

Bridges Trade



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to low expectations?

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Cancun: Will COP16 live up to low expectations?

Nearly a year ago, when the 193 members of the UN Climate Convention pasted the politically charged Copenhagen Accord into the final decisions of their annual conference, many said the agreement would never hold. Others, however, held that the political will building up to the Copenhagen meeting could carry through 2010 and yield greater results in Cancun. Yet on the eve of the 2010 Conference of the Parties, expectations are low. Many key countries as well as the UNFCCC Executive Secretary, Christiana Figueres, have clearly stated that a comprehensive deal including emissions reductions is out of the question at this year's meeting. Instead, the best case scenario is a small package agreement that would cover climate governance and agriculture and that would include early planning on new institutional mechanisms, as well as partial delivery of promised funds. Such an accord, observers say, could keep spirits, relatively, high.

The global landscape has changed much over the past 12 months. As the financial crisis continues to undermine economic stability and employment rates around the world, voters - particularly in rich countries - have other priorities for how politicians should be engaging on the international stage. Addressing climate change is no longer a critical concern; in some cases, it is increasingly considered a threat to national interests. The most obvious example of this is in the United States, where Republican gains in November's mid-term elections essentially hamstrung the Obama administration on climate policy. The once palpable expectations that the US would tackle climate change at home and take on a highly demanded leadership at the UNFCCC talks have given way to disappointment.

The role of the global economy in hindering the progress of global climate talks cannot be understated. Fiscal belt tightening around the world has led to protectionist sentiments in many countries. While politicians on the international stage spin diplomatic niceties about committing to global cooperation, the same politicians often change their tune when addressing national audiences, especially in the private sector. Energy and carbon-intensive industries are pressuring their legislators to ease off the climate protection crusade, worried that the additional costs required for lowering emissions will further cripple their bottom lines. Some industries in the US and Europe have gone so far as to finance expensive campaigns to undermine climate change credibility, while others have threatened to pack up and move their businesses elsewhere.

Because most countries keep a close eye on the US when formulating their own climate policies, the failure of the US climate bill marked a key turning point in the talks at the UNFCCC. Indeed, the collapse of that legislation erased all reasonable likelihood that a deal would be reached in Cancun. Although the Obama administration and congressional cohorts worked throughout 2010 to pass a robust energy and climate bill - complete with a cap-and-trade scheme - fears in certain sectors over the loss of global competitiveness effectively extinguished those efforts. Even the inclusion of border carbon adjustment measures such as protective tariffs was not enough to save the bill.

All eyes on the US and China

Turbulent US-China relations have greatly influenced the pace of negotiations over 2010, and the continued acrimony has been cited by many experts as the most difficult issue facing the talks in Cancun and beyond. The interdependent trading partners are the world's top emitters of greenhouse gasses (GHGs). And while the US continues to quake under the pressure of economic contractions and China digs in its

heels to keep it from slipping, neither appears prepared to make major concessions on an agreement that will have high long-term costs for some of their most competitive economic sectors.

For a global climate change pact to be effective, it is crucial to get buy-in and active participation from the world's top two GHG emitters. However, the two countries continue to be at odds over the very basics of how to proceed. Beijing continues to favour an approach that includes clear emissions reduction targets for developed countries, while it enables financial and technological support to developing countries for their voluntary actions. Washington, however, argues that a new agreement should include measurable, reportable and verifiable emissions cuts for developing countries and that the overall agreement should simply support a "bottom up" national policy approach. China demands a second phase of the Kyoto Protocol that binds only developed countries to reductions. Whereas the US - which is not a party to the Protocol - thinks it should be scrapped in favour of an agreement that reflects new global realities.

Bridging the chasm of binding commitments will be difficult. Even discussions over the provision of financial support to developing countries to help with climate change adaptation, which appeared to be one area of possible movement in Cancun, were marred recently when China announced they would not accept any financing agreement that had binding strings attached. Any financing package, they argued, should be completely free of obligations.

Spectre of Climategate lingers

Turbulence is nothing new to the climate negotiations. The low expectations heading into Cancun will likely soften the blow if agreement falters on one issue or another. In contrast to the shockwaves that rocked the climate community when "Climategate" made headlines around the world only weeks before last year's Copenhagen COP got underway, the lead-up to Cancun has been relatively tranquil.

Last November, the science of climate change came under fire when climate sceptics leaked the contents of more than 1,000 stolen emails between IPCC scientists. Critics argued that the emails proved climate scientists had intentionally exaggerated climate change, but three independent enquiries have since dismissed the accusations. Still, the incident managed to shake the Copenhagen talks and monopolised much of the media attention during that time. Since then, climate scepticism and general indifference to climate change has been on the rise in the US and in Europe.

With less political and public pressure and low expectations for solutions this year, the Mexican beach resort summit might actually be poised to yield a number of lesser but important results. At a mini-ministerial meeting to discuss preparations for the Cancun meeting, Margaret Mukahanana-Sangarwe, chair of the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) highlighted a number of issues that are ripe for agreement and others that require more negotiation but that could be resolved in Cancun. Three issues stand out as most ready for decision: REDD+, agriculture, and technology. The rapid advance in and outside the UNFCCC on the issue of Reduced Emissions from Deforestation and Forest Degradation (REDD) - the forest protection mechanism that absorbs CO₂ into the world's jungles and native forests - makes it an easy win for Cancun and an obvious area to begin moving on a global level while more difficult issues and sectors gain clarity. In addition, concise text that establishes a formal process to address the agricultural sector has been ready since June.

Difficult issues

Among the more difficult issues that will likely undergo intensive negotiation in Cancun are financing, adverse effects of response measures, mitigation, and the shared vision. Despite China's grumblings on the conditions of a financing package, the final decision will likely include enthusiastic declarations on new funding and possibly even first steps towards a new fund or finance coordination mechanism. Many of the details of such an institution are on the table, but this issue is tightly entangled with the more contentious mitigation issues. On mitigation, there are two fault lines: first the question of how to increase and manage developed country mitigation commitments across the LCA and KP decisions. The second is how to handle the level and nature of developing country mitigation actions, as it relates to the financing and technology support they will receive for these actions.

The proposal for establishing a "registry" has been under discussion for a while, and is also linked to the contentious question of how to monitor, report and verify developing country actions. Finally, the question of "response measures" considers the social and economic impacts that climate action taken at the national level have on other countries. In this regard, the trade issue of border carbon adjustments is centre stage, with developing countries pushing language in the agreement that would prohibit such unilateral measures that could have an impact on international trade. While this language will certainly find no resolve in Cancun, there is the chance that countries might establish a more collaborative, dispute prevention approach by setting up a consultative body or process that assesses response measures and their impacts.

The issues that are impossible to resolve in Cancun are mitigation, a global cut within the shared vision, how to address the interplay with international trade, market-based mechanisms such as a global emissions trading scheme, long-term financing, and many details on technology transfer and development, such as intellectual property rights and technology pools.

Despite the handful of early-harvest options, countries may be willing to walk away empty handed if they find that the Cancun package is not balanced in the interests it serves or in its treatment of the Kyoto Protocol issue - basically this means advancing on the Kyoto track. The Chair will be pushing for a single decision that captures all the agreed pieces. Although

this may prove overly optimistic, keeping all issues in one document will help to reflect balance, if it is achieved, and provide a clear picture of what remains to advance over the coming year.

In this issue...

Probably more than any other issue, **border carbon adjustment (BCA) measures** stand at the crossroads of the trade and climate change worlds. Put simply, BCA's are meant to help prevent "leakage" and help protect competitiveness in countries that have implemented emissions reduction schemes. In the article "Practical aspects of border carbon adjustments: Assessing costs from a trade facilitation perspective," Sofia Persson, an analyst at the National Board of Trade in Sweden, sheds light on the costs that a BCA could bring to the private and public sectors in both exporting and importing countries. Persson's article approaches the issue from a trade facilitation perspective and suggests that countries should look closely at the multiple layers of complexity associated with BCAs before implementing them.

The aforementioned expectations for progress on financing include the possibility of striking a deal to effectively manage emissions from **bunker fuels** - highly polluting fuel used in shipping and aviation. The High-Level Advisory Group on Climate Change Financing (AGF) has floated the idea of charging the transportation industry for their carbon emissions to raise revenue for climate financing. The AGF's proposal, however, has been met with opposition by some developing countries that oppose the fact that the plan has no exemption for developing countries. Joachim Monkelbaan explores the issue and provides analysis on what to expect from negotiations at COP 16.

The enhanced **Reducing Emissions from Deforestation and Forest Degradation (REDD+)** initiative - which adds conservation, sustainable management of forests, and enhancement of forest carbon stocks to their efforts to create financial value for the carbon stored in forests - is poised to make progress in Cancun. While REDD has already been explored at length elsewhere, Gregory Hudson examines the issue from a trade perspective.

While large-scale **biofuel production** and trade have been hotly debated over the last few years, many of the potential small-scale solutions in this area have been largely overlooked. Henrique Pacini, Dilip Khatiwada, and Thomas Lönnqvist explore some of these small-scale solutions - such as biogas produced locally from waste and residues - noting that they often are better suited to local conditions in developing countries. They then discuss linkages between small-scale biofuel and international trade.

