

From Boom to Dust?

*Agricultural trade liberalization, poverty, and desertification
in rural drylands: The role of UNCCD*

Prepared by
Unisféra International Centre

Karel Mayrand
Marc Paquin
Stéphanie Dionne

With the financial support of the
Canadian International Development Agency (CIDA)

April 2005

Table of Contents

LIST OF ACRONYMS	ii
LIST OF MAPS AND TABLES	iv
EXECUTIVE SUMMARY	v
INTRODUCTION	1
I. AGRICULTURE, DESERTIFICATION AND POVERTY IN RURAL DRYLANDS.....	2
DESERTIFICATION AND THE UNCCD: DEFINITIONS AND APPROACHES	3
<i>An Overview of Desertification Worldwide</i>	<i>3</i>
<i>The UNCCD Approach: Addressing Poverty and Environmental Degradation.....</i>	<i>5</i>
AGRICULTURE AND DESERTIFICATION: SOCIAL AND ENVIRONMENTAL INTERRELATIONS	6
<i>The Impacts of Agricultural Production on Land Degradation and Desertification</i>	<i>6</i>
<i>Agriculture, Land Degradation and Poverty in the Rural Drylands.....</i>	<i>7</i>
II. AGRICULTURAL TRADE LIBERALIZATION AND DESERTIFICATION.....	9
THE ECONOMIC IMPACTS OF AGRICULTURAL TRADE LIBERALISATION	10
THE IMPACTS OF AGRICULTURAL TRADE LIBERALISATION ON RURAL LIVELIHOODS.....	13
THE ENVIRONMENTAL IMPACTS OF AGRICULTURAL TRADE LIBERALISATION IN DRYLANDS	16
III. CASE STUDIES FROM BURKINA FASO, PAKISTAN, AND BRAZIL.....	19
EXPORT-ORIENTED COTTON PRODUCTION IN BURKINA FASO	19
<i>The Impacts of Cotton Production on Desertification</i>	<i>21</i>
<i>The Impacts of Cotton Production on Rural Livelihoods.....</i>	<i>24</i>
<i>Policy Implications for UNCCD Implementation</i>	<i>25</i>
EXPORT-ORIENTED RICE AND COTTON PRODUCTION IN PAKISTAN	25
<i>The Impacts of Rice and Cotton Production on Land Degradation and Desertification.....</i>	<i>29</i>
<i>The Impacts of Rice and Cotton Production on Rural Livelihoods.....</i>	<i>31</i>
<i>Policy Implications for UNCCD Implementation</i>	<i>32</i>
EXPORT-ORIENTED SOYBEAN PRODUCTION IN BRAZIL.....	32
<i>The Impacts of Soybean Production on Land Degradation in the Cerrado.....</i>	<i>35</i>
<i>The Impacts of Soybean Production on Rural Livelihoods.....</i>	<i>36</i>
<i>Policy Implications for UNCCD Implementation</i>	<i>37</i>
IV. THE DOHA ROUND: POLICY IMPLICATIONS FOR THE UNCCD	38
ANTICIPATING THE OUTCOMES OF THE DOHA ROUND	38
POLICY RECOMMENDATIONS FOR UNCCD IMPLEMENTATION	41
CONCLUSION	44
BIBLIOGRAPHY	45

List of acronyms

\$	US dollar
AproCA	Association of African Cotton Producers
CBD	United Nations Convention on Biological Diversity
CEC	Commission for Environmental Cooperation of North America
CGIAR	Consultative Group on International Agricultural Research
CONAB	<i>Companhia Nacional de Abastecimento</i> (Brazil)
CRIC	Committee for the Review of the Implementation of the Convention (UNCCD)
DFID	Department for International Development (UK)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
GDP	Gross Domestic Product
GTZ	<i>Gesellschaft für Technische Zusammenarbeit</i> (Germany)
Ha	Hectare
ICTSD	International Centre for Trade and Sustainable Development
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
IISD	International Institute for Sustainable Development
INSD	<i>Institut national de la statistique et de la démographie</i> (Burkina Faso)
ISRIC	International Soil Reference and Information Centre
kg	Kilogram
km	Kilometre
lb	Pound
LDCs	Least-developed countries
MDG	Millennium Development Goal
MEA	Multilateral environmental agreement
Mt	Million tonnes
NAFTA	North American Free Trade Agreement
NAP	National Action Programme
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development

PRSP	Poverty Reduction Strategy Paper
SAF	South Asian Floods
UK	United Kingdom
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
US	United States of America
USA	United States of America
USDA	United States Department of Agriculture
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

List of Maps and Tables

Maps

Map 1: Soil degradation in the world's drylands	4
Map 2: Changes in the geographical distribution of cotton production in Burkina Faso	23
Map 3: Provinces of Pakistan	27
Map 4: Crop production in Pakistan	27
Map 5: Soybean production in Brazil	34

Tables

Table 1: Types of agricultural producers in the developing world	15
Table 2: Types of farmers in Central America	15
Table 3: Burkina Faso's cotton production (1998-2004)	20
Table 4: Land area and population per type of dryland in Burkina Faso	22
Table 5: Poverty trends by socioeconomic groups	25
Table 6: Crop area, production, and yield in Punjab and Sindh (2002-2003)	26
Table 7: Paddy rice production in Pakistan	28
Table 8: Cotton production in Pakistan	28
Table 9: Overview of drylands in Punjab and Sindh	29
Table 10: Water requirements and area cultivated for Pakistan's main crops	30
Table 11: Incidence of rural/urban poverty by province (1990-1999)	31
Table 12: Soybean production in Brazil	33
Table 13: Agricultural exports by commodity	35

Executive Summary

The Millennium Development Goals (MDGs) commit the international development community to a series of objectives and targets to be achieved by 2015. They establish two interrelated goals: poverty alleviation and environmental sustainability. MDG 1 sets the objective to halve the number of people living on less than one US dollar a day (target 1) and of those suffering from hunger (target 2) by 2015. MDG 7 sets the objective to integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources (target 9). These environmental and poverty alleviation goals are closely connected.

Indeed, there is a high correlation among extreme poverty, land degradation, and rural livelihoods in the world. This relationship is even more pronounced in rural drylands. Over 1.2 billion of the world's population lives in extreme poverty, of which 900 million live in rural areas where their livelihoods depend on the consumption and sale of natural products. About two-thirds of these rural poor live in ecologically vulnerable areas. Of these, a high proportion lives in dryland areas, 250 million of whom are directly affected by desertification.

There is a similar correspondence among hunger, small-scale agriculture, and environmental vulnerability. Globally, some 852 million people suffer from hunger; of these, a large number are rural farmers. The highest prevalence of hunger is found in remote areas where food production is affected by economic, environmental, or climatic shocks. This includes dryland areas where an estimated 44% of the world's malnourished children live. According to the Millennium Project's Task Force on Hunger, about half of the undernourished people in the world are small farmers, 20% are landless rural dwellers, 10% are pastoralists and fishermen, and the remaining 20% are urban dwellers.

The marginalisation of developing country farmers in the multilateral trading system is often described as a major driver of persistent poverty in the world. They are seen as the main potential beneficiaries of further liberalisation in world agricultural trade. Given the stakes for developing countries, the Doha Round has been described as a "development round" and as a major undertaking to alleviate poverty worldwide.

This report looks at the interconnections among agricultural trade liberalisation, land degradation, and poverty in the world's rural drylands. It seeks to better understand the implications of the Doha Round on UNCCD implementation, and to derive policy implications to improve coherence among agricultural trade, poverty alleviation, and land management strategies, with a specific focus on activities to combat desertification under the framework of the UNCCD. In line with the UNCCD approach, the analysis considers both the environmental and socio-economic drivers of desertification.

The report first describes the complex relationships among agriculture, land degradation, poverty, and the marginalisation of dryland communities and then analyses how agricultural trade intervenes in these interactions. It is argued that although trade liberalisation can lead to higher rural incomes, current structural issues in global agricultural markets converge to increase the vulnerability of developing country farmers and exclude them from world markets; these issues include non-liberalised markets, declining terms of trade for commodities, and concentration in food processing and agricultural input sectors. Moreover, low infrastructure, insufficient access to farm inputs, remoteness from foreign markets, and lack of investment make dryland farmers less productive – and therefore less competitive and capable of accessing world markets. In this context, investments to improve agricultural productivity and build rural capacities are necessary to ensure the integration of drylands in world agricultural markets.

The report finds that agricultural trade affects desertification through two main drivers. The first is the intensification of production and the replacement of small-scale agriculture by intensive industrial monocultures. Large-scale agriculture's intensive use of agro-chemicals, irrigation systems, and mechanized farming techniques can have major impacts on soil quality and dryland ecosystems. On the other hand, trade may bring new investments and technologies that can improve yields while maintaining the land's productive capacity. It is argued that unless trade liberalisation is accompanied by improvements in agricultural practices and land management, it is likely to lead to massive land degradation.

The second way in which agricultural trade may affect desertification is through its impacts on rural livelihoods, most specifically through its effects on the livelihoods of small farmers in dryland areas. This report argues that the impact of agricultural trade liberalisation on poverty alleviation in rural drylands is contingent on the capacity of small farmers to seize new opportunities created by the opening of markets to raise their incomes. Small farmers tend to be vulnerable to the structural transformations of agriculture resulting from trade liberalisation. The shift from food to cash-crop production can raise incomes and improve food security, but the export sector can also displace and marginalise small farmers in terms of access to land, water, farm inputs, and state support. This may push small farmers onto marginal lands and force them to resort to unsustainable survival patterns, thereby exacerbating the land degradation/poverty spiral that is one of the root causes of desertification.

Three case studies are presented to illustrate these interactions: an analysis of the past and present impacts of export-oriented rice and cotton production in Pakistan, cotton production in Burkina Faso, and soybean production in Brazil. In Burkina Faso, cotton production is associated with a raise in farmer revenues and improved food security. At the same time, there are concerns about the impacts on land degradation of a shift to cotton production and on intensified harvesting in the southwest of the country. In Pakistan, rice and cotton production is found to increase salinisation, waterlogging, and land contamination problems associated with intensive irrigated agriculture. This leads to stagnating yields and when combined with demographic pressures, it results in increased rural poverty. Moreover, the structure of commodities markets in Pakistan is found to be detrimental to small farmers. Finally, in Brazil, large-scale intensive soybean monoculture is associated with important land degradation problems in fragile lands in the centre-west region. Large-scale monoculture creates limited employment opportunities for small farmers and landless peasants, which in turn leads to rural migration and the unsustainable exploitation of marginal lands and forest products.

