



International  
Resource  
Panel



## INTERNATIONAL TRADE IN RESOURCES A BIOPHYSICAL ASSESSMENT

International trade is indispensable in enabling countries to meet demand for vital resources, which are not available, accessible or affordable domestically. However, it is precisely the attendant impact trade has on boosting global consumption and production, which raises environmental concerns. In a global situation of tight resource supplies, escalating demand and increasing competition for access, it is important to understand the implications of rapidly rising trade flows for global resource and environmental efficiency. The International Resource Panel's (IRP) latest report aims to shed light in this regard. By focusing on upstream requirements such as materials, energy, water and land used to extract and produce traded goods, the report hopes to enhance knowledge of the multifaceted environmental consequences of world trade. It offers useful evidence for decision-makers to formulate sound policies needed to curb the depletion and degradation of resources, the production of waste and other forms of ecological destruction linked to expanded levels of trade.

The availability and accessibility of natural resources is essential for human well-being. Natural resources are unevenly distributed, and the limits to their availability in many parts of the world are becoming increasingly visible. International trade is therefore fundamental in delivering resources from sources of supply to centres of demand.

The impact of trade on boosting production and lowering costs has long been praised from an economic perspective. Yet, its impact is much more ambiguous from an environmental standpoint.

Trade can, in theory, improve global environmental and resource efficiency if it permits the extraction of resources and production of commodities in places where smaller amounts of wastes and emissions are produced. It can also facilitate access to green technologies and environmental services and goods.

But at the same time trade can be environmentally damaging by encouraging higher overall resource production and use, shifting production to countries with lower environmental standards, and raising energy use and pollution linked to transportation.

In order to determine whether world trade leads to a more efficient allocation of resource extraction and use, this study examines the so-called "upstream resource requirements" of traded commodities. These take into account the additional materials, energy, water and land used in the extraction and production of traded goods, but left behind as wastes and emissions in the exporting country.

### *Shifting patterns of trade dependence*

International trade has grown dramatically in recent decades, with its value increasing over six-fold and its volume more than doubling between 1980 and 2010. The amount of global resource extraction and use – 65 billion tons in 2010 – has increased to a lesser degree, which signifies the rising overall dependency of countries on trade.

Of the resources extracted and used worldwide, some 15 per cent are being traded. While seemingly small, this proportion increases to around 40 per cent when including resources indirectly associated with trade – that is, used in the production process, but not physically included in the traded good.



Dependency on world markets has increased with respect to all material categories, but is highest for fossil fuels and metals. Around half of the volume of extracted fossil fuels and metals – which are key ingredients of industrial production – is reallocated through trade. In contrast, biomass, such as food, is mainly supplied domestically.

Recent decades have also seen changes in traditional patterns of trade dependence. Although high-income countries remain main recipients of resources via trade, emerging economies such as China have switched to becoming major importers. On the supply side, a number of industrialised countries – including Australia, Canada, Brazil and Russia – have become important material exporters, partly prompted by rising resource prices.

Globally, the number of net exporters is decreasing. This highlights the growing vulnerability of the global trading system, as it comes to rely on ever fewer resource producers. If one or more exporters were to see their supplies disrupted due to resource depletion or political/military reasons, this could have a major destabilizing effect.

#### ***Rising upstream resource requirements of traded goods***

In examining the environmental consequences of trade, information on upstream resource requirements – as opposed to direct trade flows – can provide valuable insight.

Estimating upstream requirements – in terms of materials, water and land – of traded commodities is, however, a challenging task. Estimates range widely, from 40 to up to 400 per cent of traded materials, depending on the resource examined and the method used. Nevertheless, some common conclusions can be drawn.

The study reveals that upstream resource requirements of international trade have been rising during recent decades, often at a faster rate than direct trade flows. This is due to a general increase in trade levels, a greater share in the trade of high-processed goods, declining metal ore grades, and the need to feed a growing population from land with diminishing productivity. These factors are likely to negate any benefits of a potentially more resource efficient allocation of extraction and production activities through world trade.

While there is no definitive conclusion as to whether international trade improves or worsens the global efficiency of resource use, its distributional impacts are

more apparent. High-income countries have up to twice as large positive trade balances when measured in raw materials than by direct trade, while for low-income countries the opposite is true. This signifies a shift in resource intensive processes from high income and densely populated importing countries to low-income and more sparsely populated exporting countries, with a corresponding shift in associated environmental burdens.

The extraction and processing of resources for export depletes natural assets, while increasing waste, emissions, loss of biodiversity, land degradation and water pollution. Similarly, domestic efforts to curb greenhouse gas emissions in one country may be offset by increasing imports from, and transferring investments, to countries with weak legal commitments to reduce emissions.

#### ***Appropriate trade and environmental policies needed***

Such analyses contained in the report make clear that in the absence of appropriate policies, increased trade can have damaging effects on the environment and accentuate inequalities. The report provides essential knowledge for actors seeking to design and implement policies – including bilateral or regional trade agreements, border adjustment mechanisms, and subsidies and free allowances to domestic firms – that can help address the adverse impacts of trade on the environment.

#### **For more information, please contact:**

Moira O'Brien-Malone

E-mail: [moira.obrien-malone@unep.org](mailto:moira.obrien-malone@unep.org)

Christina Bodouroglou

E-mail: [christina.bodouroglou@unep.org](mailto:christina.bodouroglou@unep.org)

#### **About the International Resource Panel**

The International Resource Panel (IRP) was established in 2007 to provide independent, coherent, authoritative and policy-relevant scientific assessment on the sustainable use of natural resources and the environmental impacts of resource use over the full life cycle. The particular report was prepared by the IRP's Working Group on Environmental Impacts, with the aim to enhance knowledge on the nature, location and size of the environmental impacts of trade.

To download the report, please visit:  
[www.unep.org/resourcepanel](http://www.unep.org/resourcepanel)