Discussion Paper

Trade Negotiations on Environmental Goods and Services in the LDC Context

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POVERTY REDUCTION

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List of Acronyms and Abbreviations

ADB	Asian Development Bank
ADB	Asian Development Bank
AoA	Agreement on Agriculture
APEC	Asia Pacific Economic Cooperation
BBS	Bangladesh Bureau of Statistics
bln	Billion
CO_2	Carbon dioxide
COP	Conference of Parties
CPC	Central Product Classification
CTBT	Committee on Technical Barriers to Trade
CTE	Committee on Trade and Environment
CTESS	Committee on Trade and Environment Special Session
CTS	Council for Trade in Services
DFQF	Duty Free Quota Free
DR	Doha Round
DMD	Doha Ministerial Declaration
DNA	Designated National Authority
EG	Environmental Good
EGS	Environmental Goods and Services
ENT	Economic Needs Test
EPI	Environmental Performance Indicator
EPP	Environmentally Preferred Products
ERE	Environmental Regulation Effect
ES	Environmental Service
EST	Environmentally Sound Technologies
EU	European Union
Eurostat	The Statistical Office of the European Community
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
HS	Harmonised Commodity Description and Coding System
IFAD	International Fund for Agricultural Development
IPR	Intellectual Property Rights
ITC	International Trade Centre
KLE	Capital Labour Effect
km	Kilometer
LDC	Least Developed Country
MDG	Millennium Development Goal
MEA	Multilateral Environmental Agreements
MFN	Most Favoured Nation
mln	Million
NAMA	Non-Agricultural Market Access
NAPA	National Adaptation Plan of Action
n.e.c.	Not elsewhere classified
n.e.s.	Not elsewhere specified
NGMA	Negotiating Group on Market Access
NRI	Natural Resource Institute
NTB	Non-Tariff Barrier
NTM	Non-Tariff Measure
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
PM	Particulate Matter
PPM	Production Process Methods
RoO	Rules of Origin
SPS	Sanitary and Phytosanitary
TARWR	Total Actual Renewable Water Resources
TBT	Technical Barriers to Trade
TRIPS	Trade Related Intellectual Property Rights Agreement
UK	United Kingdom
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
USEPA	United States Environment Protection Agency
WCED	World Commission on Environment and Development
WITS	World Integrated Trade Solution
WTO	World Trade Organization

1. Introduction

In view of the increased intensity of global environmental problems, particularly pollution and climate change, and as a result of the integration of the global economy and increased economic interdependence among countries, environmental issues have emerged as an important area of concern for policy makers. The 15th Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Copenhagen in December 2009 showed the importance that policy makers across the world attach to global action on climate change. But it also made evident the difficulties of adopting concrete commitments for climate change action across a broad spectrum of countries and the challenge climate change poses to developing countries, especially the poorest. Since the early 1990s when the rate of trade liberalisation increased, the interface between environmental concerns and trade policies has become a prominent issue.

An ideal situation would require compatible trade and environmental policies as a result of which trade, environment and sustainable development could join paths in one direction. Recognizing the interface between trade and environment, the World Trade Organization (WTO) has given attention to the issue through various agreements, most of which contain exceptions from the trade liberalisation rule in order to legitimise the efforts of its members to protect the environment (WTO 2001).

Trade-environment issues as laid out in the work programme of the Doha Ministerial Declaration are of critical importance for the Least Developed Countries (LDCs), particularly in terms of market access opportunities. The LDCs must confront the challenge of achieving economic growth and expanding exports without degrading the environment.

Since the launch of the Doha Round (DR), negotiations on the trade-environment issue has not acquired sufficient momentum as countries focus mainly on the agriculture and non-agriculture market access (NAMA) negotiations. However, an outcome on trade and environment is expected to be part of a larger package of the agreements achieved when the DR negotiations are completed.

LDCs' participation in the trade and environment negotiations has been limited. Given these countries environmental vulnerabilities and the importance of trade in their development efforts it is important that LDCs examine the implications of these negotiations at the WTO. Moreover, the Fourth Conference on the LDCs review of the Brussels Programme of Action to be held in Turkey in 2011 provides yet another opportunity to consider the linkages between trade and sustainable development in a coherent and all encompassing manner.

Most studies on Environmental Goods and Services (EGS) focus on issues and concerns of developed and developing countries. This study will attempt to flag some of the specific LDC issues with respect to EGS negotiations and make recommendations for negotiation positions.

Based on secondary data, the paper estimates the pattern of Environmental Good (EG) trade in LDCs, their share in global trade, and major EG exports and imports by LDCs. Data on Environmental Services (ES) related to LDCs is not available in published sources, which constrained the analysis in this area.

2. Trade and Environment in the LDC Context

LDCs participation in global trade

LDCs' share in global trade is very small. In 2007, the share was only 0.8 percent, which was commensurate with their GDP share in global GDP (WTO 2009b). Traditionally, both market and product concentrations of LDCs are narrow although recently expanding. The oil and mineral exporting LDCs have experienced faster export growth in recent years due mainly to the fuel price hikes since 2003. LDC exporters of manufactured goods and primary products have negative trade balances.

Environmental priorities of LDCs

LDCs face multiple environmental problems, ranging from air and water pollution, to soil degradation and desertification, to depreciation of forests and fish resources, loss of biodiversity and ecosystems, urbanisation and congestion. LDCs are also vulnerable to the risk of climate change, including possible sea level rise which would severely impact the lives and livelihoods of a large number of people.

Developing countries tend to have the lowest Environmental Performance Indicator (EPI), particularly LDCs. These countries are either densely populated industrializing countries with stressed ecosystems (Bangladesh) or arid states with limited natural resources (Mauritania, Mali). In every case, underinvestment in key environmental infrastructure and pollution control mechanisms, inadequate natural resource management and weak and ineffective environmental governance was found to be an indicator of low EPI scores.

The environmental priorities of LDCs emanates from the very nature of the environmental problems they confront and the lack of adequate environmental policies in most of these countries. Environmental problems are complex and difficult to manage. The mitigation of environmental degradation, including the effects of climate change resulting mainly from the economic activity of developed countries, requires financial resources that LDCs lack.

3. Overview of EGS Negotiations

Definition and coverage of environmental goods

The definition and coverage of environmental goods has been a contentious issue in the WTO. Key issues that complicate defining EG include first, whether "environmental goods" should include products with multiple end uses; second, the mechanisms of capturing goods by the harmonized system; and third, how goods and services that correspond to local concerns can be identified as EG in the global trade context (Jha 2008).

Definitions by the Organisation for Economic Co-operation and Development (OECD) and the Asia Pacific Economic Cooperation (APEC) were starting points in the discussion of EG in the context of the Doha Round. The OECD and the APEC developed two separate lists of environmental products. The OECD list was developed in the context of analytical work on the role of environmental goods and services in environmental policy and industrial competitiveness. The APEC list resulted from negotiations on trade liberalisation among APEC countries.

WTO members also proposed their own products in the context of the EG negotiations based on their perceived interests and comparative advantage. In 2007, the "Friends of EGs" submitted a list of environmental goods comprising 153 items under 12 broad categories. Table 4 presents the broad categories of environmental goods proposed under the OECD, APEC and Friends of EGs' lists.

A number of suggestions have been made in the Committee on Trade and Environment Special Session (CTESS) for purposes of identifying environmental goods. These include focusing on the product's "end use" or "direct use" but concerns have been raised about the dual or multiple uses of these products. On the other hand, it has been stressed that distinctions based on processes and production methods (PPMs) should not be used as the basis for the identification of environmental goods. Other considerations relate to the concept of environmentally preferred products (EPP), which according to the United Nations Conference on Trade and Development (UNCTAD) are those goods whose production and sale contribute significantly to the preservation of the environment (UNCTAD 2003). The debate lies in the fact that for most developing countries their export interest lies in EPPs. It is in their interest, therefore, that these products be covered by the definition or approaches finally adopted in the EG negotiations at

the WTO. Such products include for instance, natural fibres and colorants, other non-timber forest products and renewable energy products, including ethanol and biodiesel.

Suggested approaches for environmental goods negotiations

Developed countries are advocating a "list-based" approach for identifying specific environmental goods while many developing countries support alternative approaches, particularly the liberalisation of environmental goods and services associated with a specific environmental project.

Under the list approach, countries would identify specific environmental goods and then negotiate the elimination or reduction of bound tariffs and non-tariff barriers permanently on those goods, on a most favoured basis. Suggestions have been made for a "development list" to be developed by developing and least developed countries to identify environmental goods subject to lower tariff reductions based on the principle of less than full reciprocity. The list approach has been criticised on the ground that it may lead to the liberalisation of goods that have both environmental and non-environmental end uses.

The project approach spearheaded by India would allow imports of goods and services at concessional terms for environmental projects approved by a designated national authority based on criteria developed by the WTO Committee on Trade and Environment (CTE). This approach is said to recognize the diversity in environmental standards and articulate the concept of common but differentiated responsibilities by developing countries, integrating environmental and development concerns in the approach to the negotiations. Developed countries have criticized the project approach, however, for failing to provide predictable, binding and permanent trade concessions, and have questioned its consistency with WTO rules.

A third alternative is an integrated approach requiring CTESS to multilaterally pre-identify the categories of environmental projects and environmental goods used in such projects that would benefit from tariff and non-tariff barrier concessions.

Yet another approach is a "request/offer" approach whereby each country will identify products that contribute to the environment and seek tariff concessions on those products while also indicating the products in which it is prepared to undertake liberalisation commitments as requested by other Members.

Environmental services

Similar to the situation with EGs, there is no universally accepted definition of environmental services. The General Agreement on Trade in Services (GATS)'s Services Sectoral Classification List, W/120, sorts environmental services as: (a) sewage services; (b) refuse disposal services; (c) sanitation and similar services; and (d) other (cleaning services of exhaust gases, noise abatement services, nature and landscape protection services, and other environmental services). The OECD argues, however, that such classification is too narrow.

In the course of negotiations, WTO members have proposed to divide ES into a "core" and "cluster" approach. The "core" group would encompass services which can undisputedly be classified as "purely" environmental categorised according to environmental media such as water, noise, solid and hazardous waste, among others. In the "cluster" approach conceptual services such as design, engineering, R&D, and consulting services can be considered as special cluster since these have environmental end use.

In fact, it is difficult to separate EG and ES for purposes of trade analysis. Environmental goods are often used to provide a service. But a good is tangible whereas a service is not. There is significant overlap between the service segment and the equipment segment of environmental products.

4. LDCs' Participation in EGS Trade

EGS play an important role in international trade. The global market for environmental goods and services was estimated to be US$540 billion in 2001.

Although the market for environmental goods and services has traditionally been confined to developed countries, developing countries such as Brazil, China, India and Mexico are emerging as major exporters and importers of EGS. LDCs on the other hand lag behind in the EGS trade although they are increasingly vulnerable to global environmental problems and are also subject to environmental compliance while exporting to develop and developing countries.

The present study estimates the EG trade performed by countries on the basis of data provided by the ITC Trade Map and WITS. In 2007, total estimated export of EG was US$783.2 billion and total estimated import was US$ 753.8 billion. These EGs are those defined in the WTO 153 list categorized at six digit level HS code.

Regional share of EG trade

The share of LDC EG exports is 0.08 percent while of EG import is 0.82 percent in 2007. In 2007, the Asian LDCs' share of total LDCs' EG export was 67.8 percent; the African LDCs' share was 32 percent. However, Asian LDCs' import share of EG in all LDCs' EG import was 26.9 percent, while the African LDCs share was 72.62 percent.

The top ten LDC exporters of EGs are Bangladesh, Tanzania, Nepal, Uganda, Liberia, Yemen, Angola, Madagascar, Senegal and Myanmar. These 10 LDCs account for 88.7 percent of all LDC EG exports. On the other hand, the top ten LDC importers of EGs are Angola, Sudan, Bangladesh, Yemen, Zambia, Ethiopia, Myanmar, Tanzania, Senegal and Democratic Republic of the Congo. These ten LDCs import 70.2 percent of all LDC EG imports

At six digit level HS code top ten EG export products comprise 69.5 percent of all LDC EG exports while top ten EG import products comprise 33 percent of all LDC EG imports. Jute and other textile fibres top the list of exports from LDCs with a share of 30.5 percent. In case of imports towers and lattice masts, iron or steel comprise 4.5 percent of LDC imports

While LDCs' participation in the EG market is very limited at present, demographic, social, political and economic factors are expected to play important roles in increasing the share of EG trade in LDCs.

5. Implications of Tariff Reduction on Environmental Goods

Elimination or reduction of tariff and non-tariff barriers from EG will increase global trade regardless of the particular involvement of developing or least developed countries in the direction of trade flows. Developed countries have matured markets and the tariff rates for EGs in developed country markets are already low.

Access to low-cost technologies will be advantageous for developing countries and LDCs. Transfer of technology is of vital importance for all developing and least developed countries for mitigation and adaptation to climate change. It is also; however, an area of controversy concerning intellectual property rights (IPR). This issue must be examined to ensure it does not act as a barrier to technology transfer to LDCs.

Tariff rates on EG

An analysis of tariff rates on EG based on the WTO '153' list at six digit level HS codes shows that tariffs on EG are already low in developed countries for the world's top ten products. The effective applied tariff rates on LDCs' top ten EG exports and imports range between 0-2 percent, except for one product in the category of 'twine, cordage, ropes and cables, of jute or other textile bast fibres' (HS Code 560710). LDCs still stand to benefit from liberalisation of EG however, since much of LDCs' exports of EG are destined to a number of developing countries where they face high export duty.

Preference erosion

In 2007, LDCs enjoyed over 91 percent duty-free access (tariff liens with imports) for manufactured products and 93 percent for agricultural products to selected importing developed countries such as Australia, Canada, the European Commission (EC), Japan, New Zealand and Norway (WTO 2009b).

It is likely that many of the EG will fall under various preferential programmes offered to LDCs by developed countries. Therefore, if these products are listed as EG, tariffs will be reduced at faster rates, which will erode LDCs' preferences in those markets and reduce their competitiveness. However, such losses can be compensated with the Duty Free Quota Free (DFQF) market access of products originating in LDCs.

Non-tariff barriers on EG

Non-tariff barriers (NTBs) are harder to detect than tariff barriers and can take various forms. Since export interest of LDCs in EG lies also in the area very near to agricultural goods, sanitary and phytosanitary (SPS) measures form the most crucial barrier for LDCs' exports. Non-compliance with these requirements can have devastating effects for the exporting country.

The lack of uniformity of environmental requirements and technical regulations in different national markets are known to affect the type of environmental goods used to meet environmental requirements, and thus act as an NTB (Vikhlyaev 2003).

6. Issues and Strategy for Negotiation of Environmental Goods and Services

Given the fact that LDCs' export interest in EG lies in EPPs which are agricultural and natural resource-based, LDCs should emphasise that the negotiating list of EG trade in the WTO includes these products. While jute and textile-based products dominate the list of EPPs by LDCs they can also include forest-based non-timber products, products made from natural fibres, natural resource-based products produced through traditional knowledge, and fisheries. However, the procedure to determine EPPs through production process methods (PPMs) to see how they are grown, extracted, manufactured and provided in a sustainable manner in all or some stages of their life cycle should be reviewed.

The special and differential treatment of market access to LDCs can also be extended to improved market access for LDCs' products which have less negative environmental impact and which are derived in an environment-friendly way.

The analysis of LDCs' interests in trade in environmental services is difficult since there is no available data. The main way to trade in environmental services is through Mode 3 and Mode 4 of the General Agreement on Trade in Services (GATS). Under Mode 3, services are provided by a subsidiary or a branch in a host country through its commercial presence. Under Mode 4, services are provided by professionals temporarily working abroad. A number of issues stand in the way of better trade performance under both these Modes, which constrains LDCs' participation.

Executive Summary

Provision of environmental infrastructural services in LDCs requires high levels of investment and expertise. LDCs may benefit from such investments through commercial presence under Mode 3 in the area of increased access to safe water through treatment of polluted water or wastewater management. However, the issue of the affordability of these essential environmental services is a concern for LDC governments. Water is a public good and privatization of such services would create a conflict of interest as provision of this good on profit-making basis would ignore affordable access for the poor. Profit-driven motivation behind the supply of necessary goods like water creates the risk of excluding those who cannot afford such private services.

Commercially meaningful liberalisation of environmental infrastructure services requires market access in environmental support services such as construction, engineering, legal and consulting services, where Mode 4 is an increasingly relevant factor. Market access of service providers from LDCs to the developed countries is constrained by stringent immigration and recruitment policies of the importing developed countries. Service providers are also affected by restrictions such as licensing requirements and pre-requisitions relating to qualification and working experience (UNCTAD 2003). Though export of ES by LDCs is not very significant, some LDCs could extract economic benefits by exporting environment-related professional services in the form of studies, assessments and consultancies. LDCs have made proposals for market access giving them special priority but their focus is more on low- and semi-skilled workers, where their comparative advantage lies. Therefore, for those environmental services which require highly skilled personnel, LDCs need training and capacity building.

The orchestration of free trade in an effort to facilitate growth in the emerging EGS markets of the LDCs may not be effective. Given the nature and extent of dependence on developed and developing countries' products that free trade creates in LDC markets, free trade may fail to bring about sustainable growth. Conversely, growth without domestic innovation and capacity building through free trade would not be environmentally or economically sustainable for LDCs in the long run. LDCs should use liberalisation as a tool to import foreign technologies at a lower cost to enhance their capacity and proficiency in extracting their own resources rather than have foreign firms doing the job.

The issue of IPR and technology transfer must be resolved to enable technology transfer to LDCs. Though studies indicate that IPR may act both positive and negative ways (OECD 2008), appropriate technology and its efficient utilization can contribute to the economic progress of countries around the world. From the point of view of developed countries, a strict IPR regime is essential for protecting technologies. Developing countries, on the other hand, can benefit from lax IPRs to access technologies and reengineering processes. The reconciliation of IPR protection and the dissemination of climate-friendly technologies is a challenge. LDCs should demand flexibility in the Trade Related Intellectual Property Rights Agreement (TRIPS) Agreement in order to solve problems of patented climate-friendly technologies.

Technology transfer through aid and technical assistance for environmental technologies has been mentioned both in the list and project approaches for EG negotiations submitted by developed and developing countries though at a less than adequate level by the former group. Though the IPR regime has not been quite strict in LDCs in case of technology transfer such a process has been slow due to various supply side constraints such as lack of capacity and financial resources. Hence in order for LDCs to take full advantage of liberalisation of EGS technical and financial assistance is essential. Such assistance is needed not only for buying clean technologies but also for addressing any probable negative impact of liberalisation on LDCs. In LDCs small and medium enterprises (SME) dominate the industrial sector and thus are not in a position to buy clean technologies to comply with domestic environmental regulations even if there is marginal reduction of prices of technologies due to tariff changes. LDCs should submit proposals to receive support from the Aid for Trade (A4T) package. The WTO Members should avoid dumping of old technologies in the name of technology transfer and facilitate technological innovation.

7. Conclusions

In general, the EG trade pattern of LDCs reflect the fact that these countries require technologies for wastewater management and potable water treatment, renewable energy plant, and management of solid and hazardous waste and recycling system. In order for these countries to access such technologies, import duty may be reduced in the importing countries. They should be also available at a concessional price offered by the developed countries.

With respect to preference erosion suffered by LDCs due to liberalisation of EGS, the loss should be compensated by developed countries and those developing countries in a position to do so by way of full DFQF, simplified rules of origin (RoO) requirements, technology transfer and financial support through various mechanisms including soft loans and A4T.

Given the dependence of LDCs on the primary sector for employment and income generation, EPPs which are based on agriculture, forestry, fishery and other natural resources should be included in the list of EGs. The current list of EPPs in the '153 list' is too narrow and should be broadened to reflect LDC products.

With respect to EPPs, the issue of PPM is critical for LDCs. This should be excluded as a means to determine a product for qualifying as an EG. PPM features prominently in the 'list approach' advocated by the developed countries in the WTO currently as opposed to the 'project approach' proposed mainly by India though it has been criticized for not having binding commitments and predictable market access. LDCs may propose a similar approach which would accommodate EPPs and is consistent with the WTO rules.

Liberalisation of EGs through tariff reduction may not increase LDCs' EGS trade unless NTBs are removed. Though EG exports to the developed countries face either zero or very low tariffs, they still may face various NTBs such as product standards, technical requirements, SPS measures and certification. In case of EPPs, where major EG export interests of LDCs lie, stringent environmental and health-related requirements that are complicated and costly must be fulfilled by the exporting countries. LDCs should participate actively in standard setting bodies in order to ensure that standards are not discriminatory against EPPs produced in LDCs. They also require financial and technical support to be able to certify EPPs credibly.

For meaningful participation in ES trade, domestic regulatory frameworks should be in place prior to allowing FDI and capital investment in the environment sector for providing environmental services. The issue of affordability of essential environmental services such as water should be the priority for LDCs as the majority of their populations live in poverty. Since many LDCs have human resources, they can take advantage of exporting environmental service providers under Mode 4. This will require capacity building in LDCs for ES providers and relaxation of various measures by the importing countries that act as barriers to movement of service providers across borders.

The challenge for LDCs is twofold: how to gain market access without degrading the environment and how to protect the environment without adversely affecting economic growth, while still making progress in the trade liberalisation process (Tussie 2000). LDCs need to create enabling environments through appropriate domestic policies that focus on underlying sustainable development priorities and concerns.

1. Introduction

In view of the increased intensity of global environmental problems, particularly pollution and climate change, and as a result of the integration of the global economy and the increased economic interdependence among countries, the environment has emerged as an important area of concern for policy makers. The Programme of Action for the Least Developed Countries for the Decade 2001-2010 adopted in the third UN Conference on the Least Developed Countries held in Brussels in 2001 includes environment as the sixth commitment. In the Brussels Programme of Action, LDCs agreed to protect the environment and reduce vulnerability to natural shocks. A number of actions towards achieving this commitment were spelt out which have to be undertaken by LDCs and their development partners. The extent to which this commitment has been fulfilled, and the actions taken to fulfill it, will be reviewed in the upcoming fourth LDC Conference in 2011 in Turkey. The 15th Conference of Parties to the UNFCCC negotiations held in Copenhagen in December 2009 shows the importance that policy makers across the world attach to global action on climate change. It also made evident, however, the difficulties of adopting concrete commitments for climate change action across a broad spectrum of countries and the challenge climate change poses to developing countries, especially the poorest.

Since the beginning of the 1990s, when the rate of trade liberalisation began to increase, the interface between environmental concerns and trade policies has become a prominent issue.

The relationship between trade openness and the environment has been discussed at length both theoretically and empirically by several authors during the last twenty years. Some of the attempts include (Grossman and Krueger 1993; Ropke 1994; Copeland and Taylor 2005; Taylor 2004; Antweiler et al 2001; Harbaugh et al 2002; Cole 2006; Cole and Elliott 2003; Frankel and Rose 2005; Managi et al 2008; Pearce and Warford 1993; Markandya 1994; Daly 1991). The conceptual framework on the relationship between trade and the environment breaks down the effect of trade on the environment in three ways: scale effect, composition effect and technology effect (Grossman and Krueger 1993). The scale effect refers to the effect on greenhouse gas (GHG) emissions as a result of increased economic activity or production due to free trade. The composition effect explains how GHG emissions are affected by the composition of output, that is, the way trade liberalisation changes the structure of the industry towards production of goods on which the country has comparative advantage. This effect could be positive or negative, depending on the country's resource abundance and the strength of its environmental policy. These are called the capital–labour effect (KLE) and the environmental regulation effect (ERE), respectively (Managi et al 2008). The technique effect refers to the improvements in energy efficiency which will result in lower GHG emissions due to technological improvements. The effect can come about in two ways. First, trade openness will increase the availability and decrease the costs of environmentally friendly goods, services and technologies. Second, increased income as a result of trade openness can generate increased demand for improved environmental quality. This can lead to more stringent environmental regulations in countries, which will promote the employment of more environmentally friendly production methods.

