



# trade hot topics

## Climate Change, Agriculture and Trade Prospects for Developing Countries

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### Background

In the coming decades the environment will likely witness significant transformations as a result of climate change, causing varying degrees of socio-economic impacts throughout the world. However, it is the majority of the least developed countries (LDCs) and small states, which have the least adaptive capacity, that are most vulnerable to the effects of climate change. The livelihoods and economic prosperity of these countries depend on climate-sensitive sectors such as agriculture, fisheries, forestry and tourism, and are confronted by environmental adaptation constraints as a result of limited resources, infrastructure and societal capacity. As agriculture provides a living for more than half of the world's poorest people, climate change will heavily impact the three-quarters of a billion Commonwealth citizens living in 'dollar-a-day' poverty. This issue of Commonwealth Trade Hot Topics highlights the consequences of climate change on agriculture, its subsequent impact on the trading capacity of developing countries, and a number of adaptation and mitigation measures to ensure their prospects for sustainable development.

In 1994 the United Nations Framework Convention on Climate Change (UNFCCC) was established to stabilise

greenhouse gas concentrations. It was followed by the adoption of the Kyoto Protocol in 1997. The UNFCCC places the heaviest responsibility for combating climate change on industrialised nations, since they have generated the overwhelming majority of past and current greenhouse gas (GHG) emissions. According to the UN, industrialised regions, such as North America, account for approximately 300,000 to over 5,000,000 metric tons of carbon dioxide (CO<sub>2</sub>) emissions from the burning of fossil fuels. Conversely, it will be small states, least-developed and low-income countries that will bear most of the burden for the environmental impacts of climate change which account for approximately 0 to 5,000 metric tons of CO<sub>2</sub> emissions. Since the majority of developing countries rely on natural resource sectors, the economic implications for sectors such as agriculture are potentially disastrous.

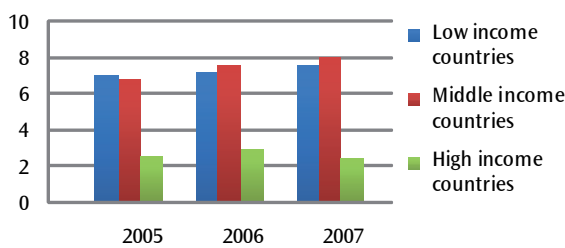
### Importance of agriculture sector for developing countries

For many Commonwealth countries agriculture is the backbone of the economy. Particularly for least developed countries, the agricultural sector contributes 30-60 per cent of gross domestic product (GDP), whereby providing employment for as much as three quarters of the population, representing a major source of international trade, supplying food

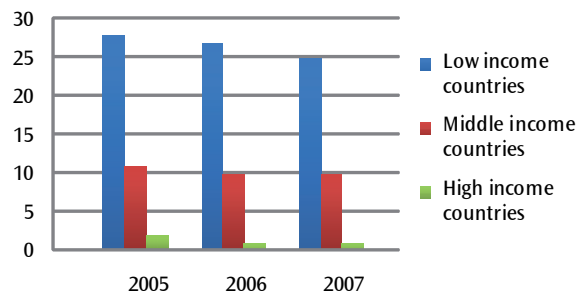
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Figure 1: GDP and agricultural growth for high, middle and low income countries, 2005-2007

### GDP growth (annual %)



### Agriculture, as % of GDP



Source: Based on data from the World Bank. World Development Indicators 2007

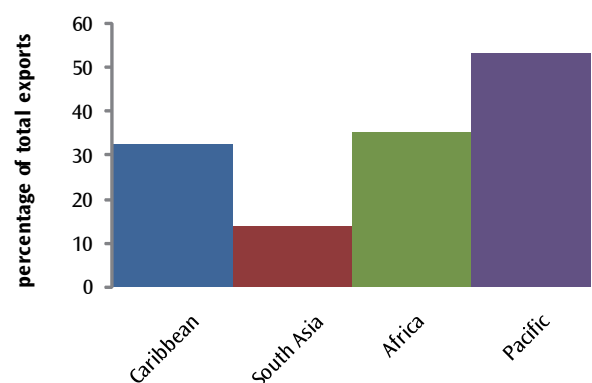
security and generating other sources of income for more than 50 per cent of the LDCs' population.

