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Climate and equity impacts of global trade

The steadily growing volume of global trade is forcing policymakers to start taking a hard look at its climate impact, while keeping equity and development issues as top priority. The carbon footprints of traded goods, the potential for carbon leakage between countries with stringent versus lax climate regulations, the impact of global transport itself - be it by road, rail, marine vessels or air freight - are at the core of the debate. The views and priorities of key stakeholder groups can be found across the spectrum.

Embodied carbon in trade - are global emissions migrating?

Pioneering research on embodied carbon in trade and on carbon leakage and competitiveness are tackling these tough questions head-on. The previous issue of the BioRes Review featured an article by Muthukumara Mani of the World Bank, who suggested that some - but not major - relocation of carbon-intensive industries to countries without climate commitments has taken place (Bridges BioRes, Vol. 1, Issue 1, October 2007, p. 4-5). However, Mani pointed out that the picture may change in the future when countries take on more stringent reduction targets.

Meanwhile, other research has identified a stronger link, suggesting that developed countries already are 'outsourcing' some of their carbon dioxide emissions by importing products manufactured by inefficient carbon-intensive industries in other countries. In fact, global emissions end up being higher overall when production relocates to the emerging economies - and China is particular. Shui Bin and Robert Harriss have studied the embodied carbon associated with trade between the US and

China (see this issue of Bridges BioRes, p. 3-5), noting that the US has managed to avoid a significant amount of carbon dioxide emissions because of its trade with China, and that overall emissions are higher because some of the more efficient production in the US is being substituted by less efficient processes in China.

Do we need a new carbon accounting system?

In suggesting that consumer products imported from the emerging economies come with a significant carbon footprint, the research on embodied carbon in trade raises questions regarding current carbon accounting systems, which are based on the nation state. It raises issues regarding the responsibilities of producer and consumer countries with regard to emissions reductions, and underlines the need for a comprehensive global regime to tackle climate change and avoid leakage of carbon emissions from countries with stringent climate policies to those without.

While the picture is not yet clear-cut, the issues have become highly political. Some dispute that significant carbon leakage is



taking place, pointing to the fact that developed countries still are producing most of their energy-intensive steel and cement products domestically. Some economists say that trade leads to greater production efficiencies, including lower overall greenhouse gas emissions.

Others have accused developed countries of 'carbon laundering' their economies by outsourcing polluting industries to developing countries. They stress the need for developed countries to take strong first steps to tackle climate change in order to address their responsibilities both with regard to their historic emissions and their current emissions, taking into account the embodied carbon in their imports. Some exporting countries have, in fact, hinted at the need to redefine emissions reduction responsibilities since part of their emissions are directly related to consumption in developed countries. Meanwhile, emerging economies are taking measures to improve the energy efficiency of their industries. There have been calls on developed countries to intensify technology transfer to developing countries, including economies they are sourcing large amounts of their consumer goods from.

Trade unions and representatives of heavy industry have, on the other hand, raised concerns over jobs lost in developed countries due to industry relocating to developing countries with less strict climate standards - leading to carbon leakage and the same, or even larger, amounts of carbon dioxide ending up in the atmosphere. Following this train of thought, a number of politicians have suggested setting up protective measures at the border.

Adjustments at the border?

At the recent World Energy Congress that met in Rome in mid-November, its Secretary General, Gerald Doucet, warned against a "trade war between those who are concerned over carbon emissions and those who are not." Such a trade war could come about if countries with stringent climate policies decided to make use of border adjustments towards imports from countries taking a lax approach to climate change mitigation.

French President Nicolas Sarkozy recently called for a European levy on imports from countries outside the Kyoto Protocol, namely the US and Canada. European legislators have called for border tax adjustments from time to time, but the European Commission has not moved on the issue, preferring a less confrontational approach.

On the other side of the Atlantic, two climate change bills currently under review in the US Senate include elements that have raised concern among some trading partners because they would require exporters of energy intensive goods to the US to buy greenhouse gas "emissions allowances" on the US market (see Bridges BioRes, Vol.1, Issue 1, October 2007, p. 6-7).

Defensive action to mitigate potential trade and competitiveness impacts envisioned in the draft bills would target countries without stringent climate regulations

in place, such as China, which is currently not required to make emissions reductions under the Kyoto Protocol. The US itself has rejected the Kyoto Protocol, and the actual enactment of any legislation to cap greenhouse gas emissions is not expected in the near future.

The WTO-compatibility of border tax adjustments in terms of energy prices affecting carbon emissions remains untested. Under a climate change agreement with global by-in, such problems would be unlikely to surface.

Cleaning up transport

Aside from the debate on carbon leakage, more attention is being focused on the emissions related to the actual transport of goods. The Intergovernmental Panel on Climate Change has singled out the transport sector as the one where emissions are rising the quickest, and efficiency gains are quickly outpaced by the rise in volume.

Marine transport has been practically untouched, leading to a situation in which Intertanko - the international organisation representing independent tanker operators - is admitting that the sector lags far behind other transport sectors in terms of fuel efficiency and other standards. In the US, environmental groups are taking a bottom-up approach to climate regulation, and have asked the US Environmental Protection Agency to set limits for greenhouse gas emissions from marine shipping (see page 6, this issue of the BioRes Review).

The transport of goods by air has received more attention, and is at the heart of a debate taking place especially in the UK on 'food miles' and 'fair miles.' With the debate on embodied carbon and leakage concerning mainly developed and emerging economies, some of the most vulnerable countries have found themselves the victims of the food miles discussion. Certain developing countries in Africa have managed to capture high-value niche markets in developed countries by air freighting fresh produce during the northern winter. These countries want to retain their right to grow, including through traded growth. They argue that their overall emissions are much lower than those of the importing countries, which should start by cleaning up their own act. In addition, these vulnerable countries are already experiencing the impacts of climate change and have limited capacities to adapt (see page 7, this issue of the BioRes Review).

In search of a global solution

While more work is needed to shed light on the cluster of issues related to trade and climate change, it is clear that both the climate change and trade communities will see much more discussion of them, both from a carbon accounting perspective and because the climate impact of trade can and should be minimised.

As climate change negotiators from around the world meet in Bali from 3-14 December to create a roadmap for negotiations on a treaty to tackle climate change after 2012, some of these discussions are likely to surface.

Talking carbon: implications of US-China trade

By Shui Bin and Robert C. Harriss

China's trade, US trade and US-China trade

At the end of September 2007, China - the country with the largest foreign exchange reserve in the world - hit a fresh record with a US\$1.43 trillion reserve. The reserve was 45 percent higher than it was in the previous year, and 52 percent higher than that of the second runner up, Japan. A senior economist at the State Information Center of China said "The increasing trade surplus has been the main driver of the reserve expansion." (China Daily 2007)

Thanks to its ceaselessly growing economy and successful transformation into a major merchandise supplier serving consumers worldwide, China ranked third in global trade terms (the sum of the absolute values of export and import) in 2005-2006 and is expected to be number two in 2007 (WTO 2006). China also has the largest trade surplus globally. During the first nine months of 2007, China's trade surplus soared to US\$185.7 billion, which already was higher than its total 2006 surplus that amounted to US\$177.5 billion.

As the largest merchandise importer, the US has been a solid first at the opposite end, registering its largest trade deficit for decades. In 2006, the US trade deficit escalated to US\$817 billion, of which as much as 28 percent related to its trade with China (see Figure1).

Although China's currency has appreciated since last year (registering a 7.4 percent increase between 2006 and September 2007), the US-China trade deficit seems still to be growing. For example, the US monthly trade deficits with China during January and September of this year were between three and 34 percent higher than they were for the same months the year before.