An ideal situation would require compatible trade and environment policies as a result of which trade, environment and sustainable development can join paths in one direction. Recognising the interface between trade and environment the World Trade Organization (WTO) has addressed the issue through various agreements, most of which contain exceptions from the trade liberalisation rule in order to legitimise the efforts of its members to protect the environment (WTO 2001). For example, Article XX of the GATT, Article XIV of GATS, TRIPS, Agreement on Sanitary and Phytosanitary (SPS) Measures and Technical Barriers to Trade (TBT) and the Agreement on Agriculture (AoA). Many WTO rules have implications for climate change. For example, disciplines on tariffs prohibiting members from collecting tariffs at levels greater than that provided for in their WTO scheduled consolidation, rules on subsidies and rules on technical regulations and standards which may not be more restrictive than necessary to fulfill a legitimate objective, and rules on trade-related intellectual property rights (IPR) that are applicable for transfer of climate-friendly technology are some of the relevant trade rules for climate change issue.

Since the initiation of the Doha Round (DR), the trade-environment issue has not acquired sufficient momentum in the WTO as countries are focusing mainly on negotiations for agriculture and non-agricultural market access (NAMA). The issue of

the environment has been put on the backburner notwithstanding the fact that negotiations on the environment are part of the single undertaking of the DR. Though Ministers reaffirmed their commitment to negotiate on trade and environment at the Cancun Ministerial in 2003 and the Hong Kong Ministerial in 2005, no substantial agreement could be reached on a number of areas since there remain major disagreements on various issues among the members. The major disagreement mainly between the United States and India has been over issues such as the removal of farm subsidies in rich countries and the reduction of tariffs on industrial products by developing countries. However, since an outcome on trade and environment is expected to be part of a larger package of the agreements achieved when negotiations of the DR are completed, it is important to recognise that the preparation and bargaining power of the participating countries will be determining factors in extracting benefits from such negotiations.

Even without being engaged actively in such negotiations, all WTO Members will be bound by the outcome of the negotiations. As it is, the participation of LDCs in the WTO negotiations on broader issues has been limited; environmental negotiations have been even more neglected. However, given the environmental vulnerability of LDCs and the importance of trade in their development efforts it is important that these countries do examine the implications of negotiations on trade and environment at the WTO.

Paragraph 31 (iii) of the Doha Ministerial Declaration (DMD) mandated negotiations on "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services" as part of the single undertaking (WT/MIN/(01)/DEC/W/1, 2001). Though there has not been much progress in the area of negotiations on the liberalisation of environmental goods and services (EGS) WTO Members will have to reach a consensus on this issue along with negotiations on other areas including agriculture, non-agricultural market access and services. The engagement of LDCs in the area of EGS negotiations is important for the following reasons:

(a) Vulnerability to climate change and lack of resources. LDCs lack resources to use low carbon technologies to reduce carbon emissions due to expanded trade. The poverty and disparities in human development converts the risks of climate change into vulnerability in poor countries (UNDP 2007). Besides, these countries lack climate-defense infrastructure and have limited access to social insurance in order to address the negative impact of climate change. Though there are no estimates for LDCs' resource requirements to tackle the impact of climate change, it has been estimated that developing countries will need an amount which ranges between US$ 262.15 billion to US$ 615.65 billion annually by 2030 on account of adaptation, mitigation and technology to address climate change in these countries. On the other hand, LDCs have given less attention not only to their environmental problems but also to trade-related environmental issues. This is due not only to lack of awareness but also lack of resources. Now when the situation is taking serious turns LDCs have started to mainstream environmental aspects in their national plans. Some of them have also prepared a National Adaptation Plan of Action (NAPA) or strategies to mitigate climate change. However, these plans do not explicitly focus the issue of interlinkages between climate change and trade including the issue of EGS.

(b) Economic and social commitments. LDCs have to deal with a number of economic and social challenges such as higher economic growth, poverty reduction and income distribution which may constrain their ability and choice to adopt a low carbon technology. On the other hand, LDCs are vulnerable to the impacts of climate change more than other countries. Therefore, the need for climate-friendly technology is more prominent in LDCs. The attempt to reduce or eliminate tariff and non-tariff barriers (NTBs) on EGS can help wider dissemination of clean technologies as costs of such technologies are expected to decline. Clean technologies can also contribute to the expansion of trade in these countries. It has been estimated that complete elimination of tariffs and non-tariff barriers, such as quota, would lead to an average increase of trade in clean coal technology, wind/solar power generation and efficient lighting technology by 13.5 percent compared to the current level, with variations across technologies and countries. Eliminating tariffs alone would raise trade levels by an average 7 percent from current levels (World Bank 2008).

(c) Informed and effective policy decisions: There is a dearth of adequate capacity in terms of both general awareness and understanding of the issues of EGS negotiations among LDCs. These lacunae may severely undermine their policy efficacy in the related area in terms of identifying their export and import interests of EGS. Against this backdrop, it will be useful for LDCs to explore the benefits and costs associated with liberalisation of the EGS in order for them to be able to engage fully in the negotiations.

1. Introduction

Though there is currently no international consensus on the definition and coverage of EGS, several developed and developing countries have already made various proposals in this regard in conformity with their respective trade interests. LDCs should be engaged in the EGS negotiations in two ways. First, LDCs should examine various proposals and approaches put forward by WTO Members before they are finalised. Second, LDCs should also assess their own interests in the area of EGS, and how and to what extent the reduction of tariff and non-tariff barriers can benefit them.

The existing studies on EGS focus on issues and concerns of developed and developing countries only; no effort has been made to highlight the concerns of LDCs in EGS negotiations. The present study attempts to flag some of the issues relevant specifically to LDCs and recommend negotiating positions that will benefit them.

1.1 Objectives and methodology of the study

The broad objective of the current study is to identify the opportunities and challenges posed by the Doha Round negotiations on the liberalisation of EGS for LDCs and suggest strategies for negotiations of EGS by LDCs. In doing so the study will:

- review environmental priorities of LDCs and provide a statistical review of the export and import patterns of merchandise and environmental goods (EG) trade;
- discuss various approaches of EGS negotiations currently discussed at the WTO and examine their suitability in the context of LDCs;
- assess the economic effects of reduction of tariff and non-tariff barriers on EGs and evaluate the trade and environmental benefit as well as the cost of liberalisation;
- discuss the issues related to ES negotiations relevant for LDCs, although some constraints are imposed by the unavailability of data on environmental services for LDCs;
- evaluate the requirements to meet the challenges of EGS negotiations, particularly in terms of capacity building and cleaner technology in order to participate in WTO negotiations effectively.

Based on secondary data the paper estimates the pattern of EG trade in LDCs, their share in global EG trade, and major EG exports and imports by LDCs. The study also examines tariff rates on the major export markets of EG traded by LDCs. Since data on EG trade in all LDCs are not available for 2008, for the sake of uniformity and comparability this study uses data for 2007. EG trade of non-WTO Member LDCs is also estimated in the study.

Meaningful statistics on LDCs' trade of ES are not available in published sources to serve as a basis for analysis. Therefore, this study can analyse data on EG trade only. A qualitative assessment was conducted in order to understand the opportunities and challenges related to liberalisation of ES.

The study utilizes data available in published documents and databases from various websites such as the WTO, United Nations Conference on Trade and Development (UNCTAD), International Trade Centre (ITC) and World Integrated Trade Solution (WITS).

1.2 Outline of the study

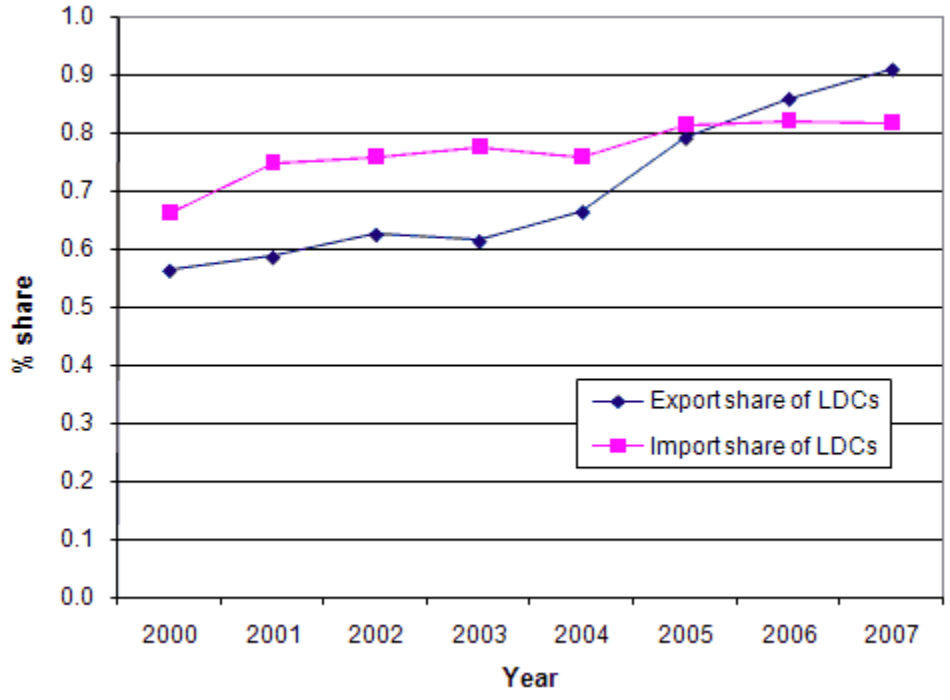
The introductory section is followed by a discussion on trade and environment in LDCs where LDCs' participation in world trade and their environmental priorities are discussed in brief. Section 3 discusses the definition and coverage of EG, suggested approaches for EG negotiations by various WTO Members and the definition of ES. Section 4 presents an estimation of EG trade by LDCs based on WTO 153 EG product list. The share of LDCs in global EG trade, contribution of LDCs EG trade per region, top ten LDC exporters and importers of EG, and top ten EG exports and imports are calculated from the ITC Trade Map and WITS database in this section. Various tariff rates for broad categories of EG by developed, developing and least developed countries are presented in Section 5. In this section issues of preference erosion and NTBs faced by LDCs on EG are discussed. A number of related issues and strategies for EGS negotiation in the context of LDCs are discussed in Section 6. Ways to participate in EGS negotiations effectively are discussed in this section. Finally, Section 7 contains concluding remarks based on the major findings and focus of the study.

2 Trade and Environment in the LDC Context

2.1 LDCs' participation in global trade

LDCs' share of trade in global trade has always been very small. In 2007 the share of LDCs in global trade was only 0.8 percent, which was commensurate with their GDP share in global GDP (WTO 2009a). Figures 1 and 2 show that though the trend of LDCs' share of world trade in goods and services was much lower compared to LDCs' share of world GDP in 1990, LDCs' share in world trade started to catch up with that of world GDP around 2005. The share of LDCs' export in global export is currently higher than the share of LDCs' import in global import. LDCs registered a fall in export growth rates in the second and third quarters of 2008 in the face of the global financial crisis. LDCs which specialise in the export of commodities may be able to avert the adverse impact of the crisis, but for those that specialise in export of manufactured items, the crisis may have a stronger and more lasting impact. It has been estimated that fuels and mining sectors experienced a negative growth of 12.3 percent during September 2008 and March 2009 (WTO 2009b). However, irrespective of the types of exports, most industries in LDCs will not be able to cope with a sustained period of economic recession. Though there are signals that some of the developed and developing countries are recovering from the shock of the financial crisis, LDCs will take longer to increase their aggregate demand through reducing unemployment rates and increasing productive investments. This will have an impact on their export sectors.

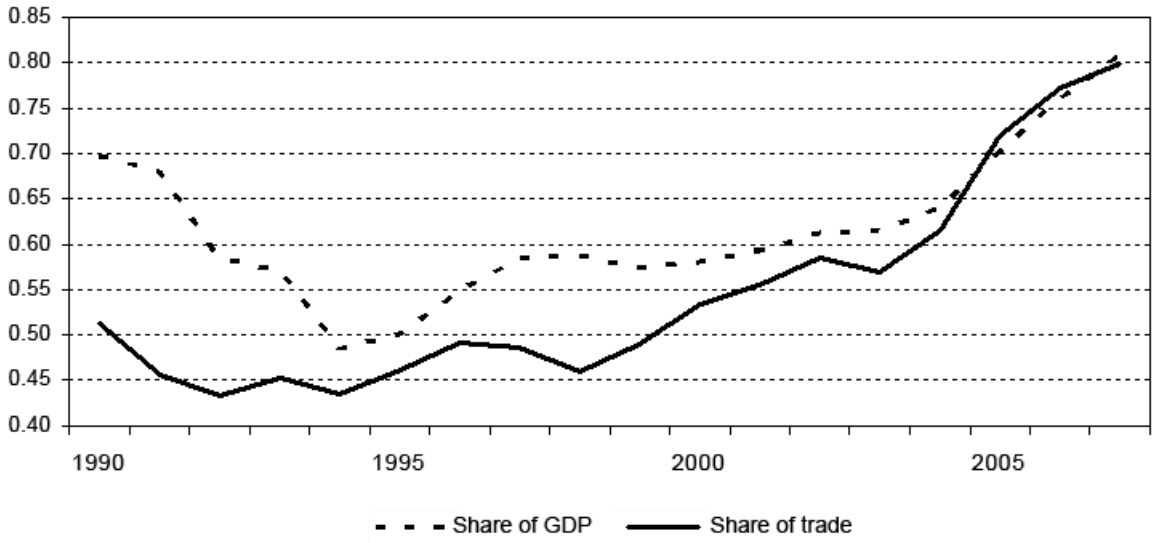
Figure 1: LDCs share (%) in total world trade



Source: UNCTAD Handbook of Statistics 2008.

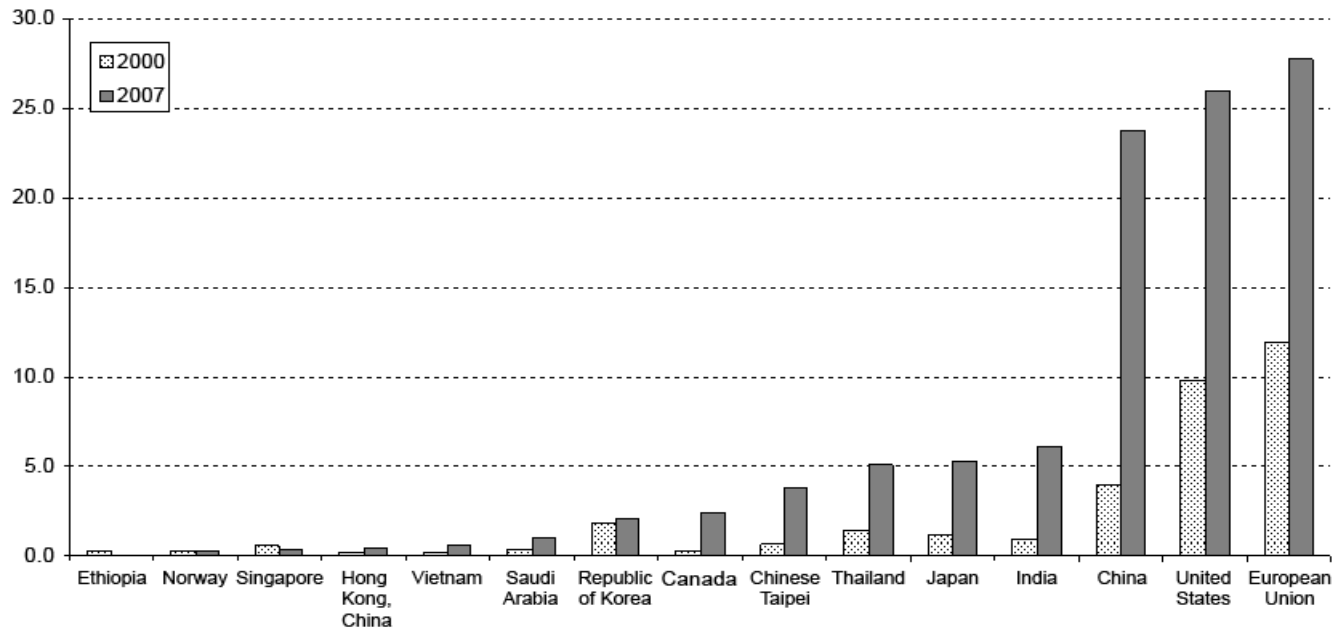
Traditionally, both market and product concentrations of LDCs are narrow. Recently, LDCs have been able to increase their share in world trade, though marginally, through the expansion of market concentration and product concentration. In addition to the usual export destinations such as the United States and the European Union, China and India have begun to emerge as the other large export destinations for LDCs (Figure 3). Nonetheless, south-south trade still represents about 45 percent of LDCs' exports (WTO 2009a).

Figure 2: LDCs' share of world GDP and trade in goods and services, 1990-2007



Source: WTO 2009a.

Figure 3: Top 15 markets for LDC exports of goods, 2000-2007 (US$ billion)



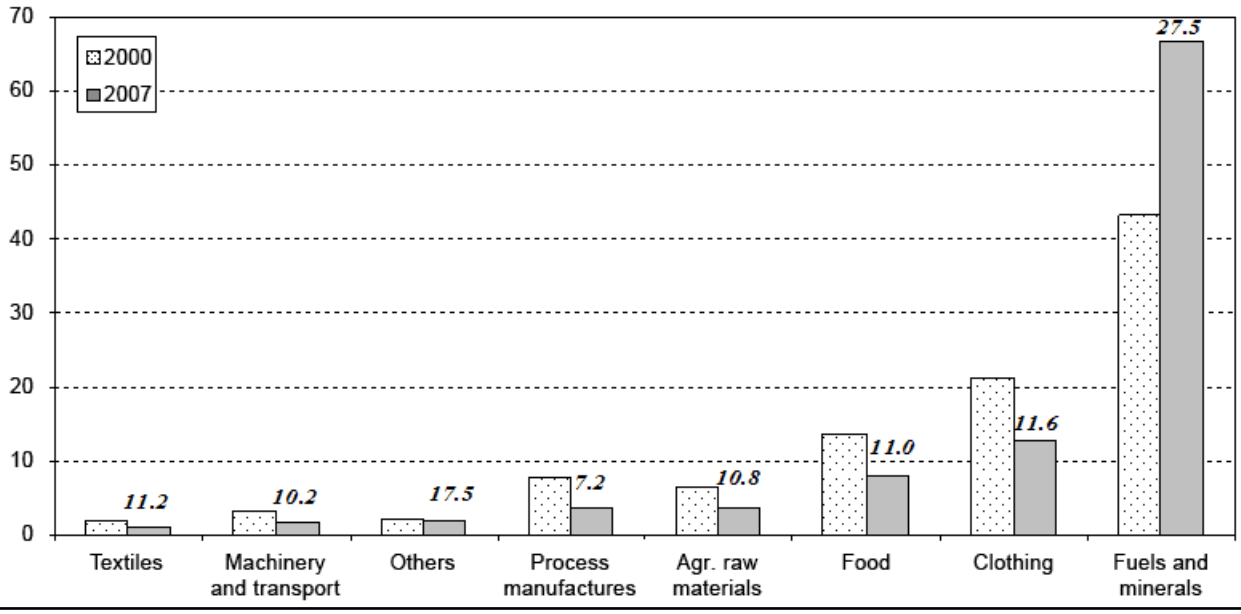
Source: WTO 2009b.

The oil and minerals exporting LDCs experienced the fastest export growth in recent times, especially since 2003 due to the price hike of fuels. As a result, the five oil exporting LDCs—Angola, Chad, Equatorial Guinea, Sudan and Yemen—currently account for more than half of total LDC exports. On the other hand, LDCs which are exporters of manufactured goods and primary products have negative trade balances.

2. Trade and Environment in the LDC Context

Exports from LDCs concentrate mainly on three products: fuels and minerals, clothing and food. According to the 2007 statistics, minerals and fuels accounted for 67 percent, clothing and food accounted for less than 13 and 10 percent respectively, of total LDC exports (WTO 2009b).

Figure 4: Composition of LDC exports by major product, 2000 and 2007



Note: The number on top of the 2007 bar indicates the average annual growth rate from 2000 to 2007.

Source: WTO 2009b.

Between 1996 and 2007, the margin of the preferential duty-free treatment for LDCs' exports (excluding arms and oil) increased from 33 percent to around 52 percent. The average tariff on LDC exports has declined over the period 1996-2007. The preference margin on agricultural products is more significant than the preference margin on non-agricultural products (WTO 2009b). But one has to bear in mind that such calculations on preference margin are based on the assumption that LDCs fully utilize their existing preferential treatment. This is usually not the case. Due to stringent rules of origin requirement the actual rate of utilization may be as low as 40 percent for products such as textiles and clothing (WT/COMTD/LDC/W/37).

Lack of supply-side capacity such as lack of infrastructure and institutional capacity are serious impediments for LDCs to effectively trade with global partners. Additionally, market access of LDCs' products could also be constrained by environmental requirements. Since these countries lack access to information, infrastructure and have poor administration of regulatory requirements they often suffered loss of exports on environmental grounds. Therefore, integration of trade-related environmental concerns and environment-related trade issues in the national planning process of these countries has become crucial (UNCTAD 1998).

2.2 Environmental concerns of LDCs

LDCs face multiple environmental problems ranging from air and water pollution, to soil degradation and desertification, to depreciation of forest and fish resources, loss of biodiversity and ecosystem, urbanization and congestion. Some of the LDCs are also vulnerable to the risk of climate change, including possible sea level rise, which would severely impact the lives and livelihoods of a large number of people around the world (UN 2008). The UNEP Fourth Global Environment Outlook (UNEP 2007) outlines the major environmental issues that countries face today, and the driving forces behind these problems. The documents trigger thought-

provoking questions and solutions. They focus on environmental issues including deforestation, loss of habitat and biodiversity, land degradation and associated soil erosion, acidification and desertification, and atmospheric and water pollution. The potential impact of climate change is also underscored for all countries, including developed countries.

A consortium including, notably, Yale University, Columbia University, the World Economic Forum and the Joint Research Centre of the European Union have recently quantified the environmental performances of countries. For the most part, the countries with the lowest Environmental Performance Indicator (EPI)[1] are developing nations, with LDCs featuring prominently (Ethiopia, Chad, and Niger, for instance). They are either densely-populated industrializing countries with stressed ecosystems (Bangladesh, India and Pakistan) or arid states with limited natural resources (Mauritania, Mali). In each and every case, under-investment in environmental infrastructure (drinking water and sanitation systems) and pollution control mechanisms, inadequate natural resource management, and weak and ineffective environmental governance was found to be an indicator of low EPI scores.