The last section adopts a prospective approach to analyse the potential impacts of the Doha Round on rural poverty and desertification in the developing world. It shows that the Doha Round is unlikely to resolve the commodities price crisis that hurts developing country farmers and to address the concentration of the supply chain in agriculture. Moreover, it is unlikely to address the structural weaknesses that prevent developing countries from seizing the opportunities afforded by trade liberalisation. Lastly, it is argued that the Doha Round has the potential to intensify land degradation and rural poverty if appropriate flanking policies are not put in place.

The UNCCD can play a role in this regard by addressing the two trade-related drivers of land degradation: the expansion and intensification of export-oriented agriculture, and the marginalisation of small farmers. It can do so by contributing to the improvement of land management and agricultural practices, and by actively supporting small farmers, securing their resource base, building their capacity, improving their agricultural practices, and facilitating access to farm inputs and financial resources.

This report proposes the development of targeted joint programmes involving economic, environmental, and agriculture departments designed to specifically address the impacts of trade

liberalisation on rural livelihoods and land degradation. Such an approach would facilitate the mainstreaming of the UNCCD framework by focusing on concrete actions and by aligning the UNCCD to high-profile economic and development processes. It is argued that such an approach would be easier to finance, and would provide results that are more easily measurable than broad, far reaching national programmes.

In this perspective, it is suggested that National Action Programmes (NAPs) be adapted to include concrete measures reflecting the challenges and opportunities generated by the new environment created by the national and international liberalisation of the agricultural sector. A first step could be to undertake national assessments of the potential impacts of trade liberalisation on desertification so as to identify areas in which intervention is most needed so as to avoid perverse impacts and maximise positive ones on rural livelihoods and land degradation. Such assessments could lead to national roundtables where stakeholders – donors; economic, agriculture, and environment departments; UNCCD focal points; and others – would define and adopt strategic, targeted interventions.

At the multilateral level, the CRIC could hold a special session on the impacts of agricultural trade liberalisation on desertification. Such a session could help document national impacts and facilitate the exchange of expertise and best practices with a view to enhancing the effectiveness of the UNCCD in the context of the rapid macro-economic and land-use change often associated with trade liberalisation. Overall, by clearly establishing and documenting the relationship among agricultural trade liberalisation, poverty, and land degradation in drylands, the case for enhanced financial support for UNCCD implementation could be strengthened in the context of the MDGs. This report provides an overview of these issues, although more research will be needed at the country level.

The stakes of agricultural trade liberalisation are high in rural drylands. In the absence of appropriate policy interventions and investments, it is unlikely that trade will lead to a generalised increase in rural incomes. Rather, it could lead to the exclusion of small farmers and to the deterioration of their agricultural resource base. The development community needs to take on the challenge of drylands agricultural productivity and support the equitable and sustainable inclusion of dryland farmers into world trade. Under current conditions, the economic boom promised through trade liberalisation is likely to turn to dust for millions of rural dwellers.

Introduction

The Millennium Development Goals (MDGs) commit the international development community to a series of objectives and targets to be achieved by 2015. Together, these goals set a new strategic framework to address development issues, prioritize action, and improve coherence in international activity. Given the diversity of the MDGs and their interrelations, their attainment will require the coherent mobilization of international policies and financial resources.

The MDGs establish the two interrelated goals of poverty alleviation and environmental sustainability. MDG 1 sets the objective to halve by 2015 the number of people living with less than one US dollar a day (target 1) and of those suffering from hunger (target 2).¹ MDG 7 sets the objective to integrate the principles of sustainable development into country policies and programmes and to reverse the loss of environmental resources (target 9).² Although this last target is not accompanied by quantifiable indicators, its attainment is both measurable and of fundamental importance for achieving the other MDGs, especially those related to poverty and hunger.

Indeed, there is a high correlation between extreme poverty, land degradation, and rural livelihoods in the world. This correlation is even more pronounced in rural drylands. Over 1.2 billion people of the world's population lives in extreme poverty, of which 900 million live in rural areas where their livelihoods depend on the consumption and sale of natural products.³ About two-thirds of these rural poor live in ecologically vulnerable areas. Of these, a high proportion lives in dryland areas, 250 million of whom are directly affected by desertification.⁴

There is a similar correspondence among hunger, small-scale agriculture, and environmental vulnerability. Globally, some 852 million people suffer from hunger; of these, a large number are rural farmers.⁵ The highest prevalence of hunger is found in remote areas where food production is affected by economic, environmental, or climatic shocks.⁶ This includes dryland areas where an estimated 44% of the world's malnourished children live.⁷ According to the Millennium Project's Task Force on Hunger, about half the undernourished people in the world are small farmers, 20% are landless rural dwellers, 10% are pastoralists and fishermen, and the remaining 20% are urban dwellers.⁸

These figures show that a significant share of the world's poor and undernourished are rural farmers suffering from a combination of socio-economic marginalisation and the degradation of their resource

¹ These targets are set on a 1990 baseline. www.developmentgoals.org.

² www.developmentgoals.org.

³ UNDP (2003a). *Human Development Report - 2003 Millennium Development Goals: A Compact Among Nations to End Human Poverty*. New York: UNDP. p.123.

⁴ Vitalis, V. (2004). *Trade, Agriculture, the Environment and Development: Reaping the Benefits of a Win-Win*. Paper presented at a Strategic Dialogue on Agriculture, Trade Negotiations, Poverty and Sustainability, Windsor, UK: ICTSD-IIED. July 14-16. p.2. See also, Nelson, M. *et al.* (1997). *Report of the Study on CGIAR Research Priorities for Marginal Lands*. TAC Working Document. Technical Advisory Committee Secretariat, FAO. March, cited in Scherr, S. (1999). "Dryland Degradation and Poverty" in World Bank (1999). *Drylands, Poverty and Development. Proceedings of the June 15 and 16, 1999 World Bank Round Table*. Washington: World Bank, November. pp. 69-77.

⁵ UN Millennium Project (2005a). *Halving Hunger: It Can be Done*. Task Force on Hunger. p.3.

⁶ UN Millennium Project (2005a), *supra*, p.3.

⁷ Sharma, M. *et al.* (1996). *Overcoming Malnutrition: Is There an Ecoregional Dimension?* Food, Agriculture, and the Environment Discussion Paper 10. Washington, D.C.: International Food Policy Research Institute. February. Cited in Scherr, S. (1999), *supra*, p.70.

⁸ UN Millennium Project (2005a), *supra*, pp.3-4.

base. Desertification, drought, and declining agricultural yields are major drivers of poverty and hunger among these populations. Under such conditions, poverty alleviation strategies must involve actions to combat desertification and favour the development of sustainable land management practices that improve the livelihoods of poor rural peoples. Accordingly, the World Summit on Sustainable Development (WSSD) recognised the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) as “one of the tools for poverty eradication” in the world and as being in line with the MDGs.⁹

The marginalisation of developing-country farmers in the multilateral trading system is often described as another major driver of persistent worldwide poverty. The Doha Round of trade liberalisation, which was launched in 2001 under the auspices of the World Trade Organisation (WTO), aims to support development and address the marginalization of least-developed countries (LDCs) in international trade through trade liberalisation, notably in agriculture.¹⁰ Given the stakes for developing countries, the Doha Round has been described as a “development round” and as a major undertaking to alleviate poverty in the world. The WSSD also endorsed the Doha initiative, emphasizing its potential for developing countries.¹¹

The outcomes of the Doha Round will likely profoundly impact agriculture and affect rural livelihoods in developing countries’ rural drylands, including those regions affected or threatened by desertification. These potential impacts will condition the achievement of MDGs 1 and 7 as well as the implementation of the UNCCD in the next decade. The objective of this report is to describe and analyse the interconnections among agricultural trade liberalisation, land degradation, and poverty in rural drylands. It seeks to better understand the implications of the Doha Round on UNCCD implementation, and to derive policy implications to improve the coherence among poverty alleviation, agricultural trade, and land management strategies with a specific focus on activities to combat desertification under the framework of the UNCCD.

The report is divided into four sections. Section I reviews recent studies on agriculture, desertification, and poverty in rural drylands. Section II analyses how agricultural trade liberalisation affects agricultural development, land degradation, and the livelihoods of small farmers in rural dryland areas. In section III, three case studies are presented to illustrate these interactions: an analysis of past and present impacts of export oriented rice and cotton production in Pakistan; cotton production in Burkina Faso; and soybean production in Brazil. Finally, section IV adopts a prospective approach and analyses potential outcomes of the Doha Round with a view to deriving policy implications for the effective implementation the UNCCD and improving policy coherence to achieve the MDGs.

I. Agriculture, Desertification and Poverty in Rural Drylands

The signature of the UNCCD in 1994 crystallized a consensus definition of desertification. It also introduced an innovative approach to combat this phenomenon that focused on both natural and socio-economic processes, and on participation in particular. This innovative approach was strongly inspired by the concept of sustainable development and by new insights that linked desertification to interactions between environmental degradation and poverty.

⁹ United Nations (2002). *Plan of Implementation of the World Summit on Sustainable Development*. Johannesburg, 4 September. Chapter II, par.7 (l).

¹⁰ World Trade Organisation (2001). *Doha WTO Ministerial 2001: Ministerial Declaration*. Doha, Qatar, 20 November. WT/MIN(01)/DEC/1, par. 3.

¹¹ United Nations (2002), *supra*, chapter V, par.47 (a).

The linkages among agriculture, rural livelihoods, and land degradation in drylands have been widely researched and documented in the past three decades. This section provides an overview of desertification worldwide and summarises the UNCCD approach, showing how the latter bridges developmental and environmental concerns to make it a true sustainable development instrument as well as a useful tool to support MDGs 1 and 7. It then describes the social and environmental interrelations between agriculture and desertification, laying the ground for an analysis of the impacts of trade liberalisation in section II. Given that the linkages among agriculture, rural livelihoods, and land degradation in drylands have already been well explored elsewhere, this section provides only a general overview of these issues.

Desertification and the UNCCD: Definitions and Approaches

An Overview of Desertification Worldwide

Drylands cover approximately 47% of the global landmass and are home to 35% of the world's population, or 1.7 billion people.¹² Estimates of rural dryland populations vary from 900 million to 1.2 billion.¹³ It is thought that desertification directly affects 250 million rural dwellers and that 135 million are at risk of being forced to abandon their land.¹⁴

Estimates of land area affected by desertification range from 36% of the world's drylands or 1,900 million ha,¹⁵ to 70% or 3,600 million ha¹⁶ depending on the methodologies or definitions used. In Africa, an estimated 500 million ha of land are affected by land degradation, including two thirds of the region's productive agricultural land.¹⁷ It is estimated that between 5 and 6 million ha are permanently lost to agriculture each year through human-induced soil degradation.¹⁸

The causes of land degradation in the world include overgrazing (680 million ha), deforestation (580 million ha), agricultural mismanagement (550 million ha), fuelwood overconsumption (137 million ha), and industry and urbanization (19.5 million ha).¹⁹ As these figures show, land degradation is directly linked to agricultural practices. It is estimated that the annual economic costs of desertification worldwide exceed US\$ 42 billion, including both output forgone and damage to natural resources, while the costs of combating desertification is estimated to be in the range of US\$ 10 to 22 billion per year.²⁰

Map 1 presents a view of land degradation in the world's drylands. It shows that desertification is a global phenomenon affecting – to various extents – over 100 countries on every continent. The regions most affected are the Sahel, Northern Africa and the Middle East, Central Asia, and areas of Southern Asia and Latin America.

