

## Who's to Blame for Global Warming?

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**Center for International Climate and Environmental Research** - E-Wire - If we take into account CO2 emissions from deforestation and methane emissions from rice fields when trying to estimate how much each country has contributed to global warming, we find that developing countries have contributed more than previously thought.

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#### Center for International Climate and Environmental Research

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Scientific and Political Choices

During the negotiations that led up to the Kyoto Protocol, the Brazilian delegation proposed that the emissions targets of the industrialized countries be based on their historical contributions to global warming ("the Brazilian Proposal"). Countries that had contributed substantially to climate change would thus be given more stringent targets than those with smaller contributions. This burden-sharing approach is a challenge - both methodologically and politically. For example, it is not unproblematic to attribute blame for emissions that took place before anyone knew that this could lead to climate change. The Brazilian proposal was not adopted in the Kyoto Protocol, but the parties agreed that it would be studied more closely under the auspices of the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UN Framework Convention on Climate Change (UNFCCC).

In March 2002, the UNFCCC invited several research communities to test out the Brazilian Proposal using their climate models. The results were presented at the SBSTA conference in New Delhi fall 2002. The ball was then hit back to the research communities, and an international scientific process with participants from several countries was instigated (MATCH - Modelling and Assessment of Contributions to Climate Change). Of particular interest was the importance of the various choices that must be made in the calculations, including choices about emissions data and models, choices about which emissions sources and components to include, and choices regarding climate indicators (e.g., radiative forcing, temperature, sea level). Researchers also looked into the importance of the emission period and evaluation year; that is, the year chosen for the calculation of emissions contributions on the chosen indicators. The work has so far resulted in the joint international article "Analysing countries' contribution to climate change: Scientific and policy-related choices" by den Elzen et al., 2005. Here, the participants used various climate models to come up with a common default estimate that could be used to test the robustness of the results and to examine the effect of a number of

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methodological and policy-related choices.

### Deforestation and rice fields

If we choose change in global mean temperature in the year 2000 as the climate change indicator and the years 1890-2000 as the attributable emissions time period, and if we include all anthropogenic emissions sources (including deforestation) for all "Kyoto gases" (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>, HFCs and PFCs), CICERO's calculations give the following contributions to global warming:

OECD countries - 38 percent Eastern Europe and the former Soviet Union - 14 percent Asia - 26 percent Africa and Latin America - 22 percent

The OECD would have responsible for a greater share of the emissions had we looked only at accumulated emissions of fossil fuels. Our decision to include CO<sub>2</sub> from deforestation and methane (with its substantial emissions from rice fields in Asia) - and our use of temperature as the indicator of climate change - means that the traditional picture of contributors to climate change is altered.

In the examples above, the world was divided into four regions. Breaking this down further into smaller regions reveals that the United States, East Asia (mainly China), Latin America, the former Soviet Union, and Western Europe stand out as the main contributors (see Figure).

The MATCH group presented its results at SBSTA in May 2006 ([Download a report](#) or a [presentation of the results](#)). The MATCH group was then asked to continue its work on the Brazilian Proposal and report back in fall 2007.

### Difficult choices

A main motivation for this international project was to test the sensitivity of the results to

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scientific and policy-related choices. We found that the choice of time period and the mix of greenhouse gases and sources that would be included had the greatest effect on the results. If we choose only CO<sub>2</sub> from fossil fuels, the OECD's share of the blame rises to almost 60 percent - while contributions from Africa and Latin America drop to about 8 percent. If the effect of cooling particles (e.g., sulfate particles) is included, several countries would be shown to have strong reductions in their estimated contribution to warming. Furthermore, updating the calculations of historical contribution over time sees increased developing country contributions owing to their fast-growing industrial emissions.

These examples illustrate how important many of the choices that need to be made are, and it is easy to imagine how complicated it can be to reach agreement on how such calculations should be made and applied. CICERO has looked further into how principles from the Brazilian Proposal can be used in future agreements, as well as their associated mitigation costs (Rive et al., 2006).

The calculations show a risk that developing countries will be given a greater allocation burden than they can handle, relative to developed countries.. Thus there will be strong political interests connected to how the contribution to global warming should be calculated, and application of this burden-sharing principle alone can quickly become too complicated and controversial.

There is therefore good reason to assume that it would be unrealistic to use this approach alone in the distributions of emissions targets in international agreements. But incorporating contribution estimates as one of several elements in a system of burden sharing can be more realizable. Regardless, estimates of this sort provide background knowledge that can be useful for the design of international climate policy.

### References

den Elzen, Michel, Jan S. Fuglestvedt, Niklas Handouml;hne, Cathy Trudinger, Jason Lowe, Ben Matthews, B