A rise in disposable income and growth in the world population estimated at 6.5 billion with a 2 billion overall increase since 1980 (GeoHive 2006) has led to increase in demand for food and hence, food production. Environmental problems today are linked to driving forces such as population growth (including rapid urbanization and excessive concentration of population), the rise in average per capita consumption, and economic growth and progress. The relationship between environmental degradation and population growth is of course not linear, as found by the Brundtland Commission in 1987 (WCED 1987). Unsustainable usage of resources by the developed world has actually had a negative trickle down effect on developing countries. North America, with 5.2 percent of the world's population consumes about 25 percent of global primary energy. While developed nations now argue vehemently for environmental protection, their progression via industrialization was far from clean and green.

This section looks into some of the major environmental problems with implications for sustainable economic growth through effective participation in EGS trade.

Air and water pollution

The Asia Pacific region faces an ever growing need for energy because of rapid industrialization. Furthermore, stark hikes in urbanization have led to phenomenal population densities that have triggered deterioration of air quality in major cities. South Asian cities, for instance, have the highest levels of air pollution globally, with extremely high levels of particulate matters PM_{10}[2] (World Bank 2003).

It is interesting to note from Table 2 that while Bangladesh and Asia have seen a 63.2 percent and a 17.9 percent rise in CO_2 emissions per capita respectively since 1990, Sub-Saharan Africa has actually experienced a decline. A decline in air quality is, therefore, more an Asian problem than an African one. Asian LDCs will require technologies that can clean air pollution. There are many possible reasons for such a discrepancy, but one of the prime reasons has to do with the difference in growth and industrialization between Asia and Africa. It could also be because African LDCs are already importing air pollution control equipments to a larger extent than Asian LDCs. An analysis of the trade pattern of EGS in LDCs in Section 4 of this paper indicates that though per capita income in Asian LDCs is higher than that of African LDCs (Table A1.1 in Annex I) the import of air pollution control items is higher in African LDC than in Asian LDCs. Given the fact that air pollution takes a toll on human lives in terms of premature deaths and high mortality in poor countries, more investment is required for air pollution control measures in these countries.

1 The Environmental Performance Index (EPI) is a method of quantifying and numerically benchmarking the environmental performance of a country's policies. This index was developed from the Pilot Environmental Performance Index, first published in 2002, and designed to supplement the environmental targets set forth in the UN Millennium Development Goals. The indicator takes environmental health and ecosystem vitality into account. (*Yale Centre for Environmental Law and Policy, and Center for International Earth Science Information Network at Columbia University*. "Environmental Performance Index")

2 Ambient concentration of particulate matter has impacts on human health. PM_{10} is a measure of particulate matter based on the diameter. This is the particulate with diameter less than 10 microns (μ) representing inhalable particles.

LDCs also face various types of water-related environmental problems. These include, among others, water pollution, saline water intrusion, and increased occurrence of floods. Adequate water supply is one of the most serious problems in the developing world. For instance, the South Pacific sub-region, with the addition of Central Africa, has the lowest per capita fresh water availability in the world. The Asia and Pacific region contains 32 percent of the world's freshwater resources but has 58 percent of the world's population (Shiklomanov 2004). Arsenic has been a major source of ground-water contamination in countries such as Bangladesh. As a matter of fact, most of the Asian and African LDCs either have lesser availability of water or do not have the technological and economic capabilities to use water resources efficiently. Technologies are also required for improved sanitation and treatment of saline water in these countries.

Land degradation

Land degradation has serious consequences for the agricultural productivity of many LDCs. This in turn poses a major threat to the food security of these countries. Land degradation in the form of soil erosion, salinisation and contamination of soil, soil nutrient depletion and desertification are common in many countries. LDCs in Sub-Saharan Africa, the Middle East and West Asia suffer the worst from desertification. Desertification touches 46 percent of the region (UNEP 2002a). The extent to which the region is affected by such degradations is illustrated by the case of Ethiopia. In Ethiopia, a country which scores very low in the EPI list, reduced agricultural productivity resulted in a loss of US$ 130 million (TerrAfrica 2004). Besides, in almost all of the Asia and Pacific sub-regions, land is degrading (IFAD and GEF 2002; ADB and GEF 2005; UNCCD 2001; Scherr and Yadav 2001).

More recent estimates reveal that land degradation in African LDCs such as Burkina Faso, Burundi, Eritrea, Lesotho, Madagascar, Mali, Niger, Rwanda, Senegal, Togo and Uganda is a serious threat for the livelihoods of their farmers. In fact, in Burundi the share of degraded and severely degraded land comprises of 56.66 and 53.78 percent respectively, of total land. In case of Rwanda the share of such land is 56.49 and 51.48 percents respectively (FAO 2009). Among the Asian LDCs, Afghanistan, Nepal and Yemen are in the worst situations in terms of land degradation, where severely degraded land ranges from 13.29 percent to 16.6 percent of total land area (FAO 2009).

Solid waste management

Management of solid wastes, sewage and other toxic wastes has become another serious problem in urban areas of LDCs. Apart from increased pressure of high population, lack of awareness on waste management and inadequate institutional initiatives, lack of appropriate waste management technology contribute to the problem. In most of the mega cities of LDCs, such as Addis Ababa, Dhaka, Kampala, Khartoum and Niamey, inhabitants suffer water- and air-borne diseases due to poorly managed wastes and sewages.

Deforestation and loss of biodiversity

Most Asian LDCs either have little forest cover or are on the verge of losing their natural forests. With a few exceptions such as Bhutan in Asia and Gambia, Lesotho, Rwanda in Africa, LDCs lost considerable area of their forestland from 1990 to 2005. Fifty percent of mangrove forests are still housed in Asia and the Pacific. However, the mangroves have been extensively destroyed in the past years with the Sundarbans, the largest of them all, undergoing extensive over exploitation of natural resources due to widespread hunting and deforestation. Many coral reefs have been threatened or totally destroyed, and Central Asia has seen a decline in its natural habitat (Wilkinson 2004). Shifting cultivation practices and slash and burn techniques used in agriculture have eroded soil quality and concurrently, future growth of food, flora, and fauna in these regions. Table 2 shows the negative change in natural forest area in Asia, Angola, and Ethiopia although steps have been taken to improve plantations between 1990 and 2000 through massive plantation schemes both by governmental and non-governmental agencies. Coastal and marine areas are under serious threat in many areas of the world, with oil spills and chemical contamination posing serious threats to many countries, mostly in the Middle East. Central Asia has seen serious degradation in its natural habitat with inland ecosystems and biodiversity increasingly threatened (Wilkinson 2004).

Climate change

Several reports, including the fourth assessment by the Inter-governmental Panel on Climate Change (IPCC) (IPCC 2007) and the famous Stern Review (2006) indicate that the world's climate is changing. Changes in temperature (air and oceanic), rate of precipitation and irregularities, widespread melting of snows, sea-level rising, increasing and devastating occurrence of extreme events such as cyclones, storms, tidal surges, floods, landslides, hit waves, and droughts are some of the evidence of the changing global climate.

The rise in atmospheric temperature due to depletion in the ozone layer is expected to lead to more extreme patterns with longer droughts, harsher winters, and wetter monsoons around the globe. Livelihood activities of millions of people in the least developed and developing countries like Bangladesh, Maldives, India, Nepal, Pakistan, Vietnam and Sub-Saharan Africa will suffer due to the physiological and geographical positions of these countries. Agriculture will be severely affected and South Asia and Sub-Saharan Africa will be the worst hit. The most serious effect of global warming, sea level rise, will force millions in Bangladesh, Maldives and many smaller Asian and African islands to become 'climate refugees'. There will be heavy loss of ecosystems and environment and with increasing impact of climate change the ecosystem will lose much of its resilience capacity. Due to depletion of groundwater levels, rapid melting of glaciers and sea level rise, availability of drinking water will be diminished.

The analysis in this Section supports a number of conclusions. First, the massive scale of environmental problems in LDCs exhibits the fact that there is not only a dearth of good environmental policies in these countries but also dearth of adequate resource and technology to address the environmental problems. Second, the severity of environmental problems emphasises the need for greater engagement of LDCs in the EGS trade, particularly for importing appropriate technologies and environment friendly products to protect their environment. Third, given the divergence of environmental concerns, priorities for LDCs as regards addressing the environment will be different across various regions of LDCs. Fourth, how such differences are reflected in the trade pattern of EGS is an issue to be examined. This is done in Section 4 of this paper which also sheds light on how LDCs are exploiting the existing trading opportunities for environment-friendly products. Finally, unless addressed with due importance, such environmental problems will pose threats to the achievement of reducing the proportion of people without sustainable access to safe drinking water and basic sanitation by half by 2015 (Targets 7 and 10) as set by the United Nations (UN) Millennium Development Goals (MDGs).

Table 1: Some selected indicators

Indicators	LDCs	Developing Countries	OECD
GDP Per Capita, PPP US $ (2006)	1,125	4,572	30,879
GDP Index (2006)	0.404	0.638	0.957
Annual Population Growth Rate (1975-2005)	2.5	1.9	0.8
Human Development Index (2006)	0.480	0.688	0.925
Export Value as % of GDP (2005)	24	44	22
Import value as % of GDP (2005)	34	40	23
Per Capita ODA (USD) (2005)	33.9	16.5	-
Per Capita Carbon Dioxide Emissions (CO_2) (2004)	0.2	2.4	11.5
Percentage of Population Using Improved Water Sources (2004)	59	79	99

Source: hdr.undp.org/en/statistics/data/.

Table 2: Environmental indicators in selected regions

Biodiversity and Protected Areas	Angola	Bangladesh	Ethiopia	Asia*	Sub-Saharan Africa	World
Protected Areas						
Protected Areas as a percent of Total Land Area, 2004	4.20	0.50	4.90	7.90	5.90	6.10
Number of Protected Areas, (larger than 100,000 hectares) 2004	8	n/a	28	387	425	2178
Wetlands of International Importance, 2004:						
Number of Sites	n/a	2	n/a	130	96	1387
Total Area (000 ha)	n/a	611	n/a	17895	26277	120242
Forests, Grasslands, and Drylands						
Forest Area and Change						
Change in forest area:						
Total,1990-2000	-0.2%	14%	-0.8%	-1%	-0.9%	-2%
Natural, 1990-2000	-0.2%	-7%	-0.9%	-1%	n/a	-4%
Plantations, 1990-2000	0.1%	4%	1.0%	5%	n/a	3%
Forest area in 2000 as a percent of total land area		9		20		29
Tropical Forest Protected, 1990s		3.70%		16.40%		9%
Climate and Atmosphere						
Carbon Dioxide (CO_2) Emissions (in 1000 metric tonnes)						
Emission as a percent of global CO_2 production, 2000	0.02	0.13	0.02	32.80	2.06	
Per capita CO_2 emissions, 2000 (in metric tonnes)	0.40	0.20	0.1	2.20	0.80	3.90
Percent change in per capita CO_2 emissions since 1990	-17.5	63.2	5.7	17.9	-8.3	-2.3
CO_2 Emissions by Sector, 2001 (in million metric tonnes of CO_2)						
Total Emissions All Sectors	5.8	32	3.3	7402.8	467.1	27898.6
Water Resources and Freshwater Ecosystems						
Total Actual Renewable Water Resources (TARWR), 2003, in cubic km						
Total actual renewable water resources	184	1211	110	14514	5463	54228
Per capita TARWR**, 2003 (cubic meters)	10909	8232	1355	3948	6957	8210

Notes: ** Asia excludes the Middle East.*
*** TARWR stands for 'Total Actual Renewable Water Resources'*
n.r stands for 'not reported' and n/a stands for not available

Source: World Resources Institute WRI; www.wri.org.

Table 3: Major environmental problems in some LDCs

Country	Environmental Problems
Bangladesh	Widespread contamination of surface water with microbial pathogens (about 30 percent of the private wells in Bangladesh show high levels of arsenic, over 0.05 milligrams per litre, and more than half of the country's administrative units are affected by contaminated drinking water); effects of climate change including sea level rise, increased flooding, and intensified storms, earthquake
Cambodia	Deforestation leading to erosion and flooding. Water pollution caused by dumping of solid and industrial wastes, use of pesticides
Haiti	Deforestation combined with perennial overuse of steep hillsides to produce severe slope instability and catastrophic landslides during heavy rains; hurricane (In early September 2008, Hurricane Ike was blamed for about 180 deaths in Haiti and the United States of America. Total damages from Ike amounted to about US$31.5 billion in the United States)
Malawi	Land degradation, soil erosion
Maldives	Climate change caused sea level rise and storms
Myanmar	Flood, cyclone
Nepal	Loss of forest, forest degradation, soil erosion, air pollution, water pollution and unmanaged solid waste
Niger	Water sources are contaminated by dioxins and heavy metal, oil spills (Nigeria recorded 418 oil spill cases in the first six months of 2008)
Sierra Leone	Deforestation

Source: hdr.undp.org/en/statistics/data/.

3 Overview of the EGS Negotiations

3.1 Definition and coverage of environmental goods

The definition and coverage of EG have been contentious issues in the WTO negotiations. Environmental goods can be narrowed down to goods whose use results in a beneficial environmental impact, such as catalytic converters for automobile exhausts. In this definition, environmental goods are actually the capital goods or technologies which are required for 'end-of-the pipe' pollution abatement. A broader definition includes the environmental characteristic of the goods themselves or their production processes. This means that goods which have relatively less negative impact on the environment at the consumption or disposal stage and goods which are produced in an environmentally friendly manner can be categorised as environmental goods. Environmental goods are also defined as those which have inherently beneficial environmental aspects such as biodegradability.

Defining the environment industry is, however, an extremely difficult task because of the ever-changing nature of this sector (Vikhlyaev 2003). Different countries have expressed varying opinions concerning the categorization of EG. The definition is complicated by the fact that many environmental problems are local; geography has a way of affecting what should or should not be categorized as an environmental product. Key issues that complicate defining EG include: first, whether "environmental goods" should include products with multiple end uses; second, the mechanism of capturing goods by the harmonized system; and third, how goods and services that correspond to local concerns can be classified as EGS in the global trade context (Jha 2008). Categorization can perhaps be arranged under a broad and a narrow heading. The broad definition takes into account environmental characteristics of the goods themselves for their production process. This means that goods which have relatively less negative impact on the environment at the consumption or disposal stage and goods which are produced in an environmentally friendly manner can be categorized as environmental goods. Environmental goods are also defined as those which have inherently beneficial environmental aspects such as biodegradability. Including the biodegradability characteristic in the broader definition raises questions of the inclusion of agricultural products such as jute, bamboo, rattan, etc. which are of export interest to developing countries. The narrow definition states that environmental goods are those whose use results in a beneficial environmental impact, i.e. the capital goods or technologies which are required for 'end-of-the-pipe' pollution abatement.

Definitions by the Organisation for Economic Co-operation and Development (OECD) and the Asia Pacific Economic Cooperation (APEC) were used as starting points in the discussion of EGS, after the Doha Declaration. The OECD and the APEC developed two separate lists of environmental products. The OECD started to identify the environmental goods and services as part of the work on the role of environmental policy and industrial competitiveness in 1992. There have been subsequent efforts to expand and deepen the analysis with more data on production, employment, trade, investment, and research and development of environmental goods and services industry in order to develop a more comprehensive list. In 1995 the OECD/Eurostat (the Statistical Office of the European Community) Informal Working Group came up with the following definition which captures the vital aspects of environmental goods and services and is widely used: "The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. These include cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use" (OECD/Eurostat 1999, p 9).

The OECD classification of environmental goods includes three broad groups under which there are categories and sub-categories of environmental goods. A total of 164 environmental products are listed under the sub-categories.

While the OECD list has been developed as part of an analytical exercise to define the conceptual scope of the EGS industry, the APEC list resulted from policy discussions in the context of trade-liberalisation negotiations. The APEC process of listing environmental goods started in 1995 in an attempt to identify industrial sectors in which liberalisation could have a positive impact on trade, investment and economic growth in the APEC economies and the region. As a result of the directives by the APEC Trade Ministers to identify possible sectors for early voluntary liberalisation, countries made proposals which also included environmental

goods and services. Initially, Canada, Japan, Chinese Taipei[3] and the United States proposed environmental goods and services to be included as a distinct category. The APEC list included 109 items within 10 broad categories.

WTO Members continued to propose their own products under the category of EGs based on their interests and comparative advantage. During the process a division has been observed between the developed and developing countries in terms of selection of EGs while LDCs has remained silent. In 2007 the "Friends of EGs" [4] group of countries submitted a list of EGs comprising 153 items under 12 broad categories. This list is being discussed and debated currently in the WTO negotiations on EGs.

Table 4: Broad category of environmental goods

OECD category	APEC category	WTO '153' List
A. POLLUTION MANAGEMENT 1. Air pollution control 2. Wastewater management 3. Solid waste management 4. Remediation and cleanup 5. Noise and vibration abatement 6. Environmental monitoring, analysis and assessment B. CLEANER TECHNOLOGIES AND PRODUCTS 1. Cleaner/resource efficient technologies and processes 2. Cleaner/resource efficient products C. RESOURCES MANAGEMENT GROUP 1. Indoor air pollution 2. Water supply 3. Recycle materials 4. Renewable energy plant 5. Heat/energy savings and management 6. Sustainable agriculture and fisheries 7. Sustainable forestry 8. Natural risk management 9. Eco-tourism 10. Other	1. Air pollution control 2. Wastewater management 3. Solid/hazardous waste management 4. Remediation/clean-up of soil 5. Noise/vibration abatement 6. Monitoring, analysis and assessment 7. Potable water treatment 8. Recycling systems 9. Renewable energy plant 10. Heat and energy management	1. Air pollution control 2. Management of solid and hazardous waste and recycling system 3. Clean up or remediation of soil and water 4. Renewable energy plant 5. Heat and energy management 6. Wastewater management and potable water treatment 7. Environmentally preferable products, based on end use or disposable characteristics 8. Cleaner or more resource efficient technologies and products 9. Natural risk management 10. Natural resources protection 11. Noise and vibration abatement 12. Environmental monitoring, analysis and assessment equipment

Source: WT/CTE/W/228; TN/TE/W/33; WTO 2007.

3 The Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu (Chinese Taipei) is being cited as a member of the World Trade Organization. A full list of members can be accessed at *www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm*.

4 Members of "Friends of EGs" group are Canada, the European Communities (EC), Japan, Korea, New Zealand, Norway, the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu, Switzerland, and the United States of America.

Table 4 presents the broad categories of EGs according to the OECD, APEC and WTO '153' lists. The products in blue are those which are listed in all three categories.

A comparison of broad categories of environmental goods among the three groups reveals that most of the goods are common in all three categories. The WTO list includes a new category termed Environmentally Preferable Products (EPP) based on end use or disposable characteristics of a product. According to the UNCTAD (2003) definition, EPPs are those goods the production and sale of which contribute significantly to the preservation of the environment. This category is absent in both OECD and APEC lists.

However, EPPs have been subjected to debates on the ground of distinguishing them based on processes and production methods (PPMs). It has been suggested in the CTESS that reliance on a product's environmental "end use" or "direct use" characteristics could be a practical criterion for the identification of environmental goods. That is, only products used for a particular environmental purpose or medium should be included in the list of environmental goods. The suggestions for use of PPMs came up in view of concerns arising from the possible dual or multiple use of these products since certain products may have significant uses other than environmental ones. However, most WTO Members do not want PPMs to be used to decide on the treatment of products. PPMs refer to process and production methods which affect the nature, properties or qualities of the product itself and its ability to have direct impact on, for example, the environment in the country of use. It typically describes a process or production method which changes the characteristics of the final product and that PPM is discernible in the change. Product related PPMs are most frequently found in the case of industrial process requirements to ensure a product's quality or fitness for use. EPPs are products which cause significantly less environmental harm at some stage of their life cycle than alternative products that serve the same purpose. A typical basket of EPPs includes goods that are superior to petroleum-based products, such as jute and biofuels, or goods produced in an environmentally friendly manner, such as coffee, or goods that contribute to the preservation of the environment, such as biofuel. However, some EPPs are not exclusively environmentally friendly and can harm the environment at some point in the production or processes. For example, the processing of most biofuel feed stocks into biofuel is energy and water intensive and not environmentally friendly. On the basis of PPM, biofuels cannot be considered as EGs as it is energy intensive and polluting. To determine whether products such as biofuel could be considered as an environmental good would require a life cycle analysis that involves PPM to examine all potential environmental impacts in the life cycle of the product. Also, for many Asian and African LDCs who are in favour of including agriculture and natural resource-based products such as forestry and fisheries as EPPs, the use of PPM to determine the environmental benefits of these products involves labeling and certification schemes.

3.2 Suggested approaches to environmental goods negotiations

Developed countries are advocating a "list-based" approach for identifying specific environmental goods for further liberalisation while most developing countries[5] are advocating an alternative 'project approach', particularly those that would tie liberalisation to environmental goods and services associated with a specific environmental project. Major features of some of the submissions made by different countries are presented in Table A1.2 in Annex I.

List approach

The list approach proposes that countries identify lists of specific environmental goods and then negotiate the elimination or reduction of bound tariffs and non-tariff barriers on such goods, permanently and on a most favoured nation (MFN) basis. Some WTO Members have expressed the view that two lists need to be prepared. China's proposal suggested setting up a "common list" and a "development list". The "common list" would include specific product lines, on which there is consensus that they constitute environmental goods. For the products in this common list, Members would commit to reducing or eliminating tariffs and non-tariff barriers.

5 Not all developing countries hold the same position though. For example, Chinese Taipei and Korea, although developing countries, are in principle part of the Friends of EG Group.

The "development list" would be a list of environmental goods drawn from the "common list" but subject to special and differential treatment. It would comprise those products selected by developing and least developed country Members from the common list, subject to exemption or a lower level of tariff reduction commitments by these countries, with a view to reflecting the principle of less than full reciprocity.

The United States has proposed developing a "core list" and a "complementary list". The "core list" would comprise products on which there is consensus that they constitute environmental goods. The "complementary list" could be developed for additional products on which definitive consensus could not be reached, but for which there is a high degree of acknowledgement that they can have significance for environmental protection, pollution prevention or remediation, and sustainability.

The list approach has been criticized on the ground that it may lead to liberalisation of goods that have both environmental and non-environmental end uses. Brazil opined that the list approach was based on the assumption that all the goods identified would have a beneficial impact on the environment, irrespective of each country's specificity. The list did not take into account issues of paramount importance for developing countries, such as the need for conciliating liberalisation with the preservation of policy space that would allow Members to create and develop their own environmental goods industry. Brazil also noted that schedules in NAMA and Agriculture would incorporate the products suggested. Members would include the goods and concessions made in the CTESS in their national schedules without classifying them as environmental goods. Inclusion of some products under the category of EPPs by some countries has also created controversy with regard to their environmental performances. For example, bicycle and parts of electronic locomotives were listed by Switzerland in its submission (TN/TE/W/57) and energy efficient appliances were included in its list by Japan (TN/MA/W/15) as EPPs. Arriving at a universally accepted list is made more complicated by various innovative proposals by Members.

Project approach

On the other hand India proposed that environmental projects that would benefit from liberalized imports of goods and services would be approved by a designated national authority (DNA) based on criteria developed by the CTE of the WTO. If DNA approves a project, goods and services included in the project would qualify for specified concessions during the project period on a most favored nation (MFN) basis. The DNA would act as the national focal point for overseeing all approvals to be granted for tariff reductions on environmental goods and services related to a specific project that is to be implemented within the country.

This approach would address diversity in environmental standards with common but differentiated responsibilities and would introduce trade liberalisation to meet the environmental and development goals of the Doha Agenda. It is also said that this approach would bring synergy between environmental goods and services and provide a framework for transfer of technology and for its adaptation by developing countries. Also, goods and services required for the project would have direct use and could be related to the environmental objective for which they were given market access concessions.