Developing countries derive important nutrition from their **fisheries**, which help ensure food security and often provide important export revenues. Global fisheries, already hard hit by overexploitation, face additional threats from climate change. Graeme MacFadeyn has looked at how fisheries are being affected by climate change; he proposes pre-emptive and adaptive strategies that countries can take to secure their food supplies as well as the benefits associated with continued exports and trade in this area. He provides pointers on potential funding for such strategies, including through Aid for Trade.

We hope you enjoy this special issue of the BioRes Review.

Practical aspects of border carbon adjustments: Assessing costs from a trade facilitation perspective

By Sofia Persson

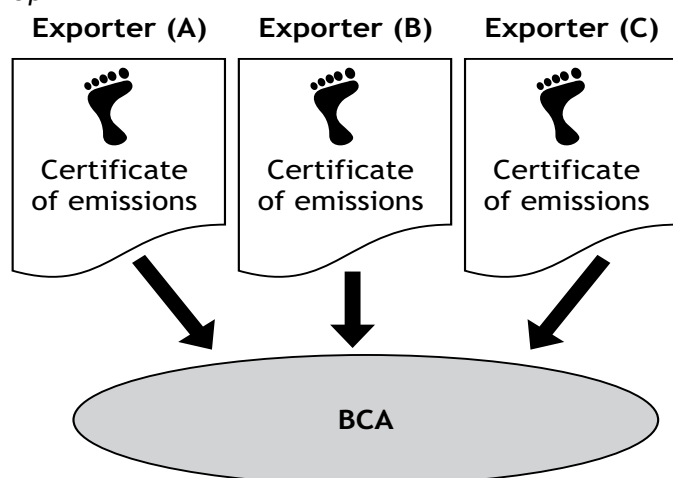
Border carbon adjustments are being discussed as a way to counter carbon leakage and mitigate competitiveness concerns in countries putting in place policies to address climate change. The administrative burden associated with border adjustments would be heavy, however, and could turn them into significant non-tariff trade barriers.

Border carbon adjustment (BCA) measures are being discussed as a response to concerns over carbon leakage and competitiveness in a number of OECD countries, although no country has implemented these types of BCA measures yet. The author has carried out an analysis, which aims at complementing the studies done on legal and economic issues with a discussion on the practical challenges and costs associated with different ways of constructing a border carbon adjustment scheme. This article focuses on the outcomes of the study. Its objective was to shed light on the costs that a BCA could bring to the private and public sectors in both exporting and importing countries. The study used a trade facilitation perspective in the analysis of the cost a BCA could entail. Trade facilitation is aimed at reducing administrative hurdles and cumbersome border procedures in international trade, as these can become non-tariffs barriers, slowing down trade and creating transaction costs.

Different types of BCAs

A BCA could either take the form of a carbon tariff or of a requirement for importers to buy emissions allowances. A border carbon adjustment scheme can be applied to imports, exports or both. The scenarios in the study focused on border carbon adjustment measures for imports. However, it is not unlikely that a BCA would also include an export component, under which carbon costs for exports of domestic greenhouse gas intensive goods would be reimbursed. The study presents three schematic designs for a BCA:

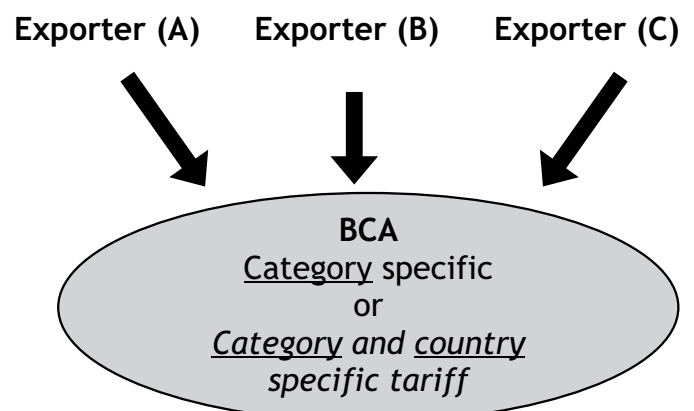
Option 1



The most ambitious approach is a border carbon tariff (or requirement to purchase emissions allowances) that adjusts the charges on imports according to the level of greenhouse

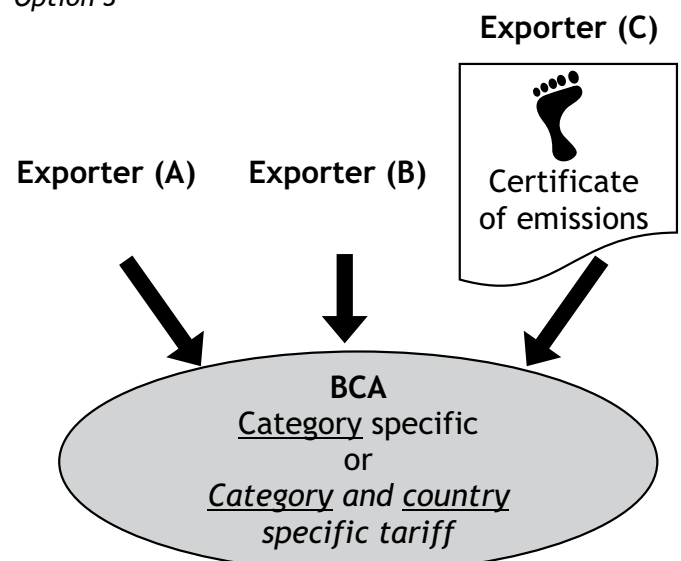
gases emitted during the production of each specific imported product.

Option 2



Under the second approach, the importing country sets a standardised tariff (or number of emissions allowances required) for each product category under the BCA to be paid when importing a product, regardless of how “green” its production process was. The standardised charge could either be based on the carbon content of domestic production or based on the carbon content embodied in imports.

Option 3



A third option is to set a standardised tariff (or emissions allowance purchase) for each product under the BCA, but to also allow producers in exporting countries that can prove that they are more efficient (i.e., emit less greenhouse gases

during the production of their products than stipulated as the benchmark level) to pay a lower tariff. Under the second and the third options it would be possible to differentiate according to country of origin.

Country and product scope

BCAs could be designed to discriminate between countries depending on whether they have implemented unilateral climate policies decreasing the emission intensity of their products, or have undertaken commitments under a new climate agreement. Any differentiation between countries would risk becoming arbitrary if it was not based on clear and objective criteria. In addition, a policy differentiating between countries would risk leading to circumvention and the implementing authorities would need to take precautionary measures and devote resources to prevent evasion of the BCA.

The product coverage in a BCA could range from a maximalist approach encompassing many products - including downstream products - to a limited list of products, such as steel, aluminium, cement and chemicals. The scope will also impact the overall administrative burden of any scheme. The more products covered by a BCA, the higher the administrative burden. A relatively small-scale Border Carbon Adjustment scheme targeting just a few countries and products should, in principle, not be too burdensome and costly to implement in terms of day-to-day management.

Complexity versus environmental efficiency

The study concluded that if the aim of the BCA is to differentiate between products with high and low emissions, the BCA requirements would have to be very onerous for the BCA to work. If the BCA is simplified, the environmental incentives are reduced. The more precise the BCA is, the higher the administrative costs are for both the public sector responsible for implementing the scheme and the private sector. Precision is the extent to which the BCA adjusts the carbon tariff, or emission allowances, according to the actual greenhouse gas emissions of the imported goods. The trade-off between precision and administrative burden is inherent to much of the legislative process, regardless of the area. Policy-makers want to make the rules as precise as possible, but run into problems when this creates too much of an administrative burden. When designing a Border Carbon Adjustment scheme, it is important to take into consideration the administrative costs that may arise from burdensome rules, especially for small and medium-sized companies and companies in developing countries.

A requirement to carry out a calculation of the greenhouse gas emissions - or a carbon footprint - and to get it accredited

could potentially be very costly and complex for the exporting company. For companies without the resources to carry out such a calculation, the requirement could become a barrier to trade. The study highlights that, in addition to the administrative costs associated with new data and documents that a BCA scheme would require, uncertainty as to whether countries will introduce such a scheme, lack of transparency, and differing requirements between countries risk increasing costs for exporters. In developing countries already burdened with complex and cumbersome trading environments, this situation would add to existent heavy trade transaction costs.

If the implementing country opts for the solution involving standardised charges, the government would need to define benchmarks for all products covered by the scheme, possibly at the country level. To set these benchmarks, the implementing country would need to gather large amounts of information on greenhouse gas emissions and production methods from domestic and/or foreign producers. The implementing country would also have to put in place a system of controls at the border. Factors that drive costs for border authorities under a BCA relate to whether: manual intervention is required to clear consignments at the border crossing; submissions can be made electronically; large resources have to be devoted to prevent evasions; many products are covered by the BCA; and whether many companies are treated individually. Another important determining factor will be whether the BCA will require major IT development to deal with new processes. For the exporting country authorities there can also be costs from a BCA, for instance if they need to put in place a scheme for rebates on exports, or if an exporting country agency would be responsible for the accreditation of the carbon footprint calculation.