The annual growth of GDP for low and middle income countries – predominately LDCs and developing economies – is closely related to agricultural production. For low income countries, agricultural production represents a significant proportion of GDP, an average of 26 per cent; while for middle income countries it represents an average of 9 per cent in relation to an average of 7 per cent GDP growth from 2005 to 2007. Whereas, agricultural production for high income countries – developed economies – is relatively insignificant, only accounting for 1 per cent of GDP. Thus, the environmental and economic concerns of climate change surrounding agriculture for low and middle income countries is considerably more pressing than for developed countries (Figure 1). In addition to the predominant role of agricultural production in annual GDP, according to the World Trade Organization (WTO), developing countries have seen a significant increase in agricultural exports since the 1990s, which reinforces the importance of the sector, not only domestically but also through increasing their presence in the multilateral trading system.

In 2007, agricultural exports for Commonwealth countries represented 33 per cent of total exports for members in the Caribbean region; 14 per cent in South Asia; 35 per cent in Africa; and 53 per cent in the Pacific (Figure 2). Therefore, for the majority of Commonwealth small states and LDCs, agriculture contributes substantially to employment, food security and export income. The data also represents a critical component for enhancing their presence in the global trading system. However, developing countries may find it difficult to continue to capitalise on their comparative advantage in the agricultural sector if the severity of the potential environmental

impacts of climate change are not acknowledged and appropriate mitigation and adaption measures are not improved.

Figure 2: Agricultural exports 2007



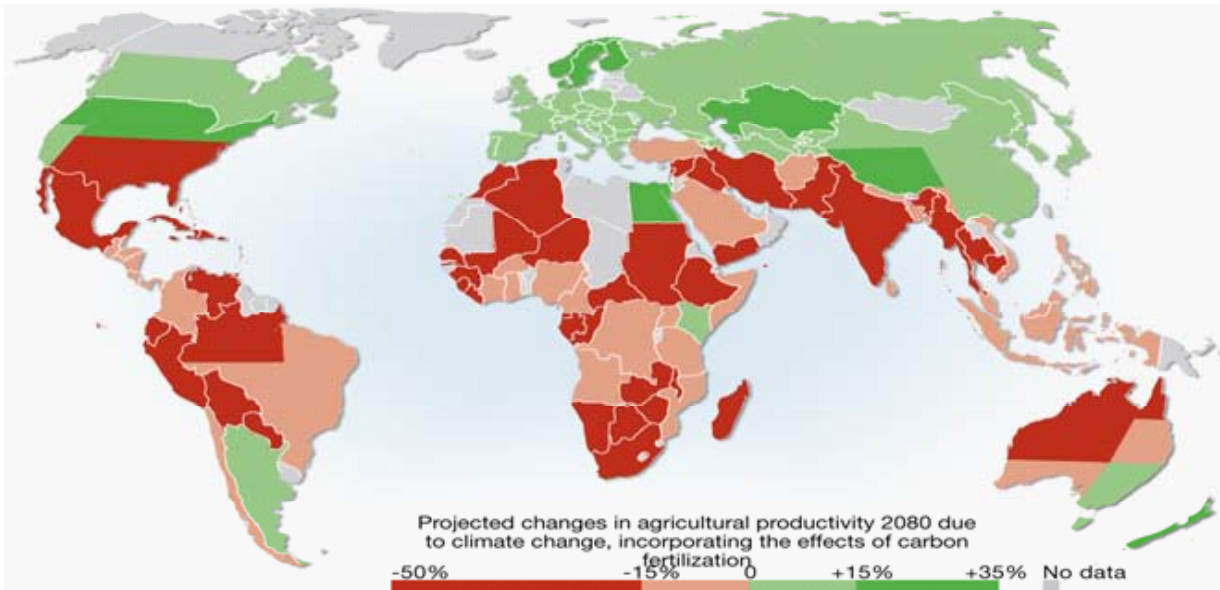
Note: Regions are reflective of Commonwealth member countries' data.