India's proposal, however, has been criticized by developed countries for failing to provide binding and predictable market access on a permanent basis for EGs and for being inconsistent with WTO rules.

Integrated approach

Argentina suggested that Members of the CTESS would multilaterally pre-identify categories of environmental projects and environmental goods that could be used under such projects. Pursuant to this approach, two cumulative conditions would have to be met by EGs to benefit from the reduction/elimination of tariffs and non-tariff restrictions under paragraph 31(iii) of the Doha Mandate.

First, goods must be included in one of the environmental project categories to be identified by the CTESS. Then the CTESS would include in each category the "environmental goods" that would be available for application to the development of national projects. Reduction or elimination of tariffs and the elimination of non-tariff barriers would be agreed multilaterally, taking account of special and differential treatment for developing countries. The tariff benefit granted by the importing Member would cover a

specific period, that is, the project implementation phase. The conditions of access to the transfer of "clean technology" and local capacity building would be negotiated within the environmental project. This integrated approach does not meet the criteria of providing binding and predictable market access for EGs and consistency with WTO rules.

Request and offer

Brazil has submitted papers in the CTESS calling for a "request and offer" approach to the environmental goods negotiations, which would allow each country to identify goods which in its view contribute to the environment and seek tariff concessions on those products, as well as indicating the products in which it is prepared to undertake liberalisation commitments as requested by other Members.

3.3 Environmental services

The General Agreement on Trade in Services (GATS)'s Services Sectoral Classification List, W/120 grouped environmental services as sewage services; refuse disposal services; sanitation and similar services; and other (cleaning services of exhaust gases, noise abatement services, nature and landscape protection services, and other environmental services). The OECD has argued that this GATS classification of ESs is too narrow because it (a) is not clearly organized according to the provision of services for specific environmental media (i.e. air, water, soil, noise); (b) focuses on 'end-of-pipe' approaches with little coverage of pollution prevention and sustainable resource management services; (c) covers services provided in the operation of facilities, plant and equipment but not the design, engineering, research and development (R&D), and consultancy services necessary for building and upgrading them; and (d) focuses on services supplied to the general community and overlooks those supplied directly to the industry (OECD 2001). The OECD/Eurostat classification is wider where seven groups of ESs are listed and under them there are ten sub-categories (Table 5). The WTO services sectoral classification list (w/120) which is based on the UN provisional Central Product Classification (CPC) has been revised as CPC version 2 in 2008 (Table 6). This classification includes seven broad categories of environmental services under which there are sub-categories.

In the context of the ES negotiations, WTO Members have proposed to categorize ESs using a "core" and "cluster" approach. The European Union proposed for instance, a classification of "core" services which encompasses those that can undisputedly be classified as "purely" environmental. Such services can further be categorized according to the environmental media, i.e. water, noise, solid and hazardous waste, etc. The European Union also proposed that services that can be termed as conceptual services such as design, engineering, R&D, and consulting services be considered a special cluster since these have environmental end uses.

It is difficult to separate EG and ES for the purpose of trade analysis. Environmental goods are often used to provide environmental services. But a good is tangible whereas a service is not. Although seemingly clear at first glance, there are significant overlaps between the service segment and the equipment segment of environmental products. The environmental services sector overlaps with many other sectors of the economy, such as architecture services, research and development, consulting services, and landscaping. This issue is not addressed at a broader length here since it is beyond the scope of the paper.

Table 5: Classification of environmental services

GATS	OECD/Eurostat
1. Sewage services, excludes collection, purification, and distribution services of water, and construction repair and alternation of sewers.	A. Water and wastewater management sector with sub-sectors: • Sewage services • Water for human use
2. Refuse disposal services. Excludes dealing and wholesale in waste and scrap, and R&D services on environmental issues 3. Sanitation and similar services	B. Solid and hazardous waste management sector with sub-sectors: • Refuse disposal and treatment services • Sanitation services • Recycling services
4. Other services	C. Protection of ambient air and climate
4. Other services	D. Noise and vibration abatement
4. Other services	E. Remediation and clean-up of soil, surface water and groundwater
4. Other services. Excludes forest and damage assessment and abatement services	F. Protection of biodiversity and landscape services
4. Other services	G. Other environmental/ ancillary services: • Design consulting and engineering • Preparation of sites, construction, installation, assembly, repair, and maintenance • Environmental research and development • Analytical services, data collection, testing, analysis, assessment • Environmental education, training, and information.

Source: OECD 2000; GATS 2000 EC Submission S/CSS/W/38; WTO 1998 (S/C/W/46, July).

Table 6: List of environmental services (CPCv2)

Division 94			Sewage and waste collection, treatment and disposal and other environmental protection services
941			**Sewerage, sewage treatment and septic tank cleaning services**
	9411	94110	Sewerage and sewage treatment services
	9412	94120	Septic tank emptying and cleaning services
942			**Waste collection services**
	9421		Collection services of hazardous waste
		94211	Collection services of hazardous medical and other biohazardous waste
		94212	Collection services of hazardous medical and other biohazardous wastes
		94219	Collection services of other hazardous waste
	9422		Collection services of other non-hazardous wastes
		94221	Collection services of non-hazardous recyclable materials, residential
		94229	Collection services of non-hazardous recyclable materials, other
	9423		General waste collection services
		94231	General waste collection services, residential
		94239	General waste collection services, other
943			**Waste treatment and disposal services**
	9431		Waste preparation, consolidation and storage services
		94311	Hazardous waste preparation, consolidation and storage services
		94312	Ship-breaking and other dismantling of wrecks services
		94313	Non-hazardous recyclable materials preparation, consolidation and storage services
		94319	Other non-hazardous waste preparation
	9432		Hazardous waste treatment and disposal services
		94321	Hazardous waste treatment services
		94322	Hazardous waste disposal services
		94333	Incineration of non-hazardous waste
		94339	Other non-hazardous waste treatment and disposal services
944			**Remediation services**
	9441		Site remediation and clean-up services
		94411	Site remediation and clean-up services, air
		94412	Site remediation and clean-up services, surface water
		94413	Site remediation and clean-up services, soil and groundwater
	9442	94420	Containment, control and monitoring services and other site remediation services not elsewhere classified (n.e.c.)
	9443	94420	Building remediation services n.e.c.
	9449	94490	Other remediation services n.e.c.
945			**Sanitation and similar services**
	9451	94519	Sweeping and snow removal services
	9459	94590	Other sanitation services
949			**Other environmental services n.e.c.**
	9490	94900	Other environmental protection services n.e.c.

Source: United Nations Statistics Division.

4. LDCs participation in EGS Trade

Environmental goods and services play an important role in international trade. Previous estimation shows that the growth of the industry has been spectacular by all standards. The size of the global market for EGS was estimated at US$453 billion in 1996, US$522 billion in 2000, and US$540 billion in 2001. The market is dominated by the developed countries with a share of 90 percent; the European Union, the United States and Japan account for 85 percent of the total market (OECD 2001). Although the market for environmental goods and services has traditionally been confined to the developed countries, developing countries such as Brazil, China, India and Mexico are emerging as major exporters and importers of EGS. The growth of the market in the developed countries has reached a saturation point at 3-5 percent while the market in developing countries is expected to grow at a rate of 8-12 percent per annum (UNCTAD 2003). In the developing countries, top ten exporters account for over 25 percent of global exports in most categories in the WTO '153' list of EGs (Jha 2008). LDCs, on the other hand, have lagged behind in the EGS trade notwithstanding the fact that LDCs are increasingly vulnerable to global environmental problems and are also subject to environmental compliance while exporting to developed and developing countries.

The present study estimates the EG trade performed by countries on the basis of data available in the ITC Trade Map and WITS. It is estimated that total global exports and total imports of EGs stood at US$783.2 billion and US$ 753.8 billion respectively in 2007. Total global exports and imports of EGs increased from US$323 billion and US$333.8 billion respectively in 2001 (Table 7 and Figure 5). These EGs are those defined in the WTO 153 list categorized at six digit level HS code. Total value of EGs exports by LDCs increased from US$ 208.11 million in 2001 to US$ 631.10 million in 2007. The growth of EG trade in LDCs during 2001 and 2007 is higher than the growth of EG trade globally (Table 7). In LDCs the EG export grew at a rate of 18.49 percent and EG import grew at a rate of 22.40 percent during 2001 and 2007 indicating the demand for EG is increasing in these countries. On the other hand, global EG export grew by 14.76 percent and EG import grew by 13.58 percent during 2001 and 2007, implying that the growth of EG trade has been higher in LDCs compared to the growth of EG trade globally. The share of EG exports by LDC in total global EG exports was 0.08 percent and the share of EG imports in total global EG imports was 0.82 percent in 2007, an increase from 0.06 percent and 0.48 percent respectively from 2001.

4.1 Regional share of EG trade

In 2007, the share of Asian LDCs in total LDCs' EG exports was 67.8 percent and African LDCs' share was 32 percent. However, in the case of imports, Asian LDCs' share of EG imports in total LDCs' EG imports represented 26.9 percent while African LDCs' was 72.62 percent for the same year. In terms of total value of EG trade (export plus import) the amount of African LDCs is 2.2 times higher than that of Asian LDCs (Table 7; Figures 6-10). The trend of growth of EG trade shows that growth of EG trade in African LDCs was higher compared to Asian and Latin American LDCs (Table 7). The volume of trade in EG is related to the size of the economy of LDCs and their total trade to some extent. As can be seen from Table A1.1 in Annex I, the population of African LDCs as a group is 3.8 times higher than that of Asian LDCs, the total GDP of all African LDCs is 1.8 times larger than Asian LDCs, and the total trade of African LDCS is 3.1 times higher than that of Asian LDCs.

This implies that despite the present small LDC share in global EGs trade, a number of factors can lead to a larger market share for LDCs in the coming years. Demographic, social, political and economic factors are expected to play an important role in increasing the share of EG trade in LDCs.

4. LDCs' participation in EGS Trade

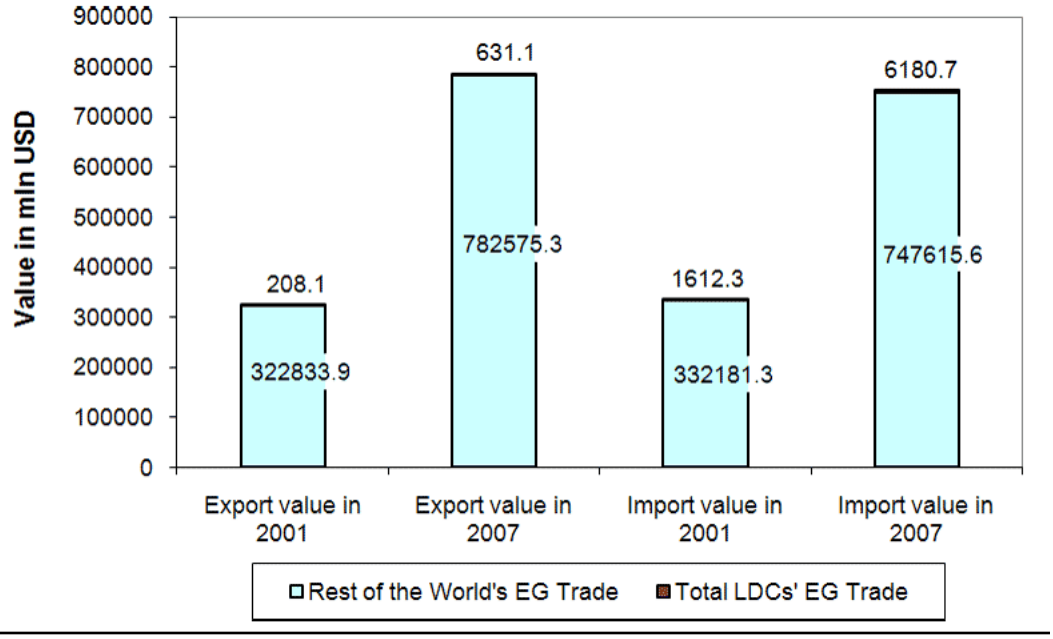
Table 7: EG trade (US$ mln) across regions and their shares (%)

		Export			Import		
		2001	2007	Growth* (%)	2001	2007	Growth (%)
Global	Total Global EG Trade	323041.99	783206.37	14.76	333793.60	753796.24	13.58
All LDCs	Total LDCs' EG Trade	208.11	631.10	18.49	1612.26	6180.66	22.40
	Share (%) in Global EG Trade	0.06	0.08		0.48	0.82	
Asian LDCs	Asian LDCs' EG Trade	141.36	427.99	18.46	492.16	1660.59	20.27
	Share (%) in Global EG Trade	0.04	0.05		0.15	0.22	
	Share (%) in LDCs' EG Trade	67.93	67.82		30.53	26.87	
African LDCs	African LDCs' EG Trade	63.38	202.15	19.33	1096.91	4488.28	23.48
	Share (%) in Global EG Trade	0.02	0.03		0.33	0.59	
	Share (%) in LDCs' EG Trade	30.46	32.03		68.04	72.62	
Latin American LDCs	Latin America's LDCs' EG Trade **	1.91	0.95	-11.64	13.68	31.79	14.05
	Share (%) in Global EG Trade	insignificant	insignificant		insignificant	insignificant	
	Share (%) in LDCs' EG Trade	0.92	0.15		0.85	0.51	

** Exponential growth.*
*** Haiti is the only LDC in Latin America.*

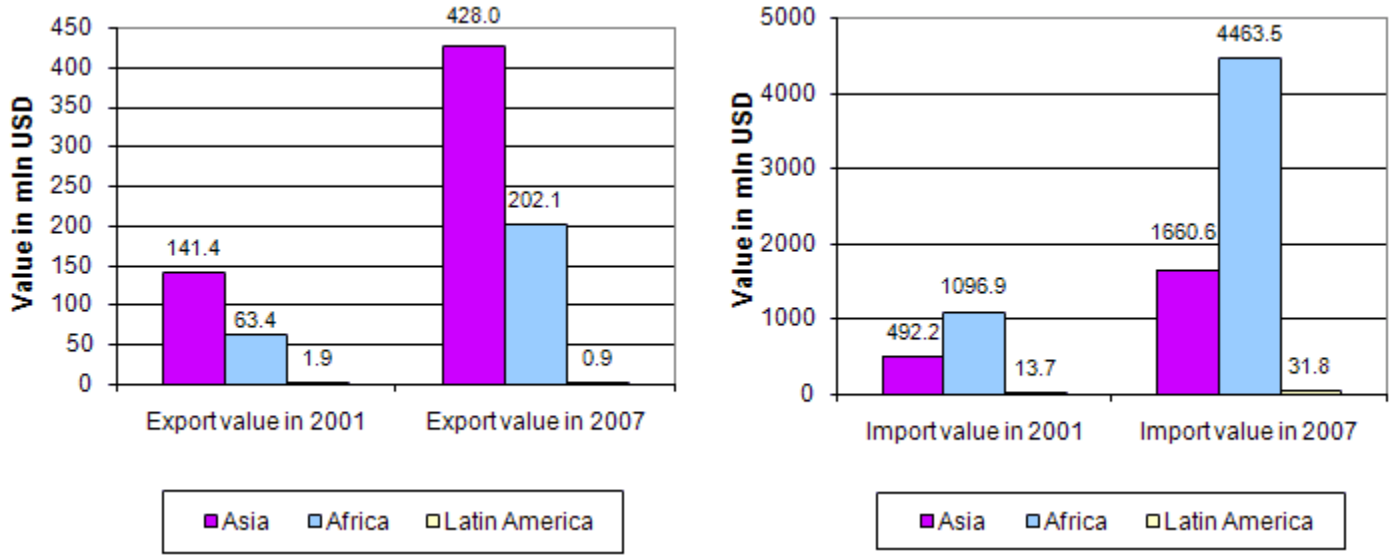
Source: Data Compiled from UN Comtrade and ITC Trade Map by the author.

Figure 5: EG trade across regions



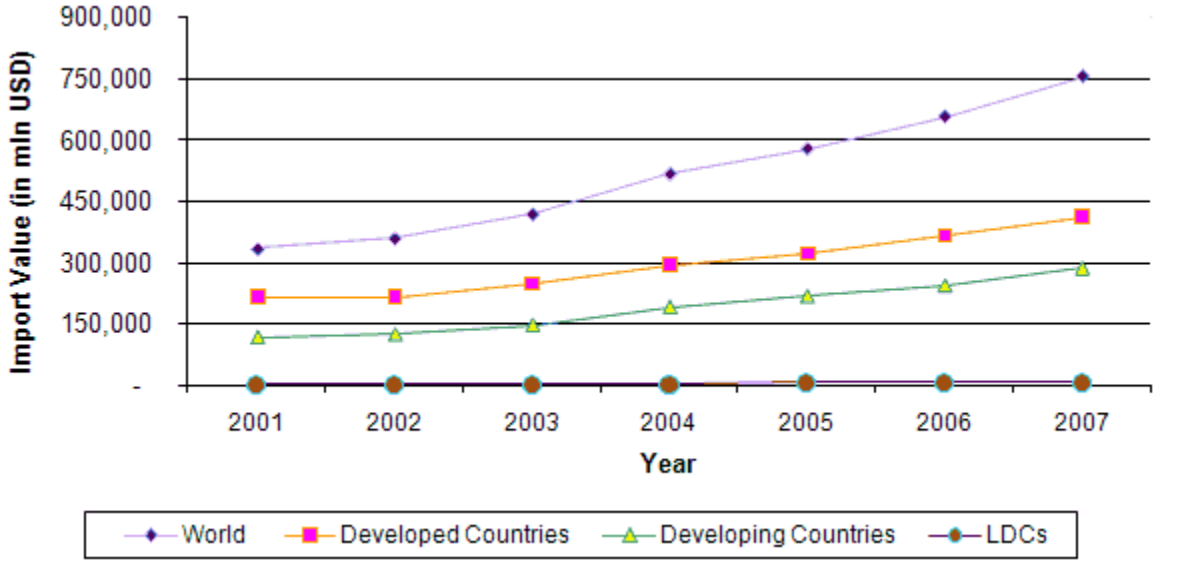
Source: Compiled by the author based on ITC Trade Map data.

Figure 6: LDCs' EG trade across regions



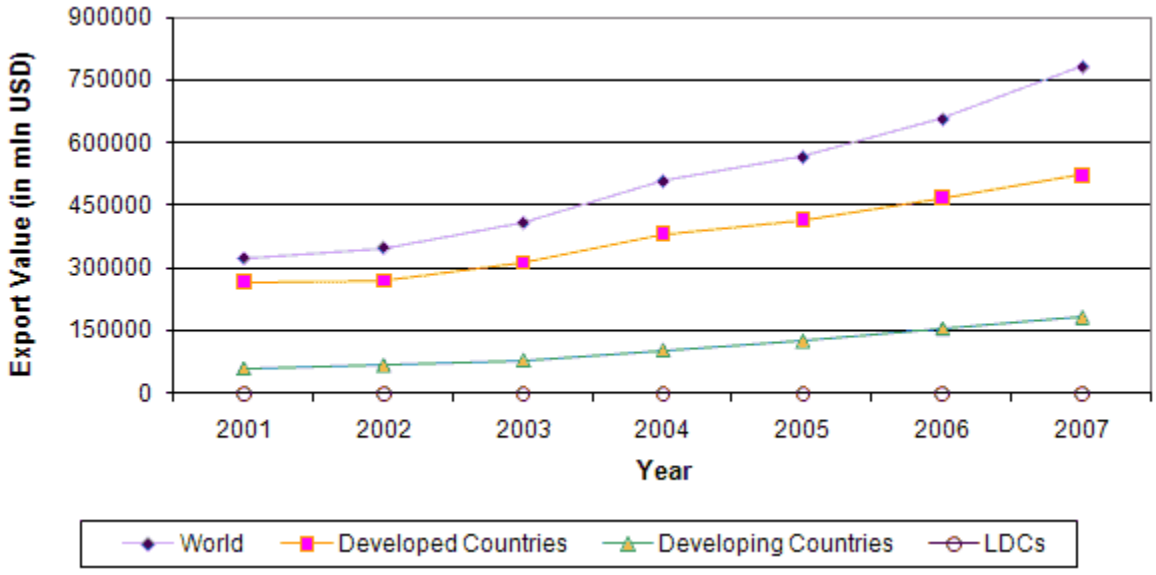
Source: Compiled by the author based on ITC Trade Map data.

Figure 7: Growth of environmental goods export, 2001-2007



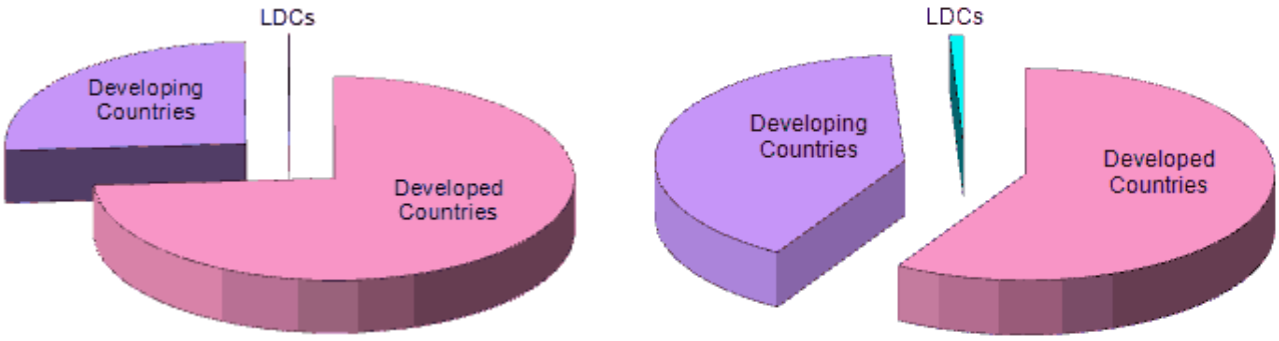
Source: Compiled by the author based on ITC Trade Map data.

Figure 8: Growth of environmental goods import, 2001-2007



Source: Compiled by the author based on ITC Trade Map data.

Figure 9: Share of environmental goods trade, 2007



Export Import

Source: Compiled by the author based on ITC Trade Map data.

Figure 10: Trade in environmental goods, 2007

Source: Compiled by the author based on ITC Trade Map data.

Tables 8-11 present product-wise trade of EGs across different regions. In the case of exports, LDCs' advantage seems to lie in EPPs. The share of EPP export is 52 percent followed by wastewater management (12.5 percent) and renewable energy plant (10.3 percent) (Table 8). However, a region-wise disaggregation reveals that EPP exports are dominant only in Asian LDCs where 72.2 percent EG exports are in the category of EPPs (Table 9). EPPs in Asian LDCs include jute and other textile fibres, sacks and bags made of jute or of other textile fibres for packaging of goods, twine, cordage, ropes and cables made of jute or other textile fibres (Table 14).

It is evident from Tables 8 and 9 that LDCs have comparative advantage in exports of agriculture and natural resource-based EPPs and not in technology based products. The dominance of exports of EPPs from LDCs emphasises the need for resolving the issue of PPMs in determining the environmental goods. Many developed country Members of the WTO have made submissions which include EPPs in the list of their EGs. These products are selected on the basis of their end use or disposable characteristics.