Are BCAs the best solution?

Diverging requirements between countries and the distortions from the resulting market segmentation can create uncertainty for economic operators and result in high compliance costs. A situation with two or more countries implementing BCAs with different rules could be a possible scenario in the future. International cooperation on border carbon adjustment could be one way to ensure simple and harmonised procedures, which would reduce the non-tariff barriers created by BCAs in different countries. However, at this point countries would be wise to consider whether BCAs are a viable option at all, or whether there are other ways to address the issues of competitiveness concerns and carbon leakage that do not entail the high administrative costs of a BCA.

Sofia Persson is an Analyst at the National Board of Trade, Sweden. The full study can be accessed on ICTSD's website.

Carbon footprint standard and Product Category Rules (PCR): How to calculate the carbon footprint of a product?

A *carbon footprint scheme or standard* is basically a methodology on how to calculate and communicate the carbon footprint of a product. These schemes or standards often use *Life-cycle analysis (LCA)* which is a production-based analytical tool to perform a systematic evaluation of the environmental aspect of a product or service system through all stages of its life-cycle: extraction and processing of raw material, through the manufacturing until the use, re-use, maintenance, recycling and final disposal. The carbon footprint is expressed as the sum of greenhouse gas emissions and greenhouse gas removals of a production process expressed in CO₂ equivalents.

To be able to use a carbon footprint to compare between product/production methods, consistency in the use of the methodology is necessary. To achieve this, standards/methodologies for carbon footprint refer to specific *product category rules (PCR)*. A product category rule (PCR) is a set of specific rules, requirements and guidelines on how to calculate the carbon footprint of that particular product category. The PCR sets the boundaries of the variables to include in the carbon footprint calculation of that particular product. When product carbon footprints are used in labeling for the consumer market, PCRs are necessary to be able to compare between products. PCR are traditionally developed by industry groups and/or national carbon footprint schemes. As a consequence there often exist many different rules for a certain product category internationally. There are efforts to achieve harmonisation between the different sets of PCR schemes.

Shipping emissions: Negotiating bunker fuels in Cancun

By Joachim Monkelbaan

Aviation and maritime shipping are critical elements of the global economy and trade. More than 90 percent of world trade is transported by sea, while eight percent of global economic activity depends on aviation that transports 40 percent of total freight value. But despite the economic benefits provided by the sector, international transport is one of the main drivers of human-induced climate change. Maritime shipping emissions account for three percent of global anthropogenic carbon emissions while four to nine percent of the climate change impact of human activities is caused by aviation. Aviation and shipping are an important element of the climate negotiations for several reasons, and the UNFCCC Conference of the Parties (COP) in Cancun is set to bring these sectors more to the forefront.

Inclusion of international transport emissions in a global climate policy framework has proven to be difficult, primarily because the responsibility for reducing emissions does not fall directly within the jurisdiction of any single country. Due to the global nature of the industry, some experts say that sectoral approaches may be more appropriate for tackling emissions reduction in international transport.

Many issues that were scheduled to be addressed in Copenhagen last year are expected to come back in Cancun: the governance of bunker fuels, trade and development issues (including competitiveness concerns in both developed and developing countries), implications for the tourism sector, and the relationship between climate and trade financing will be part and parcel of the underlying issues to take into account.

Given that aviation or maritime emissions reductions are not addressed in the Copenhagen Accord, there is continuing uncertainty regarding how to proceed and under which forum. The Kyoto Protocol calls on Annex I Parties (developed countries) to work on international transport through the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO). While there are many proposals on the table, there is no clear mandate from either the ICAO or the IMO regarding an emissions reduction strategy. Instead, the industry faces an increasing risk that a patchwork of domestic policies will emerge as individual countries or regions implement their own measures to deal with emissions. In 2012 for example, the EU's Emission Trading Scheme's (ETS) measures will be applied to all airlines that take off or land in the EU - regardless of the country of origin.

For maritime shipping there are currently two main types of policy for greenhouse gas (GHG) reduction considered by the IMO: market-based instruments (MBIs) and efficiency requirements. MBIs include emissions trading schemes, fuel levies, energy efficiency credit trading schemes, and "cap-levy-and-trade" or "hybrid" schemes. Such market-based instruments to regulate emissions will impact international trade because they impose an additional financial burden on transport, which could result in reduced imports and exports.

Regulation of greenhouse gas emissions from the international transport sector is needed to reduce global emissions. However, regulation often translates to higher costs of transporting people, resources, and goods around the globe. Developing countries situated in remote locations and with a large trade exposure, such as some Small Island Developing States (SIDS), would be particularly affected by higher transport costs.

On the other hand, regulating emissions from maritime and air transport could potentially generate resources to finance climate change adaptation and mitigation measures in developing countries.

Cancun Expectations

Climate change finance is one of the main outcomes expected from the negotiations on international transport in Cancun. The final report by the High-Level Advisory Group on Climate Change Financing (AGF) that was published on 5 November pays considerable attention to the option of raising revenues from the shipping and aviation sectors. The AGF estimates that

Cost increase of maritime transport to groups of countries

Country group of destination	CO ₂ emissions Mt CO ₂	Cost increase of maritime transport US\$ bln. US\$ 30/tonne CO ₂ (US\$ 10-50)	Cost increase of maritime transport % of GDP US\$ 30/tonne CO ₂ (US\$ 10-50)
Annex I countries	469	7.0-14.1 (4.7-23.4)	0.02-0.04% (0.01-0.06%)
Non- Annex I countries	582	8.7-17.5 (5.8-29.1)	0.08-0.15% (0.05-0.25%)
G77	465	7.0-13.9 (4.6-23.2)	0.07-0.14% (0.05-0.23%)
Least Developed Countries	13	0.2-0.4 (0.1-0.7)	0.06-0.12% (0.04-0.19%)
Small Islands and Developing States	99	1.5-3.0 (1.0-4.9)	0.45-0.89% (0.3-1.49%)

Source: CE Delft, 2010

US\$25 billion can be raised from these sectors by 2020 (out of a total of US\$100 billion that developed countries promised to channel to developing countries each year by 2020).¹

Some developing countries, however, may have issues with the fact that ships and airplanes from all countries are expected to pay for their carbon emissions, without an exception for poor countries. The AGF has taken this into account by stating in its report that the UNFCCC principle of common but differentiated responsibility² must be reconciled with the need for any market-based emission reduction measures adopted to apply equally to all ships globally. As the figure below shows, there is no direct correlation between the countries that have the biggest stake in trade and the countries where ships are owned and flagged (registered). Excluding some countries from taking climate measures could lead to carbon leakage as ship and airplane owners can easily register their vessels in countries that do not regulate aviation and shipping.

One possible option to combine environmental effectiveness with the principle of equity is to collect revenue from all ships and use the proceeds for offsetting the negative impacts on vulnerable countries (e.g., cost increases of food imports that may result from more expensive transport). One notable example of such an equitable and practical scheme is the International Maritime Emission Reduction Scheme (IMERS). In Cancun, countries could take these and other recommendations from the AGF report into account when they draw a roadmap for identifying sources of climate finance.

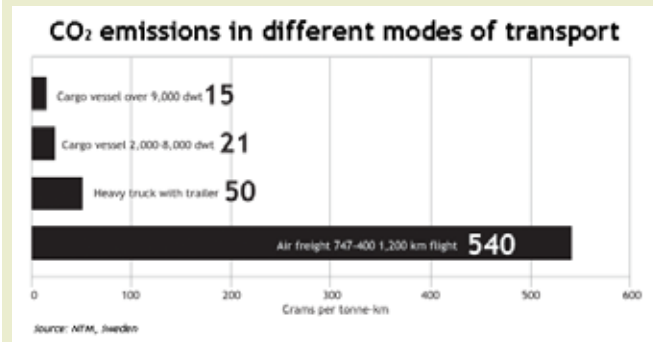
In addition to climate finance, a series of other outcomes on international transport are expected to result from Cancun. First of all, the role of the IMO and ICAO in relation to the broader framework of global climate change should be clarified. The UNFCCC could set emission reduction targets, for example, which it mandates the IMO and ICAO to implement.

1 The AGF report can be accessed at <http://bit.ly/d4SSue>.

2 Recognising that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Kyoto Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

Aviation vs. Shipping

While maritime shipping and aviation are often lumped into the umbrella sector of international transport, they are distinct industries and should be considered separately. For example, the aviation industry is concentrated into a handful of major companies, has the greatest climate impact of any transport mode, and has limited potential for fuel efficiency gains. In contrast, the maritime shipping industry has more competition, transports a larger proportion of goods, and has greater potential for improving fuel efficiency.