CO2 emissions from China and the US

Although the US and China are at the opposite ends of the spectrum with respect to trade balance, the countries converge as the top two emitters of CO₂ globally. In 2005, the US emitted 5,957 million metric tons of CO₂ (MtCO₂) followed by China's 5,323 MtCO₂. Together, their emissions make up 40 percent of the global total (see Figure 2).

As the world's largest fossil fuel producer and consumer, as well as the largest CO₂ emitter, the US has been in the spotlight as the clear frontrunner. Since 2002, China's annual growth of carbon emissions has taken off sharply, with growth rates ranging from 11 percent to 19 percent between 2002 and 2005. In June 2007, the Netherlands Environmental Assessment Agency (MNP) announced that "according to preliminary estimates for 2006, China topped the list of CO₂ emitting countries, surpassing the USA by an

estimated 8 percent." (MNP 2007). The 2007 edition of the International Energy Agency (IEA)'s Global Energy Outlook, released in November, confirmed that China will overtake the US as the world's biggest emitter of CO₂ before 2010. (IEA 2007).

The CO2 emissions associated with US-China trade

In the age of globalisation, are there linkages between trade and CO2 emissions? The answer is yes. Trade can include the transportation of more than one thinks: goods, services, capital, and also CO2 emissions.

According to the existing CO₂ accounting framework, CO₂ emissions resulting from the manufacture of a product are accounted for by the manufacturer/producer (in the country of origin) - not by the consumer (in the destination country). Therefore, when a country imports a product, it also "outsources" the related CO₂ to the exporting country.

In the case of the trade between the US and China, one can ask the following questions:

- 1) How much of China's carbon is emitted to meet final consumer demand in the US?
- 2) What quantity of CO₂ emissions has the US avoided emitting by trading with China?
- 3) What are the impacts of US-China trade on global CO₂ emissions?

Shui and Harriss have tried to answer these questions. Their research is based on US-China trade data¹ from 1997 to 2003 and an input-output approach², and has produced some interesting preliminary results (Shui and Harriss, 2006). The following sections give an overview, and raises questions for the future.

Figure 1: US Trade Deficits in Goods, 1987 -2006

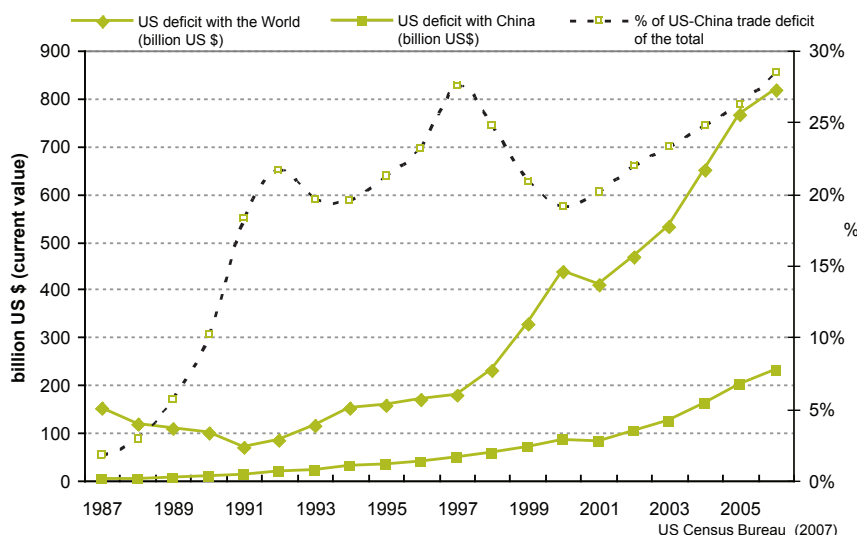


Table 1 Top 10 Exports in US-China Trade in 2003 Unit: billion US \$

Rank	Chinese Exports to the US		US Exports to China	
1	Other Computer Peripheral Equipment	11.4	Soybean	2.8
2	Audio and Video Equipment	9.9	Aircraft	2.2
3	Games, Toys, and Children's Vehicles	8.3	Semiconductor and Related Devices	2.0
4	Electronic Computers	5.6	Plastics Material and Resin	0.8
5	Institutional Furnitures	4.7	All Other Basic Organic Chemicals	0.8
6	All Other Miscellaneous	4.1	Cotton	0.7
7	Women's Footwears (except Athletic)	4.0	Other Computer Peripheral Equipment	0.7
8	Other Footwears	3.5	Meat	0.5
9	Printed Circuit Assembly (Electronic Assembly)	3.5	All Other Miscellaneous Machinery	0.5
10	Dolls and Stuffed Toys	3.3	Fertilizers	0.5
	Total of China's top 10 exports	58.4	Total of the top 10 US exports	11.6

CO₂ embodied in exports/imports

During 1997 to 2003, the top ten Chinese products exported to the US mainly comprised computers and their peripheral equipment, electronics, toys and clothing. The top ten US exports to China were more diverse, ranging from soybean, aircraft, semiconductors and computer peripheral equipment to fertilizers, as presented in Table 1. The US trade deficit with China during the study period rose from US\$49.7 billion to US\$124.0 billion, with an annual growth rate of 16.5 percent.

Mainly due to their large monetary value, the top five Chinese and US export products with the largest CO₂ embodiment pretty much fall into the same categories as when ranked by their trade value. For example, audio and video equipment (27.4 MtCO₂) and toys (25.7 MtCO₂) were the two Chinese exports with the largest CO₂ embodiment, and soybean (1.7 MtCO₂) and plastics materials (1.1 MtCO₂) were the US exports with largest associated CO₂ embodiment. Table 2 illustrates the top five Chinese and American exports with the highest associated CO₂ embodiment in 2003.

Shui and Harriss's study also revealed that the CO₂ embodiment of Chinese exports to the US has climbed from 213 MtCO₂ in 1997 to 497 MtCO₂ in 2003. This indicates that 6.8 percent and 13.3 percent of China's CO₂ in 1997 and 2003 were emitted to meet final demand in the US. The CO₂ embodiment of US exports to China was insignificant, 10 MtCO₂ in 1997 and

18 MtCO₂ in 2003, accounting for 0.2 percent of the US' annual CO₂ emissions during the same period.

"Avoided" CO₂ emissions in the US

It is well known that the US has suffered a vast trade deficit with China. The untold part of this story is that the US has avoided emitting a large amount of CO₂ within its shores because of its trade with other countries, including China. Had the US manufactured the same quantity of products domestically, its reported CO₂ emissions would be significantly higher than they are today.

The avoided CO₂ emissions due to the US-China trade (compared to US production of the same quantity of goods domestically) are significant and growing, in line with growing US imports from China. The avoided CO₂ emissions have risen from 150 MtCO₂ in 1997 to 358 MtCO₂ in 2003. The total avoided amount was 1,711 MtCO₂ during this period, about six percent higher than the emissions of the world's third largest CO₂ emitter, Russia, in 2003.

The top three Chinese exports which brought about the largest avoided CO₂ emissions for the US included audio and video equipment (21.2 MtCO₂), games and toys (19.8 MtCO₂), and computer peripheral equipment (15.0 MtCO₂).

The impact of US-China trade on global CO₂ emissions

The previous two sections have looked at the impacts of US-China trade on national emissions.

What is the impact of US-China trade at the global scale?

The CO₂ embodiment in audio and video equipment, the largest Chinese export to the US in 2003, is 27.4 MtCO₂. However, the CO₂ embodiment in the same quantity of audio and video equipment produced in the US would be 21,2 MtCO₂ - that is, 6.2 MtCO₂ lower. These figures suggest that CO₂ emissions from the manufacturing of a product in China are higher than the CO₂ emissions from producing the same product in the US, which is largely due to the relatively high use of coal and less efficient manufacturing technologies in the industrial sector in China.