Import of EGs by LDCs is almost 10 times higher than exports of EGs by LDCs. As Table 7 shows, for Asian LDCs the amount of EG imports is 3.8 times higher than their EG exports. However, for African LDCs import of EGs is more than 20 times higher than their export of EGs. For Haiti, the lone LDC in Latin America, EG import is as large as more than 33 times of its EG exports. Wastewater management and potable water treatment turns out to be the dominant import item under EGs for LDCs. The share of this item is more than 29 percent in total EG imports by LDCs. This trend reflects the fact that access to safe drinking water is a serious problem in these countries as is described in Section 2 of this report. Increased imports of renewable energy (26.36 percent) and management of solid and hazardous waste and recycling systems (17.52 percent) also underlines the existing environmental problems in these countries (Table 10). Further disaggregation of EGs imports by regions shows that these three products are dominant in both Asian and African LDCs (Table 11). This is due to the fact that all LDCs suffer from lack of safe water, acute energy crisis, and lack of waste management system.

Table 8: Region-wise EG exports according to broad product groups of 153 list, 2007 (mln USD)

Sl No.	Product Category	World	Developed Countries	Developing Countries	All LDCs
1	Air Pollution Control	71937	55756	19636	7
2	Management of Solid and Hazardous Waste and Recycling Systems	130730	112925	15360	42
3	Clean Up for Remediation of Soil and Water	5905	4367	3174	40
4	Renewable Energy Plant	202314	126973	52941	65 (10.3%)
5	Heat and Energy Management	13400	10664	2432	2
6	Wastewater Management and Potable Water Treatment	198216	158682	53638	79 (12.5%)
7	Environmentally Preferable Products, Based on End Use or Disposal Characteristics	548	389	1969	328 (51.98%)
8	Cleaner or More Resource Efficient Technologies and Products	8252	3900	5151	2
9	Natural Risk Management	7320	6580	2107	24
10	Natural Resources Protection	861	713	1938	14
11	Noise and Vibration Abatement	56677	43497	13960	11
12	Environmental Monitoring, Analysis and Assessment Equipment	87047	74078	11745	18
	Total	**783206**	**598525**	**184051**	**631**

Note: Percentages in brackets are the shares of exports of that product in total EG exports in the corresponding regions.

Source: Compiled by the author based on ITC Trade Map and WITS databases.

Table 9: LDCs' EG exports according to broad product groups of 153 list, 2007 (mln USD)

Sl No.	Product Category	All LDCs	Asian LDCs	African LDCs	Latin American LDCs*
1	Air Pollution Control	7.07	2.47	4.55	0.01
2	Management of Solid and Hazardous Waste and Recycling Systems	42.29	17.49	24.79	0.01
3	Clean Up for Remediation of Soil and Water	39.84	10.64	29.20	0.00
4	Renewable Energy Plant	64.80	33.96	30.78	0.07
5	Heat and Energy Management	1.67	0.52	1.16	0.00
6	Wastewater Management and Potable Water Treatment	78.52	27.69	50.35 (24.9%)	0.49

** Only Haiti*

Note: Percentages in brackets are the shares of exports of that product in total EG exports in the corresponding regions.

Source: Compiled by the author based on ITC Trade Map and WITS databases.

Table 9: LDCs' EG exports according to broad product groups of 153 list, 2007 (mln USD)					
7	Environmentally Preferable Products, Based on End Use or Disposal Characteristics	327.85	308.90 (72.17%)	18.94	0.01
8	Cleaner or More Resource Efficient Technologies and Products	2.10	0.64	1.45	0.00
9	Natural Risk Management	23.55	2.02	21.53	0.00
10	Natural Resources Protection	13.84	9.53	4.23	0.08
11	Noise and Vibration Abatement	11.34	7.47	3.62	0.26
12	Environmental Monitoring, Analysis and Assessment Equipment	18.23	6.67	11.55	0.01
	Total	**631.10**	**427.99**	**202.15**	**0.94**

** Only Haiti*

Note: Percentages in brackets are the shares of exports of that product in total EG exports in the corresponding regions.

Source: Compiled by the author based on ITC Trade Map and WITS databases.

Table 10: Region-wise EG imports according to broad product groups of 153 list, 2007 (mln USD)					
Sl No.	**Product Category**	**World**	**Developed Countries**	**Developing Countries**	**All LDCs**
1	Air Pollution Control	71028.05	39974.24	30317.69	416.77
2	Management of Solid and Hazardous Waste and Recycling Systems	120349.17	66512.24	46436.98	1083.13 (17.52%)
3	Clean Up for Remediation of Soil and Water	5469.29	3713.44	5182.74	42.91
4	Renewable Energy Plant	190689.40	121025.83	61955.97	1629.31 (26.36%)
5	Heat and Energy Management	12493.87	1158.89	4536.07	121.89
6	Wastewater Management and Potable Water Treatment	193121.96	137971.75	68810.21	1810.00 (29.28%)
7	Environmentally Preferable Products, Based on End Use or Disposal Characteristics	436.53	151.07	3770.69	21.08
8	Cleaner or More Resource Efficient Technologies and Products	9741.66	504.86	5554.27	123.96
9	Natural Risk Management	6172.38	3910.22	5431.66	214.10
10	Natural Resources Protection	654.34	395.87	3746.69	62.40
11	Noise and Vibration Abatement	57615.68	32929.32	20737.94	313.63
12	Environmental Monitoring, Analysis and Assessment Equipment	86023.91	53378.40	29508.55	341.49
	Total	**753796.24**	**461626.14**	**285989.45**	**6180.66**

Note: Percentages in brackets are the shares of imports of that product in total EG imports in the corresponding regions.

Source: Compiled by the author based on ITC Trade Map and WITS databases.

Table 11: LDCs' EG imports according to broad product groups of 153 list, 2007 (mln USD)

Sl No.	Product Category	All LDCs	Asian LDCs	African LDCs	Latin American LDCs*
1	Air Pollution Control	416.77	156.84	258.30	0.02
2	Management of Solid and Hazardous Waste and Recycling Systems	1083.13	247.51 (14.9%)	832.44 (18.65%)	3.18
3	Clean Up for Remediation of Soil and Water	42.91	11.54	31.32	0.05
4	Renewable Energy Plant	1629.31	530.10 (31.92%)	1083.80 (24.25%)	16.38
5	Heat and Energy Management	121.89	36.94	84.65	0.29
6	Wastewater Management and Potable Water Treatment	1810.00	403.38 (24.29%)	1374.97 (30.80%)	6.74
7	Environmentally Preferable Products, Based on End Use or Disposal Characteristics	21.08	3.66	17.33	0.09
8	Cleaner or More Resource Efficient Technologies and Products	123.96	16.52	106.76	0.92
9	Natural Risk Management	214.10	24.01	190.03	0.07
10	Natural Resources Protection	62.40	31.24	31.08	0.07
11	Noise and Vibration Abatement	313.63	112.41	198.96	2.26
12	Environmental Monitoring, Analysis and Assessment Equipment	341.49	86.43	253.88	1.18
	Total	**631.10**	**427.99**	**202.15**	**0.94**

** Only Haiti*

Note: Percentages in brackets are the shares of exports of that product in total EG exports in the corresponding regions.

Source: Compiled by the author based on ITC Trade Map and WITS databases.

4.2 Top ten EG trading LDCs

The export profile of LDCs shows that the top ten LDC exporters of EGs are Bangladesh, Tanzania, Nepal, Uganda, Liberia, Yemen, Angola, Madagascar, Senegal and Myanmar. These top ten LDCs export 88.7 percent of all LDCs' EG exports (Table 12). Among these ten EG exporters only three (Bangladesh, Nepal and Myanmar) are Asian LDCs; the remaining are African LDCs. The three Asian LDCs export 70.56 percent of total top ten EG exporting LDCs and 62.6 percent of total EG exports from LDCs as a whole. Out of these ten countries Angola, Bangladesh, Myanmar, Senegal and Tanzania are also among the top ten importers of EGs by LDCs.

With respect to EG imports by LDCs, African LDCs are the dominant importers. The top ten LDC importers of EGs are Angola, Sudan, Bangladesh, Yemen, Zambia, Ethiopia, Myanmar, Tanzania, Senegal and Democratic Republic of the Congo. These ten LDCs import 70.2 percent of all LDCs' EG imports (Tables 12). Only two Asian LDCs (Bangladesh and Myanmar) are among the top ten LDCs of EG imports contributing 12.7 percent of EG imports by LDCs. Eight African LDCs import 81 percent of total EG imports by top ten LDCs' EG importers and 87.33 percent of total EG imports by all LDCs.

The extent of participation by LDCs in EG trade in terms of value of EG trade is broadly related to the size of the economy of the respective country. Except for Liberia which has a very small GDP of US$829.7 million, this is the case in general for most of the LDCs. For example, Bangladesh tops the list if LDCs in terms of total size of the GDP and ranks first in case of EG exports and third in

case EG imports. EG trade in countries such as Angola, Congo, Ethiopia, Myanmar, Nepal, Sudan, Tanzania, Senegal, Uganda, Yemen and Zambia feature this trend (Table 12 and A1.1).

Table 12: Export and import value of EG in top ten EG trading LDCs

Country	Export Value in 2007 (in mln USD)	Export share in total EG Exports by all LDCs (%)	Country	Import Value in 2007 (in mln USD)	Import share in total EG Imports by all LDCs (%)
Bangladesh	351.1	55.6	Angola	1248.6	20.2
Tanzania	31.1	4.9	Sudan	677.6	11.0
Nepal	29.9	4.7	Bangladesh	488.0	7.9
Uganda	27.9	4.4	Yemen	376.2	6.1
Liberia	27.0	4.3	Zambia	335.9	5.4
Yemen	25.1	4.0	Ethiopia	311.2	5.0
Angola	20.9	3.3	Myanmar	295.4	4.8
Madagascar	18.0	2.9	Tanzania	261.6	4.2
Senegal	14.7	2.3	Senegal	181.8	2.9
Myanmar	14.1	2.2	Democratic Republic of the Congo	163.0	2.6
Total of top 10 LDCs	559.9	88.7	Total of Top 10 LDCs	4339.3	70.2
Rest of the LDCs	71.25	11.3	Rest of the LDCs	1841.3	29.8
Total LDCs	**631.10**	**100.0**	**Total LDCs**	**6180.7**	**100**

Source: Compiled by the author based on UN Comtrade and ITC Trade Map

4.3 Top ten EG traded by LDCs

At six digit level HS code, the top ten EG exports comprise 69.5 percent of all LDCs' EG exports. Table 13 shows that jute and other textile fibres top the list of exports from LDCs with a share of 30.5 percent. Exports of EG by LDCs are concentrated mainly on products which are made from jute and textile fibres (HS code 530310 and 630510).This is because the top exporter in this category is Bangladesh which is also the top exporter of total EG among LDCs. Nepal, Madagascar and Myanmar are the other countries that export a very small amount of these products while African LDCs do not have export interest in these products (Tables A2.1-A2.10 in Annex II).

In the case of imports, no single product seems to dominate. The top ten EG imports comprise 33 percent of all LDCs' EG imports. Towers and lattice masts, iron or steel comprise 4.5 percent of LDC imports closely followed by machines and mechanical appliances having individual functions, and parts for diesel and semi-diesel engines. LDCs' top ten EG imports fall within the broad category of renewable energy plant, wastewater management and potable water treatment, management of solid and hazardous waste and recycling system, and noise and vibration abatement (Table 14).

Table 13: Top ten export product from LDCs, 2007

HS Code	Product Description	Export (mln USD)	Share (%) in Total LDCs' EG Exports
530310	Jute & other textile bast fibres, raw or retted	192.2	30.5
630510	Sacks & bags, for package of goods, of jute or of other textile bast fibres	93.6	14.8
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	39.1	6.2
560710	Twine, cordage, ropes & cables, of jute or other textile bast fibres	28.4	4.5
730660	Tubes, pipe & hollow profiles, welded, of non-circular cross section	22.8	3.6
730630	Tubes, pipe & hollow profiles, iron or welded, of circular cross section	14.4	2.3
901590	Parts & accessories for use with the apparatus of heading No. 90.15	12.8	2.0
900190	Prisms, mirrors & other optical elements of any material, unmounted	12.2	1.9
847989	Machines & mechanical appliances having individual functions	11.8	1.9
840682	Turbines , output , 40 MW	11.6	1.8
	Total	**438.8**	**69.5**

Source: Compiled by the author based on UN Comtrade and ITC Trade Map.

Table 14: Top ten import product to LDCs, 2007

HS Code	Product Description	Import (mln USD)	Share (%) in Total LDCs' EG Imports
730820	Towers & lattice masts, iron or steel	281.1	4.5
847989	Machines & mechanical appliances having individual functions	274.5	4.4
840999	Parts for diesel and semi-diesel engines	261.0	4.2
848180	Taps, cocks, valves & similar appliances	215.5	3.5
732690	Articles, iron or steel	202.1	3.3
850300	Parts of electric motors, generators, generatg sets & rotary converters	179.9	2.9
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	179.8	2.9
850440	Static converters	158.4	2.6
853710	Boards, panels, includg numerical control panels, for a voltage ≤ 1000 V	147.9	2.4
730690	Tubes, pipe & hollow profiles, iron or steel, welded	142.4	2.3
	Total	**2042.4**	**33.0**

Source: Compiled by the author based on UN Comtrade and ITC Trade Map.

5. Implications of Tariff Reductions on Environmental Goods

Benefits from the liberalisation of EG trade are expected to accrue in economic, technological and environmental terms. Elimination or reduction of tariffs and non-tariff barriers (NTBs) from EGs will increase global trade regardless of the particular involvement of developing or least developed countries in the direction of trade flows. Both developed and developing countries have comparative advantage in the production of EGs that can benefit from greater market access. For LDCs lower or zero tariffs and the elimination of NTBs from environmental technologies will imply technologies will be available for them at lower costs.

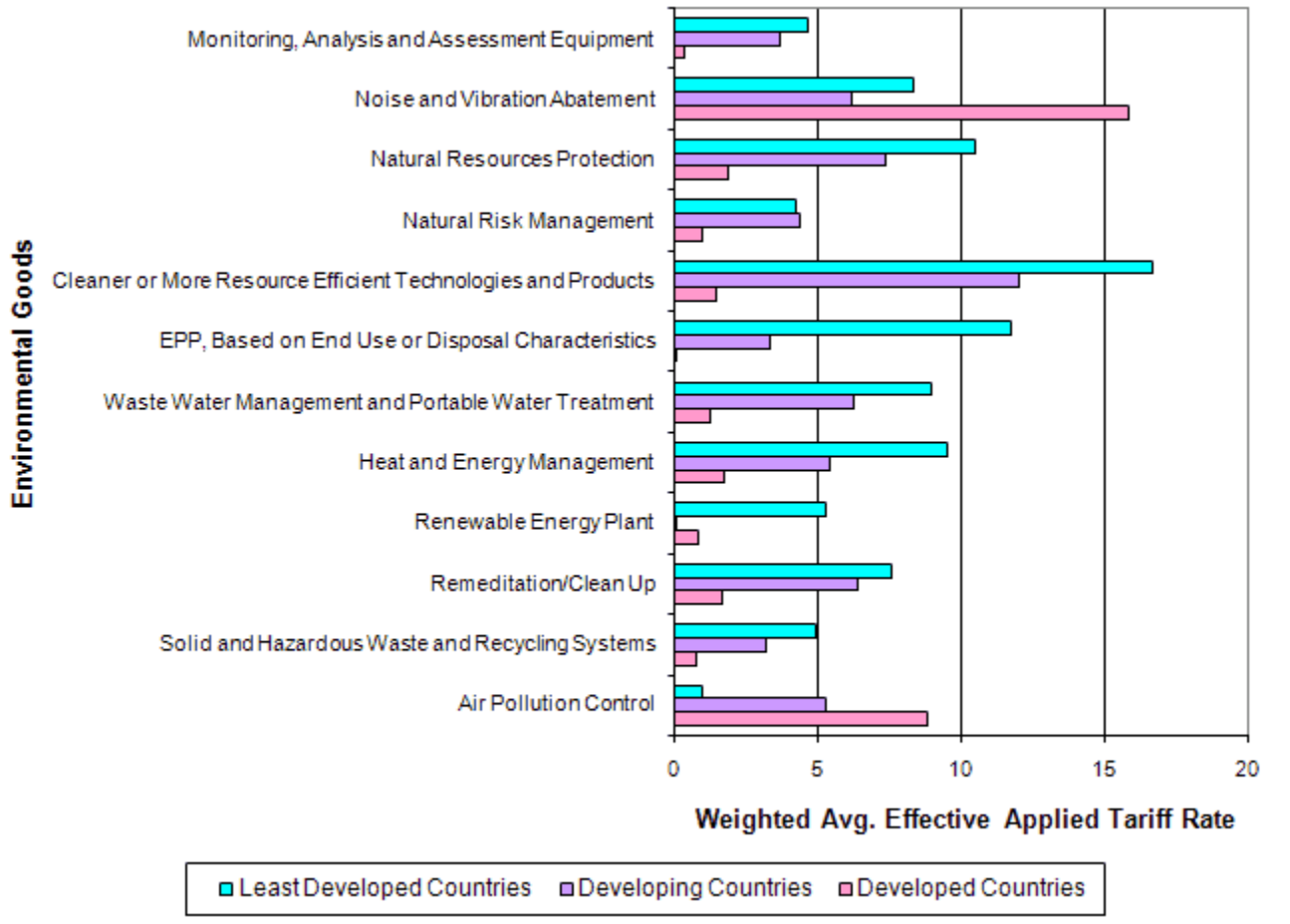
5.1 Tariff rates on EG

The Doha Ministerial Declaration mandated the reduction or elimination of tariffs, including that of tariff peaks, high tariff and tariff escalation and NTBs, in particular of products of export interest to developing countries and LDCs, by modalities to be agreed. The Declaration expressed commitment to the objective of duty-free and quota-free (DFQF) market access for products originating from LDCs. However, the Hong Kong Ministerial (2005) decision on DFQF market access was far short of the aspirations of LDCs. Annex F of the Hong Kong Declaration mentions providing DFQF market access on a lasting basis, for all products originating from all LDCs by 2008 or no later than the start of the implementation period in a manner that ensures stability, security and predictability. It also stipulated that Members facing difficulties at this time providing market access as set out above shall provide duty-free and quota-free market access for at least 97 percent of products originating from LDCs, defined at the tariff line level, by 2008 or no later than the start of the implementation period. A number of concerns with regard to meaningful market access were raised by LDCs. The most important one is whether DFQF market access for 97 percent of tariff lines will be commercially significant. Negotiations on granting DFQF market access for LDC products has not moved in a positive direction to date even though this concern has been raised by LDCs in several mini-ministerial meetings and in other forums after the Hong Kong Ministerial.

In view of the uncertainty of obtaining fruitful DFQF market access in the WTO negotiations, LDCs should use parallel tracks to gain from multilateral talks in other areas of interests, such as the liberalisation of trade in EGS since this also has strong implications for development and poverty alleviation in these countries.

An examination of tariff rates on broad categories of EGs of the '153 list' shows that developed countries have lower tariffs on EGs than developing and LDC countries (Figure 11). Except for two products—noise vibrant abatement and air pollution control technology—tariffs on all other products are between 0 to 2 percent. Tariffs on those EPPs which are currently the top EG exports by LDCs are either zero or very low. Even though tariffs on EGs in developed countries are low, LDCs stand to benefit from liberalisation of EGs since much of LDCs' exports of EGs are destined to a number of developing countries where they face high export duty for EGs. In fact, the weighted average tariff faced by LDCs in developing countries in general was nearly 12 percent in 2006 whereas tariff rates (tariff lines with imports) on agricultural products were much higher (15.3 percent) than tariff faced by non-agricultural products (11.8 percent) (WTO 2009b). LDCs also get duty free access in developing country markets. In 2006 it was for 73 percent of the total value of LDCs' of which only 30 percent was for agricultural products and the remaining agricultural exports faced an average tariff of 26 percent (WTO 2009b). Such tariff dispersions emphasize the need for improving LDCs' market access in developing countries too. Market access for EGs from LDCs is also important since tariff rates for EGs range from 3 to 12 percent in developing countries (Figure 11).

Figure 11: Weighted average effective applied tariff rate for environmental goods, 2008



Source: Compiled by the author based on ITC Trade Map data.

Tariff rates faced in developing countries by LDCs for disaggregated products at 6 digit HS code levels are not available. WITS database includes disaggregated tariff rates only for high income countries.

A disaggregated analysis of tariffs on EGs reveal that the effective applied tariff rates in the high income countries for EG exports which are on the list of LDCs' top ten EGs exports range between 0-2 percent, except for one product in the category of HS Code 560710 (twine, cordage, ropes and cables, of jute or other textile fibres). Tables 15 and 16 show tariff rates on top ten EG exports and imports in LDCs and high income countries.

A calculation based on Tables 13 and 15 shows that LDCs have to pay US$ 3.69 million per year in terms of tariffs on their top ten EG exports (Table A4.1in Annex IV). This is a forgone benefit which LDCs are currently not enjoying due to non-implementation of DFQF market access for all products from LDCs. The amount of gain will be higher if all the EG exports of LDCs are included. This estimation is only an indication of the extent of gains from duty free access and should be interpreted carefully since this calculation assumes that all LDC exports of these top ten EGs are destined to high income countries. Table 16 shows tariffs in major destinations of top ten EG exports from top ten EG exporting LDCs. Though data on tariffs in all importing countries are not available, this again indicate high tariff in developing countries.

Table 15: Tariff rates on top ten EG exports by LDCs

HS Code	Product Description	All LDCs			All High Income Countries		
		MFN Bound Tariff Rates (Weighted Avg.)	MFN Applied Tariff Rates (Weighted Avg.)	Effectively Applied Tariff Rates (Weighted Avg.)	MFN Bound Tariff Rates (Weighted Avg.)	MFN Applied Tariff Rates (Weighted Avg.)	Effectively Applied Tariff Rates (Weighted Avg.)
530310	Jute & other textile bast fibres, raw or retted	43.55	0.83	0.83	0.01	0	0
630510	Sacks & bags, for package of goods, of jute or of other textile bast fibres	65.37	11.32	8.81	1.2	0.48	0.15
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	51.23	5.25	5.18	6.27	0.71	0.39
560710	Twine, cordage, ropes & cables, of jute or other textile bast fibres	100	14.96	14.96	-	10	9.47
730660	Tubes, pipe & hollow profiles, welded, of non-circular cross section	99.09	9.48	8.81	-	12	0.64
730630	Tubes, pipe & hollow profiles, iron or, welded, of circular cross section	68.12	14.18	11.53	1.31	0.45	0.35
901590	Parts & accessories for use with the apparatus of heading No. 90.15	59.75	3.56	3.51	7.79	1.53	1.08
900190	Prisms, mirrors other optical elements of any material, unmounted	69.57	8.14	7.78	1.96	0.61	0.36
847989	Machines & mechanical appliances having individual functions	59.73	4.18	3.9	2.35	1.23	0.81
840682	Turbines output , 40 MW	38.77	4.82	4.43	10.66	2.28	1.99

Source: Compiled by the author based on WITS database.