¹² Secretariat of the United Nations Convention on Biological Diversity (2001). *Global Biodiversity Outlook 2001*. Montreal; GTZ. *Fact Sheet Desertification*. www.gtz.de/desert.

¹³ See, Dobie, P. (2001). *Poverty and the Drylands*. Nairobi: UNDP Drylands Development Centre. September; see also UNCCD (2004), *supra*, p.4.

¹⁴ UNCCD (2004). *supra*, pp.2 and 4.

¹⁵ UNEP (2002). *Global Environment Outlook 3 (GEO-3), Past Present and Future Perspectives*. New York: UNEP.

¹⁶ GTZ, *supra*.

¹⁷ UNEP (2002), *supra*.

¹⁸ GTZ, *supra*.

¹⁹ UNEP (2003). *Global Environment Outlook 3 (GEO-3)*. New York: UNEP.

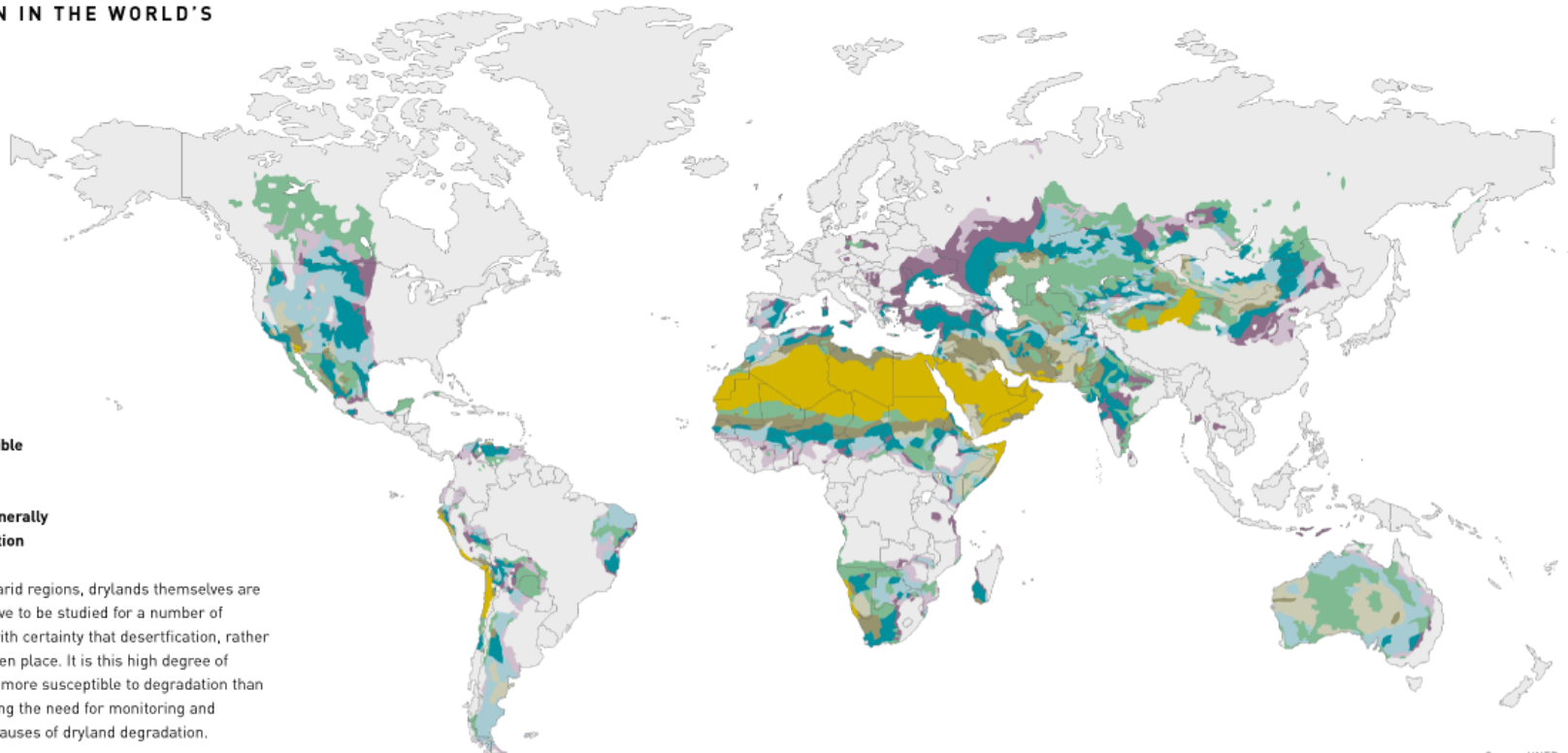
²⁰ Toulmin, C. (1994). « Combating Desertification : Encouraging Local Action Within a Global Framework », in Bergesen, H.O. and G. Parmann (eds.). *Green Globe Yearbook of International Co-operation on Environment and Development 1994*. Oxford: Oxford University Press. pp. 79-88.

Map 1: Soil degradation in the world's drylands²¹

SOIL DEGRADATION IN THE WORLD'S DRYLANDS, 1990s



Owing to the erratic rainfall in arid regions, drylands themselves are difficult to define, and areas have to be studied for a number of decades before it can be said with certainty that desertification, rather than natural variability, has taken place. It is this high degree of variability that makes drylands more susceptible to degradation than other regions, and more pressing the need for monitoring and understanding the underlying causes of dryland degradation.



Source: UNEP.

²¹ Source: American Association for the Advancement of Science. *Atlas of Population and Environment*. <http://atlas.aaas.org/index.php?part=2&sec=eco&sub=deserts>.

The UNCCD Approach: Addressing Poverty and Environmental Degradation

The UNCCD defines desertification as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities”.²² Land degradation itself is further defined as a “reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: (i) soil erosion caused by wind and/or water; (ii) deterioration of the physical, chemical and biological or economic properties of soil; and (iii) long-term loss of natural vegetation”.²³

This definition combines both the anthropogenic and biophysical processes that are involved in the land degradation process. As Reynolds & Stafford Smith state: “Land degradation in drylands involves complex interactions between biophysical factors (the meteorological and ecological dimensions of desertification that include sensitive soils, extreme rain events etc.) and socioeconomic factors (the human dimensions of desertification that include overgrazing, deforestation, intensive use of soils and water resources etc)”.²⁴

This dual focus on human and natural causes of desertification constitutes the conceptual basis leading to the UNCCD approach: addressing both the socio-economic and environmental processes at play in the desertification process. It also provides the conceptual basis for the UNCCD decentralised and participatory approach to promoting sustainable land management in rural drylands.

More specifically, the UNCCD preamble explicitly recognises that “desertification and drought affect sustainable development through their interrelationships with important social problems such as poverty, poor health and nutrition, lack of food security, and those arising from migration, displacement of persons and demographic dynamics”. In line with this recognition, the UNCCD commits Parties to “adopt an integrated approach addressing the physical, biological and socio-economic aspects of the processes of desertification and drought”,²⁵ and to “integrate strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought.”²⁶ The Convention also commits affected country parties to “address the underlying causes of desertification and pay special attention to the socio-economic factors contributing to desertification processes.”²⁷ The inclusion of poverty eradication and other socio-economic factors in the UNCCD approach creates policy interconnections with the MDGs and other poverty alleviation strategies.

The UNCCD also considers the impacts of trade on desertification. Its preamble refers to “the impact of trade and relevant aspects of international economic relations on the ability of affected countries to combat desertification adequately”. In addition, the Convention instructs Parties to “give due attention, within the relevant international and regional bodies, to the situation of affected developing country Parties with regard to international trade, marketing arrangements and debt with a view to establishing an enabling international economic environment conducive to the promotion of sustainable development.”²⁸

²² UNCCD. Article 1(a).

²³ UNCCD. Article 1(f).

²⁴ Reynolds, J.F. and D.M. Stafford Smith (2002). Do Humans Cause Deserts? in Reynolds, J.F. and D.M. Stafford Smith (eds.) (2002) *Global Desertification: Do Humans Cause Deserts?* Dahlem Workshop Report 88. Berlin: Dahlem University Press. p.8.

²⁵ UNCCD. Article 4.2 (a).

²⁶ UNCCD. Article 4.2 (c).

²⁷ UNCCD. Article 5 (c).

²⁸ UNCCD. Article 4.2 (b).

The regional annex for Latin America goes further, considering “the frequent use of unsustainable development practices in affected areas as a result of complex interactions among physical, biological, political, social, cultural and economic factors, including international economic factors such as external indebtedness, deteriorating terms of trade and trade practices which affect markets for agricultural, fishery and forestry products.”²⁹

The UNCCD therefore provides for the consideration of trade issues that generate impacts on desertification or on the capacity of Parties to create an enabling environment for implementing strategies to combat desertification. In that perspective, the consideration of socio-economic and environmental impacts of agricultural trade liberalisation in the context of the Doha Round falls directly within the purview of the UNCCD.

Agriculture and Desertification: Social and Environmental Interrelations

The Impacts of Agricultural Production on Land Degradation and Desertification

Agricultural activity has significant environmental impacts and constitutes the most important form of land use worldwide. The conversion of fragile marginal drylands to agriculture, as well as improper agricultural, pastoral, and land management techniques are two of the most important drivers of land degradation and desertification worldwide. Several regions of the world experience stagnating or even declining agricultural yields due to land degradation. A global survey conducted in the early 1990s found that about 23% of all land used, including 38% of croplands and 21% of permanent pastures, was subject to degradation.³⁰

Due to demographic pressure or economic incentives, agriculture often involves the conversion of marginal drylands to cropland or pasture. Worldwide, 90% of original dryland ecosystems have been converted to pasture, agriculture, or urban settlements.³¹ The expansion of cultivated area through land conversion is often associated with deforestation and loss of biodiversity, as well as with increased wind and water erosion that leads to land degradation. As will be seen in the case studies, the expansion of soybean production in Brazil is raising such issues.

Survival agriculture may also lead to rapid land degradation when the combined effect of poverty and demographic growth leads subsistence farmers to intensify their use of the land over and above its productive capacity. For example, farmers may shorten or abandon fallows or resort to other unsustainable techniques that affect soil quality. Such short-term survival patterns often end up accelerating the spiral of land degradation and declining yields. The case study on Burkina Faso in section III below provides an illustration of such a process.