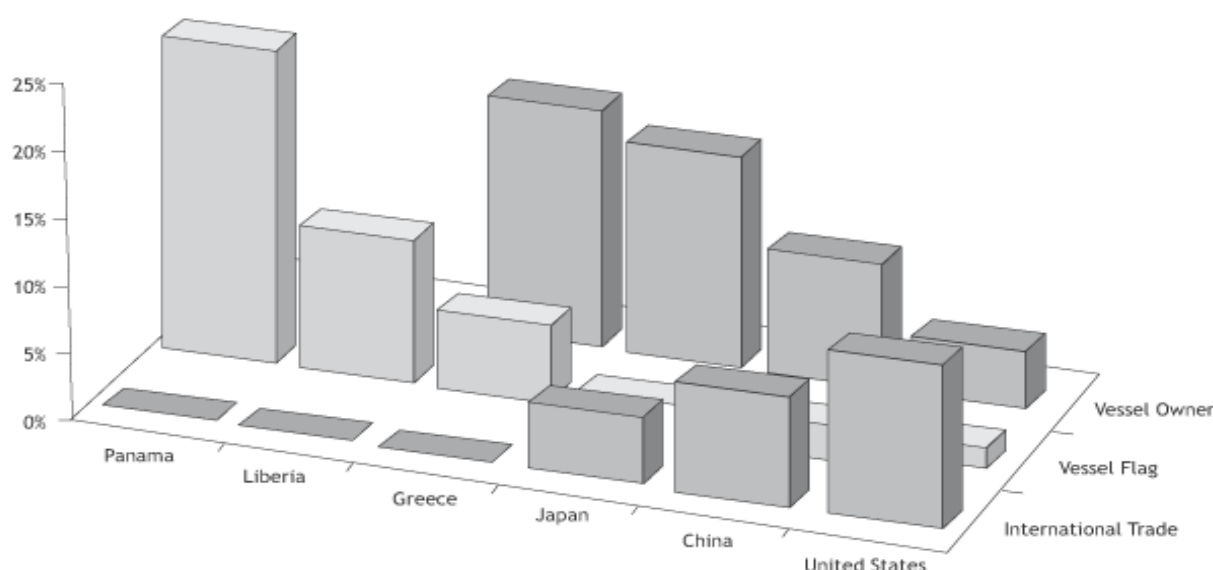


Studies on the shipping industry have shown that significant reductions in emissions could be achieved by simply reducing cruising speeds and using more efficient ships. Meanwhile, the most plausible efficiency gains in the aviation sector appear to stem from changing air traffic management.

Due to the urgency of the climate change threat, action should be taken in the most promising forum. Alternatively, implementation of unilateral approaches is most promising, but could create a patchwork of differing policies. To avoid that situation, countries need to give a strong political signal, preferably through a stand-alone decision, to ICAO and IMO so that these organisations can progress with implementing measures to curb emissions from aviation and shipping.

Joachim Monkelbaan is Programme Officer for ICTSD's Global Platform on Climate Change. Further reading on the issue can be found in Monkelbaan's recent paper International Transport, Climate Change and Trade: What are the Options for Regulating Emissions from Aviation and Shipping and what will be their Impact on Trade?

Comparison of International Trade (Percent of Global Value of Merchandise Trade), Vessel Flag (Percent of Global Deadweight Tons, DWTs), and Vessel Owner (Percent of Global DWTs) by Country



Sources: DOC 2006; World Bank 2007

Seeing REDD:

Unresolved trade issues at the brink of consensus

By Gregory Hudson

In the lead-up to the UNFCCC's Sixteenth Conference of the Parties (COP16), the UN collaborative initiative on Reducing Emissions from Deforestation and Forest Degradation, or "REDD" programme, has become the focus of increased attention. Still a pilot project, REDD's basic premise is simple: to have rich countries pay poor countries to preserve or replant their forests. In return, rich countries would get a "carbon credit" to offset other emissions in a wider carbon-trading scheme. As a result, the programme's designers hope, the programme would be win-win. However, while REDD's premise is simple, the details of such a programme are complicated and the subject of negotiation and concerns about corruption, monitoring and verification pervade the programme.

Less attention, though, has been given to the potential trade implications of REDD. To make REDD conducive to world trade, policymakers should consider its possible impact on two aspects of world trade: the currencies of recipient countries, and the incentives for logging in non-participating countries. Together, these unintended trade consequences could damage REDD's credibility on the world stage. Though REDD has made considerable progress in the last few years, especially in comparison to other climate change initiatives, policymakers would be wise not to take its success for granted. Looking to Cancun and beyond, REDD should remain an ongoing subject of analysis and improvement, especially in light of its potential—and unresolved—impacts on trade.

Negotiating background

Though initiatives against deforestation in poor countries have had a long history, proposals to frame them as an emissions-reduction scheme did not arise until 2005 when COP11 took place in Montreal. There, led by Papua New Guinea, the Coalition of Rainforest Nations proposed the basic scheme where rich countries would pay poor countries for maintaining their forests. At first treated with scepticism by rich countries, particularly the United States, momentum behind the programme grew nonetheless and at the Bali COP in 2007 the parties erected it as a major new pillar in efforts at climate change mitigation.

Further, Bali supplemented the basic REDD programme with a call for the development of another programme, REDD+, which aims not only to pay poor countries to maintain their forests, but also to help them conserve, sustainably manage, and enhance their carbon forest stocks. Hence, REDD+ is more about capacity building, while REDD proper is more about payments, though both programmes are closely related. While REDD and REDD+ were expected to be fully developed by the Copenhagen Conference in 2009, the momentum for a wider climate deal collapsed there, and REDD stalled with it. Nevertheless, Articles 6 and 8 of the Copenhagen Accord highlighted the importance of REDD and REDD+, with the latter article committing countries to pay US\$30 billion for the 2010-2012 period.

Despite the overall disappointment at Copenhagen, REDD still stands out as an area of considerable progress. Shortly after consensus was reached on the Bali Action Plan, a bevy of multinational partners arose to fund REDD and REDD+ pilot programmes. The most prominent partners include the UN, with its UN-REDD Programme, and the World Bank, with its Forest Carbon Partnership Facility (FCPF) and Forest Investment Program (FIP).

Currently, the various partners are experimenting with different pay-for-forest schemes among pilot countries, as well as with different techniques in forest surveillance, payment method, fund governance, and more. The problems thus far with REDD have been well documented, including strong concerns over corruption and verification.¹ To facilitate learning to deal with these problems, the negotiating countries launched the REDD+ Partnership in May 2010; its website hosts a database of the various REDD+ projects for review by other partners and the public. Ideally, these countries hope, a few best practices will emerge from all the experimentation to pave the way for implementation of REDD in a larger climate change treaty.

Today, deforestation and forest degradation account for between 15 to 20 percent of worldwide carbon emissions; as such, they are of critical importance to mitigating the impact of climate change. But like all efforts at mitigation, REDD and REDD+ may unexpectedly impact international trade.

Trade impacts

The REDD programme has already been the subject of public criticism over issues such as the potential for corruption, but the potential effects to trade have been significantly overlooked. Two aspects of international trade stand out as susceptible to REDD influence. First, REDD may significantly appreciate the currencies of heavily forested developing countries, making it harder for them to pursue an export-oriented model of development. Second, REDD could relocate deforesting industries to countries where deforestation is not currently a problem – a form of carbon leakage. While neither problem seems severe enough to scrap the overall effort at REDD, each problem should be addressed in a targeted manner to ensure REDD remains credible with developing countries in the long run.

Currency appreciation

All things being equal, REDD has the potential to appreciate a forested country's currency, and thereby hurt its attempts to promote exports. At its core, the REDD programme dissuades those countries who would deforest or degrade a forest by promising them, instead, a higher payment for keeping their forests robust and standing. In other words, by giving a monetary incentive for healthy forests, REDD raises the opportunity costs of deforesting products. Presumably, an effective REDD programme will raise the opportunity

¹ See, for example, the recent 14th International Corruption Conference in Bangkok on November 13th, where REDD was given high priority as an area of corruption.

costs high enough that forest maintenance prevails over forest degradation and the products associated with such degradation, such as palm oil.

However, since REDD is internationally financed, a successful country programme will not only limit the amount of deforestation, it will also increase the inflows of capital from abroad, putting appreciative pressure on the country's currency. To illustrate this, consider the differing sources of income between a deforesting industry and a REDD programme. At some level, a deforesting industry sells its product both to a domestic market and a market abroad for export. However, if REDD succeeds at converting forests to protected lands, foreign income will replace the income that had been gained by selling the deforesting product domestically. To make the REDD payment useful, the recipient country has to exchange the foreign payment for its own currency, and so there will be pressure for the domestic currency to appreciate. Indeed, even for countries that primarily export their deforesting products, REDD payments would presumably have to exceed the income generated by such exports to make the forest protection worthwhile; hence, even exporting countries could face currency appreciation.

The biggest fear arising from such currency appreciation is that it could hurt the export competitiveness of the forested country's other products. Currency issues - particularly between the US and China - have come to a head in 2010 and those countries with export-led growth models may worry in time that so-called "Dutch disease" may take hold as REDD payments stunt their economic development.² In essence, if REDD programmes displace the production of products linked to deforestation, it may not only be foreigners that "pay" to keep the forests maintained - it may be other exporters from the country, too.