Table 16: Tariffs on top ten EGs of LDCs by major destinations

HS Code	Product Description	Top Exporters	Major Export Destination	Tariffs
530310	Jute and other textile bast fibres, raw or retted	Bangladesh	China, India, Pakistan	China 6.1%; India 9.6%; Pakistan duty free
630510	Sacks & bags, for packg of goods, of jute or of other textile bast fibres	Bangladesh, Nepal	India, European Union, Sweden, Syrian Arab Republic	European Union not available; India 9.8%; Syria 30.3%; Sweden 0.8%
560710	Twine, cordage, ropes and cables, of jute or other textile bast fibres	Bangladesh	India, Malaysia, Mexico	India and Mexico not available; Malaysia duty free
847989	Machines & mechanical appliances having individual functions	Bangladesh, Liberia, Nepal, Tanzania	European Union, India, Italy, Kenya, Mexico, Netherlands, Nigeria, Philippines, Poland, Russian Federation, United Arab Emirates	European Union, Poland not available; Netherlands 0.1%; India 3.6%; Italy 0.1%; Mexico 11.4%; Philippines 0.8%; United Arab Emirates 4.7%; Kenya, Nigeria, Russian Federation duty free
840682	Turbines output, 40 MW	Tanzania	Kenya	Kenya duty free
730630	Tubes, pipe & hollow profiles, iron or welded, of circular cross section	Nepal	India	India 9.8%
730660	Tubes, pipe & hollow profiles, welded, of non-circular cross section	Senegal, Uganda	Bosnia and Herzegovina, Burundi, Mali, Rwanda, Tanzania	Bosnia and Herzegovina, Mali, Rwanda, Tanzania not available; Burundi 14.1%
890790	Buoys, beacons, coffer-dams, pontoons and other floating structures	Angola, Liberia, Myanmar, Senegal, Yemen	Mali, Singapore, South Africa, United Kingdom	Mali 10%; UK 0.3%; Singapore and South Africa duty free
901590	Parts and accessories for use with the apparatus of heading No 90.15	Yemen, Angola	European Union, Madagascar Norway, South Africa, United Kingdom	European Union not available; Madagascar 9%; United Kingdom 0.2%; Norway, South Africa duty free
900190	Prisms, mirrors & other optical elements of any material, unmounted	Myanmar	China, Hong Kong, Taiwan	Taiwan not available; China 8.9%; Hong Kong duty free

Source: ITC Trade Map and UN Comtrade.

EG imports in LDCs face high tariffs ranging from around 3 percent to 13 percent in case of top ten EGs (Table 17) as opposed low rates of tariffs in high income countries. For top ten EG imports the amount of tariffs in LDCs equals to US$ 118.13 million (Table A4.3 in Annex IV). This is based on the assumption that all LDCs apply the same effective tariff for a product. As a result, this estimation may not reflect the actual amount import tariffs and shows only the extent of the tariff revenues. Table A4.2 in Annex IV shows the tariff rates applied by the individual LDC on their EG imports.

Table 17: Tariff rates on top ten EG imports by LDCs

HS Code	Product Description	All LDCs			All High Income Countries		
		MFN Bound Tariff Rates (Weighted Avg.)	MFN Applied Tariff Rates (Weighted Avg.)	Effectively Applied Tariff Rates (Weighted Avg.)	MFN Bound Tariff Rates (Weighted Avg.)	MFN Applied Tariff Rates (Weighted Avg.)	Effectively Applied Tariff Rates (Weighted Avg.)
730820	Towers & attice masts, iron or steel	62.09	7.67	4.3	1.58	0.4	0.27
847989	Machines & mechanical appliances having individual functions	59.73	4.18	3.9	2.35	1.23	0.81
840999	Parts for diesel & semi-diesel engines	38.16	9.77	7.68	3.76	1.16	0.71
848180	Taps, cocks, valves & similar appliances	55.11	5.73	5.07	7.11	2.67	1.96
732690	Articles, iron or steel	58.89	13.74	12.84	6.78	2.66	1.55
850300	Parts of electric motors, generators, generating sets and rotary converters	29.05	5.12	4.27	4.71	1.77	1
847420	Crushing/grinding machines for earth/ stone/ores, minerals substances etc.	47.44	3.01	2.99	3.22	1.28	1
850440	Static converters	35.55	3.47	3.33	1.52	0.63	0.41
853710	Boards, panels, including numerical control panels, for a voltage ≤ 1000 V	55.8	6.44	5.77	4.61	2.26	0.99
730690	Tubes, pipe & hollow profiles, iron or steel, welded	73.59	14.94	8.11	10.73	1.61	0.49

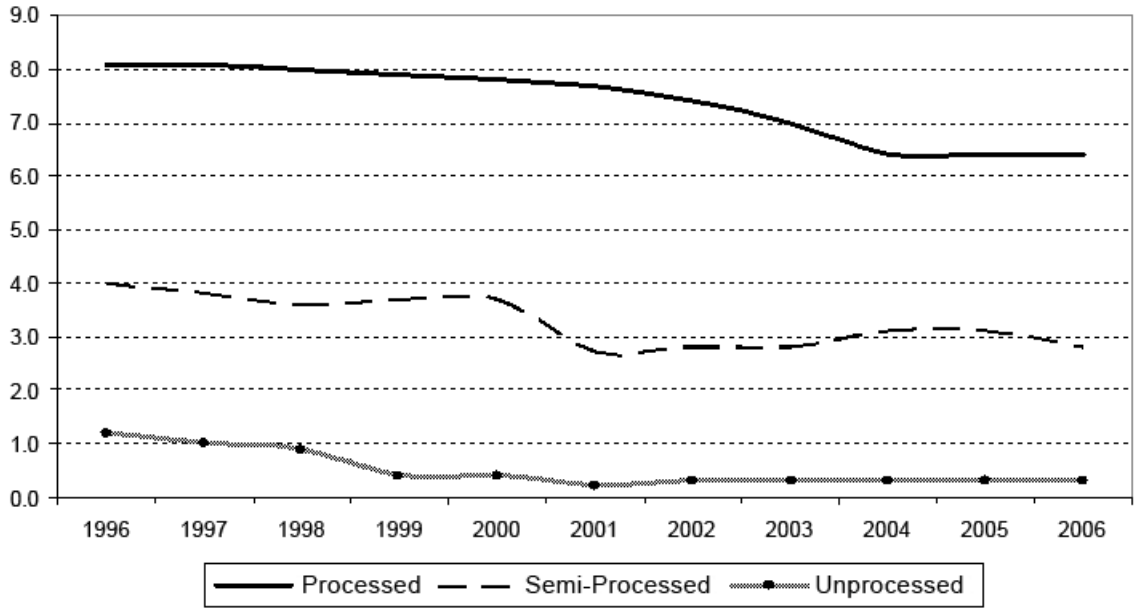
Source: Compiled by the author based on WITS database.

5.2 Preference erosion

A number of studies have revealed that WTO negotiations on tariff reductions will cause preference erosion in LDCs. Most LDCs enjoy duty-free access to the developed country markets under various preferential arrangements on a non-reciprocal basis. The European Union accorded DFQF market access for all goods (except arms and ammunitions) from LDCs from 5 March 2001 under the Everything but Arms (EBA) initiative. A transition period of between 2002 and 2009 was provided for the phasing in of sugar, rice and bananas. The full implementation of the EBA initiative by the EU came into effect 1 October 2009. In 2007 many developed countries, such as Australia, Canada, European Communities, Japan, New Zealand and Norway provided total or nearly total duty-free status to LDC exports both in terms of tariff lines and import value.

It has been observed that in selected importing developed country markets on average (weighted), LDCs benefit from preferential duty-free treatment on 91 percent of the dutiable MFN tariff lines. The coverage of preferential duty-free access is 100 percent or close to it for non-agricultural raw materials (principally minerals and fuels). Over 91 percent of manufactured products exported (tariff line with imports) benefit from duty-free treatment, while this percentage rises to 93 percent in the case of agriculture (WTO 2009b). Figures 12 and 13 show the tariff rates and duty free treatment experienced by LDCs.

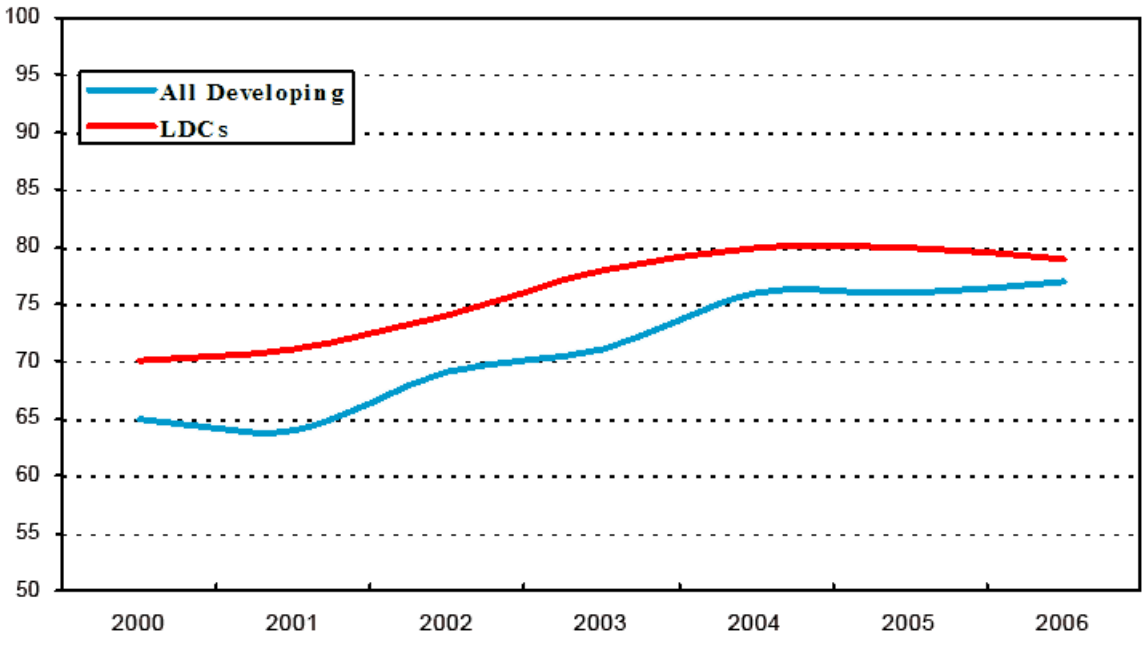
Figure 12: Average tariffs faced by LDCs on processed, semi-processed and unprocessed exports to developed markets, 1996-2006 (%)



Note: *Average tariff (excluding arms and oil).*

Source: *ITC/UNCTAD/WTO based on CAMAD.*

Figure 13: Duty-free treatment on LDCs' exports (excluding arms and oil), 2000-2006



Source: WTO website, www.wto.org.

5. Implications of Tariff Reductions on Environmental Goods

Though LDCs cannot fully realise preferential market access due to various non-tariff measures (WT/COMTD/LDC/W/39) including stringent rules of origin (RoO), and lack of supply-side capacity in LDCs (such as narrow export baskets, weak infrastructure, etc.) preferences will be diminished as a result of WTO negotiations on tariff reductions and various sectoral reform policies by developed countries under WTO obligations (Yu and Jensen 2005). Some studies have estimated the extent of preference erosion due to negotiations on non-agricultural market access. It has been estimated that Bangladesh will lose US$222.4 million, Cambodia US$53.6 million and Nepal US$17.8 million due to preference erosion (Subramanian 2003). Estimates by Hoekman and Olarrega (2005) show a welfare (real income) loss of US$460 million for African LDCs and additional loss of US$100 million for Bangladesh, from preference erosion in the EU (including in agriculture). According to Grynberg and Silva (2004) losses in terms of income transfers to producers in preference-dependent economies are estimated to be about $1.7 billion. Producers will require 14 to 20 years to adjust. This would imply a net present value of losses ranging from US$6.0 billion to US$13.8 billion. In another study by Limao and Olarreaga (2004) it has been estimated that tariff revenue currently foregone due to preferences to LDCs is US$763 million; Bangladesh is likely to be the largest loser (US$202 million). Not only Bangladesh, but countries in East Africa and Sub-Saharan Africa will also be adversely affected due to DR negotiations (Polaski 2006). A more recent study shows that the benefit of DFQF market access of LDC products in the developed country markets is a few times more than the currently proposed market access for 97 percent tariff lines of LDC products (Laborde 2008). While referring to these estimates it should, however, be kept in mind that methodologies and assumptions of these studies differ and these estimates are only indicative of the extent of losses by LDCs. The margin of preference enjoyed by LDCs in developed country markets (the difference between the MFN tariff and the rate applicable to LDCs) under various preferential schemes is shown in Table A1.3 in Annex I.

It is likely that many of the EGs will fall under various preferential programmes offered to LDCs. Therefore, if these products are listed as EGs, tariffs placed on them will be reduced at a faster pace, which will erode LDCs' preferences in those markets and reduce their competitiveness. Even though LDCs are not required to make any tariff reduction commitment in the Doha Round the outcome of tariff reductions by other countries will have implications for LDCs which could sometimes be disadvantageous for them. Therefore, LDCs should demand DFQF market access for all their products immediately, from all developed and developing countries that are in a position to do so.

5.3 Non-tariff barriers on environmental goods

NTBs are harder to detect than tariff barriers. NTBs can take various forms such as quantitative restrictions, customs procedures and administrative practices, special charges, restrictive practices like state trading and procurement policy, technical barriers to trade, export restraint, and production and export subsidies. They can be further related to product standards, process standards, certifications, registrations and testing procedures, packaging, mark-up, labeling and language barriers or even environmental barriers. Export interest of LDCs in EG lies also in the area very near to agricultural goods. In the case of export of agricultural products, SPS measures form the most crucial barrier for such exports from LDCs. Non-compliance of these requirements can have devastating effects for the exporting country. Bangladesh has already suffered from the repercussion of non-compliance with a SPS requirement which resulted in a trade ban for its shrimp exports to the European Union market in 1997 (Khatun 2004).

Standards, certifications, and environmental regulation limit trade to a great extent. Products from LDCs face difficulties in entering foreign markets due to a lack of appropriate standards for their products, which may be quite stringent to protect domestic suppliers. The lack of uniformity of environmental requirements and technical regulations in different national markets are known to affect the type of environmental goods used to meet environmental requirements, and thus act as an NTB (Vikhlyaev 2003).

The United States imposes import quotas on short, hard or rough, medium, and long staple cotton, cotton waste, and cotton processed but not spun. It applies preferential and non-preferential rules of origin while differentiating between its imports. The US further provides subsidies and other aids for upland and extra long staple cotton, honey and wool, some of which are EG items of export interest to LDCs. Import quotas on raw silk are also used by Thailand to deter such imports into the country. Thailand also requires licensing for imports of jute. India employs voluntary export restraints on wood products and levies excises on all import

items and also uses preferential rules of origin applied under bilateral and regional trade agreements. If markets are to be opened then the potential trade distorting effect of these barriers should be taken into account while engaging in negotiations in order to minimize their consequences.

NTBs provide the main impediment to the flow of goods from developing countries. Since the classification of EGs can coincide closely with agricultural goods, these goods chiefly fall prey to NTBs which are hard to perceive at a first glance. Barriers including environmental and production regulation and standards, eco-labeling, certifications, subsidies, and restriction of foreign direct investment (FDI) can all serve as implicit obstructions that hinder the flow of goods from LDCs.

6. Issues and Strategies for Negotiation of Environmental Goods and Services

The negotiating strategy of LDCs should stem from their own requirements for import and potential for export of EGS. LDCs are not bound to make any tariff reductions commitment during the DR negotiations, though they are encouraged to do so. However, any tariff and non-tariff reduction commitments by developed and developing countries will benefit LDCs. On the other hand, such tariff reduction will also result in preference erosion in LDCs, as mentioned in the previous section. The loss due to preference erosion can be minimized by full implementation of DFQF in the markets of the developed country and of the developing countries in a position to do. Studies have shown that full coverage of all tariff lines in the US market would increase LDC exports to the United States by nearly 20 percent compared to the 6 percent rise from 97 percent coverage of tariff lines (Laborde 2008). This study also estimated that though countries such as Lesotho and Madagascar would suffer from increased competition due to full DFQF initiative, the effect would be very small compared to the effects due to non-implementation of full DFQF. For LDCs to avoid losing from the DR, additional measures such as DFQF access for all products from LDCs, elimination of cumbersome rules of origin which block exports of LDCs and adjustment assistance programme for poor people in these countries are needed (Laborde 2008; Polaski 2006; Rahman and Shadat 2006; Yu and Jensen 2005). With regard to EGS negotiations, as liberalisation of EGS is part of the single undertaking of the Doha Round negotiations LDCs should participate actively in the discussions to ensure that negotiations of EGS result in an outcome that is meaningful to the sustainable development of their respective countries.

Social, political and economic factors in their respective countries need to be considered by LDC negotiators when they participate in the discussions on what goods to liberalise, how to liberalise and what approaches should be adopted. Though the issue of export of EGS is in fact part of the overall market access issue from which LDCs may benefit, opening up of domestic markets of LDCs for foreign products and companies is a more sensitive issue. LDCs have to participate effectively in the negotiations on EGS so they can make an informed assessment of the opportunities and challenges attached to EGS liberalisation. While the principal objective of such negotiations should be whether reduction or elimination of tariff and non-tariff barriers will protect the environment while expanding national trade, LDCs have to consider a number of aspects while adopting strategies of EGS negotiations.

At the same time it is useful to have a common LDC position in case of EGS negotiation though problems may arise due to heterogeneity of natural resources endowments and economic and industrial characteristics within LDCs. Such a common position is justified on both trade and environmental grounds. LDCs are demanding greater market access for their products in the developed and developing countries as they shift their trade policies towards liberalisation and more integration with the global economy. As a result of these initiatives they have offered greater market access to foreign products through reduction in tariff rates. LDCs are also grappling with several environmental problems (Section 3) that lead to deterioration of poverty levels of these countries since the poor are the most vulnerable sections of the society to bear the brunt of environmental degradation. Hence LDCs should be encouraged to raise a united voice to strengthen their position for greater market access and environmental sustainability. LDCs may work out an approach which will accommodate goods and services of their interests. Though there are some differences in terms of interests in EGS exports and imports among LDCs across various regions, the common goal is poverty alleviation through employment generation and income distribution.

6.1 Negotiations of environmental goods

Given the fact that LDCs' export interest in EG lies in EPPs which are agricultural and natural resource based, they should emphasise that the negotiating list of EG trade in the WTO include products of their interest. While jute and textile-based products dominate the list of EPPs by LDCs, they can also include forest-based non-timber products, products made from natural fibres, natural resource-based products produced through traditional knowledge and fisheries. However, the procedure to determine EPPs

through PPMs to see how they are grown, extracted, manufactured and provided in a sustainable manner in all or some stages of their life cycle should be reviewed.

LDCs are hesitant to develop a list in line with the 'list approach' proposed by the developed countries due to apprehension that most of the EGs which are of export interest to LDCs are likely to be based on PPM criterion. LDCs and even developing countries are against PPM-based criterion since this could be misused and in the name of protecting the environment they can in fact turn into green protectionism. The use of such procedures may then lead to the use of other protectionist measures such as labour standards while exporting EG from LDCs. As it is LDC products are often subject to scrutiny on technical, sanitary and labeling grounds which act as NTBs on their exports. Most industries in LDCs are in the category of small and medium enterprises (SMEs) which lack financial and technological capability to comply with requirements set by the importers of the developed countries. The list approach does not emphasise the need for technology transfer adequately. In view of these issues, the 'project approach' proposed by India stands to offer better opportunities for LDCs in terms of market access since this approach is supposed to enable technology transfer, which can in turn help improve LDC compliance with technical and sanitary requirements.

The special and differential treatment of market access to LDCs can also be extended to improved market access for LDCs' products which have less negative environmental impact and which are derived in an environment-friendly way.

6.2 Negotiations of environmental services

The Doha Ministerial Declaration placed services negotiations into the overall time frame of the DR. It reaffirms the Guidelines and Procedures for the Negotiations adopted by the Council for Trade in Services on 28 March 2001 as the basis for continuing the negotiations, with a view to achieving the objectives of the GATS. Annex C of the Hong Kong Declaration stipulates that members shall develop appropriate mechanisms for the full and effective implementation of the LDC Modalities, including, expeditiously developing appropriate mechanisms for according special priority including to sectors and modes of supply of interests to LDCs. The LDC modalities adopted on 3 September 2003 set out a number of important issues for LDCs including 'preferential market access mechanism' which should be created for achieving effective market access for LDCs to the developed markets. Members should open their markets to 'all categories of natural persons from LDCs, particularly unskilled and semi-skilled persons' without applying a so-called 'economic needs test'.

The LDC group in the WTO has requested that developed country Members establish 'appropriate mechanisms' to facilitate effective access for LDCs' services and service suppliers to foreign markets before presenting their final market access offers. An LDC text circulated on 28 March 2006 focused on a mechanism requiring developed country Members to grant "permanent, non-reciprocal, special priority solely to LDCs, notwithstanding any provisions of the GATS". According to some Members, this mechanism would create a new or modified GATS obligation, as well as require existing GATS obligation (MFN) to be waived.

The legal effect of the elements of the LDC proposal is being examined in view of the WTO procedures. How a mechanism could be developed to create, modify or waive obligations at the level of GATS agreement, which do not have the 'Enabling Clause', is a matter of contention. The 'signalling conference' held towards the end of the Geneva mini-ministerial 2008 indicated the sort of binding market opening commitments the developed and developing countries would be willing to undertake under the Doha Round negotiations. It has been reported that good progress was made by the European Union and the United States on temporary movement of natural persons under Mode 4 as well as on the cross border supply of services under Mode1. It was also indicated by the European Union that it might consider lifting the economic needs test. Though this has been a major step forward, the issue of market access for low skilled workers remained on the back burner.

To ensure participation of LDCs in services negotiations, the General Council Decision of 1 August 2004 states, "Members shall strive to ensure a quality of offers, particularly in sectors and modes of supply of export interest to developing countries, with special attention to be given to least developed countries". However, LDCs' participation in services trade and particularly in environmental services trade is limited not only because of supply-side constraints including lack of capacity but also due to various

international regulations and requirements. The issue of temporary movement of natural persons under Mode 4 of GATS is being discussed at the Committee on Trade in Services (CTS) of the WTO. A positive outcome of negotiations on this will facilitate export of ES from LDCs.

The analysis of LDCs' interests on trade in environmental services is difficult since there are no data available on this. The main way to trade in environmental services is through Mode 3 and Mode 4 of the General Agreement on Trade in Services (GATS). Under Mode 3 services are provided by a subsidiary or a branch in a host country through its commercial presence and under Mode 4 services are provided by professionals temporarily working abroad. A number of issues stand in the way of better trade performance under both these Modes, which constrain LDCs' participation.

Provision of environmental infrastructural services in LDCs requires high levels of investment and expertise. LDCs may benefit from such investments through commercial presence under Mode 3 in the area of increased access to safe water through treatment of polluted water or in case of wastewater management. However, the issue of affordability of these essential environmental services is a concern for governments of LDCs. Water is a public good and privatization of such services would create conflict of interest as provision of this good will be on profit making basis ignoring the affordability of the poor in the face of weak regulatory capacity in LDCs. Profit-driven motivation behind the supply of necessary goods like water creates the risk of exclusion of people who cannot afford such private services.

Liberalisation may also act to undermine many traditional and local technologies and methods of environmental services in favor of advanced and modern techniques and tools imported from abroad. In the process, region-specific, cheap, simple and cost effective innovation may be discouraged in favor of expensive, complex and sometimes out-dated technologies exclusively imported from abroad (Sugathan 2007).