Modern industrial agriculture may also lead to land degradation and desertification. The industrialisation of agricultural production through intensive monoculture and the use of agro-chemicals and mechanization increases yields, but often leads to land degradation due to improper land management techniques and the overexploitation of land resources. This is especially true in drylands, which are more vulnerable to such intensive land uses. For instance, intensive use of land for soybean production is leading to land degradation problems in Brazil. Inappropriate irrigation and drainage is also a significant cause of land degradation through salinisation and waterlogging. This is especially problematic in countries such as Pakistan that resort to large scale irrigation systems.

²⁹ UNCCD. Annex III and article 2(b).

³⁰ Oldeman, L.R., R.T.A. Hakkeling and W.G. Sombroek (1991). *World Map of the Status of Human-Induced Soil Degradation: An Explanatory Note*. Second Revised Edition. Wageningen and Nairobi: International Soil Reference and Information Centre (ISRIC) and UNEP.

³¹ UNEP (2003), *supra*.

In the long run, land degradation resulting from the expansion of agricultural land, unsustainable survival patterns, or improper intensive agricultural techniques may lead to declining yields and eventually to the loss of arable land. Socio-economic factors, including international trade and economic policies, are key drivers of agriculture-related land degradation. Indeed, economic incentives such as national and international demand; commodity prices; and access to credit, inputs, and technology all play a role in conditioning the environmental impacts of agriculture. In addition, government policies such as land use regimes, environmental regulations, subsidies for agro-chemicals and irrigation, as well as a series of other public policies also condition the environmental impacts of agriculture.

Agriculture, Land Degradation and Poverty in the Rural Drylands

Agricultural productivity is one of the most important determinants of economic growth and poverty in the developing world.³² Poverty alleviation has been directly correlated with improvements in agricultural productivity throughout the world.³³ Recent research shows that a 1% increase in agricultural yields reduces the proportion of people living on less than one US dollar per day by between 0.6% and 1.2%.³⁴ Another recent study covering 58 developing countries concludes that a 10% increase in agricultural productivity is associated with a 6% reduction in the proportion of people living with less than \$1 a day.³⁵ This correlation is even higher for Sub-Saharan Africa.

Desertification is strongly correlated to poverty because it is directly associated with declining agricultural yields. For example, per capita agricultural production increased by about 40% between 1980 and 2001 in developing countries, but fell by about 5% in Sub-Saharan Africa over the same period, due in large part to land degradation and low access to modern agricultural inputs and technology.³⁶ The case study on Pakistan below shows that stagnating or declining land productivity is closely associated with the growth of rural poverty in this country. Conversely, strategies aimed at reversing land degradation trends and improving agricultural productivity are likely to bring important dividends in terms of higher rural incomes and reduced poverty.

The desertification/poverty relationship has often been described as a downward spiral of land degradation and poverty with the rural drylands' poor as both agents and victims of land degradation.³⁷ This spiral can be summarized in the following way: "To reduce risks in conditions of extreme scarcity, people pursue economic activities with low but certain returns, including production for their own subsistence and survival through multiple activities. Pervasive poverty leads to environmental degradation as people have to eat into the environmental capital stock simply to survive, but this in turn undermines the productivity of key assets on which livelihood depends."³⁸ Such self-destructive survival patterns often constitute the last-resort strategy for poor, marginalised dryland communities.

³² DFID (2004a). *Agriculture, Growth and Poverty Reduction*. Working Paper. October. p.3.

³³ DFID (2004b). *Making Agricultural Markets Work for the Poor*. Working Paper for the Renewable Natural Resources and Agriculture Team, DFID Policy Division. September.

³⁴ DFID (2003). *Agriculture and Poverty Reduction: Unlocking the Potential*. DFID Policy Paper, December. p.1.

³⁵ Lin, L., J. Piesse and C. Thirtle, (2001). *Agricultural Productivity and Poverty in Developing Countries*. Extension to DFID Report No. 7946. DFID: London. Cited in DFID (2002). *Better Livelihoods for Poor People: The Role of Agriculture*. Issues Paper. May. p.4.

³⁶ DFID (2002), *supra*, p.9.

³⁷ Way, S.A. (2005). "Examining the Linkages Between Poverty and Land Degradation: From Blaming the Poor Towards Recognising the Rights of the Poor in Marginal Dryland Areas" in Johnson, P.M., K. Mayrand and M. Paquin (eds.). *Governing Global Desertification – Linking Environmental Degradation, Poverty and Participation*. London: Ashgate Press (forthcoming).

³⁸ UNCTAD (2004). *The Least Developed Countries Report 2004, Overview*. New York: UNCTAD. p. 3.

Another last-resort strategy is permanent migration to cities or to OECD countries. Indeed, 60 million people are expected to emigrate from desertified areas of Sub-Saharan Africa and North Africa over the next two decades.³⁹ In addition, it has been estimated that between 700,000 and 900,000 Mexicans permanently leave drylands each year, a significant proportion of them migrating to the United States.⁴⁰ Similar migration patterns have been documented in the Southern regions of Brazil.

Recent studies on poverty and desertification point to processes of political and socio-economic exclusion and marginalisation as the root causes of this downward spiral.⁴¹ According to Way, “the primary direct causes of land degradation are increasingly understood as usually the result of limited opportunities, inequitable processes of development, unequal distribution of rights and power, lack of rural infrastructure and misguided policies.”⁴² Way also argues that “broader processes of social exclusion are often at work in mediating the link between poverty and degradation [...]”.⁴³

It is also increasingly argued that development processes such as international trade, liberalisation of agricultural markets, monetization of local economies, urbanisation, sedentarisation and political marginalisation all play a role in further marginalising poor rural dryland communities. In that context, “attention must be shifted from addressing the physical processes of desertification, to addressing questions of land tenure and land markets, transport and access to markets, marketing and trade, food processing and storage, credit markets and water supply”.⁴⁴ In fact, this line of thought considers socio-economic marginalisation as a cause rather than a result of poverty and desertification.

In this perspective, policy prescriptions involve strategies designed to break the socio-economic exclusion of poor rural dryland populations through secure access to resources (land, water etc.), improved access to credit, and better and more equitable insertion into national and world agricultural markets. Trade policy and accompanying national policies appear to play a key role in this regard, given that they can either exacerbate or attenuate the exclusion of the poorest segments of rural populations in the developing world through their socio-economic impacts.

Considering the high prevalence of extreme poverty among rural populations and the importance of agricultural productivity in raising rural incomes and alleviating extreme poverty, one would expect official development assistance (ODA) and national investment to focus on rural development and agriculture. But the volume of ODA going to agriculture fell from US\$ 6.2 billion to US\$ 2.3 billion between 1980 and 2002, falling from 17% to 3.7% of total ODA over the same period.⁴⁵ According to IFAD, “this neglect of agriculture, in terms of both international development cooperation and domestic resource allocation, must be redressed if we hope to achieve the challenging poverty targets of the Millennium Summit.”⁴⁶ This observation is also true for reversing the current land degradation trend, which fuels poverty worldwide.

³⁹ UNCCD (2004), *supra*, p.8.

⁴⁰ UNCCD (2004), *supra*, p.8.

⁴¹ Indeed, “Social exclusion is [a] problem that limits the extent to which transmission mechanisms enable the poor to benefit from agricultural growth”. DFID (2004b). *supra*, p.18.

⁴² Way, S.A. (2005), *supra*.

⁴³ Way, S.A. (2005), *supra*.

⁴⁴ Way, S.A. (2005), *supra*.

⁴⁵ DFID (2004c). *Official Development Assistance to Agriculture*. Working Paper. November. p.3.

⁴⁶ IFAD (2001). *Rural Poverty Report 2001 - The Challenge of Ending Rural Poverty*. Oxford: Oxford University Press. p.iv.

II. Agricultural Trade Liberalization and Desertification

The FAO estimates that approximately 2.5 billion people worldwide depend on agriculture for their livelihoods⁴⁷, 96% of whom live in developing countries.⁴⁸ Trade in agriculture totalled US \$552 billion in 2001, which represents 45% of total agricultural production⁴⁹. Agricultural trade liberalisation is considered by many a key strategy to increase rural incomes and support development in the developing world. According to some estimates, a 1% growth in agricultural exports in developing countries can increase annual per capita income by 12% in Southern Asia, 4% in Latin America and Eastern Asia, and by up to 20% in sub-Saharan Africa.⁵⁰ According to another study, agricultural trade liberalisation could reduce the number of people living in absolute poverty by 130 million, or 12% of the world total, with the greatest gains likely to go to sub-Saharan Africa.⁵¹

Nevertheless, while agricultural trade liberalisation bears much potential for developing countries' farmers in terms of fairer competition and increased market shares resulting in higher rural incomes, it also involves socio-economic and environmental transformations that may significantly affect long-term agricultural production, rural livelihoods, and land degradation in drylands. And it remains to be seen if developing countries, especially LDCs, will be able to capitalize on the new opportunities created by a liberalised world agricultural market, or if they will end up in a worse situation following liberalisation.

Agricultural trade can affect desertification through two main drivers. The first is through the intensification of production and the replacement of small-scale agriculture by intensive industrial monocultures. Large-scale agriculture, through intensive use of agro-chemicals, irrigation systems, and mechanized farming techniques, can have major impacts on soil quality and dryland ecosystems. On the other hand, trade can bring new investments and technologies that can improve yields while maintaining the productive capacity of the land. The dynamics created by this driver are illustrated in the case study on Brazil in the following section.

The second way in which agricultural trade may affect desertification is through its impacts on rural livelihoods, especially those of small dryland farmers. Trade liberalisation can either create opportunities or further marginalize small farmers in the developing world, depending on the policies accompanying its implementation. Small farmers tend to respond to new opportunities or income shocks by expanding land under production or intensifying the use of the land; in turn, this leads to land degradation when marginal lands are brought into production or overexploited, which is often the case in the drylands. This process is illustrated in each of the three case studies presented in the next section.

This section analyses key issues that link trade to desertification in developing rural drylands. The first part analyses some of the economic constraints that affect the capacity of developing country farmers, especially those in LDCs, to benefit from trade liberalisation. The second and third parts of this section describe how, under current market conditions, agricultural trade is impacting rural livelihoods and the environment in rural drylands.

⁴⁷ FAO (2005). *The State of Agricultural Commodity Markets*. Rome: FAO.

⁴⁸ http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5419e/y5419e00.htm. Accessed February 18th, 2005. p.6.

⁴⁹ Oxfam (2002a). *Boxing Match in Agricultural Trade: Will WTO Negotiations Knock Out the World's Poorest Farmers?*. Oxfam Briefing Paper #32. November.