However, there is an alternative. Where REDD programmes seem likely to cause currency appreciation, forested countries may be better off turning to REDD+ programmes for sustainable management instead. Where REDD-plus funds train sustainable forestry techniques, rather than transfer cash directly, they will probably be less likely to cause currency appreciation. Though forest management training is admittedly an indirect form of combating deforestation, if it were coupled in exchange for verifiable reductions in deforestation, it could still be effective—and less costly to the country's exporters. Ultimately, more experimentation needs to be done by the REDD programme partners to determine whether REDD-induced currency appreciation and Dutch disease should be a serious concern.

Deforestation relocation

The second impact REDD and REDD+ could have on international trade is related to the degree to which it changes the source countries of deforestation. Put simply, a successful REDD programme in one country could incentivise other countries to pick up the deforestation instead, where it did not exist previously; as a result, the relocation of the deforesting industry could both leak carbon and change the composition of trade among developing countries.

Similar to the currency problem outlined above, REDD programmes may raise the opportunity costs to producing

forest-degrading products, and so discourage their production. Thus, if REDD programmes covered a sufficient percentage of forest sources, the programmes would also raise the product's prices. In other words, with supplies from developing countries restricted because of REDD, but demand remaining unchanged, prices for products such as palm oil would presumably rise. Yet, higher prices also make the product more attractive to others contemplating joining the market. As a consequence, third countries outside of REDD—which never had a deforestation problem before—may take up the deforesting industries, and so replace the former deforesters. As a result of this unintended carbon leakage, the REDD payments would do little for climate mitigation, still be costly to those who pay them and benefit those who receive them, while incidentally encouraging third-party countries to deforest.

Indeed, REDD could significantly change the composition of South-South trade between REDD payment receivers and third-party countries. On the demand side, REDD recipients, now producing less of a deforesting product, may feel tempted to use their REDD payments to re-import the products that moved to new, non-REDD countries. As a consequence, the real benefit of the REDD payment would not be captured by the world, with reduced carbon emissions, but by the newly deforesting countries, who respond to higher world prices and new demand from former exporters. Policymakers should be careful that their scheme does not merely encourage others to fill the deforestation gap left by the REDD recipients.

To ensure such a deforestation gap does not occur, it is crucial that REDD programme designers focus on engaging as many forested countries as possible. With each additional country that participates in REDD, there are fewer incentives for carbon leakage, and fewer incentives for distortion in South-South trade. Given that deforestation rates vary drastically by country—the rate is 0.17 percent in DR Congo, for example, compared to almost 2 percent in Indonesia³—the potential for carbon leakage, without expansive REDD coverage, is huge. REDD should not merely reduce deforestation in Indonesia to replace it with increased deforestation in the Congo.

So, for REDD to be truly successful, it must not only preserve the forests in the countries it targets, but also preserve them around the world without stunting development.

At COP 16, REDD may turn out to be a victim of its own success. Already, the Chair of the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) has designated REDD+ as "almost completed", and able to deliver "concrete results... without having to devote much time to [it] in Cancun." Since most of its work is already done, it is probably safe to say that REDD+ is poised to make progress at the talks, even if we do not know how comprehensive the final product will be. The AWG-LCA is scheduled to meet on 29 November from 3pm to 6pm - though the group says it will meet for "as long as necessary." Here, it will make the final preparations for its "outcome" before it is presented to the full COP.

³ Filou, Emille. (2010) "Saving Trees in the Congo Basin: is REDD a Solution or a Quagmire". Ecosystem Marketplace

² Macintosh, Andrew. (2010) "Can Money Grow on Trees?" Australian Council for International Development Research Paper. Page 6.

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Tailor-made solutions: Small-scale biofuels and trade

By Henrique Pacini, Dilip Khatiwada, and Tomas Lönnqvist

In current debates on biofuels trade, the focus tends to be on large-scale production. However, the production of small-scale biofuels is better suited for many smaller developing and least-developed countries. Small-scale biofuels can bring many social and environmental benefits at the local level and, cumulatively, their production and utilisation can bring significant trade benefits.

Biofuel markets and trade

A large number of countries are now producing biofuels in order to achieve multiple objectives. Apart from contributing to lower carbon emissions, biofuels – both liquid and gaseous – could potentially contribute significantly to energy security, sustainable development and improved waste management in rural and urban areas.

As awareness of climate change has grown, and fossil fuel prices have become increasingly volatile over the last ten years, the market potential of biofuels has become clear. Many national mandates and voluntary measures to promote biofuels as a complement to conventional energy sources have emerged. This has led to greater commoditisation of biofuels, which are now established in international energy trade.

Liquid biofuels for transport, which are produced at a large scale, are the most traded today. In 2009, global production of ethanol was about 74 billion litres, a four-fold increase since 2000. A large part of the production was absorbed by local markets – such as in the US – but Brazil has been a significant driver of bioethanol trade and is currently the world's largest exporter. Global production of biodiesel has been estimated to be approximately 19 billion litres, with the bulk of tradable supply coming from Malaysia and Indonesia.

Small-scale biofuels

But despite the massive potential, large-scale production of liquid biofuel is often in conflict with small-scale agricultural systems rooted in many developing countries. For these countries, alternative biofuel production systems are needed in order to ensure compatibility with local realities.

Recent studies have looked at key trade aspects for the identification of suitable developing and least-developed countries for bioethanol production. The criteria for selecting such countries were the following: (1) surplus cane sugar, (2) dependency on imported fuels, and (3) potential for economical production.^{1 2} The same studies have noted the many technical, socio-economic, and environmental benefits of small-scale biofuels as a means to promote sustainable development. The focus has been on energy access for the poor, reducing oil imports, income generation via specialised exports, rural development and reduced environmental degradation.

¹ DSDG, 2005. Dutch Sustainable Development Group (DSDG). Feasibility study on an effective and sustainable bio-ethanol production program by least developed countries as alternative to cane sugar export. Ministry of Agriculture, Nature and Food Quality (LNV), the Netherlands.

² UNDESA, 2007. Small-scale production and use of liquid biofuels in Sub-Saharan Africa: Perspectives for sustainable development. United Nations Department of Economic and Social Affairs (UNDESA) commission on sustainable development: fifteen-session 30 April-11 May 2007, New York. Background paper no. 2. DESA/DSD/2007/2.

Especially in least developed countries, energy supply is complicated by poor infrastructure. This provides an opportunity to develop local bioenergy potentials, such as biogas and other small-scale waste-to-energy pathways, which have social and environmental advantages that complement regulatory efforts in fulfilling environmental standards.

There are several examples of attempts to insert small-scale production into the broader liquid biofuels production chains. These include the biodiesel program in Brazil, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) pro-poor initiative in Africa and India, and Colombia's experience with small-scale jatropha biodiesel production in the Mesoamerica project.

Trade dimensions of small-scale biofuels production

At a first glance, the direct connection between small-scale biofuels and international trade appears to be related to their cost-competitiveness as compared to alternatives (fossil fuels such as gasoline, diesel, natural gas, LPG, and kerosene). Promoting a renewable energy system, given that the system provides more expensive fuel than the conventional alternative due to its small scale, is a challenge. However, if examined from a broader perspective, small-scale biofuel production can be economically feasible, while at the same time delivering gains for sustainable development. The following approaches have been identified:

- **Focusing on foreign markets:** Countries and regions that have blending mandates and/or sustainability criteria in place are more likely to pay price premiums for biofuels, accommodating the costs of small-scale production. This is nevertheless dependant on the capacities of the producers to deliver biofuels that adhere to the standards required by the target markets.
- **Exploring marginal production possibilities:** Economies of scale as an enabling factor for market penetration of biofuels is not universally applicable. In isolated regions, fuel costs can be extremely high due to expensive transport and lack of local competition. Availability of non-monetary factors (i.e., labour) leads to the emergence of economically viable small-scale biofuel production for fuel, cooking and electricity generation.
- **Piggybacking on existing industries:** For example, Nepal can produce 18,045 m³ of molasses-based ethanol per year without compromising food security by using leftovers from its sugar production. US\$10 million can be saved annually by reducing imports of gasoline if molasses-based ethanol becomes the base for an E20 blend in Kathmandu Valley. Nepal could therefore cut foreign debt caused by petroleum imports simply by realising existing domestic potential for transport-grade ethanol.
- **Exploring trade-offs between domestic consumption and exports of fossil resources:** In developing countries dependant

on hydrocarbon exports (e.g., Bolivia and Venezuela), the buildup of local biofuel capacities can also be meaningful, as biofuels could lower the carbon intensity of the economy. Moreover, biofuel production could generate profits from additional fossil energy exports, made possible by a domestic shift to a larger share of biofuels in the total consumption.

These options are not mutually exclusive, but rather complementary. The first option features a direct link to trade, as it aims to direct exports towards regulated markets that could command the necessary price premiums. The second, third and fourth options offer indirect benefits to trade, which are nevertheless substantive.

Prices of fossil energy are often high in developing countries. For example, Zambia has one of the highest liquid fuel prices in the world, according to a recent assessment from GTZ. Nepal subsidises imports of gasoline for transportation and kerosene for cooking. The fact that developing countries often mobilise scarce resources to cater to their energy needs represents a large macroeconomic burden, especially in terms of usage of foreign reserves. High payments for energy and fossil energy imports could undermine efforts to maintain the value of the national currency, jeopardising their terms of trade.