Source: Based on data from the World Trade Organization.

### Environmental implications for developing countries

The impacts of higher temperatures, more variable precipitation, more extreme weather events and the rise in sea levels caused by climate change will directly affect the output in the most vulnerable sectors, such as agriculture (Figure 3), as changes in productivity will determine the export level of these commodities. While direct effects of production, as well as livelihoods, dependent on agriculture and other susceptible sectors will be more apparent, the indirect effects on other economic sectors will appear in the form of changes in prices on inputs and outputs from the directly affected sectors following the changes in production. Consequently, a country's entire economy will be impacted by the effects of climate change.

Figure 3: Projected changes in agricultural productivity in 2080 due to climate change, incorporating the effects of carbon fertilisation



Source: Water SISWeb - Projected agriculture in 2080 due to climate change<sup>1</sup>

### Temperature

Projections for the increase in global mean surface temperature by 2100 are between 1.5°C (2.7°F) and 6°C (10.8°F)<sup>2</sup>. However, for many developing regions – such as Africa – the increase in temperature is significantly higher, as a result of greater climate change induced environmental strains in their geographical locations. Potential warming scenarios across the continent range from a low of 0.2°C (0.36°F) per decade to a high of more than 0.5°C (0.9°F) per decade. This warming will be greatest over the interior of semi-arid margins of the Sahara and central southern Africa<sup>3</sup>. The increase in temperature across the African continent will not only impact the length of growing season and productivity in the agricultural sector, but it will also alter the climatic landscape.

By the next century, agro-climate projections suggest a northward shift of thermal regimes, which would significantly reduce boreal and arctic ecosystems, while having the opposite effect on tropical zones as they will experience considerable expansion. For example, the tropics will potentially cover almost all of Africa, apart from a very small stretch in South Africa and a narrow fringe along the Mediterranean coast.<sup>4</sup> Whereas in South Asia, the increase in temperature will accelerate the glacial melting in the Himalayas, which is projected to increase flooding and will affect water resources within the next two to three decades, with the potential effect of decreasing crop yields by up to 30 per cent by the mid-twenty-first century.<sup>5</sup> As a result of this expansion in climatic zones and environmental

effects of increases in temperature, many types of agriculture production will cease or require the introduction of new types of crops for cultivation under the new growing conditions.

While the majority of developing economies in the southern hemisphere are likely to experience a dramatic decline in their agricultural productivity, many of the developed economies in the northern hemisphere will experience an increase in agricultural productivity (Figure 3). This will severely affect many developing economies, in which their comparative advantage in agriculture production will be lost.

### Precipitation

Levels of precipitation determine the length of growing season for agricultural productivity. Therefore, any changes to precipitation levels will alter seasonal rain patterns, whereby affecting crop production. Without significant mitigation and adaptation to the effects of climate change, the changes to precipitation levels will have a detrimental effect on rain-fed agriculture.

1 [http://www.siswebs.org/water/story.php?title=Projected\\_agriculture\\_in\\_2080\\_due\\_to\\_climate\\_change](http://www.siswebs.org/water/story.php?title=Projected_agriculture_in_2080_due_to_climate_change)

2 Paul V Desanker, August 2002, 'Impact of Climate Change on Life in Africa', World Wildlife Foundation (WWF), <http://www.worldwildlife.org/climate/Publications/WWFBinaryitem4926.pdf>.

3 Ibid.

4 Gunter Fischer et al, 'Socio-economic & climate change impacts on agriculture: an integrated assessment, 1990-2080', *Philosophical Transactions: Biological Sciences* 360 (1463) November 2005: 2072.

5 The World Bank, 2009, 'South Asia and Climate Change: A Development and Environment Issue', <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:21469804~menuPK:2246552~pagePK:2865106~piPK:2865128~theSitePK:223547,00.html>.