⁵⁰ WWF (2004). From Trade Negotiations to Global Adjustment Preparatory Phase Summary Report Paris June 14. <http://www.panda.org/downloads/policy/ntoasummary.pdf>

⁵¹ Oxfam (2002b), *Rigged Rules and Double Standards: Trade Globalization and the Fight against Poverty*. Oxfam. pp. 47-48.

⁵¹ Vitalis, V. (2004), *supra* p.4.

The Economic Impacts of Agricultural Trade Liberalisation

International trade theory predicts that under perfect market conditions, countries will specialise according to their respective comparative advantages and that goods and services will be produced at a lower cost, thereby increasing welfare globally. This increased welfare will lead to higher average incomes, and to higher consumption and investment levels that will fuel economic growth. Generally speaking, higher investment rates will translate into productivity gains that will make the economy more efficient and competitive. Trade theory also predicts that the process of reallocating productive resources will produce losers and winners, and that losers should be compensated and/or redirected towards new productive activities. Those winners and losers will be, *inter alia*, countries or regions, economic sectors or industries, and consumers/producers.

It is generally accepted that developing countries have a strong comparative advantage in agriculture and that they will benefit most from a liberalisation of trade in that sector. In theory, developing countries will specialise in producing commodities for the world market. Sales on the world market will generate foreign currency earnings to sustain investments in agricultural productivity improvements. In addition, liberalization can be instrumental in attracting foreign direct investment (FDI) and new technologies to improve productivity in the agricultural sector. These productivity gains and extra earnings will raise rural incomes and stimulate consumption and economic growth. In the process of increasing agricultural productivity, farm labour will be released and absorbed in the urban manufacturing sector. Economic theory predicts that under appropriate conditions, this process will allow developing countries to realise their economic take-off.

Unfortunately, evidence from the last 15-20 years tends to diverge from the classic theoretical model. According to the OECD: “Although economic theory predicts increases in welfare and economic growth following trade liberalisation, empirical research has not demonstrated a direct link between trade openness and growth.”⁵² UNCTAD reaches a similar conclusion based on an analysis of 51 LDCs that saw their exports grow between 1990 and 2000. It concludes that “there is no statistically significant relationship between export growth and changes in private consumption”, and that “[...] export growth is simply not having a strong and sustained virtuous poverty-reduction effect in most of the LDCs.”⁵³ Last but not least, UNCTAD concludes that “[t]he relationship between trade and poverty is [...] asymmetrical. Although LDCs with declining exports are almost certain to have a rising incidence of poverty, increasing exports do not necessarily lead to poverty reduction.”⁵⁴

While these observations are applicable at various extents to developing countries as a whole, they are particularly relevant for LDCs, including Burkina Faso, which is experiencing severe land degradation and desertification processes.⁵⁵ Indeed, agriculture represents 25% of low-income countries’ GDP and employs nearly 75% of their workforce.⁵⁶ For most LDCs, earnings from agricultural exports are essential to provide foreign currencies required to import the goods necessary for economic growth and poverty reduction, including food, manufactured consumer goods, energy, raw materials, industrial goods, and machinery.⁵⁷ This dependence on agricultural commodities for

⁵² OECD (2003). *Agricultural Trade and Poverty: Making Policy Analysis Count*. Paris: OECD. p.20.

⁵³ Indeed, the report finds that export growth led to higher private consumption in 22 countries but had an impoverishing effect in 18 countries. In 29 countries exports growth was found to have an ambiguous effect on consumption. UNCTAD (2004), *supra*, p.11.

⁵⁴ UNCTAD (2004), *supra*, p.9.

⁵⁵ Out of 50 LDCs, 12 have over 50% of their territory covered with drylands, several of which are facing moderate to severe desertification. Other LDCs such as Haiti or Bangladesh do not have significant portions of their territory composed of drylands but are nevertheless facing important land degradation problems.

⁵⁶ UNDP (2003a), *supra*, p.125.

⁵⁷ UNCTAD (2004), *supra*, p.3.

export earnings makes LDCs highly vulnerable to resource depletion, including land degradation, and to deteriorating terms of trade for agricultural commodities.⁵⁸

Indeed, trade liberalisation often crystallises LDCs' specialisation and dependence as exporters of commodities instead of supporting export diversification.⁵⁹ According to the FAO, some developing country commodities exporters have managed to diversify their production, but the vast majority of LDCs still depend on only a few commodities – a single one in the case of Burkina Faso – for their export earnings. More than 50 developing countries depend on three or fewer commodities for between 20% and 90% of their export earnings. The FAO further notes that “43 developing countries depend on a single commodity for more than 20% of their total revenues from merchandise exports. Most of these countries are in sub-Saharan Africa or Latin America and the Caribbean and depend on exports of sugar, coffee, cotton and bananas. Most suffer from widespread poverty.”⁶⁰

Empirical evidence therefore differs from theoretical predictions, and this is especially true in the case of LDCs, despite the fact that they are specialising in the production of agricultural commodities for which they possess theoretical comparative advantages. This is due in part to imperfect market conditions, including non-liberalised agricultural markets, concentration in the food-supply chain, declining terms of trade for commodities, and lack of capacity in developing countries – especially LDCs – to seize new market opportunities. Moreover, specialisation in commodities export has increased many developing countries and LDCs' vulnerability to price volatility on world markets. Under these conditions, trade liberalisation often leads to major social and environmental impacts that play a role in increasing poverty and accelerating land degradation worldwide.

According to the FAO, countries that have specialised in commodity exports have not benefited from such a strategy due to what the organisation describes as a commodity crisis that is having devastating impacts on poor farmers in the developing world. This crisis is created by a combination of factors: price fluctuations; market concentration in agricultural processing and distribution leading to lower prices paid to producers; and a decline in world prices due to surplus production as a result of World Bank and International Monetary Fund policies that encouraged the expansion of export crops to generate foreign currency earnings. As a consequence, the terms of trade for commodities-dependant countries have deteriorated markedly in the last decade.⁶¹ On the other hand, it must also be noted that the intensification and mechanisation of agriculture under the impulse of the multilateral institutions has led to higher yields and lower prices for food in developing countries.

According to the World Bank, the average real price of agricultural commodities fell by 5.3% between 1990 and 2003.⁶² Another study found that between 1980 and 2002 the prices of 12 tropical commodities fell by 50% to 86%.⁶³ For example, cotton prices declined by 50% between 1980 and 2002 with significant impacts in countries such as Burkina Faso, which depend on this commodity for export earnings.⁶⁴ The FAO estimates that if the prices of the ten most important agricultural

⁵⁸ UNDP (2003a), *supra*, p.123.

⁵⁹ UNCTAD (2004), *supra*, p.20.

⁶⁰ FAO (2005), *supra*.

⁶¹ See Lines, T. (2004). *Commodities Trade, Poverty Alleviation and Sustainable Development: The Re-emerging Debate*. Paper Presented at UNCTAD XI, Sao Paulo, Brazil, June 15th.

⁶² Lines, T. (2004), *supra*, p.6.

⁶³ These commodities are: copra, coconut oil, palm oil, sugar, cocoa, coffee, tea, pepper, groundnuts, jute, cotton and rubber. See, Robbins, P. (2003). *Stolen Fruit: The Tropical Commodities Disaster*. London: Zed Books. Cited in Lines, T. (2004), *supra*, p.6.

⁶⁴ FAO (2005), *supra*, p.21.

commodities exported by developing countries had kept pace with inflation, developing countries would have earned an additional US\$ 112 billion in 2002.⁶⁵

While economic theory predicts that lower prices will lead producers to decrease production or to shift to other crops, LDCs' dependence on a few commodities, and their lack of capacity to diversify exports, often leads them to expand production to compensate for the declining value of commodities. Such expansion can lead to the increased application of agro-chemicals, to the expansion of cultivated land, or to reduced fallows, with potential impacts on land degradation and desertification.

Developing countries and LDCs' current difficulties in raising incomes and fostering economic development through agricultural trade are not only attributable to structural inequities in the trade regime. According to UNCTAD: "International trade cannot work to reduce poverty in countries where the level and efficiency of investment are not adequate to support sustained economic growth."⁶⁶ Indeed, current difficulties faced by developing countries are caused in large part by structural and institutional socio-economic weaknesses and often by adverse environmental conditions, including drought and desertification. In rural drylands, these adverse conditions coincide, thus magnifying the difficulties dryland farmers face in integrating the world market.

In the context of the UN Millennium Project, Jeffrey Sachs and other economists have formulated the hypothesis that several African countries are caught in a poverty trap, i.e., that these countries are too poor to sustain economic growth due in part to the low productivity of their agriculture. This low productivity prevents the accumulation of savings that would be needed to invest in economic growth. Moreover, insufficient infrastructure and human capital make it impossible to attract foreign investment to compensate for this absence of savings.⁶⁷ As a consequence, there are simply no financial resources available to invest in rural development. While these observations are focused on Africa and are especially relevant for Burkina Faso, the subject of a case study in this report, they are to a large extent transferable to other LDCs and to virtually all rural areas facing severe desertification.

According to Sachs, the low productivity of agriculture makes investments in water and land management that would lead to higher yields impossible, thereby creating a vicious circle of decreasing yields and poverty that is very common in the drylands, especially those affected by desertification.⁶⁸ Social and demographic trends also reinforce the poverty-trap pattern. According to Sachs *et al.*, population growth in rural areas of Africa has led to a fall in the average size of household farms and to an extension of agricultural production rather than to its consolidation into larger production units practicing more intensive forms of agriculture.⁶⁹ Such a process can also be observed in Pakistan. This results in decreasing agricultural productivity, environmental degradation, and general impoverishment as farm sizes and yields are too low to support households, much less to be competitive on world markets.⁷⁰ Although no empirical study has been conducted on this issue, one could infer that there is a high probability that most regions affected by desertification are also perfect examples of poverty traps.

Another factor that leads to a persistent poverty trap in rural drylands is the unavailability of crops specifically designed for the prevailing environmental and climatic conditions. High yield varieties

⁶⁵ FAO (2005), *supra*, p.21.

⁶⁶ UNCTAD (2004), *supra*, p.13.

⁶⁷ Sachs, J. *et al.* (2004). "Ending Africa's Poverty Trap" in Brainard, W.C. and G.L. Perry (eds.) (2004). *Brooking Papers on Economic Activity 1:2004*. Washington D.C.: Brookings Institution Press. p.122.
<http://www.unmillenniumproject.org/reports/secretariatdocs.htm>. Accessed February 17th, 2005.

⁶⁸ Sachs, J. *et al.* (2004), *supra* p.130.

⁶⁹ Sachs, J. *et al.* (2004), *supra*, p.140.

