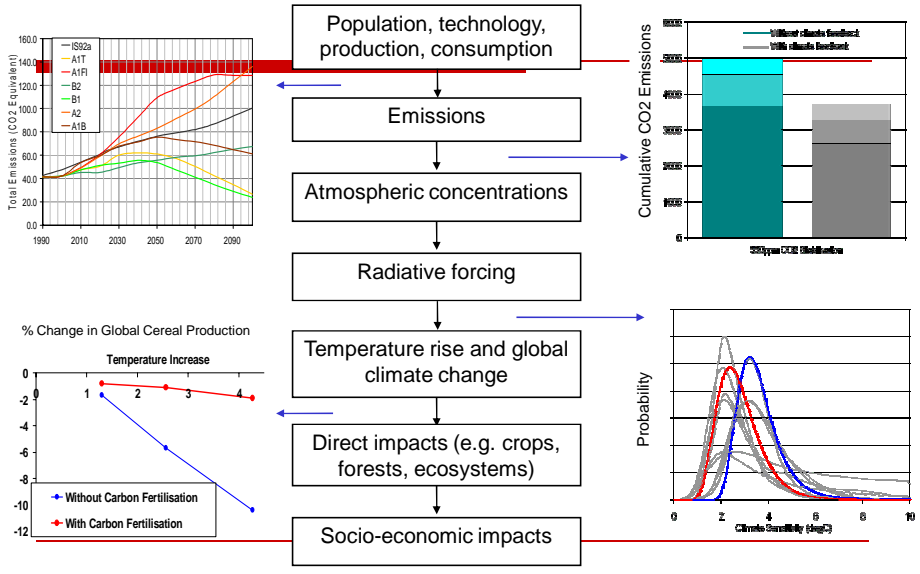
- ❑ Sea level rise leads to land loss and higher costs for coastal protection, wetland loss, salt intrusion
 - ❑ Climate change also affects human health, through heat stress (cardiovascular, respiratory), cold stress (cardiovascular), vector-borne diseases (malaria, dengue fever, schistosomiasis), other infectious diseases (cholera), water and food quantity and quality, air pollution, and extreme weather events
 - ❑ ...
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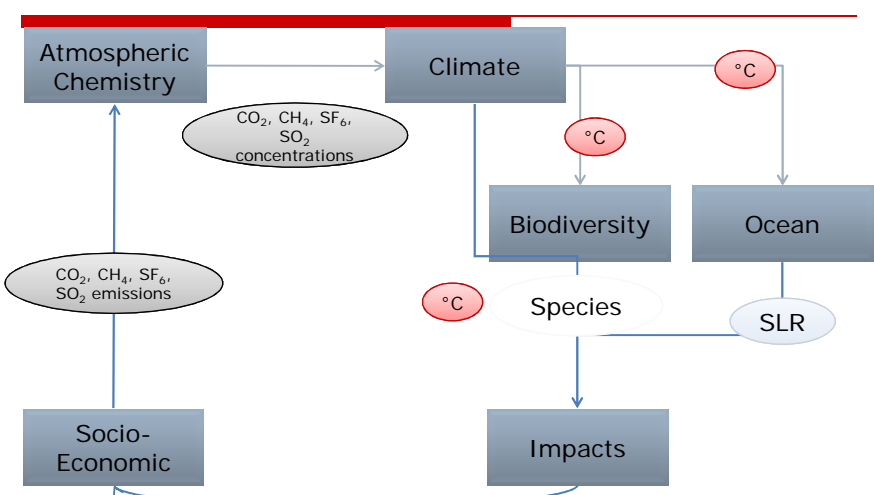
Impacts of Climate Change - 3

- Climate change has many different impacts, with different effects for different countries, sectors, times
- If one wants to get insights, high level indicators need to be used
- If one wants to compare the impacts of climate change to the impacts of emission reduction, include the impacts in the national accounts, or determine how much compensation should be paid, money is the appropriate indicator

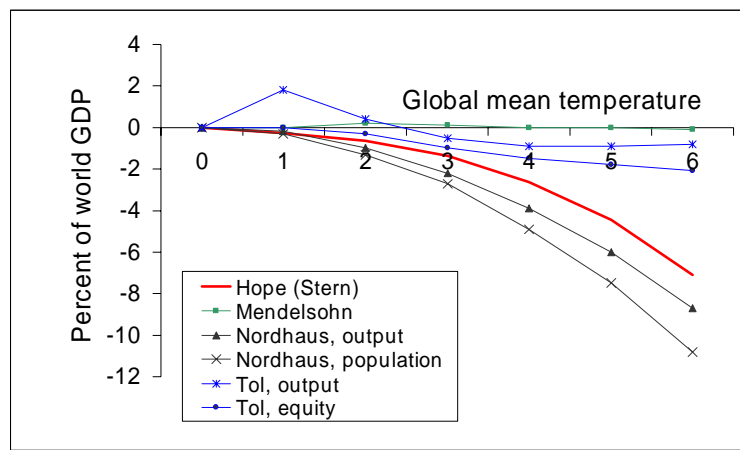
The economics of climate change is driven by natural science