Figure 2: US and China CO₂ Emissions 1980 - 2005

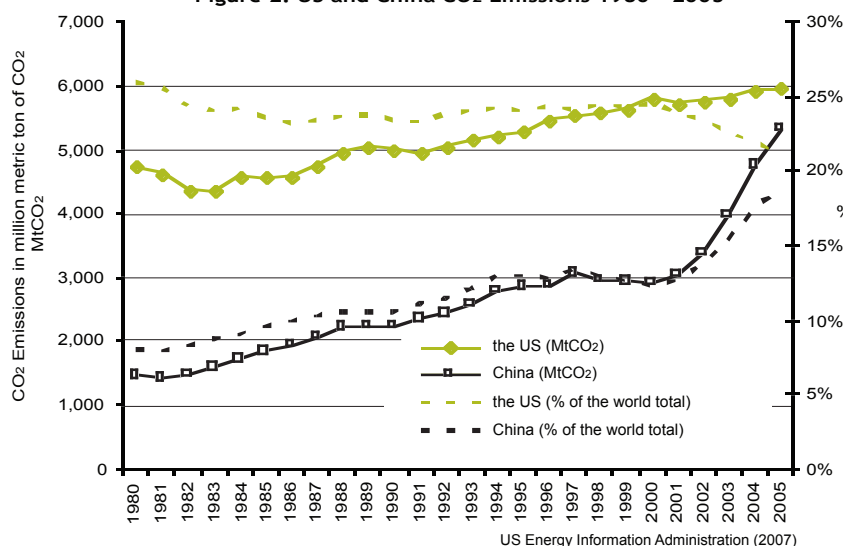


Table 2 Top 5 Exports in US-China Trade, ranked by their CO₂ embodiment in 2003 Unit: MtCO₂

Rank	CO ₂ emissions embodied in Chinese exports		CO ₂ emissions embodied in US exports	
1	Audio and Video Equipment	27.4	Soybean	1.7
2	Games, Toys, and Children's Vehicle	25.7	Plastics Material and Resin	1.1
3	Other Computer Peripheral Equipment	19.4	All Other Basic Organic Chemicals	1.1
4	Institutional Furniture	13.5	Fertilizers (Mixing Only)	0.8
5	Women's Footwear (except Athletic)	12.8	Aircraft	0.8
	Total of China's top 5 exports	98.9	Total of the top 5 US exports	5.5

Therefore, the "additional" global CO₂ emissions resulting from US-China trade during 1997-2003 would be 720 MtCO₂ in total, about 17 percent higher than Canada's total CO₂ emissions in 2003 (See Figure 3).

Concluding observations

Trade is a complicated and multifaceted issue. The economic, financial, political and social impacts of trade have been discussed at great length. Embodied carbon in trade is less well studied, and has remained rather "invisible" in current discussions of the linkages between trade and climate change.

In the case of the two global top traders - the US and China - the monetary imbalance has fueled political and economic arguments. The embodied carbon of their trade flows has not quite established itself as a talking point for these top two carbon emitters. The huge US trade deficit does help it reduce its domestic CO₂ emissions. For China, its rocketing trade surplus includes the cost of rising domestic and global carbon emissions.

There are now an increasing number of studies on carbon embodiment in trade. All indicate the significant role trade plays in national, regional and global CO₂ emissions (Antweiler, 1996; Wyckoff and Roop, 1994; Muradian et al., 2002; Peters and Hertwich, 2006; Weber and Matthews, 2007). Quantifying carbon and other pollutants associated with international trade will shed light on opportunities and priorities for implementing emissions mitigation programmes such as the successors to the Kyoto Protocol.

Deepening globalisation has ensured a need to address the significance of the carbon dimension of trade if we are really serious about finding a way to confront climate change.

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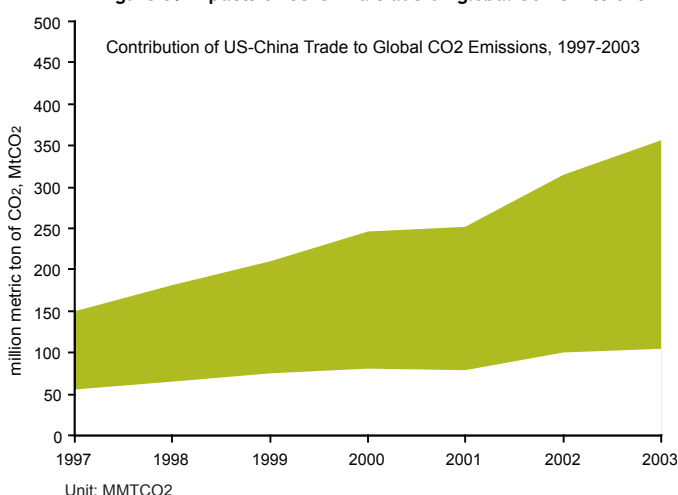
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Endnotes

- The data was provided by the US Department of Commerce.
- One of main models used is called the Economic Input-Output Lifecycle Assessment (<http://www.eiolca.net/about.html>).

Figure 3: Impacts of US-China trade on global CO₂ emissions



Environmental groups target shipping emissions

The shipping industry's greenhouse gas emissions have been off the public's radar screen, and apart from a small group of experts, they have been ignored even by most of the climate and trade communities. This seems about to change.

US groups take action

On 3 October, the California Attorney General Jerry Brown and a coalition of environmental groups simultaneously petitioned the US Environmental Protection Agency (EPA) to regulate emissions from marine shipping causing climate change.

The environmental groups Earthjustice, the Center for Biological Diversity, Friends of the Earth and Oceana said that "the sheer number of these ships, coupled with operating practices that use fuel inefficiently and poor government oversight, results in carbon dioxide emissions" equal to "the emissions of 130 million to 195 million cars."

The petitions came in the wake of a US Supreme Court ruling in April, which confirmed that the EPA has the jurisdiction to regulate in the area of climate change. The current petitions were the first to be filed after the Supreme Court decision, and would affect global shipping operations.

Even though potential EPA rules would apply to US territorial waters only, they would apply to all vessels operating there, regardless of their country of origin or country of flag. Tough rules in the US would likely also lead the country to push for tightened rules at the international level through the International Maritime Organisation (IMO).

Petition calls for efficiency, cleaner fuels

The petition asked the EPA to act by "(1) requiring marine shipping vessels to meet emissions standards by operating in a fuel-efficient manner, using cleaner fuels, and/or employing technical controls, so as to reduce emissions of carbon dioxide, nitrous oxide, and black carbon, and (2) controlling the manufacture and sale of fuels used in marine shipping vessels by imposing fuel standards to reduce emission products that contribute to global warming." The EPA will have to provide a response to the petition within six month's time.

Study looks at ship pollution and human health

A recent study has linked pollution-related illness and mortality to emissions of seafaring vessels.

The study, conducted at the University of Delaware in the US, links approximately 60,000 lung- and heart-related deaths in 2002 to the pollution and chemicals emitted by large shipping freighters. According to the researchers, these deaths were due to the poor fuel standards of the shipping industry.

Over the last couple of decades, the international community has taken steps to reduce emissions from other sectors, but the shipping industry has been left largely unregulated. Emissions from buses and trucks have, for example, been reduced by almost 90 percent.

"If the US is to do its part in reducing the threat of global climate disruption, then EPA must limit the global warming emissions from ships that enter the ports of the United States," commented California Attorney General Jerry Brown. Danielle Fugere of Friends of the Earth noted that "Slower speeds, cleaner fuels, better ships - the steps that the shipping industry must take are clear. It's up to the EPA to ensure these steps are taken."