According to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2001) precipitation simulations in Southern Africa indicate reduced precipitation in the next 100 years and most models project that by 2050 the interior of Southern Africa will experience significant decreases during the growing season. Climate change effects are projected to weaken the Southern African monsoon during 2000-2049, which would then decrease precipitation levels, creating a drying effect over the majority of the western sub-tropical region by the 2080s due to fewer rainy days and less intense rainfall. Further climate change projections suggest that induced warming of the Indian Ocean would create an increase in droughts to Sub-Saharan Africa with approximately 10-20 per cent drier averages than 1950-2000<sup>6</sup>.

Since most of Africa relies on rain-fed agriculture, it is highly vulnerable to changes in climate, seasonal shifts, and precipitation patterns. Thus, any amount of warming will result in increased water stress. Given that roughly 70 per cent of the African population lives by farming, and 40 per cent of all exports are agricultural products, the African region is dangerously susceptible to the effects of climate change.<sup>7</sup>

### **Water security**

While advanced and intermediate economies are also vulnerable to impacts caused by climate change, such as severe floods and droughts, they have typically undertaken considerable investment in water infrastructure that will assist in mitigating the effects on their production levels and, therefore, minimising the impact on their economies. Whereas most developing economies, which tend to be in more flood and drought prone regions, continue to be confronted with hydrologic variability and have yet to achieve water security. In an effort to mitigate the effects of these extreme weather events on developing, particularly vulnerable, economies considerable investment in infrastructure is required to become resilient to water-related shocks and damages. The necessary areas of investment include protecting both natural infrastructure such as aquifers, water catchments and wetlands, as well as man-made infrastructure such as pipelines, reservoirs and dams. However, infrastructure investments must be balanced with appropriate investment in institutions and capacity-building, while maintaining a forward planning outlook to enable the most effective results to adapt to the changing needs of the environment.<sup>8</sup> Since the agriculture sector is heavily dependent upon

water accessibility, it is crucial that appropriate investment and planning is provided to minimise the effects of climate change as well as the impact on agricultural productivity.

### **Policy implications for developing countries**

Over the next few decades, the economic implications for developing countries as a result of climate change will become increasingly apparent. Presently, many small states have limited agricultural export commodities. This is extremely hazardous with the potential environmental impacts of climate change as it has the possibility of completely eliminating the production of the particular commodity, as well as, devastating the sector if it remains restricted to a few products. Thus, there is need for small states to build a strategic climate adapted trade policy in the sector, particularly if it has a potential competitive advantage; otherwise, diversify productive structures, where feasible, into economic and climatic resilient sectors, and invest in resilient and climate adapted infrastructure. This will invariably require Commonwealth developing countries, particularly small states, to continually build alliances with other high-income countries with similar interests in order to gain leverage for accessing quantitative and qualitative financing for adaptation.

The sustainability of developing countries' economies will depend on the severity of environmental impacts resulting from climate change and whether sufficient mitigation and adaptation measures as well as policies are put in place prior to the advancement of climate change. Ensuring the enhancement of environmental technologies; the access to appropriate infrastructure; suitably designed foreign aid and investment packages; and the accessibility to trade preferences, will potentially ease the economic strain on natural resource affected sectors from the environmental impacts caused by climate change.

### **Adaptation and mitigation**

Although the predicted economic impacts on climate-sensitive sectors are not presently visible, avoiding or delaying measures to prevent and/or

6 Hannah Reid et al, November 2007, 'The Economic Impact of Climate Change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy', Environmental Economics Programme Discussion Paper 07-02, International Institute for Environment and Development, London, UK, 8.

7 Desanker, 2002.

8 The World Bank, 2009, 'Water Resource Management: Floods and Droughts', <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXT/WAT/0,,contentMDK:21706960~menuPK:4828753~pagePK:148956~piPK:216618~theSitePK:4602123,00.html>.

ease the environmental effects will only further intensify the constraints.