⁷⁰ UNCTAD (2004), *supra*, p.20.

developed during the green revolution were generally designed to fit the conditions of intensive, irrigated agriculture in Latin American and Asia. Most of these varieties are not adapted to the agronomic conditions of the drylands where agriculture is mostly rain-fed, fertilizer-scarce, and conducted on arid or sub-humid lands. The same observation applies to most modern genetically engineered crops. Moreover, the combination of high transport costs, lack of infrastructure, water scarcity, and geographical remoteness reduced the accessibility of farm inputs and irrigation, thus preventing the green revolution from reaching several dryland regions.⁷¹

Competitiveness on world markets is not only linked to labour costs, but also to agricultural productivity in general. This is where rural dryland communities appear to be most disadvantaged since they do not have the financial resources, infrastructure, technology, or human capacity to increase their productivity while simultaneously facing a deteriorating resources base. This creates a context in which their insertion in the world market is extremely difficult without outside support. This shows that in addition to improving access to foreign markets for developing countries' agricultural products, measures are needed to improve their competitiveness.

The Impacts of Agricultural Trade Liberalisation on Rural Livelihoods

The analysis of the impacts of agricultural trade liberalization on social structures and small-scale farming in rural areas of the developing world is often inexistent, incomplete, or anecdotal.⁷² Generally speaking, agricultural trade liberalisation influences existing dynamics in the agricultural sector, including the scale, type, and intensity of farming, land management practices, inputs and technology use, as well as other variables that may impact rural dryland livelihoods. Through its effects on these variables, agricultural trade liberalisation can impact poverty and farm incomes, rural development, migratory flows and urbanization, food security, income inequities, gender issues, health, traditional knowledge, and culture.

The impact of agricultural trade liberalisation on poverty alleviation in rural drylands is contingent on the capacity of small farmers to seize new opportunities created by the opening of markets and to raise their incomes. According to the Millennium Project's Task Force on Hunger, small-scale farming is both the main engine of economic growth and a central factor in reducing poverty and hunger in developing countries.⁷³

Indeed, the greatest progress in poverty alleviation has been observed in countries where small-scale farming has driven agricultural growth. This seems to be the case in Burkina Faso where cash-crop producers have seen their incomes and food security improve. In the opposite case, where agricultural growth has been generated by large scale agriculture, such as in Brazil, the impacts on poverty reduction have been close to neutral on average.⁷⁴ This difference can be explained by the fact that large-scale farmers tend to spend their income on capital-intensive, often imported goods and services while small-scale, labour intensive agriculture generates income that is spent on locally-produced goods, services, and labour, thus having a greater impact on poverty and hunger.⁷⁵

Small farmers are often disadvantaged on world markets compared to large intensive production units due to diseconomies of scale, lack of access to credit and inputs, low productivity, and insufficient

⁷¹ Sachs, J. *et al.* (2004), *supra*, p.137.

⁷² See WWF (2004), *supra*.

⁷³ UN Millennium Project (2005a), *supra* p.69.

⁷⁴ See Mellor, J. (2000). "Agricultural Growth, Rural Employment, and Poverty Reduction – Non-tradables, Public Expenditure and Balanced Growth". In *Poverty or Prosperity: Rural People in a Globalized Economy*. Proceedings from the World Bank Rural Week, March 28-31. Cited in DFID (2002), *supra*, p.5.

⁷⁵ DFID (2004f). *Agriculture, Hunger and Food Security*. Working Paper. August. p.13.

human resources, which prevent access to foreign markets. A survey of 27 country case studies on the impacts of trade liberalization on hunger in developing countries found that trade was in many instances hurting small-scale farmers by raising the price of agricultural inputs and decreasing prices at the farm gate.⁷⁶

The combination of trade liberalisation and state withdrawal from the agricultural sector seems to have been especially detrimental to small farmers in the developing world. These farmers were faced with income losses due to the displacement of their products by cheap subsidised food imports from OECD countries at the same time as the State was removing support policies that ensured affordable inputs, stabilised revenues, and provided access to credit. These processes have been documented to various extents in the cases of Burkina Faso, Brazil, and Pakistan.

Following trade liberalisation, a gradual shift from small-scale to large-scale, export-oriented farming has been observed in most developing countries. This process often led to the marginalization of small farmers. A case study on India conducted for the European Commission by Morrissey *et al.* concludes that “past benefits of liberalisation seem to have gone more in favour of large farmers than the small ones.”⁷⁷ As demonstrated in section III, this statement also applies to Brazil.

The shift from small-scale to large-scale agriculture is in large part the result of new market conditions created by trade liberalisation. Indeed, agricultural trade liberalisation creates new conditions in which non-traditional markets gradually replace traditional ones. These new markets are characterised by increased transaction costs, higher risk, and the need for greater capital investment to modernise production techniques.⁷⁸ Large-scale farming is more adapted to this new environment since larger producers can absorb transaction costs and risks and access credit more easily. This suggests that large-scale farmers are better positioned to benefit from the new market environment and that they may reap the lion’s share of new market opportunities generated by trade liberalisation, thereby intensifying existing inequities.

A report published by the International Institute for Environment and Development (IIED) distinguishes three categories of agricultural producers in the rural developing world: successful competitive entrepreneurs; traditional family farmers; and the marginalised poor struggling for survival (See table 1). According to the report, Rural Worlds 2 and 3 are the main centres of rural poverty in the world, but Rural World 1 is the main beneficiary of trade liberalisation. These three categories of farmers are illustrated in the case studies in the following section. Small farmers are often neglected or disadvantaged by the policy environment, including the trade regime. This suggests that unless something is done to facilitate the integration of small farmers in the global market, trade liberalisation will not succeed in alleviating poverty in rural drylands.⁷⁹

Similarly, a study on Central American agriculture distinguishes four types of farmers (see table 2). The last two categories (Types 3 and 4) are well integrated in the international product chain. They consist of capital-intensive, large-scale, agro-industrial farms such as Brazil’s soybean farms, with access to foreign capital and technology. The Type 2 category consists of medium size producers that

⁷⁶ Madeley, J. (2000). *Trade and Hunger – An Overview of Case Studies on the Impact of Trade Liberalization on Food Security*. Stockholm: Forum Syd. October. p.8.

⁷⁷ Morrissey, O. *et al.* (2005). *Sustainability Impact Assessment of Proposed WTO Negotiations – Interim Report for the Agriculture Sector Study*. Impact Assessment Research Centre, Institute for Development Policy and Management, University of Manchester. UK. p.18. www.sia-trade.org.

⁷⁸ Kydd, J. and A. Dorward (2001). “The Washington consensus on poor country agriculture: analysis, prescription and institutional gaps”. In *Development Policy Review* 19(4): 467–478. Cited in DFID (2004f), *supra*, pp.13-14.

⁷⁹ For a detailed analysis of the challenges of sustainable livelihoods for rural world 2 and 3, see Vorley, B. (2002), *supra*.

are integrated in the product chain through contract farming and are heavily dependant on a few buyers. They are similar to cash-crop farmers in Burkina Faso and Pakistan. The Type 1 category – small farmers – comprises the majority of farmers and labour force and is not integrated in the global market. Small producers are typically labour-intensive, traditional farmers concentrated on lower value lands and producing for their own consumption or the local market. They are present in the three countries analysed in the case studies.

Table 1: Types of agricultural producers in the developing world⁸⁰

Rural World 1	Globally competitive; embedded in agribusiness; commodity producers and processors; politically connected, export-driven; adopters of Green Revolution and transgenic technologies. For example, soybean producers in Brazil.
Rural World 2	Locally orientated, with access to and control of land; multiple enterprises; undercapitalised; declining terms of trade; the ‘shrinking middle’ of agriculture. For example, cotton/corn producers in Burkina Faso and rice/cotton/wheat producers in Pakistan.
Rural World 3	Fragile livelihoods; limited access to productive resources; multi-occupational migrants straddling rural and urban residencies; unskilled and uneducated; dependent on low-waged, ‘casual’ family labour; redundant relative to global food and fibre production. For example: food crop producers in Brazil, Burkina Faso, and Pakistan.

Table 2: Types of farmers in Central America⁸¹

Type 1	The majority of small producers, with access to limited land and low quality resources, are usually located on hillsides and produce for the local market or for personal consumption. A small number of these producers form part of the agro-export chain. Significant proportions have cattle livestock, but are not specialists in this area. For example. Food-crop producers in Brazil, Burkina Faso, and Pakistan.
Type 2	The medium-sized producers, which have some managerial capacity, include coffee, milk, poultry and eggs, fruit and ornamental plant producers. Many of them have established contractual relationships with other actors in the processing and marketing chains. They also are involved in exportation. For example, cotton/corn producers in Burkina Faso and rice/cotton/wheat producers in Pakistan.
Type 3	The agro-industrial firms include those involved in basic transformation (rice mills, sugar refineries, coffee processing plants, cattle and poultry abattoirs) and more advanced agro-industries in the dairy sector, fruit processing, oil preparation and other agro-industries. For example, soybean producers in Brazil.
Type 4	The transnational firms specialize in banana and pineapple production. For many years, these firms have controlled large amounts of land and offered employment to the most-needy and least-trained agricultural labourers.

⁸⁰ Adapted from Vorley, B. (2002). *Sustaining Agriculture: Policy, Governance, and the Future of Family-based Farming. A Synthesis Report of the Collaborative Research Project 'Policies that Work for Sustainable Agriculture and Regenerating Rural Livelihoods'*. London, UK: IIED., p.9.

⁸¹ Pomadera, C. and C. Murillo (2003). *The Relationship between Trade and Sustainable Development of Agriculture in Central America*. Winnipeg: IISD. p.3.

The picture described by these two studies is that of a deepening gap between small- and large-scale farmers with the latter often appropriating the bulk of state support, high quality lands and water resources, and the former being pushed onto marginal lands, faced with a deteriorating resource base and persistent socio-economic marginalization. In between, medium-sized producers try to maintain their position on local and national markets. According to another report, poverty incidence decreased by 8 percentage points to 42% between 1994 and 1998 for cash-crop farmers, but increased by 2 percentage points to 53% for food-crop farmers.⁸²

This trend may exacerbate inequities and lead small poor farmers to adopt unsustainable survival strategies that deteriorate their resource base, or to abandon their land and migrate to cities or developed countries. Such migration can reduce pressure on land, forest, and water resources, but also lead to reduced biological and genetic diversity as traditional knowledge is lost in the dissolution of rural communities. Nadal has shown that traditional agriculture, poverty, and genetic diversity are highly correlated in Mexico, which would show a clear linkage between traditional rural livelihoods, and biological and genetic diversity.⁸³ A shift to modern mechanised agriculture may therefore lead to a net loss of biological diversity under certain circumstances. This would suggest that in addition to having a greater impact on poverty alleviation, traditional small scale farming also brings significant environmental benefits.⁸⁴

As mentioned, economic theory predicts that rural labour released by the consolidation of the agricultural sector will be absorbed in secondary and tertiary industries that will develop in urban centres. This reallocation of labour, however, assumes that job creation in the manufacturing and services sector will keep pace with population growth and rural migration, which is often not the case in developing countries. As a result, rural dryland communities often find themselves caught in unsustainable survival patterns fuelling the spiral of poverty and resource degradation described earlier.