Representatives of the shipping industry called for a global approach. "We would prefer to see these issues resolved at the international level," said T.L. Garrett, vice president of the Pacific Merchant Shipping Association. "Then everyone's on a level playing field. We think it's the most efficient way of advancing these environmental initiatives." Joe Angelo, deputy managing director of Intertanko, a group representing independent tanker operators, agreed that the best approach was "to reduce emissions worldwide - universally - not just unilateral action in the United States or the European Union."

Shipping - a major source of pollution

According to the petition by the environmental groups, marine vessels produce close to three percent of the world's greenhouse gases. The worldwide fleet of 90,000 ships transports 90 percent of the world's goods, and only six countries emit greater amounts of greenhouse gases. Shipping has grown by three percent annually on average over the last three decades, and shipping emissions are projected to grow by more than 70 percent by 2020, as global trade expands.

More recently, Intertanko released informal preliminary data showing that greenhouse gas emissions from marine transport have grown rapidly, and are almost twice as high as previously thought. The rapid growth over the last six years is due both to the growing volume of trade, and increasing shipping speeds with more fuel being burned. The Intertanko report, when completed, will be presented to the International Maritime Organisation.

Freighters, however, travel the open seas, leagues away from the coastal inhabitants that fall ill. Inhabitants near major trade routes will be most affected, mainly in South and East Asia and Europe. By 2012, the study predicts that the death rate is likely to grow by 40 percent.

International shipping accounts for eight percent of global sulphur emissions. This is unsurprising considering that the industry largely uses bunker fuel, which is the waste by-product of distillate oil. Thus it contains the excess sulphur driven out by the distillation process, in concentrations upwards of 2000 times higher than in highway diesel fuel.

The researchers call on the international community to update shipping standards in order to better protect the environment and lives of coastal inhabitants.

Food miles debate carries on

The bulk of internationally traded goods are transported by water, roads and rail - aviation, however, also plays an important and growing role. While consumers have become increasingly concerned about the 'carbon footprint' of the food they eat, the export of fresh produce based on air freighting provides some of the poorest and most vulnerable countries with opportunities for high-value export-led growth.

Organic air freighted goods with strings attached

The Soil Association, a leading certifier of organic products in the UK, has said it will continue to certify air freighted fresh produce from developing countries. The decision came with strings attached - the agricultural products would also have to adhere to strict ethical standards.

According to the Soil Association, emissions of greenhouse gases related to air freighted goods are 177 times greater than those associated with marine transport, and the group had been considering whether to stop labelling products based on their carbon footprint.

The organisation had been conducting a four-month consultative process, with participants stressing the need to consider the wider emissions context, including the full supply chain for both imported and local organic products in any comparison.

The Soil Association is pushing exporters to seek alternatives to air freighting whenever possible, its chairwoman, Anna Bradley, said. She noted that "It is neither sustainable nor responsible to encourage poorer farmers to be reliant on air freight, but we recognise that building alternative markets that offer the same social and economic benefits as organic exports take time."

The Soil Association will be working on the standards over 2008, so they can come into effect in 2009. The exporters would be obliged to comply with the additional ethical standards by 2011.

The aviation sector

The aviation sector contributes around two percent of global carbon dioxide emissions. However, when indirect effects from other pollutants as well as cloud formation are added, aviation contributes up to nine percent of radiative forcing, or global warming effect. Aviation is also one of the fastest-growing sectors. Emissions have doubled since 1990 and are projected to further grow by 3.5 percent annually.

The aviation industry is heavily subsidised, starting with development and manufacture. Major disputes at the WTO have involved such subsidies, pitting Brazil and Canada against each other over support to Embraer and Bombardier, and the US currently challenging subsidies paid to Europe's Airbus, and Europe simultaneously going after subsidies paid to US manufacturer Boeing. Airports are also subsidised, while international tickets and jet fuel are exempt from taxes.

Acrimony at aviation meeting

At the International Civil Aviation Organisation (ICAO) Assembly in September, the EU and US clashed over the legality of including international aviation in the European emissions trading scheme.

The EU has set up the scheme as one of its main measures to reach its commitment reductions under the Kyoto Protocol. The scheme currently covers industry, with aviation set to be included as early as 2011. The US opposes a scheme under which its airlines would have pay up when landing and departing from Europe.

At its last meeting in 2004, the Assembly had issued a resolution supporting regional emissions trading schemes. At the 2007 Assembly, however, participants drafted a resolution saying that regional emissions trading schemes should be based on 'mutual consent' when involving aircraft from third parties. In practice, this would require negotiating separate agreements with all third parties.

The European group filed a "reservation" against the ICAO resolution, meaning they are ready to go ahead with including aviation in their emissions trading scheme. "Whilst Europe is committed to multilateral action to address the effects of aviation emissions, mutual agreement is not a pre-condition for the implementation of market-based measures," according to the written reservation of the group. The group called the current ICAO approach to climate change piecemeal and unambitious.

The ICAO Assembly decided to establish a working group on aviation and climate change, which will be charged with looking at, among other, voluntary measures, possibilities for technological advances in aircraft and ground-based equipment, improvements in air traffic management, economic incentives, and market-based measures to achieve reductions in emissions of greenhouse gases.

Exporters weary of additional hurdles

Reactions to the Soil Association announcement were mixed. Development charity Oxfam welcomed the decision, noting the benefits of applying fair trade standards. Duncan Green, head of research at Oxfam, stressed that "curbing greenhouse gas emissions is an urgent and vital task, but rich countries should start by putting their own houses in order, not by effectively boycotting poor ones."

Alexander Kasterine, an expert on trade and development at the International Trade Centre (ITC) claimed, however, that the Soil Association was missing the point. He said "Food transport has nothing to do with working conditions of farm workers, and only a small proportion of these exporters are currently using fair trade or ethical trade standards." Patricia Francis, ITC's executive director added that "Organic production in Africa has been an export success story. ITC is disappointed that the Soil Association will make it harder for African companies to enter lucrative markets. African companies and cooperatives want to trade internationally. To get value-added organic foods onto retail shelves, they have an overwhelming amount of standards to meet. Meeting these standards costs money - laboratories, audits and more. Too many standards will hurt African farmers."

Patenting and access to clean energy technologies in developing countries

By John H. Barton

For the world to make the transition to a low-carbon economy, renewable energy technologies have to be made available globally at an unprecedented scale. One option often flagged is here allowing flexibilities in the intellectual property (IP) system to facilitate the spread of renewable technologies in developing countries. This article explores whether IP is the bottleneck.

This article focuses on three renewable energy sectors: solar photo-voltaic (PV), biofuels and wind energy. It concentrates on more advanced developing countries, such as Brazil, China, and India.

In the politically-sensitive pharmaceutical sector, patents often have a substantial impact on price, as there may be no substitutes for a new product. In contrast, in the renewable energy sectors considered in this article, the basic technological solutions have long been off-patent. Usually, only specific improvements or features are patented. Thus, a number of competing patented products exist – and as a result of the competition, prices are usually brought down as compared to the royalties and the price increases that would be charged under a monopoly. In addition, there is competition not only between firms within a specific renewables sector, but also between the sectors and alternate sources of fuel or electricity. As a result, much of the benefit of the technologies is shared with the ultimate customers.

Another characteristic of the PV, biomass and wind sectors is that some of the renewable energy technologies, particularly PV technologies, are not yet inexpensive enough to compete without some form of subsidy or regulation (such as a feed-in law requiring that a portion of the electricity on a grid be supplied from renewable sources). Moreover, firms have been hesitant to invest in substantial research on their own, except in areas with significant subsidies – as seen in the current ethanol boom in the US. Hence, much of the research in these areas is funded by the government. At least in the US, the subsidised research will almost certainly end up protected by patent rights. When the research is licensed, a certain amount of favouritism is, by law, to be shown to US manufacturers.

