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How bad is climate change?

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ABSTRACT

Natural scientists and environmental organizations predict catastrophe if global warming continues at the current pace. Their indicators warn us about different hazards of climate change but fail to show their overall impact on human needs and well being. Environmental economists model future costs and benefits of economic activities to compare them with the expected damage and mitigation costs of climate change. The wide range of their estimates reflects different model assumptions and controversial pricing of non-market effects. We do not know, therefore, the significance of climate change, especially in comparison to other environmental and socioeconomic costs and benefits. Integrated environmental-economic accounts can reduce the ambiguity of modelling by measuring the economic costs of climate change during a past accounting period. Climate policy rather than politics could be the result.

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1. Introduction

Natural scientists and environmental organizations warn us about catastrophe if global warming continues at the current pace. They use a large variety of indicators and models of climate change. The validity and practicality of these assessments need to be examined to avoid contradictory if not misleading policy advice.

The widely acknowledged report of the Intergovernmental Panel on Climate Change (IPCC) presents the "scientific basis" of climate change. It uses biophysical measures that point to potential disaster if no action is taken. But what is the significance of so many degrees of global warming, centimetres of sea level rise, percents of sea ice losses and numbers of cyclones (see Box. 1)? It is far from clear what these impacts mean for human wellbeing. The challenge is to aggregate or combine the different indicators and to compare them to other environmental and socioeconomic concerns.

2. Physical impact measures

2.1. Aggregation of physical impacts

Compound indices like those of human development (UNDP, no date), sustainable development (Nováček and Mederly, 2002) or wellbeing (Prescott-Allen, 2001) attempt aggregation. Typically, they calculate averages of selected ('representative') indicators. However, their overall goals are generic, the choice of the underlying indicators is judgmental, and equal indicator weighting does not do justice to unequal issues. All these indices can do is rank countries according to index scores; they cannot show success or failure of national policies – neither for the index goals, nor for component areas of environment, income, wealth, health, education, or climate change. Except for the human development index, most measures include carbon emissions as an indicator of climate change and potential non-sustainability of economic growth and development.

Indicator averages do not permit a direct comparison of the underlying component indicators, measured in different units of measurement, even after some kind of standardization. Only a common measuring rod could achieve comparability across the wide spectrum of subjects addressed. For environmental impacts, two attempts at commensurability stand out: (1) the use of areas of bioproductive land and water and (2) the weighting of flows of natural resource use and pollutants by their weight. They are discussed here to illustrate the problems of aggregating physical measures of pressure on climate change and, in particular, those from greenhouse gas emissions.

The *Ecological Footprint* compares the "biocapacity" of land and water areas with humanity's demand on nature for natural resource consumption and waste disposal (Global Footprint Network,

Box 1

Selected impacts of climate change

How bad is it?	*How bad will it be?* (by the end of the century)
Global warming: **0.78** °C (1850/1900–2003/12)	Global warming: **2.6** °C (0.3–4.8 °C)
Sea level rise: **19 cm** (1901–2010)	Sea level rise: **54 cm** (26–82 cm)
Arctic sea ice: **3.8%** shrinkage per decade (1979-2012)	Arctic sea ice, year-round reduction: **43–94%**
Tropical cyclones: **increasing no.** ("likely" in some regions, since 1970)	Tropical cyclones: **increasing no.** ("likely" increase in intensity)

Source: IPCC (2013).