Moreover, small farmers may not respond to new market conditions the way economic theory predicts. Studies on traditional corn farmers in Mexico showed that despite adverse new market conditions following the entry into force of the North American Free Trade Agreement (NAFTA), and market share losses to US corn imports, traditional corn farmers in Mexico did not abandon production but instead sought to expand their cultivated area into marginal lands, forests, and biosphere reserves to compensate for lower incomes. As a result, a declining average yield was observed among poor small-scale Mexican farmers due to the cultivation of less productive, fragile lands.⁸⁵

The Environmental Impacts of Agricultural Trade Liberalisation in Drylands

Five different drivers associated with agricultural trade liberalisation can generate environmental impacts. First, trade liberalisation can affect the scale of production. Following liberalisation, agricultural production can expand or contract in a given country or region following the reshuffling

⁸² Secretariat of the UNCCD (2005). *Mainstreaming of National Action Programmes and their Contribution to Overall Poverty Eradication*. Report to CRIC.3, Bonn, 2-11 May. Advanced copy. p.27.

⁸³ See Nadal, A. and T. Wise (2004). *The Environmental Cost of Agricultural Trade Liberalisation: Mexico-US Maize Trade Under NAFTA*. Working Group on Development and the Environment in the Americas, Discussion paper #4, June.

⁸⁴ Commission for Environmental Cooperation. (2004), *Maize and Biodiversity: The Effects of Transgenic Maize in Mexico*. Montreal, CEC Secretariat. http://www.cec.org/files/PDF//Maize-and-Biodiversity_en.pdf

⁸⁵ Nadal, A. (2000). *The Environmental & Social Impacts of Economic Liberalization on Corn Production in Mexico*. Gland, Switzerland and Oxford, UK: WWF International and Oxfam GB. pp. 1-113.

of comparative advantages. Both the expansion and contraction of production can have positive or negative impacts on the environment. Generally speaking, increases in production are achieved through the expansion of land under production or through the intensification of production to generate higher yields. These two strategies each raise a series of potential environmental impacts. As will be seen in the next section, the two processes are occurring at a very large scale in Brazil. There is also some crop expansion occurring in Burkina Faso.

A second driver is the composition of agricultural production. Countries may seek to adapt to new opportunities and price signals by changing the mix of commodities they produce. They may also respond to new opportunities by shifting from food production to export crops such as cotton, rice, or soybeans, for example. Given that each crop is characterised by a different mix of environmental impacts on land, water, and agro-chemical use, changes in the production mix following trade liberalisation can have positive, negative, or neutral impacts. For example, a gradual shift towards cotton production is occurring in Burkina Faso with impacts on land degradation. In Pakistan this shift towards cotton and rice production in the last few decades has had important impacts on scarce water resources since these cash-crops are more water intensive than traditional food crops such as wheat.

The structure of production is a third driver of environmental change often associated with trade liberalisation. As described above, trade liberalisation favours a shift from small to large scale agricultural production. Such a pattern is observable in Brazil's soybean sector and is associated with intensive use of agro-chemicals and mechanised cropping techniques. On the other hand, small-scale production is characterised by a low rate of application of farm inputs and low mechanisation and by land expansion strategies. Such is the case in Burkina Faso. Pakistan's cotton and rice sectors are less intensive than Brazil's soybean sector, but they benefit from large-scale irrigation. Both intensive and extensive agriculture can lead to land degradation if improper land management strategies are adopted.

The fourth driver of the environmental impacts of trade liberalisation is related to the technologies used in agriculture. As trade is liberalised, farmers may gain better access to agricultural technologies, including farm inputs and machinery and genetically modified crops in areas where such crops are suitable. Moreover, trade leads to higher incomes and/or to improved access to foreign capital to finance the adoption of new technologies. The environmental impacts of such a process will depend on the technologies introduced. For example, drip-irrigation technologies could reduce soil salinity and improve efficiency in water use in Pakistan. On the other hand, access to cheaper first-generation agro-chemicals can lead to land and water contamination.

The last driver of environmental impacts associated with trade liberalisation is the regulatory framework. Trade liberalisation is often accompanied by regulatory reforms or deregulation processes designed to decrease state intervention in the economy. This has been the case in several developing countries, including Burkina Faso, where the State disengaged from the farm input sector, thereby making inputs less accessible to small farmers. In some cases, the environmental impacts may have been positive when they led to reduced use of pesticides. In other cases, such policies may have led to the under-application of fertilizers and to decreasing yields and land degradation. Such has been the case in Pakistan and Burkina Faso. Policies and regulations adopted in the wake of trade liberalisation can do much to prevent negative environmental impacts. For example, new land management policies can prevent land degradation resulting from a more intensive use of the land to respond to world demand.

The environmental impacts of trade liberalisation are also directly related to pre-existing environmental conditions, including land quality, water availability, climatic conditions, ecosystem resilience, etc. Given that drylands are particularly sensitive ecosystems that are often already subject

to land degradation, and that agriculture is the single most important land use in rural drylands, they have the potential to be greatly affected by trade liberalisation.

Trade liberalisation therefore holds the potential to magnify pressures on land, water, and ecosystem resources in drylands. This may lead to an overuse of land resources and to further land degradation, especially in countries with fragile drylands.⁸⁶ The magnitude of this degradation is difficult to assess given that local conditions as well as state interventions need to be factored in. Strutt estimated that trade liberalisation in Indonesia would lead to increased land degradation in certain crops, but that the loss would equivalent to only 0.15% of the global welfare gains generated by trade liberalisation.⁸⁷ There is growing evidence, however, that trade can generate significant impacts on land degradation and be one of the key drivers in the desertification process.

The conversion of agriculture from small-scale multiple cropping systems to medium- and large-scale intensive monocultures may have significant impacts on land degradation. Agarwal et al. describe this process in the following way: “Governments and large farmers in West Africa have become critically dependant on cash crops to pay for import and taxes. In the bargain, the intense cultivation of the lands through monoculture has led to increasing desertification. [...] The increased demand for cash crops discouraged food production, and virtually wiped out practices such as allowing the land to fallow and recover, or crop rotations systems, which kept the land in good condition.”⁸⁸

Similarly, Nadal argues that the restructuring of the corn sector following NAFTA has contributed to “accelerating soil erosion trends both through specialization and monoculture, coupled with increased use of fertilizers (as is observed in the case of the more competitive producers), and because of a more intensive use of soils, including through the extension of the agricultural frontier to marginal lands, by traditional producers.”⁸⁹ This means that small-scale farming can also generate negative environmental impacts in the context of trade liberalisation. Trade is especially likely to exacerbate land degradation under open access land management regimes where land property rights are ill defined, allowing for uncontrolled extension on marginal lands.⁹⁰

While the transformation induced by trade liberalisation can produce negative environmental impacts, trade can also bring environmental benefits through improved infrastructure, the spread of new management techniques, or improved access to new and adapted technologies. Trade can also open new market opportunities for certified products, thereby improving agricultural practices. However, such positive outcomes may not materialise if proper policies and regulations are not put in place. Capacity-building and various forms of support to small farmers appear especially important in this regard

⁸⁶ See Harou, P.A. (2002). “What is the Role of Markets in Altering the Sensitivity of Arid Land Systems to Perturbation?” in Reynolds, J.F. and D.M. Stafford Smith (eds.) (2002), *supra*, pp. 253-274.

⁸⁷ Strutt, A. (1998). *Trade Liberalisation and Land Degradation in Indonesia*. Australian Centre for International Agricultural Research.

⁸⁸ Agarwal, A., S. Narain and A. Sharna (eds.) (1999), *Green Politics*. New Delhi: Centre for Science and Environment. p. 166.

⁸⁹ Nadal, A. (2000), *supra*, p.3.

⁹⁰ Demeke, B. *Is Globalization Bad for the Environment? International Trade and Land Degradation in Developing Countries: The Case of Small Open Economy*. Department of Agricultural and Applied Economics, University of Wisconsin-Madison.

III. Case Studies from Burkina Faso, Pakistan, and Brazil

The first two sections of this report mapped out the interconnections among poverty, agriculture, and land degradation and analysed how agricultural trade liberalisation could intensify, attenuate, or otherwise modify these interrelations. This section seeks to illustrate these processes through the concrete examples of three countries: Burkina Faso, Brazil, and Pakistan. These case studies are not intended to provide a comprehensive assessment of the impacts of trade on desertification in these countries, but rather to illustrate the issues that commodities exports raise for poverty, rural livelihoods, and desertification.

The three countries present a mix of small-scale subsistence agriculture (rural world 3), medium-scale commercial production (rural world 2), and large-scale industrial monocultures (rural world 1). The case studies also represent three categories of developing countries likely to be affected differently by agricultural trade liberalisation in the context of the Doha Round.

Brazil is a middle-income country and a major commodity exporter where agro-industrial production is well developed and expanding geographically. It is likely to benefit from trade liberalisation and capture larger shares of the world agricultural market. Burkina Faso is an LDC that depends on cotton for most of its export revenues. The country is severely affected by desertification and rural poverty is prevalent. Its agricultural sector is labour intensive and mostly engaged in subsistence farming. It is likely to gain increased market shares from trade liberalisation if discussions on cotton in the context of the Doha Round lead to positive outcomes. Pakistan is a low-income developing country with a large population, almost half of which is employed in agriculture. Agricultural production in Pakistan is heavily dependant on irrigation and agro-chemicals. Export and food production growth is mainly achieved through increases in yields, often at the cost of land degradation. Pakistan could also gain from trade liberalisation in rice and cotton production, its two main export crops.

Although they differ in many regards, the impacts of trade liberalisation in all three countries are likely to intensify some of the key pressure points that link poverty, land degradation, and agriculture. While these countries are potential beneficiaries of the Doha Round, the outcomes of trade liberalisation could raise challenges that need to be addressed to ensure trade does not result in further land degradation and impoverishment.

Export-Oriented Cotton Production in Burkina Faso

Burkina Faso is among the poorest countries in the world, ranking 173rd out of 175 countries in terms of its Human Development Index (2002). The country's GDP was estimated at \$US 264 per capita in 2002.⁹¹ Agriculture represents 31.8% of the GDP and employs 92% of Burkina Faso's labour force.⁹² The country faces significant demographic pressures, with an annual population growth rate of 2.9%.⁹³ The majority of Burkina Faso's population is rural, with only 17.4% living in urban areas in 2002.