Renewable energy markets

There are three types of markets for renewable energy capabilities for developing nations. The most obvious one is the market for enabling the nation itself to reduce its CO₂ emissions (not currently required by international law, but possibly required in the future). The second

is the market for providing carbon offsets under the clean development mechanism (CDM) under the Kyoto Protocol. Both these markets can be served by importing products incorporating the technology, e.g. photovoltaic panels for off-grid electrical supply.

The third type of market is for renewable products, such as biofuel (or conceivably electricity), and equipment, such as wind turbines, in which the developing country industry can become integrated into the global industry as a supplier. For this type of market, the nation must license the capability to produce such products, perhaps in an indigenous firm or in a joint venture between a local firm and a developed country firm. Alternatively, it can develop the national capacity to research and produce the products independent of a foreign licensor.

The photo-voltaic sector

Basic PV technology involves manufacture and treatment of a silicon slice used to create electricity when illuminated by the sun. There are a number of PV firms, organised in a loose oligopoly; the leading five firms make up about 60 percent of the market. Hence, the benefits of the basic (silicon-slice) technology are likely to be available to developing countries even in the face of patents. If developing country firms wish to enter the field as producers, they are likely to obtain licenses on reasonable terms because of the large number of firms in the sector. The possibility of entry is demonstrated by Tata-BP Solar, an Indian firm based on a joint venture, and Suntech, a Chinese firm. Suntech has not only been able to develop its own technologies but has also purchased developed country firms.

Biofuel technology

Typical biofuel technology is based on the conversion of sugar or maize into ethanol, but there are many other ways to convert biomass into fuels. In this context, again, developing countries have reasonably good access to current technologies. Indeed, Brazil has long been a leader. The questions become more challenging with regard to future biofuel technologies. There are

government and venture-capital funded efforts underway to develop new processes, enzymes, or microorganisms for producing biofuel - particularly by breaking down lignin, an important component of many plants that is not now readily available for fuel use. There will be many patents in these areas. Nevertheless, production is necessarily decentralised and there is competition among biofuel manufacturing methods and between alternative fuels. Hence, it again seems likely that the holders of patents in this area will be willing to license their technology, and the licensing fees for these technologies are unlikely to remain high for very long. The key barriers encountered by developing countries will probably not be related to IP, but to the tariffs and other trade barriers against the international sugar and ethanol markets. For example, the US has a tariff in place on Brazilian ethanol - which is cheaper, both economically and environmentally - than US maize-based ethanol.

The wind sector

The wind sector is more concentrated than the PV sector - here four firms make up roughly 75 percent of the industry. The sector is, however, competitive enough to allow developing nations to build wind farms incorporating equipment from the global market without enormous IP costs. It could be more difficult for developing nations to enter the global market for wind turbines, however. The current industrial leaders are strong, and are hesitant to share their technology out of fear of creating new competitors. There have been significant patent battles in this sector in the US. In addition, the engineering aspects of technology transfer have sometimes proven difficult. Nevertheless, both China and India have succeeded in building major firms over the last 10 years. The leading Indian firm has been buying developed country competitors.

Exports, firm purchases and IP

There do not seem to be significant IP barriers hindering the world from the benefiting from reduced CO₂ emissions in developing countries. When it comes to developing country opportunities to enter the export markets for PV cells, ethanol (or other renewable fuel) and wind engines, the picture is slightly more mixed. Certainly, for ethanol, the key concerns would relate to tariff and similar barriers, not IP barriers. For PV, the IP system is unlikely to be a significant barrier. For wind energy, there is some ground for concern, but again, IP problems would probably be minor.

The world is also seeing a new technology transfer mechanism in the form of developing countries purchasing developed country firms. However, there is a simultaneous risk of global concentration, particularly in the wind sector, so the world should be alert to the risks of cartel behaviour.

The three renewable energy sectors discussed above serve as examples of other important questions developing countries are facing. Should they strengthen their IP protection in order to make foreign investors more willing to transfer technology? The evidence from these

sectors suggests a possibility that stronger IP would help in the more scientifically advanced developing nations, and offers little indication of risks associated with such strengthening. (The answer may be different in poorer nations.)

The role of subsidies

The three sectors examined also underline the importance of public support for new technologies. The economics of renewable energy often requires support if the technology is to be developed. Developed country governments are likely to seek to ensure that national firms are favoured in the process of licensing technology that has benefited from support at the development stage. Part of the political basis for the support is the hope of helping national manufacturers. This builds a bias against developing nations.

It is possible to eliminate this bias by asking developed countries to agree to forego their national favouritism by licensing publicly funded inventions, at least with respect to technologies of global environmental importance. This would be quite similar to the "humanitarian clauses" being considered in the medical and nutritional areas. It would be far better to go even further - for developed countries to commit themselves to devote a portion of their technology development to the special needs of developing countries and to ensure that developing country firms have the opportunity to participate in the efforts.

Such arrangements could be negotiated in either of two ways. The first would entail commitment to make technology more readily available within the climate change negotiations. This could take the form of a quid-pro-quo for stronger environmental constraints upon developing nations. Making this work would require a stronger technology transfer commitment than has been typical for global environmental agreements. The other approach would be to create a stand-alone technology arrangement, with the quid-pro-quo based on reciprocity among research funders.

Removing trade barriers

Finally, the most important task would be to remove unnecessary barriers to trade in renewably sourced fuels, and perhaps in the future in renewably sourced electricity. Unless the world moves to a global carbon tax, renewable energy subsidies are essential. However, current subsidies are often designed in response to domestic concerns, particularly domestic agricultural concerns, and may end up discriminating against developing countries. Subsidies should ideally be redesigned so as not to distort trade or discriminate against developing country firms. A more equitable structuring of environmental market intervention would itself create stronger incentives for technology transfer to developing nations.

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A Doha round deliverable for climate change?

By Mahesh Sugathan

The Doha round negotiations are proving to be divisive, drawn-out and complicated, with trade delegations expending much of their energy on high profile issues such as agriculture and industrial market access. However, also on the agenda is an area potentially of great interest to climate change negotiators: talks aimed at freeing up trade in environmental goods and services by cutting tariffs and non-tariff barriers.

WTO members have on their plate a set of negotiations that could increase the global flow of clean and energy-efficient technologies and renewable energy, speeding up the diffusion of know-how critical in allowing countries to make a shift towards a sustainable energy future.

As trade ministers meet during the UNFCCC Conference of the Parties in Bali, they are likely to consider the liberalisation of environmental goods and services as a potential deliverable from the global trading system with regard to the global quest to mitigate climate change. This article provides some background on key issues and the state of the negotiations on environmental goods and services at the WTO.

The mandate

Paragraph 31 (iii) the 2001 Doha Ministerial Declaration calls for the reduction, or as appropriate, elimination of tariff and non-tariff barriers on environmental goods and services (EGS). The mandate does not specify what environmental goods are, nor does it indicate the pace, depth or sequencing of liberalisation in this sector vis-à-vis other goods and services. Discussions on the definition and scope of environmental goods are taking place within the WTO Committee on Trade and Environment special negotiating session. Although many members eventually want to see their commitments reflected in the group at the WTO negotiating access for industrial goods, most developing countries want the issues related to environmental goods to be resolved in the Committee on Trade and Environment.

Defining environmental goods and the challenge of 'dual use' goods

The lack of a universally accepted definition of EGS has left trade delegates struggling over the scope of goods and services slated for liberalisation. Several approaches have surfaced, centred on lists, projects, or a request-offer process for bringing down trade barriers.

One bone of contention is that of so called 'dual use' goods. While the aim of the EGS mandate is to liberalise trade, some say this applies to goods intended solely for environmental protection purposes, and oppose any consideration of dual use goods that can have both environmental and non-environmental uses.