Potential measures to ease environmental impact include the following<sup>9</sup> :

- **Conservation tillage:** Increases soil water retention in the face of drought while also sequestering carbon below ground.
- **Small-scale irrigation facilities:** Increases crop productivity and soil carbon, in addition to conserving water confronted by greater variability.
- **Agro-forestry systems:** Increases above and below-ground carbon storage while also increasing water storage below ground, even in the face of extreme climate events.
- **Properly managed rangelands:** Copes better with drought and sequesters significant amounts of carbon.

While preventive environmental measures are important in reducing the impacts of climate change, improvements to infrastructure throughout developing economies will complement the technical improvements for a more effective resistance. However, in order to effectively implement these measures appropriate foreign aid and investment is required.

### *Foreign aid and investment*

Regardless of climate change, foreign aid and investment into developing countries has been a vital component to economic growth for the majority of developing countries, especially the LDCs. However, many of these economies will be threatened with further struggle or even a reversal of any economic advancement, if appropriate measures are not implemented before the effects of climate change emerge. In order to become resilient to the potential environmental shocks and damages, and subsequently the economic loss, many of the world's poorest countries require much more investment in infrastructure.

Even though considerable amounts of aid and investment have been given to developing countries, in an effort to promote economic growth, progress has been marginal. An overall restructuring of the implementation of processes is required to create more effective foreign aid and investment packages.

### *Carbon tariff*

In addition to a lack of appropriate aid and investment, further economic obstacles are

preventing developing countries from preparing their economies for the environmental impacts of climate change through the form of a carbon tariff.

While industrialised countries must reduce considerable amounts of their carbon emissions under the Kyoto Protocol, the same measures do not apply to developing countries as industrialised countries are the primary source for current GHG levels. However, neither the UNFCCC nor the Kyoto Protocol address trade measures as a specific means of implementation or competitiveness. Further to a carbon tax on carbon emissions generated from domestic products, industrialised countries are beginning to implement a carbon tariff on imported goods. The carbon tariff is intended to equalise cost of reducing GHG by taxing “the implicit subsidies on the carbon content of imports that come from carbon non-compliant countries.”<sup>10</sup> If this measure is unilaterally applied to goods produced in developing economies, the economic effects will be devastating. Although the carbon tariff may largely be targeted at developing economies such as China, which heavily relies on coal for two-thirds of its total energy, whereby producing a third more CO<sub>2</sub> emissions per unit of energy than the USA,<sup>11</sup> developing economies throughout the Commonwealth – especially LDCs and the small vulnerable economies (SVEs) – will be confronted with extreme economic strains.

In June 2009, the United States Congress passed the US Clean Energy and Security Act which includes provisions allowing their government to take action against trading partners that fail to meet US greenhouse gas standards; however, this act will not come into effect before 2025. Similar proposals are emerging from the European Union and Canada, in an effort to eliminate a competitive disadvantage on their industries as a result of industrialised countries' efforts to reduce GHG.<sup>12</sup> The implementation of these proposals should consider the development prospects of developing countries, especially the repercussions for small states and LDCs, as the consequences will create numerous economic difficulties, by straining growth in developing countries and increasing production costs in industrialised countries.

9 Gerald C Nelson, March 2009, 'Agriculture and Climate Change: An Agenda for Negotiation in Copenhagen', International Food Policy Research Institute, 2.

10 Jacqueline Thorpe, 27 March 2008, 'Possible carbon tariffs could have an impact on growth: report', National Post, Toronto, Canada.

11 Ibid.

12 David Stanway, 3 July 2009, 'China says 'carbon tariffs' proposals breach WTO rules', Reuters, <http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE5620FV20090703>.

## Adaptation, financing and development

Climate financing mechanisms are crucial to promote adaptation to climate change in LDCs, SVEs, and SIDS (small island developing states). Under the UNFCCC, a number of developed countries committed to provide “new and additional financial resources” to meet the costs of adaptation and to foster “the transfer of, or access to, environmentally sound technologies and know-how”. There is, however, an apparent imbalance between the resources directed to mitigation and adaptation. In the Global Environment Facility, for instance, a total of US\$990 million has been destined to mitigation activities whereas only US\$20.4 million has been directed to adaptation measures.