As an indirect benefit, realising local small-scale biofuel potentials might free foreign reserves, which can then be used to stimulate trade of goods and services needed for development processes in these countries.

Biogas and trade

One example of a small-scale biofuel with large untapped potential and numerous benefits is biogas, produced from waste and residues, and improving living conditions both directly and indirectly. Biogas is a local business that affects national trade. Small-scale production with simple technologies can replace kerosene and LPG for cooking. Bio-fertilisers can replace traditional fertilisers. Additional environmental gains include reduced contamination and eutrophication of water sources, as residue flows are redirected into biogas schemes, not waterways. National effects on trade are seen through local activities that reduce dependence on imported fossil energy and fertilisers.

The authors have looked at examples in Bolivia and Nepal. In Bolivia, household waste-to-energy initiatives are replacing fossil fuel for cooking. Industry waste-to-energy can also substitute fossil fuel sources, mainly natural gas, and enable the use of larger biogas plants applying more advanced digester technology. Replacing natural gas with biogas in industry could permit an increased export of natural gas to neighbouring countries. The domestic use of natural gas is subsidised by the government in Bolivia. Given the positive effects on trade, environment and social conditions, an equivalent subsidy on biogas should be pursued.

In the case of Nepal, biogas is primarily derived from cattle dung and has been an emerging technology to provide basic energy services in rural households for cooking and lighting purposes. There are numerous benefits in biogas production, for example, health benefits (i.e., improved indoor air quality), agricultural benefits (i.e., biogas slurry as the best fertiliser), environmental benefits such as reduction in usage of firewood, kerosene, LPG, reduced carbon emissions and employment generation, workload reduction and empowerment of women. In Nepal, the Biogas Support Programme (BSP) was the first renewable energy project with the registration of two simultaneous Clean

Development Mechanism (CDM) projects in 2005, taking account of 19,396 biogas plants, and annual carbon revenue in excess of US\$600,000. Until 2009, more than 200,000 biogas plants were constructed and it is estimated that Nepal has production potential of 1.9 million plants.

In Nepal, biogas technology could replace 4,713,495 litres/year of kerosene, and 377,000 tons/year of fuel-wood. US\$4 million can be saved annually by reducing imports of kerosene. Furthermore, at the individual household level, the following qualitative benefits are possible: greenhouse gas emissions reduction of 7.4 tons, 25 litres kerosene savings, 1.75 ton slurry compost fertiliser production per household per year, and three hours time saving per day. These are significant contributions in regard to resource utilisation, trade balance and sustainable development at the local level considering small-scale biogas plants.

Additional financing through the CDM is available for biogas schemes, which further adds to the feasibility of such initiatives. Finally, small-scale biogas is only the first step in the process of attributing value to waste and seeing it as a resource. Small scale biogas is therefore a first step to developing larger plants with more sophisticated technologies that can be used to replace natural gas and further reduce dependence on fossil energy.

Conclusion: Why it matters

The initial perception that biofuels are only economical when produced in large scale must be changed. Realising small-scale biofuel opportunities is essential to the process of integrating developing and least developed countries into the international bioenergy arena without clashing with local socio-economic structures. Experiences in Nepal and Bolivia illustrate the feasibility of realising local small-scale biofuel potentials, and their multiple benefits that trickle down to improve terms of trade.

Fuel prices are often very high in poor, isolated regions. By creating local biofuel capacities that are viable at a small-scale, developing and least developed countries can benefit directly from biofuel exports towards mandated markets, or indirectly from improved terms of trade by freeing local resources once employed for pricey domestic energy or energy imports.

In countries like Nepal, commercial renewable energy sources such as bioethanol and biogas could enhance socio-economic benefits, reduce environment burdens, such as indoor air pollution (by using biogas as cooking fuel instead of firewood or kerosene), urban air pollution (bioethanol in transport reduces tail pipe emissions from automobiles), and delivering trade gains by reducing imports of fossil fuels (gasoline and kerosene). In countries such as Bolivia and Venezuela, which are big hydrocarbon exporters, the promotion of biogas could reduce the opportunity costs of consuming fossil fuels locally; domestic consumption of biogas could free more natural gas for export to neighbour countries.

While the promotion of small-scale biofuel production faces many challenges, the examples presented here demonstrate the importance of trading experiences in an global effort to move small-scale biofuel production in developing countries to the forefront of the bioenergy agenda.

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Addressing potential impacts of climate change on fisheries trade

By Graeme Macfadyen

The world's fisheries and fisheries trade will be affected by climate change in numerous ways. Foreseeing the changes and taking adequate adaptation and mitigation measures can help developing countries continue to derive benefits from this valuable resource - including through exports.

The world's poorest countries will be most affected by global climate change, including in the area of fisheries. Meanwhile, poorer countries tend to be more nutritionally and economically dependent on fish than wealthier countries, due to their higher per capita consumption of fish products, and the fact that they derive a greater share of employment, Gross Domestic Product (GDP) and export earnings from fish. While agriculture, forestry and freshwater resources have been central in climate policy discussions, the effects of climate change on fisheries resources, and thus the implications for health and livelihoods in the developing world, have been largely ignored.

Climate change impacts in the fisheries sector

Projected changes in fish populations and ecosystems due to climate change may be significant, and will lead to impacts within the fisheries sector and on national economies (see Box 1).

Impacts can occur at two main levels, which correspond approximately to the domains of micro- and macro-economic analysis:

- **within the sector** - impacts on the incomes, assets, and livelihoods of individual fishers, fish farmers, processors, and those engaged in marketing and the provision of inputs to the sector; and
- **at the national level** - impacts on revenues, exports, per capita fish supply, and contributions to employment and GDP.

Macro-economic concerns arise only when fisheries are sufficiently prominent in society and the economy to be a concern for national economic planning. This will be the case for many developing countries, particularly many island states, where fisheries often number among the major export revenue sources.

Assessing potential future impacts of climate change requires recognition that climate change is just one of many factors impacting on a country's fisheries sector, and not necessarily the most important one. In addition, assessing the magnitude of

potential change over different, and potentially long, timescales is difficult, especially at the country level.

For these reasons, it is virtually impossible to make quantitative projections about climate change impacts in individual countries. Nevertheless, one can suggest the different types of physical changes resulting from climate change, and the possible impact pathways to the effects on ecosystems and fish production, and in turn the impacts on trade and competitiveness of the fisheries sector and on fishers, communities and nations.

Within-sector impacts

All those in the supply chain - producers, processors, those transporting and selling fish - will be affected by changes in incomes, value-added, employment and food security. These changes may include:

- **Changes in fishing/business strategies and methods**, such as types of gear or forms of processing, to reflect changes in the abundance, distribution, and phenology of different fish species;
- **Changes to aquaculture** as coastal and inland areas become more or less suitable for aquaculture with changes in sea or lake levels, and changes in water quality and properties;
- **Changes in marketing chains and end market destinations**, resulting from shifts in the species mix of wild catches, changes in the balance of production between capture fisheries and aquaculture, and changes between marine and inland resources;
- **Shifts in the balance between fishing, fish farming and other livelihood activities**, with those in the sector seeking to divest if fishing or fish farming becomes less profitable. Alternatively, reduced livelihood opportunities in agriculture and other sectors may result in more people looking to fishing as a "safety-net" occupation;
- **The willingness of stakeholders to invest in community or participatory management**, itself important in enhancing adaptive capacity, may change if stocks are seen to be subject to climate-driven processes beyond the control of local management. Conversely, the threat of climate change impacts may galvanise local management to minimise

Box 1: Climate change impacts on the fisheries sector

Physical climate change impacts in oceans, lakes and rivers include changes to:

- heat content and temperature
- salinity, density and stratification
- ocean circulation and coastal upwelling
- sea, lake and river levels
- sedimentation brought about by climate-induced changes to land use
- ocean acidification, and
- low frequency climate variability patterns (e.g. El Niño Southern Oscillation (ENSO))



Resulting changes include:

- physiological, spawning and recruitment processes of fish
- primary production (e.g. diatoms and phytoplankton)
- secondary production (e.g. zooplankton)
- distributions of fish (through permanent movement, or changes to migration patterns)
- the abundance of fish (due to changes in primary and secondary production)
- phenology (e.g., timing of life-cycle events such as spawning), and
- species invasions and disease

- impacts and enhance adaptation;
- Changes due to mounting **costs of adaptation** in an attempt to maintain income and employment; and
- Changes due to **damage to infrastructure and assets, and increased safety risks** from increased severity and potentially frequency of extreme weather events.

Wider impacts

Climate-induced changes in the fishery sector may also have *wider societal and economic implications at the national level*, and these will be greatest where fish and fisheries play important roles in society and the economy. Examples include:

Rent generation from the sector. For many developing countries, the value of fisheries in the Exclusive Economic Zone (EEZ) is considerable and the sale of fishing licences to foreign vessels in return for access to national waters makes substantive contributions to GDP. Governments also generate revenue from domestic fisheries through the collection of various fees and taxes relating to fishing, processing and trading inputs and outputs.