Many of the proponents of environmental goods liberalisation - dubbed the 'Friends of Environmental Goods' and comprising Canada, the EU, Japan, Korea, New Zealand, Norway, Chinese Taipei, Switzerland and the US

- have argued that the benefits of EGS liberalisation would be limited if it was restricted to the handful of products used solely for environmental purposes.

On the other hand, a number of developing countries are concerned about cutting tariffs for goods only vaguely linked to environmental protection, worrying in particular about the impacts of 'dual-use' imports on small and medium enterprises (SMEs) in the non-environmental sectors.

The 'list' approach to defining environmental goods

Over the years, WTO members have focused quite heavily on different lists of environmental goods that could be liberalised. Countries have considered lists of environmental goods compiled by the Organisation of Economic Cooperation and Development (OECD) and the Asia Pacific Economic Cooperation (APEC) forum. The 'Friends' of environmental goods mentioned above have expressed a preference for the list approach under which WTO members would negotiate a reduction of bound tariffs on the agreed list of goods. After coming up with various individual lists, the 'Friends' consolidated and trimmed them down into one informal list comprising 153 products. The products are grouped under various environmental categories including renewable energy, heat and energy management, and cleaner or more resource-efficient technologies and products.

Can the list be updated?

If delegates were to agree on a set list of environmental goods, these would have to be updated, as new technologies and solutions appear - a living definition reflecting the real world. The problem here would be how to treat outdated environmental goods. Tariffs lowered and bound once cannot be hiked up again.

The 'project' approach to defining environmental goods

An alternative approach, introduced by India and Argentina as a response to the problem of dual use goods, centres on specific projects. Under the project approach, tariff would be temporarily bound at lower levels for agreed goods and services destined for specific environmental projects - for the duration of the project only. The criteria for the projects would be decided multilaterally by the Committee on Trade and Environment. The approach has met with criticism from many of the 'Friends,' which say it lacks predictability and would include burdensome

procedures. In addition, they question its consistency with WTO rules.

The 'request-offer' approach to defining environmental goods

Brazil has informally floated a third approach under which WTO members would negotiate the goods for liberalisation based on a 'request-offer' approach. The request-offer approach is used under the General Agreement on Trade in Services (GATS), with countries requesting specific liberalisation commitments from each other, and then extending tariff cuts they deem appropriate equally to all WTO members.

Goods of interest to developing countries

From the beginning of the negotiations, it has been clear that most industrially produced environmental goods are of interest mainly to developed and the most advanced developing countries. Therefore, some developing countries have proposed that agricultural environmental goods also should figure in any basket of goods slated for liberalisation. While African countries expressed some interest in organic agriculture early on in the negotiations, the issue was not taken up by developing countries owing to the fear that discrimination (albeit positive) on the basis of process and production methods (PPMs) would be introduced within the WTO. The issue has recently popped up again, however, both indirectly in an informal proposal by Brazil, and in a draft proposal submitted by Peru.

Are biofuels environmental goods?

The WTO distinguishes between industrial and agricultural goods, with the former subject to a more stringent set of rules related to tariffs, subsidies etc. Due to historic classification reasons, as well as how they are processed, biodiesel is considered an industrial good while bioethanol is considered an environmental good. At a recent meeting of the WTO Committee on Trade and Environment, Brazil - an efficient producer of ethanol that faces major tariff barriers in developed country markets - suggested that biofuels should be considered as environmental goods. Both developed country members such as the US, EU, Australia and Canada, and developing country members such as Cuba, opposed this designation. Peru and some other developing countries fully supported the Brazilian proposal.

Environmental services

Liberalisation of environmental services was an essential element of the Doha mandate, although it has received far less attention than environmental goods since discussions started at the WTO. The environmental services discussed at the WTO refer to human-produced services, such as end-of-pipe pollution control and remediation services and potentially related services such as construction, engineering, technical testing, analysis and management consulting services. They do not include ecosystem services provided by nature.

Unlike environmental goods, environmental services existed as a separate category within the WTO Services Sectoral Classification List even before the launch of the Doha Round. Discussions on environmental services have progressed slowly. A group of countries dubbed 'Friends

of Environmental Services' have played an active role as demanders, both in terms of flagging conceptual issues that need to be worked out and in requests for specific countries to liberalise specific environmental services.

Classification

A number of delegations have said that the current WTO Services Sectoral Classification list needs to be updated to reflect current realities and the evolution of the environmental industry beyond traditional end-of-pipe/pollution control/remediation/clean-up towards integrated pollution prevention and control, cleaner technology and resources and risk management.

The EU has proposed an alternative classification comprising 'core' services that can undisputedly be classified as purely environmental and where the services are classified according to the environmental media (i.e. air, water, solid and hazardous waste, noise, etc.). In addition, the EU has proposed a 'cluster' approach under which services such as design, engineering, R&D and consulting services that have an environmental 'end-use' would be subject to a special 'cluster' or 'checklist'. Commitments for these 'end uses' could be made within relevant GATS sectors other than the environment. Presently, WTO members are free to make use of their own classifications.

Requests for market opening

Most developing countries have received requests to undertake specific commitments in all environmental services, principally from developed countries. In addition, a group of developed countries made a collective, or plurilateral, request for market opening in 2006, targeting a large number of developing countries. The request covered sewage services; refuse disposal; sanitation; cleaning of exhaust gases; noise abatement; nature and landscape protection; and other environmental protection services in specific ways.

Very few developing countries have formally expressed a willingness to make commitments. Except for Chinese Taipei, no developing economy has requested market access commitments in environmental services.

A number of countries have highlighted the close linkage between environmental goods and services, noting that their separation is difficult, owing to their integrated nature. They have suggested that, where appropriate, environmental goods and services should be liberalised in parallel.

Steps ahead

Most delegates agree that the overall approach will be critical to resolve before discussions on the selection and treatment of environmental goods can begin. Members have also called on the Committee of Trade and Environment special session to address issues of non-tariff barriers and transfer of technology. In a broader context, a lack of movement on issues of interest to developing countries, particularly agriculture, also inhibits proactive developing country engagement on EGS negotiations.

Mahesh Sugathan is Programme Coordinator - Economics & Trade Policy Analysis at ICTSD

Banana and pineapple exports from Ecuador

By Sara Wong

Developing countries face various sanitary standards and other requirements when exporting agricultural products to developed country markets. These standards often have different impacts on large, small and medium-sized farms.

This article explores the impact of non-tariff requirements that Ecuadorian banana and pineapple farmers and exporters face in their major export markets. As such, it contributes to a better understanding of to what extent - and for what products - sanitary and phytosanitary (SPS) standards and technical barriers to trade (TBT) in developed countries present obstacles to exports of tropical products.

Cultivation and export of bananas

Bananas are Ecuador's main tropical export, representing approximately two thirds of total tropical exports. Pineapples are a less important agricultural export, barely representing two percent of total agricultural exports. They are, however, an export product on the rise and one of Ecuador's top three tropical product exports. Both bananas and pineapples face non-tariff requirements in their export markets.

There are thousands of banana producers in Ecuador, displaying different levels of technological implementation, productivity, and cultivation practices. Banana production is centred around large and medium producers (by farm size), which are more productive and have better cultivation practices. According to data from the last agricultural census in Ecuador (CNA, 2000) on water use, pesticide use, and SPS measures in small, medium and large farms, only medium and large farms have access to irrigation, and regularly use pesticides and SPS measures. Most banana producers sell their produce to exporters. In a few cases, producers (in general, multinational companies) sell directly to foreign markets. The main export markets for Ecuadorian bananas are the EU (the countries by the Mediterranean and Baltic Sea), the US, and Russia, receiving 43, 22, and 20 percent of Ecuadorian banana exports, respectively.

