science summary

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Development of a methodology for the assessment of global environmental impacts of traded goods and services

Science Summary SC040091/SS

A new report part funded by the Environment Agency through the Scientific Knowledge for Environmental Protection (SKEP), European Research Area Network (ERANET) evaluates methodologies for estimating the environmental impacts of internationally traded goods and services and recommends the most suitable method for further development and use.

In 2008, the SKEP - Scientific Knowledge for Environmental Protection - network commissioned work to develop a way of assessing the environmental impacts of international trade, which led to the EIPOT project (environmental impacts of trade). The project was carried in 2008-2009 by a consortium of four institutions: Stockholm Environment Institute at the University of York (project coordinator), Sustainable Europe Research Institute in Vienna, Netherlands Environmental Assessment Agency in Bilthoven and Statistics Sweden in Stockholm.

The project aimed to:

- evaluate existing environmental accounting techniques that can illustrate the transnational impacts of traded goods and services;
- outline a framework and criteria for such methods to assess the environmental impacts of imported and exported goods and services;
- identify the most suitable method and expand it into an accounting approach useful to all SKEP states;
- identify data requirements and suggest possible data sources for the method;
- elaborate the roles of different authorities in providing data and advice to implement the method.

In the project, an evaluation approach called RACER was adapted and used to assess the suitability of various methods to assess transnational environmental impacts of traded goods and products.

Rather than focussing on one approach and its further development, the report found that a method incorporating different elements from the most successful tools would be best.

The report looked at five policy dimensions – economic, environmental pressure/impact, geography, time, and lifecycle stage – to understand the specific requirements for the method. The focus here was on trade flows between different economies and production sectors within them, rather than on individual traded products.

An environmentally extended multi-region input-output (EE-MRIO) framework closely connected to the System of Economic and Environmental Accounts (SEEA) would be most suitable according to the report. The main elements of this framework should include the following:

- monetary input-output tables of all EU countries plus an equal number of EU trading partners in a resolution of more than 100 economic sectors;
- detailed, bilateral trade datasets for goods and services in monetary (and possibly physical) units;
- complete tables of environmental accounts for a number of environmental aspects: emissions, material flows, energy use, land use, water use, air emissions, waste production, bioproductivity, biodiversity and other impact categories.

Data from process analysis and lifecycle analysis (LCA) could be incorporated into hybrid approaches and/or to enumerate specific processes (such as international transportation or waste management practices).

Further recommendations include:

- Each run should begin with a top-down analysis using EE-MRIO model. The analysis can then be specified and refined with bottom-up techniques.
- To investigate local and regional impacts, the EE-MRIO model should be integrated with spatially explicit models of environmental impacts.

- Structural path analysis in a multi-region input-output framework (MRIO-SPA) can be used to identify major pressures or impacts along supply chains. This top-down analysis should be used routinely in MRIO modelling.

In terms of data sources, availability and accuracy, the report recommends:

- Data from European Framework 7 project EXIOPOL should be used to build the EE-MRIO framework.
- Data from other meta-databases such as the Global Trade Analysis Project (GTAP) could be used to fill gaps in country coverage, sector data, and environmental extensions.
- Supply and use tables (SUTs), rather than symmetric input-output tables (SIOTs), should be used if they are more detailed and up to date.
- Non-survey based balancing procedures should be used to re-balance hybridised IO tables, update matrices and produce time series if no superior data are available.
- Bilateral trade data are essential to estimate trade flows between economic sectors of different countries. UN Comtrade and associated databases are recommended.
- EXIOPOL will use process and LCA data to disaggregate environmentally relevant sectors further, such as agriculture and food products, metal ores and products, fossil fuels, electricity and waste treatment. If further specification is required, additional life cycle inventory data should be used.

The final chapter of the report explores using the method on a wider scale. Future research and policy are also discussed, with the following recommendations:

- A 'steward' should be chosen to carry out analyses of environmental impacts of trade. Possible candidates are the European Commission and SKEP consortium.
- Environmental accounting and data provision should be harmonised among the main institutions.
- The feasibility of the proposed approach should be tested with an empirical case study. Several areas of research require long-term attention, including hybridisation of models and computational needs.
- A long-term research strategy is needed to coordinate the various research activities that contribute to EIPOT-type analyses. A separate branch should be established that supports trade-related research.
- National governments should consider presenting environmental impacts embodied in imports as part of the environmental pressure of national consumption. National statistical offices should produce and make available in short-term intervals symmetric input-output tables (SIOTs) based on superior hybrid technology assumptions.
- All providers of data should document data compilation procedures, underlying assumptions and uncertainty of data in a transparent way.

This EIPOT project report will be of interest and use to the SKEP network, national ministries and agencies, national statistical offices (NSO), the European Commission (EC) and Eurostat as well as academia.

This summary relates to information from Science Project SC040091, reported in detail in the following output(s):

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