Food and nutritional security.

Food security at the household and national level is achieved through trading of fish to generate income used for purchase of other food items. In addition, having access to fish provides direct nutritional security in the form of access to a healthy, balanced diet, rather than just access to sufficient calories. The fisheries sector also plays an important role with regards to food security in many countries by acting as a safety net whereby people may start fishing when other food or income generating activities are threatened. As climate change begins to impact inland and near-shore fisheries, the role of fisheries as a safety net is likely to become less viable. In addition, global levels of fish exports are rising, especially from developing countries. At the same time, per capita supply of fish is decreasing globally - despite the rapid rise of aquaculture production - due to population increases. Therefore, policy makers face important challenges in terms of balancing local nutritional needs with the revenue generating potential of export-oriented production.

Costs of adaptation. To maintain the flow of benefits to society and the economy from fisheries, governments are likely to have to increase their investments in developing coherent "climate proof" sectoral policy and legislation, management and development.

Trade competitiveness. At the most fundamental level, climate change has the potential to impact on total fish production volumes available for trade, both domestically and to export markets. Trade impacts could include changes such as trade volumes shifting to different export market destinations due to their different preferences for particular species, changes to total trade value, changes in the production for export and

local consumption, and changes in balance between marine and inland fisheries and aquaculture. There could be changes to the contribution of fisheries to exports and trade earnings, and the reliability of supplies could diminish.

The ability of individuals, communities and countries to deal with the wide range of climate change induced impacts listed above depends on their vulnerability. As shown in Box 2, vulnerability is a product of *exposure* and *sensitivity* combining to form *potential impacts*; and the adaptive capacity to respond to these impacts.

Responses to climate change impacts

What then can individuals and countries do to ensure that they maintain trade competitiveness in the face of the potential impacts of climate changes? Responses in the form of adaptation and mitigation offer potential to maintain or increase fisheries trade both domestically and internationally.

Adaptive measures in the fisheries sector

Fisheries-specific adaptive measures offer potential to maintain or increase fisheries trade both domestically and internationally, on a sustainable basis. Examples of such measures are provided below.

Re-building stocks and improving fisheries governance. Stocks that are not over-fished are likely to be more resilient to climate change impacts. Thus, initiatives aimed at management of the sector - such as decommissioning superfluous vessels, introducing fishing rights, improving monitoring, control and surveillance - will help improve the adaptive capacity of fisheries to climate change.

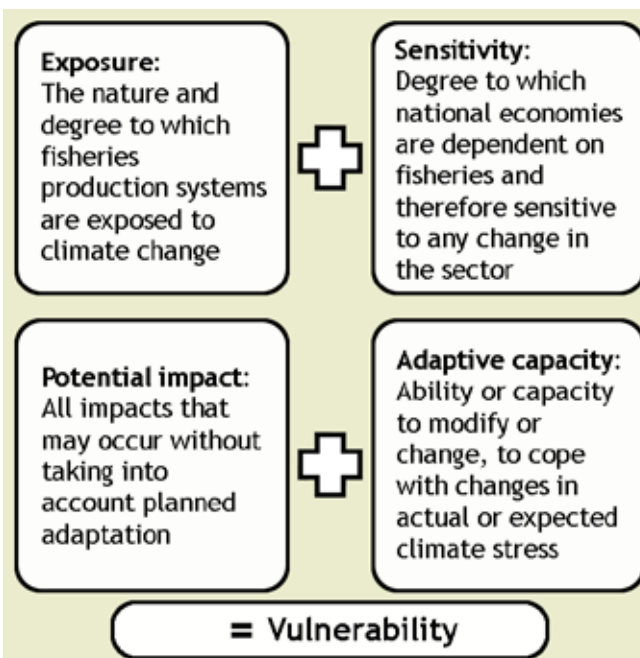
Strategies regarding onshore fisheries and coastal infrastructure. Provision of safe havens or harbours for the fishing sector to protect vessels

can ensure continuing levels of catches. Climate-proofing any such developments through careful positioning and appropriate engineering will be increasingly important.

Managing declining incomes if fish catches fall, and efforts aimed at diversification and fostering alternative livelihood activities. Enabling exit from the fishery sector in response to downturns, by providing training in alternative occupations or through general investments in skills and capabilities, may be important in fisheries that are declining or subject to reduced productivity under projected climate change.

Dealing with fisheries' status as a safety net activity. In many countries, climate change impacts on livelihoods in other sectors, such as agriculture, may result in increased pressure on fish resources. This, in turn, requires specific policies to deal with part-time and occasional fishermen wishing to exploit fish resources. Such an approach ensures that fish catches are sustainable.

Box 2: Vulnerability to climate change impacts



Disaster preparedness and response. Policy-level responses can include investing in improved weather information and storm warnings, as well as ensuring that the fishery sector is included in national disaster preparedness and response planning.

Aquaculture development. Aquaculture production increases can sometimes help offset capture fisheries production declines. These aquaculture assets should be climate-proofed. Other adaptive measures include species selection, selective breeding and genetic modification in aquaculture.

Ecosystem-based adaptation. Coastal ecosystems like wetlands, coral reefs and mangroves all provide natural shoreline protection from storms and flooding. This in addition to their role in maintaining sustainable fish supplies by providing breeding and nursery areas.

Mitigation in the fisheries sector

Mitigation options in the fisheries sector are very much at the early stages of investigation. Few studies of energy consumption by the world's fishing fleets have been conducted and the current contribution of the fisheries sector to global warming is not yet known.

Policy options for climate change mitigation could include taxation, regulation and incentives related to fuel use and vessel engine emissions. Other options include supporting technical innovations to reduce fuel usage and emissions in fishing vessel engines. Countries could promote fuel-efficient fishing methods - such as using static methods rather than active gear such as trawling, with its high energy requirements - through differential licensing conditions and decommissioning support. The development of low-impact aquaculture, such as herbivorous aquaculture species, also has a role to play.

In addition, improvements in building design and handling practices to reduce energy requirements and improve energy efficiency can make a contribution. Fuel use for the further transportation of fish to markets can also be made more efficient. Other than addressing the need for better technologies, it will be important to protect and rehabilitate mangroves, as they have a valuable role to play in sequestering carbon.

In many cases, countries could increase their competitive trading position by implementing adaptation and mitigation policies. For example, if countries protect wetlands, coral reefs and mangroves - and the range of ecosystem services they provide - they may be able to access tangible financial benefits in the form of tradable permits and payments. These could include conservation payments, payments for environmental services, linkages with carbon markets (e.g. Reducing Emissions from Degradation and Deforestation (REDD) for mangroves), and funding or revenues through eco-tourism ventures. Countries and companies could also brand and promote their products as climate- and environmentally-friendly, thereby positioning themselves favourably on markets for sustainable products. In addition, efficient production methods can lead to cost reductions in and of themselves.

Funding to address climate change impacts and fisheries trade

As seen from the above discussion, individual countries can, and should, do a great deal in order to address climate change impacts on the fisheries sector. This will allow them to maintain trade competitiveness and the very significant benefits - both

in economic and social terms - that they derive from the sector. Some potential sources of funding for adaptive and mitigating responses to climate change are discussed below.

Aid for Trade. Set up in the course of the long-running Doha Round of global trade talks, the WTO work programme on Aid for Trade aims to mobilise additional funding to help poor countries overcome supply-side constraints that hamper their ability to benefit from the multilateral trading system. While Aid for Trade is primarily trade-related, the economic resilience that it creates could have positive effects in helping countries deal with the potential impacts of climate change on fisheries. This would be particularly true if Aid for Trade could anticipate possible climate impacts on trade-related infrastructure or on key fish species or sectors likely to be impacted, and respond accordingly in the design, implementation and financing of relevant projects. Given the very significant potential impact of climate change on fisheries trade, Aid for Trade could potentially and legitimately be used to support many of the adaptive and mitigating measures discussed above. For example, at least two dimensions of the Aid for Trade initiative are relevant for enhancing the competitiveness of fisheries: strengthening trade-related infrastructure (which may need to be climate-proofed) and building productive capacity (especially for small and artisanal fisheries). Enhancing the competitiveness of the sector is a key adaptive measure, making the sector resilient to external shocks, including climate change impacts.

The Integrated Framework (IF) for Trade-Related Technical Assistance. The IF was established in 1997 to support least-developed country (LDC) governments in trade capacity building and integrating trade issues into overall national development strategies. Through the IF, the participating agencies (including the UN Development Programme, the World Bank and the WTO) combine their efforts with those of LDCs and other development partners to respond to trade development needs. The ultimate goal is to support the integration of LDCs into the global trading system in order to contribute to poverty reduction and sustainable development. The IF has two objectives: To "mainstream" (or integrate) trade into national development plans; and to assist in the coordinated delivery of trade-related technical assistance in response to needs identified by the LDC. Clearly, there is potential for technical assistance to focus on fisheries sector trade related needs in response to climate change impacts.