Cultivation and export of pineapples

There are approximately six thousand hectares of pineapple farms in Ecuador. Approximately a third of this land is dedicated to growing pineapples for export. In general, pineapples intended for export are grown on large- or medium-sized farm. There are only a few farms large enough to grow pineapples for export, and small pineapple farms usually produce for the local market. Cultivation practices also differ among the large, medium and small pineapple farms. Most large pineapple farms, as well as the medium-sized ones, generally, have access to irrigation systems, apply fertilizer, and follow consistent

sanitary and phytosanitary standards. In contrast, most small pineapple farms do not have irrigation, do not apply fertilizer and do not follow SPS practices. According to the trade statistics of the Central Bank of Ecuador, the main export markets for Ecuadorian pineapples are the EU and the US. In 2006, 45 percent of the total value of Ecuadorian pineapple exports went to the EU and 40 percent to the US. Eighty percent of pineapple exports were handled by banana export companies (Ecuador Exporta, 2007).

Understanding the barriers banana and pineapple exports face

To gain a better understanding of the operating conditions, we surveyed thirteen banana exporters and farmers, and five pineapple exporters and farmers. Each survey questionnaire was complemented by interviews with the corresponding exporter and farmer. The companies were selected so as to include the majority of banana and pineapple exports in Ecuador in the sample. In the case of bananas, the sample included at least one company representative of large-, medium-, and small-sized companies (by volume of exports or production), a cooperative of farmers, and an export association. For pineapples, the sample was planned in the same way. However, the final sample included large or medium-sized companies, as no small farms, cooperatives or associations of pineapple producers/exporters were found.

The questions were of a general nature (years in business, volume or value of dollar exports, main export markets, mode of transport used), about the non-tariff barriers faced, the impact of non-tariff barriers on costs, degree of competition from other export companies, and assistance received either from the government or from private firms.

The results

All the farmers and exporters interviewed reported at least three non-tariff barriers for banana exports, and at least seven in the case of pineapple exports. They all said they had to deal with SPS and environmental rules and requirements. Almost all of the banana farmers and exporters, and all of the pineapple producers and exporters, mentioned that they also had to deal with labelling regulations and labour requirements. Certification requirements were also reported by some farmers and exporters. Medium and small farmers and exporters in particular reported they had to deal with challenging procedural and administrative tasks.

The farmers and exporters of bananas and pineapples clearly identified SPS standards as the most difficult and frequent non-tariff measures they faced. The most frequent were certification and testing requirements, labelling, and environmental rules. Labour rules, certification and testing requirements, labelling, and environmental rules were considered the most difficult measures (see figure 1 for pineapples).

Escalating requirements

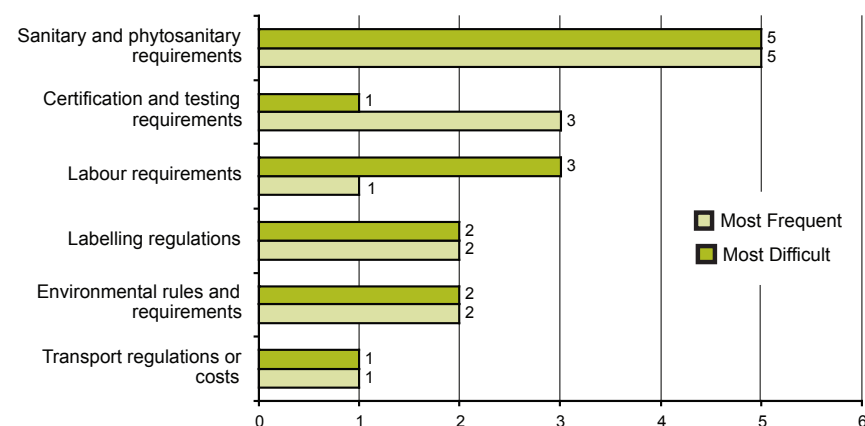
All the farmers and exporters interviewed had the perception that they had to comply with more and more non-tariff requirements each year. When asked about private-sector standards for fresh bananas and pineapples, only respondents representing small farms said they did not know about these standards. Respondents representing large and medium-sized farms reported that they were facing private-sector standards such as those of EUREPGAP as well as consumers' demand for a certain size, weight, presentation, and quality. In all the banana and pineapple businesses, compliance with non-tariff measures implied higher costs, either in export or production, according to the nature of their business. This higher cost did not mean, however, that the businesses lost export markets.

Seventy-five percent of the banana exporters or producers and sixty percent of the pineapple exporters and producers had not received any assistance from the Ecuadorian government to meet non-tariff requirements. The banana exporters or producers that mentioned some help from the government pointed out that this had consisted of measures to maintain a minimum price for bananas, and in getting information on non-tariff barriers. The respondents from small farms said they had not received any government assistance.

Small producers hard-hit - cooperatives a solution

In general, the ability to cope with SPS and technical requirements appeared to differ between large, medium, and small banana and pineapple producers. The large producers did not experience problems complying with SPS and technical standards. However, medium and small producers found it very difficult, if not impossible, to comply with the most stringent SPS and technical requirements on markets such as the EU market.

Figure 1: Non-tariffs Requirements faced by Pineapple Exporters and Farmers



Source: Interviews with pineapple farmers and exporters of Ecuador.

One possible solution would be for the farmers to create cooperatives. An interview with a banana cooperative illustrated the positive results that small farmers could reach when working together to meet world market demands. The cooperative gave some (local) market power to small producers allowing the farmers to receive better prices for the bananas they sold, as compared to a situation in which they would have sold the fruit by themselves. The cooperative also provided the associates with information about the standards they needed to meet, provided follow-up in the implementation process, and kept them abreast of developments with regard to requirements on the world market. Another issue that came up in the interviews was the growing importance of export contracts (between exporters and farmers), which established long-term business relationships and ensured quality control.

Perceptions of standards as a trade barrier

Most banana exporters and producers (85 percent) reported that they did not consider the standards (SPS, technical, and others) barriers to their trade. This was also the case for most pineapple exporters and producers, although with a smaller margin (60 percent). In fact, when asked if their production or exports had increased as a consequence of their compliance with the standards imposed by the importing countries, just over half of the banana exporters and producers said yes (while just under half did not respond), and 60 percent of the pineapple exporters and producers said yes (40 percent of the pineapple producers and exporters did not respond).

When comparing tariff and non-tariff barriers, all banana exporters and producers agreed that tariffs were the main barrier to banana trade (mainly due to an EUR176 per MT duty imposed by the EU); not the SPS or technical standards set by the importing markets.

On the contrary, pineapple producers and exporters - which do not face tariffs in their main importing countries, the US and the EU - considered the non-tariff requirements, rather than tariffs, the main trade barrier.

To conclude, Ecuador complies with a number of SPS and technical standards defined in its export markets. However, the level of compliance and associated market access varies according to the type of farmer. In order to comply with reasonable SPS and technical standards, and to gain access

to markets in developed countries, it is important for Ecuadorian farmers to receive necessary technical support. Help provided by developed countries in setting up these processes is a key factor.

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For further information on a dialogue on "Tropical Products, Trade, Natural Resources Management and Poverty" organised by ICTSD and ICONE, see <http://www.ictsd.org/dlogue/2007-12-03/2007-12-03-desc.htm>

Cutting subsidies to save the fish

Oceana, a campaign group seeking to protect and enhance the world's oceans, visited Geneva in October to stimulate discussion on subsidies and sustainability. Oceana chief scientist Michael Hirshfield and board member and 'Cheers' star Ted Danson visited ICTSD, and answered some questions regarding their vision for a successful WTO fisheries subsidies agreement.

BioRes: To set the stage, what is the plan of action for your presence in Geneva?