The interplay between trade and environment is an evolving issue and subject to debates as the relationship can exhibit both positive and negative results on poverty and human development. Therefore, the opportunities and challenges of liberalisation of ES should be examined through in-depth cost benefit analysis on a case-by-case basis, that is, on a country-by-country and service-by-service basis. The objective of such an exercise is to explore mechanisms to ensure efficiency and equity if liberalisations take place in case of ES. In order to ensure accessibility and affordability of essential products and services such as drinking water and sanitation there should be regulations on prices and business practices of domestic private and foreign companies. In LDCs the monopoly of the government in these sectors is justified on equity grounds. Commercial presence of foreign enterprises under Mode 3 may contribute to increased investment and capital formation, improvements in the coverage and quality of environmental services, transfer of technology and capacity building. However, without an understanding on the implications of liberalisation of essential environmental infrastructural services such as water LDCs should not make any commitments on this.

Commercially meaningful liberalisation of environmental infrastructure services requires market access in environmental support services such as construction, engineering, legal and consulting services, where Mode 4 is an increasingly relevant factor. Market access of service providers from LDCs to the developed countries is constrained by stringent immigration and recruitment policies of the importing developed countries (Chanda 2008). Service providers are also affected by restrictions such as licensing requirements and pre-requisitions relating to qualification and working experience (UNCTAD 2003). Though export of ES by LDCs is not very significant some LDCs could extract economic benefits by exporting environment-related professional services in the form of studies, assessments and consultancies. For example, LDCs which suffer from environment- related natural disasters such as flood, cyclone, and drought are better equipped with the expertise for dealing with such catastrophes.

LDCs have made proposals for market access giving them special priority but their focus is more on low- and semi-skilled workers as they have comparative advantage on this. Therefore, for those environmental services which require highly skilled personnel LDCs need training and capacity building.

On the other hand, LDCs should also seek to impose limitations on market access commitments in the form of ceilings on prices for essential services provided by the government, minimum level of the share of profits that must be reinvested in the

national infrastructure, and technology transfer and training, in order to build capacity and keep control of investing foreign firms (Vikhlyaev 2003). In the case of Mode 3 and Mode 4 interventions into various infrastructural sectors of LDCs, trade negotiations should be designed to take these issues into account. Negotiations should stipulate the degree of market access of foreign firms, regulation, and standards on the basis of which companies should be allowed to access such sensitive areas of the economy of LDCs.

6.3 Cross-cutting issues

The orchestration of free trade in an effort to facilitate growth in the emerging EGS markets of the LDCs may not be effective. Growth without domestic innovation and capacity building through free trade would not be environmentally or economically sustainable for LDCs in the long run. LDCs should use liberalisation as a tool to import foreign technologies at a lower cost to enhance their capacity and proficiency in extracting their own resources rather than have only foreign firms do the job.

The UNFCCC has mandated transfer of technology and know-how related to environmentally sound technologies (EST). The Conference of Parties COP 7 held in Marrakesh in 2001 adopted a framework for technology transfer to enhance implementation of climate-friendly technologies. The importance of transfer of energy efficient and low carbon technologies to developing countries has been emphasized in the Stern Review as well (Stern 2006).

The issue of IPR and technology transfer has to be resolved for enabling technology transfer to LDCs. Though studies indicate that IPR may act in both positive and negative ways (OECD 2008) appropriate technology and its efficient utilization can contribute to the economic progress of countries around the world. From the point of view of developed countries, a strict IPR regime is essential for protecting technologies. Developing countries, on the other hand, can benefit from lax IPRs to access technologies and reengineering processes. The reconciliation between protection of IPR and the dissemination of climate-friendly technologies is a challenge. LDCs demand flexibility in the TRIPS Agreement in order to solve problems of patented climate-friendly technologies. Article 66.2 of TRIPS which mandates Members to take measures to encourage technology transfer to LDCs should be implemented for climate technologies. Transfer of technology, one of the key elements of the Bali Roadmap, is of vital importance for all developing and least developed countries for mitigation as well as adaptation. The IPR regime is a barrier to technology transfer to LDCs which needs to be reviewed.

Technology transfer through aid and technical assistance for environmental technologies has been mentioned both in the list and project approaches for EG negotiations submitted by developed and developing countries, though at a less than adequate level by the former group. Though the IPR regime has not been quite strict in LDCs in case of technology transfer such a process has been slow due to various supply-side constraints such as lack of capacity and financial resources. Hence for LDCs to take full advantage of liberalisation of EGS, technical and financial assistance is essential. Such assistance is needed not only for buying clean technologies but also for addressing any probable negative impact of liberalisation on LDCs. In LDCs, small and medium enterprises dominate the industrial sector and are not in a position to buy clean technologies to comply with domestic environmental regulations even if there is marginal reduction of prices of technologies due to tariff changes. LDCs should submit proposals to receive support from the Aid for Trade package. The WTO Members should avoid dumping old technologies in the name of technology transfer and facilitate technological innovation.

7. Concluding Remarks

The findings of this study indicate that participation of LDCs in EGs trade is nominal. EGs trade in most of the LDCs is too insignificant to be analysed for any recommendations. Out of 49 LDCs, 23 countries have EG exports less than US$1 million and two countries have either not exported any EG or have not reported. Though EG imports by LDCs are higher than EG exports, 13 countries have EG imports below US$10 million and 25 countries (including these 13 countries) have below US$50 million. However, those LDCs which have some amount of EG trade are improving their situation in terms of increased participation in global EG trade. Thus, even though LDCs' EG trade is much less than that of developed countries, the rate of increase of LDCs' EG trade is higher than that of global EG trade during 2001 and 2007. The top EG exporters and importers are also countries with relatively higher GDP and trade. This implies that as the economies of LDCs grow EG trade in these countries are expected to grow further.

In view of the expected growth in LDCs' participation in EG trade and their vulnerability to environmental degradation and climate change, and given the fact that liberalisation of EGS is part of single undertaking of the DR negotiations, LDCs should follow and participate in the WTO's EGS negotiations. Such participation will be meaningful if it is backed by informed arguments based on analytical exercise.

Export interest of LDCs varies across countries. For Asian LDCs, EPPs are the dominant EG exports, which are agriculture and natural resource based. In case of African LDCs wastewater management and potable water treatment tops the list both in case of EG exports and imports. However, the import of wastewater management and potable water treatment is 27 times higher than export of this product. Wastewater management and potable water treatment is the second most important EG import of Asian LDCs, exceeded only by renewable energy plant. The EG trade pattern of all LDCs, in general, reflect the fact that these countries require technologies for wastewater management and potable water treatment, renewable energy plant, and management of solid and hazardous waste and recycling systems. In order for these countries to access such technologies, import duty may be reduced in the importing countries. They should be also available at a concessional price offered by the developed countries. Additionally, import of these EGs, which also involves import of ES in the form of commercial presence and FDI in the importing countries, should lead to transfer of state of the art technology and ensure capacity building. This is required for both improved environmental conditions within the country and strengthened capacity to comply with environmental requirements demanded from exporting LDCs by importing developed countries.

Though tariffs on EG exports by LDCs are low in the developed countries and some even get duty free access there is still scope for reduction of tariffs in developing countries. DFQF access of all products from all LDCs is also critical in view of the preference erosion to be suffered by LDCs due to DR negotiations. In addition to full DFQF, the loss due to preference erosion should be compensated for by way of simplified RoO requirements, technology transfer and financial support through various mechanisms including soft loans and A4T. The loss of tariff revenue as a result of liberalisation of EGs could be compensated by these initiatives. Due to stringent RoO the preference utilization by LDCs is less than full – 88 percent in Canada, 81 percent in the European Union, and 79 percent in the United States (WTO 2009a). In case of technology transfer, the IPR regime should be relaxed for LDCs where LDCs should be exempted from the obligation of patent protection of EGs for a longer period from the time of implementation. The experience with financial support is that the gap between requirements and allocation of resources for adaptation, mitigation and technology transfer to address the climate change is huge (South Centre 2009). Financial support should be new and additional to the overseas development assistance (ODA), free of conditionalities and adequate for improving trade and environmental condition.

The primary sector in LDCs is still the major source of employment and income generation. This sector is crucial not only for improved EGs trade but also for employment generation and poverty alleviation. Therefore, EPPs which are based on agriculture, forestry, fishery and other natural resources should be included in the list of EGs. There are only six products at the six digit level in this broad category and thus exclude many EPPs which are of LDCs' interest in the currently discussed '153 list' in the WTO. LDCs need to prepare their lists according to their comparative advantages.

7. Concluding Remarks

With respect to EPPs, the issue of PPM is critical for LDCs. This should be excluded as a means to determine a product for qualifying as an EG. PPM features prominently in the 'list approach' advocated by the developed countries in the WTO currently as opposed to the 'project approach' proposed mainly by India, though it has been criticized for not having binding commitments and predictable market access. LDCs may propose a similar approach which would accommodate EPPs and is consistent with the WTO rules.

Liberalisation of EGs through tariff reduction may not increase LDCs' EGS trade unless NTBs are removed. Though EG exports to the developed countries face either zero or very low tariffs, they still may face various NTBs such as product standards, technical requirements, SPS measures and certification. In case of EPPs where major EG export interests of LDCs lie, complicated and costly stringent environmental and health-related requirements must be complied with by the exporting countries. LDCs should participate actively in standard-setting bodies to ensure that standards are not discriminatory against EPPs produced in LDCs. They also require financial and technical support to be able to certify EPPs credibly.

For meaningful participation in ES trade, domestic regulatory frameworks should be in place prior to allowing FDI and capital investment in the environment sector for providing environmental services. The issue of affordability of essential environmental services such as water should be the priority for LDCs as the majority of their populations live in poverty. Also, as most people in LDCs live in rural areas, the provision of various environmental technologies and products and education services on how to utilize these modern instruments to pollute less is crucial. In such cases liberalisation of EGS should ensure that environmental benefits go beyond the production industries into more service oriented sectors at lower costs to improve the quality of life and standard of living for people in terms of a cleaner environment. Since many LDCs have human resources they can take advantage of exporting environmental service providers under Mode 4. This will require capacity building in LDCs for ES providers and relaxation of various measures by the importing countries which act as barriers to movement of service providers across borders.

Liberalisation of EGS as laid out in the work programme of the Doha Ministerial Declaration is of critical importance to LDCs not only in terms of market access opportunities for its EG exports in the global market, but also for access to cleaner technologies at an affordable price. It is expected that as barriers are removed from EGS for which LDCs have competitive advantage, they can realize economic growth and development patterns that are more environmentally sustainable over time. However, there needs to be a coherent policy to ensure consistency between poverty alleviation and sustainable development. The twofold challenge for LDCs is first, how to gain market access without degrading the environment, and second, how to protect the environment without harming economic growth (Tussie 2000). Progress in the trade liberalisation process has to be achieved by creating an enabling environment through appropriate domestic policies which focus on underlying sustainable development priorities and concerns.

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Annex I: LDCs, submissions and tariff rates

Table A1.1: Total GDP, per capita income, population size and total export-import of LDCs, 2007

Sl	Regions	Name of the LDCs	Total GDP at current prices in 2008 (mln US$)	Per capita income (PPP US$), 2007	Total Population size (thousands), 2005	Total Import in 2007(mln US$)	Total Export in 2007 (mln US$)	Total EGs Import in 2007 (mln US$)	Total EGs Export in 2007 (mln US$)
1	Asian LDCs	Afghanistan*	12678.7	1,054	24507	-	-	156.151	1.71
2		Bangladesh	78998.9	1,241	153122	17622.87	13142.95	488	351.10
3		Bhutan*	1327.5	4,837	650	-	-	9.279	0.27
4		Cambodia	11192.7	1,802	13866	5926.20	4602.34	127.753	3.93
5		Kiribati*	77.6	1,295	92	73.76	10.98	2.137	0.02
6		Lao People's Democratic Republic*	5326.5	2,165	5880	1885.16	1161.38	68.856	1.39
7		Maldives*	1260.2	5,196	292	1096.29	108.17	68.75839	0.00
8		Myanmar	28663.5	904	48345	5028.56	4931.16	295.4157	14.10
9		Nepal	13406.4	1,049	27222	2098.67	770.81	50.1675	29.95
10		Samoa*	534.4	4,467	179	265.61	97.47	3.754	0.04
11		Solomon Islands	655.8	1,725	474	284.99	158.47	0.004	0.00
12		Timor-Liste*	569.1	717	992	113.85	30.60	4.681	0.11
13		Tuvalu*	31.8	..	10	38.39	1.34	0.787	0.13
14		Vanuatu*	558.5	3,666	216	201.71	29.91	8.599	0.14
15		Yemen*	31069.9	2,335	21024	8510.71	6298.94	376.244	25.13
Total Asian LDCs			**186351.6**	**....**	**119242**	**43150**	**31344.51**	**1660.59**	**427.99**
16	African LDCs	Angola	34998.7	5,385	16618	12298.73	40745.94	1248.57	20.90
17		Benin	6643	1,312	7868	4614.60	724.36	93.58	0.71
18		Burkina Faso	7949.1	1,124	13747	1303.85	439.82	70.74	0.80
19		Burundi	1111.2	341	7378	423.00	156.20	11.29	0.56
20		Central Africa Republic	2015.6	713	4101	183.80	138.32	10.71	0.44
21		Chad	8354	1,477	10019	527.23	2511.32	52.01	0.20
22		Comoros*	530.1	1,143	616	160.15	43.27	4.40	0.03
23		Democratic Republic of the Congo	11613.3	298	59077	2777.06	2066.09	162.96	1.56
24		Djibouti	981.3	2,061	805	2327.15	202.21	71.07	0.29

** Non-WTO LDC Members*

Source: Compiled by the author based on ITC Trade Map and following websites: www.unohrlls.org/en/ldc/related/62/, esa.un.org/unpp/index.asp, unstats.un.org/unsd/snaama/dnllist.asp, hdrstats.undp.org/en/indicators/91.html

Annex I

Table A1.1: Total GDP, per capita income, population size and total export-import of LDCs, 2007

Sl	Regions	Name of the LDCs	Total GDP at current prices in 2008 (mln US$)	Per capita income (PPP US$), 2007	Total Population size (thousands), 2005	Total Import in 2007(mln US$)	Total Export in 2007 (mln US$)	Total EGs Import in 2007 (mln US$)	Total EGs Export in 2007 (mln US$)
25	African LDCs	Equatorial Guinea*	17884.1	30,627	609	1246.19	9346.69	137.65	2.67
26		Eritrea*	1475.8	626	4473	349.25	71.76	12.58	0.19
27		Ethiopia*	25726.9	779	74661	5808.65	1277.15	311.22	3.50
28		Gambia	1056.5	1,225	1526	320.94	12.52	6.64	0.07
29		Guinea	4969.6	1,140	9221	1281.50	1058.98	81.63	0.65
30		Guinea Bissau	404.4	477	1473	205.36	81.76	14.10	0.05
31		Lesotho	1615.9	1,541	1995	269.35	680.22	33.78	0.05
32		Liberia*	829.7	362	3334	7850.65	1030.28	43.89	26.97
33		Madagascar	9329.8	932	17614	2445.48	1343.31	90.25	17.99
34		Malawi	4128.2	761	13654	1377.85	868.56	35.43	0.71
35		Mali	8599.4	1,083	11833	2184.85	1440.63	86.99	2.25
36		Mauritania	3270.7	1,927	2985	1430.42	1353.71	82.81	4.05
37		Mozambique	9840.3	802	20834	3049.75	2412.08	93.19	13.43
38		Niger	5210.1	627	13102	955.69	550.05	34.15	4.60
39		Rwanda	4456.9	866	8992	696.88	183.47	29.18	0.66
40		Sao Tome and Principe*	177.4	1,638	153	79.42	6.73	4.77	0.11
41		Senegal	13287.5	1,666	11281	4871.39	1546.26	181.83	14.68
42		Sierra Leone	2324	679	5107	607.11	399.02	33.74	11.77
43		Somalia*	2660.3	..	8354	823.73	223.33	5.28	0.13
44		Sudan*	70275.8	2,086	38698	0.00	0.00	677.59	1.33
45		Tanzania	20745	1,208	39007	787.10	280.03	261.64	31.14
46		Togo	2877.3	788	5992	3493.35	1336.67	17.49	2.98
47		Uganda	15828.8	1,059	28699	5919.02	2139.35	151.24	27.90
48		Zambia	14441.1	1,358	11738	3971.13	4618.62	335.88	8.77
Total African LDCs			**315611.6**	**....**	**455564**	**74640**	**79290.00**	**4488.28**	**202.15**
49	**Latin American LDC**	Haiti	7076.6	1,155	9 410	1457.71	616.63	31.79	0.95

** Non-WTO LDC Members*

Source: Compiled by the author based on ITC Trade Map and following websites: www.unohrlls.org/en/ldc/related/62/, esa.un.org/unpp/index.asp, unstats.un.org/unsd/snaama/dnllist.asp, hdrstats.undp.org/en/indicators/91.html

Table A1.2: Some important submissions/contributions on EGS since Doha Ministerial

Submission	Proposals
Friends of EGs Canada, EU, Japan, Korea, New Zealand, Norway, Switzerland, Chinese Taipei, US JOB (07)/54; 27/04/2007; CTESS	Proposed a 153 list of Environmental Goods in 12 broad categories including a category of Environmentally Preferred Products
India and Argentina JOB (07)/77; 6/6/2007	This outlines the process how goods and services imported in the context of a project would be used only for environmental and how key areas of concern for developing countries, such as transfer of technologies and NTBs, can be addressed.
New Zealand TN/TE/W/49; 26/5/2005; CTESS	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
New Zealand TN/TE/W/46; 10/2/2005	Used 'reference points' to OECD and APEC definitions as a justification for including any products in a list of environmental goods.
New Zealand TN/TE/W/6; 6/6/2002; CTESS	Referred to previous work by APEC and OECD which are good starting points for discussion on the clarification of the concept of environmental goods and services.
United States TN/TE/W/64; 20/02/2006	The document asks questions such as whether the products already in the environmental goods and services list have a clear and direct environmental benefit, if the product has dual/multiple end uses, and whether the product is sensitive or whether it otherwise raises concerns for delegations.
United States TN/TE/W/52; 4/7/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
United States TN/TE/W/34; 19/6/2003; CTESS	Supported the APEC list as a starting point for discussions.
United States TN/TE/W/8; 9/7/2002; CTESS	Negotiations on environmental goods, identified the issues to be considered in defining the scope of environmental goods subject to negotiations and the negotiating process.
Cuba TN/TE/W/69; 30/06/2006	Proposed low enough tariff on developing country exports of EG in developed country markets and mutual recognition and financial and technological support to achieve entry in case of goods facing non-tariff barriers.
Cuba TN/TE/W/55; 5/7/2005	Stressed the importance of addressing NTMs such as certification and eco-labelling requirements. These may actually be much greater than tariffs and could include, among others, various kinds of sanitary standards, intellectual property licensing requirements, subsidies and labelling.
European Union TN/TE/W/56; 5/7/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
Korea TN/TE/W/48; 18/2/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.

Source: WTO.

Table A1.2: Some important submissions/contributions on EGS since Doha Ministerial

Submission	Proposals
European Communities TN/TE/W/47; 17/2/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
China TN/TE/W/42; 6/7/2004; CTESS	Proposed a common list that would include environmental goods of export and import interest to developed countries. Also proposed a 'developmental list' that would be derived from the common list and comprise goods eligible for special and differential treatment in the form of lower levels of reduction commitments for developing countries.
Chinese Taipei TN/TE/W/44; 7/10/2004	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
Argentina TN/TE/W/62; 14/10/2005; CTESS	Members of the CTESS will multilaterally pre-identify categories of environmental projects and environmental goods that could be used in them.
Brazil TN/TE/W/59 8/7/2005 ; CTESS	Definition of EG should aim to achieve trade promotion, environmental improvements and poverty alleviation through income generation and job creation for local population.
Switzerland TN/TE/W/57; 6/7/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
India TN/TE/W/51 TN/TE/W/60 TN/TE/W/67; 3/6/2005	Environmental projects that would benefit from liberalised imports of goods and services would be approved by a designated national authority based on criteria developed by the CTE of the WTO. Domestic implementation of these criteria would be subject to WTO dispute settlement.
Canada TN/TE/W/50; 2/6/2005	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
Qatar TN/TE/W/27; 25/4/2003	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
Qatar TN/TE/W/19; 21/2/2003	Formally proposed specific lists of products. Adopted a "list based" approach to liberalisation by proposing lists of goods that use the ones developed by APEC and OECD as a starting basis.
Qatar TN/TE/W/19; TN/MA/W/24; 28/1/2003; CTESS; NGMA	Provided a list of efficient, lower-carbon and pollutant-emitting fuels and technologies to be included in the OECD list of environmental goods
Qatar TN/TE/W/14, 19, 21; 9/10/2002; CTESS	Environmental Goods – Suggested to include energy efficient goods such as combined-cycle natural gas-fired generation systems and advanced gas turbine systems in the light of environmental goods
Kenya and African Countries TN/TE/W/40; 11/8/2003	Proposed to include agricultural products and the proposal was not pushed further.

Source: WTO.

Table A1.3: Tariffs under preferential schemes

Preferential Agreement	Average Tariff Rate (all HS-6 products)	Average Tariff Rate (tariff peak products)
Canada		
GSP	4.3	28.2
LDCs [1]	4.4	22.8
MFN	8.3	30.5
European Union		
GSP	3.6	19.8
Non-ACP LDCs	0.9	12.4
MFN	7.4	40.3
Japan		
GSP	2.3	22.7
LDCs	1.7	19.0
MFN	4.3	27.8
United States		
GSP	2.4	16.0
Non-AGOA LDCs	1.8	14.4
MFN	5.0	20.8

[1] Does not reflect the recent Canadian initiative with regard to LDCs' exports; for example, under the revised GSP (2002) apparels exports enjoy zero-tariff access to the Canadian market under an LDC-friendly RoO criteria of 25 percent local value addition requirement.

Source: Hoekman, Ng, and Olarreaga (2005) and IMF staff estimates as quoted in Subramanian (2003).

Annex II: Top ten environmental goods exported by top ten LDCs

Table A2.1: Top ten exported products of top ten EG exporting LDCs, 2007: BANGLADESH

HS Code	Product Description	Export of Bangladesh (mln USD)	Share of Total EG Export (%)
530310	Jute and other textile bast fibres, raw or retted	190.17	54.16
630510	Sacks & bags, for packaging of goods, of jute or of other textile bast fibres	82.30	23.44
560710	Twine, cordage, ropes & cables, of jute or other textile bast fibres	25.67	7.31
560890	Knotted netting of twine/cordage/rope, & made up nets of textile materials	9.38	2.67
847989	Machines mechanical appliances having individual functions	5.68	1.62
840999	Parts for diesel & semi-diesel engines	5.53	1.58
842290	Parts of dish washing, cleaning or drying container, packaging or wrapping machinery	5.36	1.53
840681	Turbines, output > 40 MW	4.73	1.35
842940	Tamping machines & road rollers, self propelled	2.39	0.68
732690	Articles, iron or steel	2.22	0.63

Source: ITC Trade Map and UN Comtrade.