NAPAs and PRSPs. Specific reference to the fisheries sector in National Plans of Adaptation (NAPAs) to climate change signals priority for expenditure on adaptation in the sector. Therefore, countries could make sure to include the sector in on-going reforms to existing plans or preparation of new NAPAs. Inclusion in Poverty Reduction Strategy Papers (PRSPs) helps to ensure fisheries and aquaculture in the highly indebted poor countries receive a budget allocation in associated medium-term expenditure frameworks. This can contribute to maintaining sustainable fisheries and ensuring government investment in infrastructure, services and regulatory institutions that help to maintain or improve trade competitiveness. PRSPs have also become the standard tool in the search for trade-related assistance, since they serve as the platform on which donors base their aid planning.

Graeme Macfadyen is the Director of Poseidon Aquatic Resource Management. This article summarises and updates work funded by the Commonwealth Secretariat (Macfadyen, G., and Allison, E: Climate Change, Fisheries, Trade and Competitiveness: Understanding Impacts and Formulating Responses for Commonwealth Small States. 2009).

ICTSD update

ICTSD's work on trade and climate change over 2010 and activities in Cancun

Over the past year, ICTSD has been deeply engaged in a wide range of topics in the interface between trade and climate change. In addition to regular reporting and analysis of trade and climate change issues in BioRes, Bridges, and regional periodicals, ICTSD has produced an array of cutting edge research papers and organised an array of dynamic policy dialogues, which brought together a broad range of actors and stakeholders.

One area we have covered extensively is technology transfer and diffusion. The elimination or reduction of tariff barriers and non-tariff barriers is one channel for promoting the diffusion of clean, climate-friendly technologies. In 2010, ICTSD completed a research project on trade in climate-friendly goods in three sectors important from an emissions-perspective: buildings, renewable energy supply, and transport technologies.

As a follow up to these sectoral studies, ICTSD also sought to build a broad consensus around goods with an exclusive or predominantly environmental use - so-called "single-use goods." This work is useful because identifying climate-related environmental goods in existing tariff classifications poses trade negotiators many challenges; since certain products have multiple uses, the potential environmental benefits of trade liberalisation may be uncertain.

Intellectual property protection is another key factor that impacts technology transfer. In 2010, a unique collaboration between ICTSD, the United Nations Environment Programme and the European Patent Office, resulted in a groundbreaking study on patents and clean energy which yielded important insights, evidence, and data that could lead to better-informed policy-making on this important subject.

The study includes the findings from a comprehensive mapping of clean energy technologies, a patent landscape for clean energy generation technologies and the first global survey of clean energy licensing practice. A notable outcome of the study has been the creation by EPO of a new patent classification scheme for clean energies and a searchable database now available on the EPO's patent information service (esp@cenet). The new scheme will provide reliable and user-friendly patent information and thus help improve the transparency of the patent system in this critical technology sector.

Carbon leakage - the movement of polluting activities to countries with more lax environmental regulations - has also been a crucial issue for ICTSD. As the Copenhagen summit last year gave little clarity on how major emitting economies will proceed to regulate their emissions, uncertainties about carbon leakage remain important. In light of this development, ICTSD has conducted several research projects looking into the possible impact of policy measures intended to mitigate concerns for leakage, in particular border carbon adjustment measures and the allocation of emission allowances free of charge.

By applying concrete policy proposals to existing trade flows, ICTSD has been able to assess the vulnerabilities of certain developing countries to border measures. In addition, a recent ICTSD paper explores the practical aspects of such measures, pointing to the trade-off between costs for the policy measures and the sought effect (see pg. 4). Last, research has scrutinised the practice of allocating emission allowances free of charge, discussing the possible impacts both from a legal and an economic perspective.

To culminate the year, ICTSD will bring this background in trade and climate change to a series of events in Cancun. From 8-9 December, we will be holding a two day symposium on "The Role for Trade and Markets in Addressing Climate Change and Sustainable Development." The symposium aims generate proposals for fostering strong multilateral regimes on trade and climate change and promoting the transition to a low-carbon economy and a sustainable energy future. The symposium will feature a series of panels involving a diverse group of stakeholders in a constructive, forward-looking dialogue to ensure the multilateral climate and trade regimes are properly equipped to deliver on the challenges before them.

In addition, ICTSD will organise two official UNFCCC side-events. On 30 November, a panel set up in collaboration with UNEP and EPO will discuss how practical tools derived from the study mentioned above can contribute to a better understanding of IPR options in the UNFCCC negotiations. On 4 December, our Cancun-team will give a broad overview of the trade and climate linkages, and present recent ICTSD research.

We look forward to seeing you there.

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UNFCCC COP 16 events & resources

Select COP 16 Side Events

Date	Time	Event	Venue
Tuesday 30 th	15:00-16:30	ICTSD side event on “Patents, technological knowledge and access to climate change mitigation technologies” (Co-organised by UNEP and EPO)	Room 3, Cancun Messe
	20:15-21:45	Friends of the Earth International side event on “Climate finance: The good, the bad and the ugly”	Sandia
Wednesday 1 st	16:45-18:15	Climate Action Network-Europe side event on “EU climate financing: NGO analysis and recommendations”	Monarca
Thursday 2 nd	16:45-18:15	International Tropical Timber Organisation (ITTO) side event on “REDD-plus: Enhancing environmental services and private sector participation”	Mamey
Friday 3 rd	16:45-18:15	IATP side event on “Transition to climate friendly agriculture: the current finance regime versus viable alternatives”	Mamey
Saturday 4 th	11:30-13:00	FERN side event on “Lessons learned from FLEGT for REDD”	Monarca
	18:30-20:00	ICTSD side event on “Leveraging multilateral trade to address climate interface”	Room 2, Cancun Messe
	All Day (Sat. & Sun.)	Development and Climate Days, co-organised by IIED, IISD, the Stockholm Environment Institute (SEI), and RING.	Caribe Park Royal Grand
Monday 6 th	20:15-21:45	UNEP-Finance Initiative side event on “Financing real transformation? Designing an effective financial mechanism under the convention”	Jaguar
Tuesday 7 th	18:30-20:00	World Intellectual Property Organization (WIPO) side event on “Supporting Successful Partnering in Technology Transfer”	Mamey
Wednesday 8 th	13:20-14:40	UNCTAD side event on “Rio+20: The transition to a green economy - implications for poverty alleviation and sustainable development”	Sandia
Wednesday 8 th - Thursday 9 th	All Day	ICTSD two-day Symposium on “The Role of Trade and Markets in Addressing Climate Change and Sustainable Development.” Participants must register to attend. Visit www.ictsclimate.org .	Azul Sensori Hotel

Trade and Climate Change-Related Resources

INTERNATIONAL TRANSPORT, CLIMATE CHANGE AND TRADE: WHAT ARE THE OPTIONS FOR REGULATING EMISSIONS FROM AVIATION AND SHIPPING AND WHAT WILL BE THEIR IMPACT ON TRADE? ICTSD Programme on Trade and Environment, Trade and Sustainable Energy Series, Background Paper, September 2010.

INTERNATIONAL TRANSPORT, CLIMATE CHANGE AND TRADE. By Joachim Monkelbaan. ICTSD Programme on Trade and Environment, Trade and Sustainable Energy Series, Background Paper, September 2010.

CLIMATE-RELATED SINGLE-USE ENVIRONMENTAL GOODS. By Rene Vossenaar. ICTSD Programme on Trade and Environment Paper No. 13, September 2010.

PATENTS AND CLEAN ENERGY: BRIDGING THE GAP BETWEEN EVIDENCE AND POLICY. Final report and executive summary, by UNEP, EPO, and ICTSD, September 2010.

HARMONISING ENERGY EFFICIENCY STANDARDS - BUILDING FOUNDATIONS FOR CO-OPERATIVE ACTION. ICTSD Programme on Trade and Environment, Issue paper No. 14, September 2010.

TECHNOLOGY MAPPING OF THE RENEWABLE ENERGY, BUILDINGS, AND TRANSPORT SECTORS: POLICY DRIVERS AND INTERNATIONAL TRADE ASPECTS. ICTSD Programme on Trade and Environment, Issue paper No. 12, May 2010.

AGRICULTURAL TECHNOLOGIES FOR CLIMATE CHANGE MITIGATION AND ADAPTATION IN DEVELOPING COUNTRIES: POLICY OPTIONS FOR INNOVATION AND TECHNOLOGY DIFFUSION. ICTSD Platform on Climate Change, Agriculture and Trade Series, Policy Brief No. 6, May 2010.

AID FOR TRADE AND CLIMATE CHANGE FINANCING MECHANISMS: BEST PRACTICES AND LESSONS LEARNED FOR LDCs AND SVEs IN AFRICA. ICTSD Programme on Competitiveness and Sustainable Development, Issue Paper No. 10, January 2010.

CLIMATE CHANGE AND DEVELOPING COUNTRY AGRICULTURE: AN OVERVIEW OF EXPECTED IMPACTS, ADAPTATION AND MITIGATION CHALLENGES, FUNDING REQUIREMENTS. ICTSD Platform on Climate Change, Agriculture and Trade, Issue Brief No. 2, December 2009.