Oceana: We are here to draw attention to the fact that global overfishing and unsustainable fishing practices have depleted nearly all commercial fish populations and degraded the ecosystems that support them. Nonetheless, many governments continue to provide significant subsidies to their fishing sectors. Fisheries subsidies amount to between US\$30-34 billion annually, of which US\$20 billion go directly toward supporting fishing capacity, such as boats, fuel, equipment and other operating costs.

Here in Geneva, we will meet with trade delegates, Geneva-based organisations and WTO Secretary-General Pascal Lamy to stress the fact that the WTO has a historic opportunity to eliminate harmful subsidies and regulate those left to ensure that they don't threaten the sustainability of global fish stocks. In this regard, we've developed an action plan to stimulate debate within the Doha round fisheries negotiations.

BioRes: Could you please tell us more about your action plan?

Oceana: First off, we need to make it clear that our goal is the elimination of capacity-enhancing subsidies, which lead to increases in overcapacity and overfishing. That said, we recognise that there may be a need for some flexibility for developing countries. To that end, we want to make sure that any such subsidies meet the test of sustainability.

The action plan contains five main points. First of all, we have to make sure there are enough fish - subsidies should only be provided to harvest healthy resources. Fishing efforts must be kept within the maximum sustainable yield of the population, at a sustainable rate ensuring long-term productivity.

Second, fishing capacity must be kept at a sustainable level, and should be modest compared to the fish caught, otherwise the subsidies make no sense.

Thirdly, subsidies should focus only on fishing efforts within each country's EEZ (exclusive economic zone).



There are few places where there are extra fish - this certainly is the case for the high seas. There are already too many boats in the high seas, so it makes no sense to subsidise and develop more capacity to send more boats there.

Fourthly, a country should have at least a basic fisheries management system in place in order to be allowed to provide subsidies to its fisheries sector. Developing such a system is not rocket science, and can be done everywhere with relatively simple methods. There is no need for developing countries to develop sophisticated systems, such as those of the US. However, they need to be adequate to answer the first two questions above, and should be open to review by independent fisheries experts. Such fisheries management systems would include measures for setting total allowable catches for

The essential thing is that we have an agreement that doesn't make things worse, but makes them better.

target and major by-catch species, monitoring and control measures, means to assess population sizes and fishing rates, for example.

Fifth, with regard to subsidies in developing countries to replace foreign capacity with domestic capacity, the same rules should apply.

BioRes: What subsidies should developing countries be allowed to provide to their artisanal fishing sectors?

Oceana: Although our preference again is for no capacity-enhancing subsidies at all, we understand that special treatment may be appropriate for developing nations, particularly those with smaller economies. Our overall test, as above, is one of sustainability.

Artisanal fisheries are certainly candidates for developing country subsidies. To ensure that artisanal or subsistence fishing does not lead to overexploitation of resources, it should be strictly defined to include only nearshore fishing that uses specific low capacity fishing gears and results in minimal commercial exploitation.

Small-scale or artisanal fishing activities are not automatically sustainable. It's a question of the scale of the overall fishing operations. Therefore, the fisheries themselves will answer the question of what subsidies and fishing efforts are sustainable. The point is to address overcapacity, so the fishery will lead the way - the issue is not one of juxtaposing the big guy and the little guy.

However, when it comes to so called small-scale industrial fishing, we would also look at the technical capacity to land fish. Fishing used to be a local activity, and the fish had places to hide, to reproduce. Currently, large factory ships employ 20 percent of fishermen, but process as much as 80 percent of the catch. Size and technical capacity, fishing power, matters. There are new technologies, large nets, practices such as bottom trawling that can easily vacuum up large amounts of fish. And there is a link between subsidies and sophisticated technology.

BioRes: How do you see aquaculture and subsidies in this area?

Oceana: It would be delusional to think that aquaculture could provide an easy fix to the problem of overfishing and depletion of fisheries. First of all, what you farm matters. Farming carnivorous fish contributes to the same problem, since the fish feed is produced from the wild fish catch. In addition, antibiotics and fish waste can lead to immense pollution problems. In our opinion, aquaculture should not be subsidised.

BioRes: If the Doha round negotiations on fisheries subsidies don't succeed, is there a backup plan?

Oceana: Our emphasis is primarily on the Doha round. However, even if the round were to go into a freeze, the issue of overfishing is not going to go away, so we'll have to deal with it at the national and regional levels. There may be other multilateral processes where the fishery issue could be inserted, but the Doha round really provides a once-in-a-lifetime opportunity to address unsustainable fisheries subsidies.

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Material from the BioRes Review can be used in other publications with full academic citation.

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UPCOMING EVENTS

DECEMBER

- 3-4 WTO COMMITTEE ON TRADE AND DEVELOPMENT. Geneva, Switzerland. www.wto.org
- 3-7 GLOBAL MINOR USE SUMMIT. Rome, Italy. www.fao.org/ag/AGP/AGPP/Pesticid/JMPR/MinorUseSummit.pdf
- 3-14 THIRTEENTH CONFERENCE OF THE PARTIES TO THE UNFCCC AND THIRD MEETING OF THE PARTIES TO THE KYOTO PROTOCOL. Bali, Indonesia. www.unfccc.int
- 4-6 IUFRO TRAINING WORKSHOP: WORKING EFFECTIVELY AT THE INTERFACE OF FOREST SCIENCE AND FOREST POLICY. Muguga/Nairobi, Kenya. www.iufro.org/science/special/spdc/actpro/wkspml07/trainwshpnairobi/
- 5 SOUTH INNOVATION PERSPECTIVES SERIES SEMINARS. Geneva, Switzerland. www.southcentre.org/Events/SouthInnovationPerspectives_seminars.htm
- 10-12 WTO TRADE POLICY REVIEW BODY - TURKEY. www.wto.org
- 17-20 INTERNATIONAL CONFERENCE ON SUSTAINABLE FOREST MANAGEMENT AND POVERTY ALLEVIATION: ROLES OF TRADITIONAL FOREST-RELATED KNOWLEDGE. Kunming, China. www.iufro.org/download/file/1928/3500/kunming07-tftfk-1st-announcemt-call.doc
- 18 WTO DISPUTE SETTLEMENT BODY. www.wto.org
- 19-20 WTO GENERAL COUNCIL. Geneva, Switzerland. www.wto.org

JANUARY

- 1 Jan- UN INTERNATIONAL YEAR OF PLANET EARTH.
- 31 Dec. www.yearofplanetearth.org/index.htm
- 21-25 SIXTH MEETING OF THE CBD ABS WORKING GROUP. Geneva, Switzerland. www.cbd.int
- 22-25 THE INTERNATIONAL CORAL REEF INITIATIVE GENERAL MEETING. Washington, DC, USA. www.icriforum.org/router.cfm?show=secretariat/GMDC/gmDC.html
- 30-31 A CHANGE IN CLIMATE FOR WHALES: IS THERE A COMMON WAY FORWARD? - SECOND PEW-SPONSORED WHALE SYMPOSIUM. Tokyo, Japan. www.pewwhales.org/tokyosymposium/

FEBRUARY

- 4-9 3RD WORLD CONGRESS ON BIOSPHERE RESERVES. Madrid, Spain. www.unesco.org/mab/madrid/congress2008.shtml
- 7-9 DELHI SUSTAINABLE DEVELOPMENT SUMMIT (DSDS) 2008: SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE. New Delhi, India. www.linux.teriin.org/dsds/2008/index.htm
- 25-28 SECOND INTERNATIONAL CONFERENCE ON HEALTH AND BIODIVERSITY. Galway, Ireland. www.cohabnet.org/cohab2008
- 27-28 WORKSHOP ON MODELLING BIO-ENERGY IN AGRICULTURAL-ECONOMIC MODELS. Bonn, Germany. www.ifw-kiel.de/konfer/narola/program.htm

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