On ‘Aid for Trade’, donors have committed on average US\$21 billion per annum (2000–2005). The distribution of the resources across regions, however, differs with Asia being the highest recipient, followed by Africa and Latin America. The quantity and quality of external official development assistance (ODA) continues to be a debated issue. Aid allocated for building productive sectors and economic infrastructure in LDCs has been a declining priority and continues to receive marginal ODA commitments (UNCTAD LDC Report 2008). Enhancing the competitiveness and resilience of smaller developing countries will require a quantitative and qualitative scaling up of Aid for Trade and focus should be placed on building: (1) a strategic climate adapted trade policy; (2) a diversified productive structure; and (3) a resilient and climate adapted infrastructure.<sup>13</sup>

## Conclusion

The high agricultural dependence of most Commonwealth small states, least developed countries, and low-income countries, combined with low climate-adaptive capacity and given their negligible contribution to global carbon dioxide emissions, necessitates a critical rethink of approaches to formulating development-oriented trade and climate policies that does not undermine their economic resilience-building efforts, particularly given their inherent structural constraints. Strategic efforts need to be made in ensuring geographical balance on data used in global climate simulating models particularly from developing countries. In addition, quantitative and qualitative climate adaptation financing should be made accessible to small states, LDCs and low-income countries, be it through the Aid for Trade forums or the UNFCCC process.

In order to ensure the sustainability of the agricultural sector in developing countries, with the advancement of climate change, appropriate mitigation and adaptation measures are required immediately in order to prevent a stalemate or reversal of achieved economic progress. Without necessary environmental measures and investment in infrastructure, developing countries are at the most risk to subsequent socio-economic repercussions arising from climate change. These effects will only be further intensified by either disregarding or postponing suitable adaptation and mitigation measures. Thus, acknowledging a global responsibility for countries that are most susceptible to the environmental and economic consequences of climate change through the implementation of appropriate trade and climate change policies is vital to developing countries’ economic sustainability.

13 Commonwealth Secretariat, ICTSD, 2008: Trade and Climate Change: Key Issues for LDCs, SVEs, and SIDS from a Competitiveness, Adaptation and Resilience Perspective.

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This Trade Hot Topic is brought out by the International Trade and Regional Co-operation Section (ITRC) of the Economic Affairs Division (EAD) of the Commonwealth Secretariat, which is the main intergovernmental agency of the Commonwealth - an association of 53 independent states, comprising large and small, developed and developing, landlocked and island economies - facilitating consultation and co-operation among member governments and countries in the common interest of their peoples and in the promotion of international consensus-building.

ITRC is entrusted with the responsibilities of undertaking policy-oriented research and analysis on trade and development issues and providing informed inputs into the related discourses involving Commonwealth members. The ITRC approach is to scan the trade and development landscape for areas where orthodox approaches are ineffective or where there are public policy failures or gaps, and to seek heterodox approaches to address those. Its work plan is flexible to enable quick response to emerging issues in the international trading environment that impact particularly on two highly vulnerable Commonwealth constituencies – least developed countries (LDCs) and small states.

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10 June 2009: Prime Ministerial Caribbean Banana Policy Review Meeting, held in Castries, St Lucia

10 June 2009: Discussion meeting on Challenges to Small States in the Multilateral Trading System, organised during the World Trade Week, UK (8-12 July 2009), held in London, UK

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18 May 2009: Seminar on Preference Erosion: How Much and What To Do About It?, held in London, UK

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31 March-1 April 2009: Brainstorming Workshop - The Doha Round: Securing Development Outcomes for Small Economies and LDCs, held in Hampshire, UK

## Selected ITRC Publications

The Impact of Trade Preference Erosion on Recipient Countries, (forthcoming), by Chris Milner, Oliver Morrissey and Evious Zgovu, Commonwealth Secretariat.

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