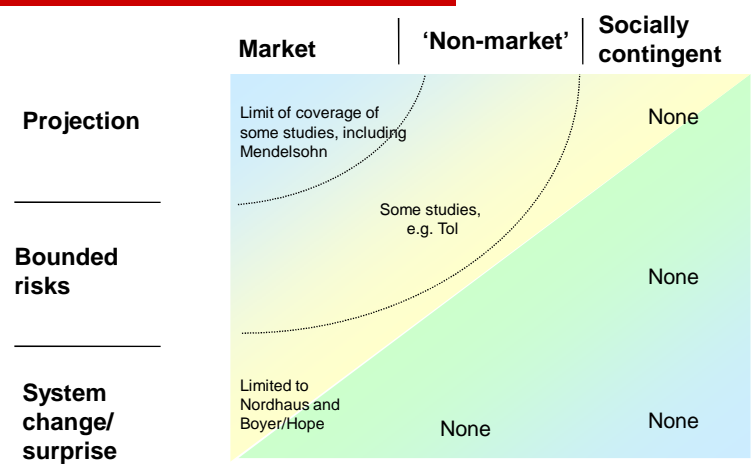
How does an IAM work?



Comparison of Integrated Assessment Model Output



- All models only have partial coverage of impacts
- Values in the literature are a sub-total of impacts



Source: Watkiss, Downing et al. (2005)

Impacts of ocean acidification are mostly ignored in integrated assessment models!

Why is that?

What is so special about environmental goods?

- Not all environmental goods and services are traded on markets
 - Individuals can derive value from environmental goods from more sources than direct consumption
 - Types of environmental services include:
 - source of materials input: fossil fuel, wood products, fish, water etc.
 - life-support services: liveable climatic regime, breathable atmosphere
 - Amenity services: recreation, wildlife observation, scenic view, passive use values
 - For some of these services markets do not reflect full social costs or benefits of a good
 - Market failure
 - Often public good character
 - Externalities
 - Lack of clearly defined property rights
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Non-market Valuation

- The aim is to express a welfare loss in an equivalent income loss
 - Two categories of methods exist
 - Direct methods
 - Hypothetical market (intended behaviour): e.g. Contingent valuation
 - Revealed preference methods (indirect methods)
 - Surrogate market: e.g. Hedonic pricing and Travel cost
 - People make choices within markets: prices paid and quantities purchased
 - Derive values people place on environmental amenities and disamenities from purchase decisions
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Existing Studies on Ocean Acidification

- Existing studies related to ocean acidification analyse the recreational value of coral reefs
 - These studies are either based on the contingent valuation approach (stated preferences) or the travel cost approach (revealed preferences)
 - Valuation is expensive, therefore, estimated values are extrapolated (benefit transfer) from one place to the next and from one case to the next – as values are highly context-specific, this introduces all sorts of uncertainties, which are not well-understood
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Travel Cost Model

- Method to value the use of natural resources for recreational purposes
 - Access to recreational sites command seldom a price
 - To enjoy a national park people must visit the park and this costs money
 - Basic premise: Time and travel cost expenses represent the „price“ of access to the site
 - Total willingness to pay to visit a site can be estimated by the number of trips that they make at different travel costs
 - Travel is a complement to recreation
 - Different approaches exist
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Contingent Valuation

- Revealed preference methods like the travel cost approach can only estimate the use value of the environment, and only if that value affects behaviour in a measurable and interpretable manner
 - For the rest, we have to use either hypothetical markets or experimental markets (together: constructed)
 - Experimental markets have delivered little estimates (but a lot of insights), so the contingent valuation method remains – this is a stated preference method
 - All methods have considerable problems, but contingent valuation has the additional drawback that one is dealing with *stated* rather than *revealed* preferences, often in an *unfamiliar* context
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Conclusion

- Integrated assessment models are incomplete
 - Impacts related to ocean acidification are largely ignored
 - Existing economic studies have focused on the recreational value of coral reefs
 - One reason is that the value of changes in the economy are difficult to identify and to measure
 - How can changes in ecosystem services, the food chain, the occurrence of individual species be measured and valued?
 - How to disentangle the effects?
 - Are market goods affected?
 - Are related market good affected?
 - What kind of data would be available?
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THANK YOU