Table A2.2: Top ten exported products of top ten EG exporting LDCs, 2007: TANZANIA

HS Code	Product Description	Export of Tanzania (mln USD)	Share of Total EG Export (%)
840682	Turbines, output , 40 MW	11.60	37.25
530410	Sisal & other textile fibres of the genus Agave, raw	6.01	19.31
560721	Binder or baler twine, of sisal textile fibres of the genus Agave	2.96	9.51
901580	Surveying, hydrographic, oceanographic, meteorologic/ geophysical instrument	1.79	5.74
630510	Sacks & bags, for packaging of goods, of jute or of other textile bast fibres	1.30	4.16
842940	Tamping machines & road rollers, self propelled	0.98	3.14
847982	Mixing/kneading/crushing/grinding, screening, sifting, homogenizing, emulsifying or stirring machines having individual function	0.76	2.45
730690	Tubes, pipe & hollow profiles, iron or steel, welded	0.60	1.92
841950	Heat exchange units, non-domestic, non-electric	0.49	1.59
847989	Machines mechanical appliances having individual functions	0.37	1.20
731029	Cans, iron or steel, capacity <50 litres	0.30	0.96

Source: ITC Trade Map and UN Comtrade.

Table A2.3: Top ten exported products of top ten EG exporting LDCs, 2007: NEPAL

HS Code	Product Description	Export of Nepal (mln USD)	Share of Total EG Export (%)
730630	Tubes, pipe & hollow profiles, iron or welded, of circular cross section	13.68	45.68
630510	Sacks & bags, for packaging of goods, of jute or of other textile bast fibres	9.00	30.03
730690	Tubes, pipe & hollow profiles, iron or steel, welded,	3.44	11.47
392010	Film & sheet etc., non-cellular etc., of polymers of ethylene	1.01	3.37
903190	Parts & accessories for measuring or checking instruments, appliances & machines	0.57	1.91
841181	Gas turbines of a power not exceeding 5000 KW	0.51	1.69
847989	Machines & mechanical appliances having individual functions	0.48	1.59
730300	Tubes, pipes & hollow profiles of cast iron	0.24	0.78
902780	Instruments & apparatus for physical or chemical analysis	0.17	0.58
732690	Articles, iron or steel	0.16	0.53

Source: ITC Trade Map and UN Comtrade.

Table A2.4: Top ten exported products of top ten EG exporting LDCs, 2007: UGANDA

HS Code	Product Description	Export of Uganda (mln USD)	Share of Total EG Export (%)
730660	Tubes, pipe & hollow profiles, iron or welded, of circular cross section	19.35	69.35
730690	Tubes, pipe & hollow profiles, iron or steel, welded	2.99	10.70
850239	Electric generating sets	0.72	2.59
903300	Parts & access for machines, appliances, instruments or appliances of Chapter 90	0.64	2.28
850680	Primary cells & primary batteries	0.52	1.87
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	0.42	1.49
850161	AC generators (alternators), of an output not exceeding 75 KVA	0.25	0.90
841440	Air compressors mounted on a wheeled chassis for towing	0.24	0.87
850300	Parts of electric motors, generators, generating sets & rotary converters	0.23	0.82
901580	Surveying, hydrographic, oceanographic, meteorologic/geophysical instrument	0.19	0.69

Source: ITC Trade Map and UN Comtrade.

Table AA2.5: Top ten exported products of top ten EG exporting LDCs, 2007: LIBERIA			
HS Code	**Product Description**	**Export of Liberia (mln USD)**	**Share of Total EG Export (%)**
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	25.67	95.17
840999	Parts for diesel & semi-diesel engines	0.75	2.77
848190	Parts of taps, cocks, valves or similar appliances	0.24	0.90
847989	Machines & mechanical appliances having individual functions	0.16	0.61
847990	Parts of machines & mechanical appliances having individual functions	0.03	0.13
848340	Gears & gearing, ball screws, gear boxes, speed changers/torque converters	0.02	0.09
901580	Surveying, hydrographic, oceanographic, meteorological/geophysical instrument	0.02	0.07
842833	Continuous-action elevators/conveyors for goods/ materials, belt type	0.01	0.05
732690	Articles, iron or steel	0.01	0.04
848140	Valves, safety or relief	0.01	0.03

Source: ITC Trade Map and UN Comtrade.

Table A2.6: Top ten exported products of top ten EG exporting LDCs, 2007: YEMEN			
HS Code	**Product Description**	**Export of Yemen (mln USD)**	**Share of Total EG Export (%)**
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	9.47	37.69
841182	Gas turbines of a power exceeding 5000 KW	3.11	12.38
840999	Parts for diesel & semi-diesel engines	1.47	5.86
901590	Parts & accessories for use with the apparatus of heading No 90.15	1.34	5.35
730300	Tubes, pipes & hollow profiles of cast iron	1.20	4.77
850164	AC generators, of an output exceeding 750 KVA	0.78	3.11
903190	Parts & accessories for measuring or checking instruments, appliances & machines	0.69	2.74
850300	Parts of electric motors, generators, generating sets & rotary converters	0.61	2.44
848140	Valves, safety or relief	0.60	2.37
902680	Instruments apparatus for measuring check variables of liquids or gases, not elsewhere specified	0.50	1.98

Source: ITC Trade Map and UN Comtrade.

Table A2.7: Top ten exported products of top ten EG exporting LDCs, 2007: ANGOLA			
HS Code	**Product Description**	**Export of Angola (mln USD)**	**Share of Total EG Export (%)**
901590	Parts & accessories for use with the apparatus of heading No 90.15	9.06	43.33
901580	Surveying, hydrographic, oceanographic, meteorological/geophysical instruments	1.58	7.56
903289	Automatic regulating or controlling instruments & apparatus	1.55	7.43
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	1.50	7.15
847990	Parts of machines mechanical appliances having individual functions	1.34	6.39
732690	Articles, iron or steel	1.14	5.47
903180	Measuring or checking instruments, appliances & machines	1.11	5.30
848190	Parts of taps, cocks, valves or similar appliances	0.59	2.83
848180	Taps, cocks, valves & similar appliances	0.36	1.70
840999	Parts for diesel & semi-diesel engines	0.32	1.54

Source: ITC Trade Map and UN Comtrade.

Table A2.8: Top ten exported products of top ten EG exporting LDCs, 2007: MADAGASCAR			
HS Code	**Product Description**	**Export of Madagascar (mln USD)**	**Share of Total EG Export (%)**
950720	Fish-hooks, whether or not snelled	3.47	19.26
901580	Surveying, hydrographic, oceanographic, meteorological/geophysical instrument	3.11	17.26
902690	Parts of instruments and appliances for measuring or checking variables of liquids or gases	2.53	14.08
530310	Jute & other textile bast fibres, raw or retted	1.67	9.29
560721	Binder o baler twine, of sisal textile fibres of the genus Agave	1.35	7.48
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	1.08	6.03
840999	Parts for diesel & semi-diesel engines	0.59	3.25
392010	Film & sheet etc, non-cellular etc, of polymers of ethylene	0.57	3.16
732690	Articles, iron or steel	0.47	2.59
850440	Static converters	0.34	1.88

Source: ITC Trade Map and UN Comtrade.

Table A2.9: Top ten exported products of top ten EG exporting LDCs, 2007: SENEGAL

HS Code	Product Description	Export of Senegal (mln USD)	Share of Total EG Export (%)
730820	Towers & lattice masts, iron or steel	2.51	17.09
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	1.34	9.13
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc	1.23	8.36
840999	Parts for diesel & semi-diesel engines	0.96	6.56
731010	Tanks, casks, drums, cans, boxes and similar containers of capacity ≥ 50L but < 300L	0.72	4.93
730660	Tubes, pipe hollow profiles, welded, of non-circular cross section	0.64	4.36
732690	Articles, iron or steel	0.62	4.22
850440	Static converters	0.51	3.49
842940	Tamping machines & road rollers, self propelled	0.50	3.41
848340	Gears gearing, ball screws, gear boxes, speed changers/torque converters	0.46	3.12

Source: ITC Trade Map and UN Comtrade.

Table A2.10: Top ten exported products of top ten EG exporting LDCs, 2007: MYANMAR

HS Code	Product Description	Export of Myanmar (mln USD)	Share of Total EG Export (%)
900190	Prisms, mirrors other optical elements of any material, unmounted	12.14	86.11
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	0.46	3.28
730690	Tubes, pipe hollow profiles, iron or steel, welded	0.39	2.73
732690	Articles, iron or steel	0.14	1.01
903289	Automatic regulating or controlling instruments & apparatus	0.13	0.91
850440	Static converters	0.09	0.67
732510	Cast articles of non-malleable cast iron	0.08	0.57
530310	Jute & other textile bast fibres, raw or retted	0.08	0.57
560314	Non-wovens, man-made filaments weighing > 150g/m^2	0.08	0.53
903149	Optical instruments & appliances	0.07	0.51
841440	Air compressors mounted on a wheeled chassis for towing	0.07	0.51

Source: ITC Trade Map and UN Comtrade.

Annex III: Top ten environmental goods imported by top ten LDCs

Table A3.1: Top ten imported products of top ten EG importing LDCs, 2007: ANGOLA

HS Code	Product Description	Import of Angola (mln USD)	Share of Total EG Import (%)
847989	Machines mechanical appliances having individual functions	105.84	8.48
848180	Taps, cocks, valves and similar appliances	100.44	8.04
901580	Surveying, hydrographic, oceanographic, meteorological/ geophysical instrument	61.92	4.96
732690	Articles, iron or steel	53.93	4.32
847990	Parts of machines, mechanical appliances having individual functions	50.00	4.00
901590	Parts & accessories for use with the apparatus of heading No. 90.15	47.49	3.80
848190	Parts of taps, cocks, valves or similar appliances	43.23	3.46
842940	Tamping machines & road rollers, self propelled	38.11	3.05
853710	Boards, panels, including numerical control panels, for a voltage ≤1000 V	35.69	2.86
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	31.03	2.49

Source: ITC Trade Map and UN Comtrade.

Table A3.2: Top ten imported products of top ten EG importing LDCs, 2007: SUDAN

HS Code	Product Description	Import of Sudan (mln USD)	Share of Total EG Import (%)
730820	Towers & lattice masts, iron or steel	45.98	6.79
840999	Parts for diesel & semi-diesel engines	41.12	6.07
840290	Parts for diesel & semi-diesel engines	39.19	5.78
841090	Parts of hydraulic turbines water wheels including regulators	33.22	4.90
841360	Rotary positive displacement pumps	27.93	4.12
850300	Parts of electric motors, generators, generating sets & rotary converters	26.93	3.97
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	23.84	3.52
841370	Centrifugal pumps	23.53	3.47
730900	Reservoirs, tanks, vats & similar container, of a capacity more than 300L, iron or steel (other than compressed or liquified gas)	17.77	2.62
847989	Machines & mechanical appliances having individual functions	16.91	2.50

Source: ITC Trade Map and UN Comtrade.

Table A3.3: Top ten imported products of top ten EG importing LDCs, 2007: BANGLADESH			
HS Code	**Product Description**	**Import of Bangladesh (mln USD)**	**Share of Total EG Import (%)**
847989	Machines & mechanical appliances having individual functions	62.78	12.87
850440	Static converters	25.29	5.18
853710	Boards, panels, Including numerical control panels, for a voltage ≤ 1000 V	22.73	4.66
841480	Air or gas compressors, hoods	22.51	4.61
840999	Parts for diesel & semi-diesel engines	16.88	3.46
854140	Industrial & laboratory electric resistance heated furnaces & ovens	16.61	3.40
730820	Towers & lattice masts, iron or steel	15.45	3.17
850300	Parts of electric motors, generators, generating sets & rotary converters	13.70	2.81
842121	Filtering or purifying machinery & apparatus for water	13.25	2.71
841989	Machinery, plant/laboratory equip f treat of mat by change of temperature	12.87	2.64

Source: ITC Trade Map and UN Comtrade.

Table A3.4: Top ten imported products of top ten EG importing LDCs, 2007: YEMEN			
HS Code	**Product Description**	**Import of Yemen (mln USD)**	**Share of Total EG Import (%)**
841182	Gas turbines of a power exceeding 5000 KW	40.09	10.66
840999	Parts for diesel & semi-diesel engines	21.74	5.78
850164	AC generators, of an output exceeding 750 KVA	20.07	5.33
730300	Tubes, pipes & hollow profiles of cast iron	19.33	5.14
730690	Tubes, pipe & hollow profiles, iron or steel, welded	18.52	4.92
850162	AC generators, of an output exceeding 75 KVA but not exceeding 375 KVA	17.02	4.52
841869	Refrigerating or freezing equipment	14.28	3.80
850300	Parts of electric motors, generators, generating sets & rotary converters	13.39	3.56
730820	Towers & lattice masts, iron or steel	10.49	2.79
732690	Articles, iron or steel	8.22	2.18

Source: ITC Trade Map and UN Comtrade.

Table A3.5: Top ten imported products of top ten EG importing LDCs, 2007: ZAMBIA			
HS Code	**Product Description**	**Import of Zambia (mln USD)**	**Share of Total EG Import (%)**
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	31.29	9.32
730690	Tubes, pipe & hollow profiles, iron or steel, welded	30.74	9.15
841381	Pumps	21.99	6.55
850300	Parts of electric motors, generators, generating sets & rotary converters	20.41	6.08
841790	Parts of industrial/lab furnaces & ovens including incinerators non-electric	18.36	5.47
848180	Taps, cocks, valves & similar appliances	10.24	3.05
850440	Static converters	9.73	2.90
730820	Towers & lattice masts, iron or steel	9.20	2.74
847989	Machines & mechanical appliances having individual functions	8.25	2.45
841370	Centrifugal pumps	8.16	2.43

Source: ITC Trade Map and UN Comtrade.

Table A3.6: Top ten imported products of top ten EG importing LDCs, 2007: ETHIOPIA			
HS Code	**Product Description**	**Import of Ethiopia (mln USD)**	**Share of Total EG Import (%)**
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	29.38	9.44
842940	Tamping machines & road rollers, self propelled	24.62	7.91
850680	Primary cells & primary batteries	23.39	7.51
850239	Electric generating sets	17.47	5.61
730690	Tubes, pipe & hollow profiles, iron or steel, welded	15.50	4.98
730820	Towers & lattice masts, iron or steel	13.61	4.37
732690	Articles, iron or steel	11.64	3.74
848140	Valves, safety or relief	11.13	3.58
850300	Parts of electric motors, generators, generating sets & rotary converters	10.01	3.22
850440	Static converters	8.68	2.79

Source: ITC Trade Map and UN Comtrade.

Table A3.7: Top ten imported products of top ten EG importing LDCs, 2007: MYANMAR

HS Code	Product Description	Import of Myanmar (mln USD)	Share of Total EG Import (%)
840999	Parts for diesel & semi-diesel engines	26.85	9.09
841960	Machinery for liquefying air or gas	23.18	7.84
900190	Prisms, mirrors & other optical elements of any material, unmounted	17.75	6.01
560811	Made up fishing nets, of man-made textile materials	12.90	4.37
841090	Parts of hydraulic turbines & water wheels including regulators	9.77	3.31
730690	Tubes, pipe & hollow profiles, iron or steel, welded	8.66	2.93
841480	Air or gas compressors, hoods	8.44	2.86
850239	Electric generating sets	7.12	2.41
730820	Towers & lattice masts, iron or steel	7.02	2.38
841490	Parts of vacuum pumps, compressors, fans, blowers, hoods	6.37	2.16

Source: ITC Trade Map and UN Comtrade.

Table A3.8: Top ten imported products of top ten EG importing LDCs, 2007: TANZANIA

HS Code	Product Description	Import of Tanzania (mln USD)	Share of Total EG Import (%)
841182	Gas turbines of a power exceeding 5000 KW	46.56	17.79
730820	Towers & lattice masts, iron or steel	33.98	12.99
850300	Parts of electric motors, generators, generating sets & rotary converters	15.69	6.00
560811	Made up fishing nets, of man-made textile materials	11.59	4.43
850440	Static converters	9.04	3.46
850161	AC generators (alternators), of an output not exceeding 75 KVA	7.76	2.97
840999	Parts for diesel & semi-diesel engines	6.38	2.44
841381	Pumps	5.45	2.08
903289	Automatic regulating or controlling instruments & apparatus	5.36	2.05
854140	Photosensitive semi-conducting device, photovoltaic cells & light emitting diodes	5.05	1.93

Source: ITC Trade Map and UN Comtrade.

Table A3.9: Top ten imported products of top ten EG importing LDCs, 2007: SENEGAL			
HS Code	**Product Description**	**Import of Senegal (mln USD)**	**Share of Total EG Import (%)**
730820	Towers & lattice masts, iron or steel	14.31	7.87
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	13.37	7.35
840999	Parts for diesel & semi-diesel engines	12.72	7.00
730300	Tubes, pipes & hollow profiles of cast iron	9.59	5.28
850440	Static converters	8.89	4.89
732690	Articles, iron or steel	7.86	4.32
848180	Taps, cocks, valves & similar appliances	6.82	3.75
842940	Tamping machines & road rollers, self propelled	6.68	3.67
841381	Pumps	6.63	3.65
842121	Filtering or purifying machinery & apparatus for water	4.78	2.63

Source: ITC Trade Map and UN Comtrade.

Table A3.10: Top ten imported products of top ten EG importing LDCs, 2007: CONGO			
HS Code	**Product Description**	**Import of Congo (mln USD)**	**Share of Total EG Import (%)**
730820	Towers & lattice masts, iron or steel	8.91	5.47
841381	Pumps	8.39	5.15
730900	Reservoirs, tanks, vats & similar container, of a capacity more than 300L, iron or steel (other than compressed or liquified gas)	7.90	4.85
730690	Tubes, pipe & hollow profiles, iron or steel, welded	7.32	4.49
848180	Taps, cocks, valves & similar appliances	6.79	4.16
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	6.39	3.92
853710	Boards, panels, including numerical control panels, for a voltage ≤ 1000 V	6.24	3.83
730660	Tubes, pipe & hollow profiles, welded, of non-circular cross section	6.12	3.75
847989	Machines & mechanical appliances having individual functions	5.58	3.42
842290	Parts of dish washing, cleaning or drying container, packaging or wrapping machine	5.53	3.40

Source: ITC Trade Map and UN Comtrade.

Annex IV: Impact of tariff reductions

Table A4.1: Gains from duty-free access of EGs from LDCs in high income countries

HS Code	Product Description	Effectively Applied Tariff Rates (Weighted Avg.)	Export (mln USD)	Value of Tariff (Forgone gains, mln USD)
530310	Jute & other textile bast fibres, raw or retted	0	192.2	0
630510	Sacks & bags, for package of goods, of jute or of other textile bast fibres	0.15	93.6	0.14
890790	Buoys, beacons, coffer-dams, pontoons & other floating structures	0.39	39.1	0.15
560710	Twine, cordage, ropes & cables, of jute or other textile bast fibres	9.47	28.4	2.69
730660	Tubes, pipe & hollow profiles, welded, of non-circular cross section	0.64	22.8	0.15
730630	Tubes, pipe & hollow profiles, iron or welded, of circular cross section	0.35	14.4	0.05
901590	Parts & accessories for use with the apparatus of heading No. 90.15	1.08	12.8	0.14
900190	Prisms, mirrors other optical elements of any material, unmounted	0.36	12.2	0.04
847989	Machines & mechanical appliances having individual functions	0.81	11.8	0.10
840682	Turbines output , 40 MW	1.99	11.6	0.23
	TOTAL		**438.8**	**3.69**

Source: Estimated by the author based on Tables 13 and 15.

Table A4.2: Tariffs on top five EG imported by top ten EG importing LDCs

HS Code	Product Description	Tariff Rates (%)
Angola		
847989	Machines & mechanical appliances having individual functions	2
848180	Taps, cocks, valves and similar appliances	2
901580	Surveying, hydrographic, oceanographic, meteorological/ geophysical instruments	2
732690	Articles, iron or steel	10
847990	Parts of machines, mechanical appliances having individual functions	2
Sudan		
730820	Towers & lattice masts, iron or steel	4.51
840999	Parts for diesel & semi-diesel engines	7.47
840290	Parts for diesel & semi-diesel engines	10
841090	Parts of hydraulic turbines water wheels including regulators	10
841360	Rotary positive displacement pumps	10
Bangladesh		
847989	Machines & mechanical appliances having individual functions	1.67
850440	Static converters	7.33
853710	Boards, panels, Including numerical control panels, for a voltage ≤ 1000 V	8.5
841480	Air or gas compressors, hoods	9.13
840999	Parts for diesel & semi-diesel engines	5
Yemen		
841182	Gas turbines of a power exceeding 5000 KW	5
840999	Parts for diesel & semi-diesel engines	5
850164	AC generators, of an output exceeding 750 KVA	5
730300	Tubes, pipes & hollow profiles of cast iron	5
730690	Tubes, pipe & hollow profiles, iron or steel, welded	5
Zambia		
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	0
730690	Tubes, pipe & hollow profiles, iron or steel, welded	1.97
841381	Pumps	3.51
850300	Parts of electric motors, generators, generating sets & rotary converters	3.48
841790	Parts of industrial/lab furnaces & ovens including incinerators non-electrical	0

Source: WITS Database.

Table A4.2: Tariffs on top five EG imported by top ten EG importing LDCs

HS Code	Product Description	Tariff Rates (%)
Ethiopia		
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	5
842940	Tamping machines & road rollers, self propelled	5
850680	Primary cells & primary batteries	19.86
850239	Electric generating sets	4.96
730690	Tubes, pipe & hollow profiles, iron or steel, welded	10
Myanmar		
840999	Parts for diesel & semi-diesel engines	3.38
841960	Machinery for liquefying air or gas	1
900190	Prisms, mirrors & other optical elements of any material, unmounted	3
560811	Made up fishing nets, of man-made textile materials	1
841090	Parts of hydraulic turbines & water wheels including regulators	1
Tanzania		
841182	Gas turbines of a power exceeding 5000 KW	0
730820	Towers & lattice masts, iron or steel	0
850300	Parts of electric motors, generators, generating sets & rotary converters	0
560811	Made up fishing nets, of man-made textile materials	9.98
850440	Static converters	0
Senegal		
730820	Towers & lattice masts, iron or steel	4.68
847420	Crushing/grinding machines for earth/stone/ores minerals substances etc.	5
840999	Parts for diesel & semi-diesel engines	10
730300	Tubes, pipes & hollow profiles of cast iron	15
850440	Static converters	5
Congo		
730820	Towers & lattice masts, iron or steel	10
841381	Pumps	10
730900	Reservoirs, tanks, vats & similar container, of a capacity > 300L, iron or steel (other than compressed or liquified gas)	15
730690	Tubes, pipe & hollow profiles, iron or steel, welded	-
848180	Taps, cocks, valves & similar appliances	10

Source: WITS Database.

Table A4.3: Gains from duty-free access of imported EGs to LDCs

HS Code	Product Description	Effectively Applied Tariff Rates (Weighted Avg.)	Total Import (mln USD)	Value of Tariff Imposed in LDCs (mln USD)
730820	Towers & lattice masts, iron or steel	4.3	281.1	12.09
847989	Machines & mechanical appliances having individual functions	3.9	274.5	10.71
840999	Parts for diesel & semi-diesel engines	7.68	261	20.04
848180	Taps, cocks, valves & similar appliances	5.07	215.5	10.93
732690	Articles, iron or steel	12.84	202.1	25.95
850300	Parts of electric motors, generators, generating sets and rotary converters	4.27	179.9	7.68
847420	Crushing/grinding machines for earth/stone/ores, minerals substances etc.	2.99	179.8	5.38
850440	Static converters	3.33	158.4	5.27
853710	Boards, panels, including numerical control panels, for a voltage ≤ 1000 V	5.77	147.9	8.53
730690	Tubes, pipe & hollow profiles, iron or steel, welded	8.11	142.4	11.55
	TOTAL		**2042.4**	**118.13**

Source: Estimated by the author based on Tables 13 and 15.

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