Subsistence farming is the main agricultural activity in Burkina Faso, covering approximately 85% of cultivated lands and consisting mainly of rain-fed, low-yield production of millet, sorghum, maize,

⁹¹ UNDP (2003b). *Human Development Report, Statistics: Burkina Faso*.
http://hdr.undp.org/statistics/data/cty/cty_f_BFA.html.

⁹² FAO (2004e). *Food and Agricultural Indicators, Country : Burkina Faso*.
http://www.fao.org/es/ess/compendium_2004/pdf/ESS_BKF.pdf.

⁹³ FAO (2004e), *supra*.

and rice.⁹⁴ Agricultural production is labour intensive and the rate of mechanisation remains very low, varying from 50% in cotton growing areas to only 1-2% in the north of the country where subsistence farming is the main activity.⁹⁵

Cotton production is concentrated in the west and south-west.⁹⁶ Cotton is one of the most organized agricultural sectors and is strongly supported by the government due to its importance for export earnings.⁹⁷ The majority of cotton producers work on small farms (3 to 5 ha) and a minority on larger ones (up to 25 ha). In contrast to subsistence farmers who maintain relatively diversified production systems, cotton farmers tend to concentrate on cotton production, although the average farmer may also grow cereals for household food on about half of the land.⁹⁸

Although cotton represents a small share of agricultural production, it is Burkina Faso's major export product, representing 52.2% of its exports in 2001.⁹⁹ Burkina Faso ranked 16th as an exporter of cotton in 2003.¹⁰⁰ The world's top five exporting countries – the United States, Uzbekistan, Australia, Greece, and Brazil – accounted for 70% of exports in 2001. In 2001, Western and Central African countries represented 10% of world exports.¹⁰¹

Table 3: Burkina Faso's cotton production (1998-2004)¹⁰²

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Area harvested ('000 Ha)	353	240	260	360.1	406.0	..
Production ('000 MT)	284	254	274	378	406	500
Yield (kg/Ha)	810	1060	1060	1040	1000	..
Value (CFAF billions)	45.4	40.1	44.0	66.0	70.7	..
Farm gate price (CFAF per kg)	185	160	175	200	175	185

As shown in table 3, cotton production doubled between 1999 and 2003, revealing a clear pattern of growth for this export-oriented sector. The Burkina Faso government actively supported this growth through the impetus of the World Bank and the International Monetary Fund. Table 3 also shows that although its overall value grew at the same time as production increased, farm-gate prices remained

⁹⁴ Burkina Faso (2000). *Programme d'action national de lutte contre la désertification*. 90 p.

http://www.unccd.int/actionprogrammes/africa/national/2000/burkina_faso-fre.pdf.

⁹⁵ Ministère de l'Agriculture, de l'Hydraulique et des Ressources halieutiques, Burkina Faso. *Résumé du Plan d'action pour la mécanisation agricole*. <http://www.agriculture.gov.bf/documents/mecanisation.php>.

⁹⁶ FAO (1996a). *The State of Food and Agriculture, Regional Review: Burkina Faso*.

http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w1358e/w1358e08.htm

⁹⁷ Ministry of Economy and Finance, Burkina Faso (2004). *Poverty Reduction Strategy Paper, Progress Report 2000-2002*. <http://www.imf.org/external/pubs/ft/scr/2004/cr0478.pdf>.

⁹⁸ Roncoli, M.C. et al. *Farmers' Behavioral Responses To Seasonal Rainfall Forecasts In The Sahel-Sudan*. <http://64.233.161.104/search?q=cache:9nFgIdaAwTJY:conference.ifas.ufl.edu/ifs/papers/c/c10.doc+Drought+cotton+Burkina+Faso&hl=en>

⁹⁹ World Trade Organisation (2004). *Trade Policy Review: Burkina Faso. Trade Policies by Sector*. 21 p.

http://www.wto.org/english/tratop_e/tpr_e/s132-4_e.doc.

¹⁰⁰ FAO (2003). *Key Statistics of Food and Agriculture External Trade. 2003. Exports, Cotton Lint*.

<http://www.fao.org/es/ess/toptrade/trade.asp>

¹⁰¹ Morrissey, O. et al. (2005), *supra*.

¹⁰² World Trade Organisation (2004), *supra*.

stable over the period. Also, since yields remained stable, increased production over the years appears to have resulted from the expansion of the cultivated area.¹⁰³

The world price for cotton has been declining in recent years, resulting in decreasing revenues in the cotton producing countries of West and Central Africa. In 2001-02, the world price fell to its lowest level in 30 years.¹⁰⁴ Consequently, cotton export earnings fell from US\$200 million to US\$148 million between 1998 and 2002, despite a slight increase in the volume exported.¹⁰⁵ It has been suggested that support policies for cotton producers in developed countries is one of the main causes for this global price decline. Such subsidies encourage production that would otherwise be unable to compete on the international market, thus inflating supply and depressing world prices.¹⁰⁶

Cotton producers receive six billion US dollars a year in subsidies.¹⁰⁷ The United States alone accounts for 50% of world cotton subsidies, with China, the EU, and India sharing the remainder. This amount is equivalent to four times the value of cotton produced by Benin, Burkina Faso, Chad, and Mali taken together. Cotton subsidies in the USA totalled US\$ 3 billion in 2001-2002 and were equivalent to a protection rate of 95%.¹⁰⁸ According to Oxfam estimates, US and EU cotton subsidies result in \$250 million in direct losses, and \$1 billion in indirect losses in West Africa each year. While a Malian cotton farmer earns about \$400 per year, a US cotton farmer receives \$250 per ha in subsidies.¹⁰⁹

In response to this situation, Benin, Burkina Faso, Chad, and Mali undertook an initiative referred to as the 'sectoral initiative' on cotton at the Ministerial Meeting in Cancún. Their main demands were "the phasing out of domestic support for cotton production and cotton export subsidies; and, transitional measures in the form of financial compensation to offset the loss of revenue incurred."¹¹⁰ This proposal has led to the creation of a special committee on cotton in the context of the WTO negotiations on agriculture. The producers of the Western and Central African Countries also formed an Association of African Cotton Producers (AproCA) in December 2004.¹¹¹

A decrease in subsidies is expected to lead to less production in industrialized countries, accompanied by an increase in the world price for cotton and translating into higher revenues and larger market shares for developing countries. Higher incomes for cotton producers would help alleviate poverty: according to the FAO, total subsidy elimination would raise world prices by 5-11% and increase West African exports by 9% and possibly by as much as 38%. This could represent a 1-2% increase in GDP for West African countries.¹¹²

The Impacts of Cotton Production on Desertification

Ninety-five percent Burkina Faso's territory is classified as dryland (arid, semi-arid, dry sub-humid) and is subject to desertification. Seventy-six percent of Burkina Faso's population lives on semi-arid lands.¹¹³ Table 4 summarises these figures. Land degradation is a widespread phenomenon. It is most

¹⁰³ World Trade Organisation (2004), *supra*.

¹⁰⁴ Morrissey, O. *et al.* (2005), *supra*.

¹⁰⁵ World Trade Organisation (2004), *supra*.

¹⁰⁶ World Trade Organisation (2004), *supra*.

¹⁰⁷ ICTSD (2003). "Cotton & Special Products Crop Up in WTO Agriculture Group", in *Bridges Weekly*. Volume 7, number 27. July 28. <http://www.icts.org/weekly/03-07-28/story4.htm>.

¹⁰⁸ OECD (2004). *Agricultural Policies in OECD Countries at a Glance*. Paris: OECD.

¹⁰⁹ Oxfam International (2004), *White Gold Turns to Dust*, Oxfam Briefing Paper #58. Oxfam, March.

¹¹⁰ World Trade Organisation (2004), *supra*.

¹¹¹ ICTSD (2004). "Coton: l'AproCA, pour défendre les intérêts des producteurs" AllAfrica.com, 28 December.

¹¹² Sachs, J. *et al.* (2004), *supra*, p.178.

¹¹³ Murray, S. *et al.* (1999), *supra*.

severe in the northern and central regions where poverty and food insecurity are prevalent. Current land degradation trends in Burkina Faso are expected to lead to significant desertification. Under a pessimistic scenario, if no significant action is undertaken to reverse current land degradation trends, the country's north will be transformed from a semi-arid to an arid region by 2020, the centre from a sub-humid to semi-arid one, and the south from a humid to a sub-humid region.¹¹⁴

Table 4: Land area and population per type of dryland in Burkina Faso¹¹⁵

	Moist sub humid	Dry sub humid	Semi arid	Arid	Total
Land area (km ²)	13,711	58,508	188,993	14,535	275,747
Land area (% of total)	5.0%	21.2%	68.5%	5.3%	100.0%
Population ('000)	226	2,128	7,957	162	10,472
Population (% of total)	2%	20%	76%	2%	100.0%

Combined with deforestation, demographic pressures, and poverty and governance issues, agriculture is considered a major driver of land degradation in Burkina Faso. The combined impact of decreasing land productivity and population growth has led farmers to increase their pressure on the land by shortening fallow periods and over exploiting their lands.¹¹⁶ The privatization of the agricultural input sector and the abolishment of fertilizer subsidies in the 1990s made the situation worse, leading to lower fertilizer application rates and a subsequent decline in soil fertility.¹¹⁷

Deforestation is also becoming a significant problem. Some 75,000 ha of forest are cleared each year for agricultural purposes, for example.¹¹⁸ This expansion of agricultural lands at the expense of forest brings higher returns to producers than the intensification of agriculture in semi-arid regions since it is more advantageous to abandon degraded lands and clear new ones for production.¹¹⁹

Even though desertification is generally associated with subsistence agriculture, cotton production is mentioned in several studies as a major cause of land degradation.¹²⁰ Barbier and Carpentier point out that sustainable agriculture is difficult to achieve in Burkina Faso's semi-arid areas due to the large amount of organic matter needed to maintain or improve yields. Consequently, they argue, farmers are more likely to migrate than invest in improving the productive capacity of the land because this strategy is less costly.¹²¹ There has already been a noticeable regional shift of cotton production "from the northern part of the central areas towards the south and south-western parts of the country" where

¹¹⁴ Burkina Faso (2000), *supra*.

¹¹⁵ Murray, S. *et al.* (1999), *supra*.

¹¹⁶ Ouedraogo, M. *Land Tenure and Rural Development in Burkina Faso: Issues and Strategies*. http://www.iied.org/docs/drylands/dry_ip112eng.pdf.

¹¹⁷ World Trade Organisation (2004), *supra*.

¹¹⁸ Burkina Faso (2000), *supra*.

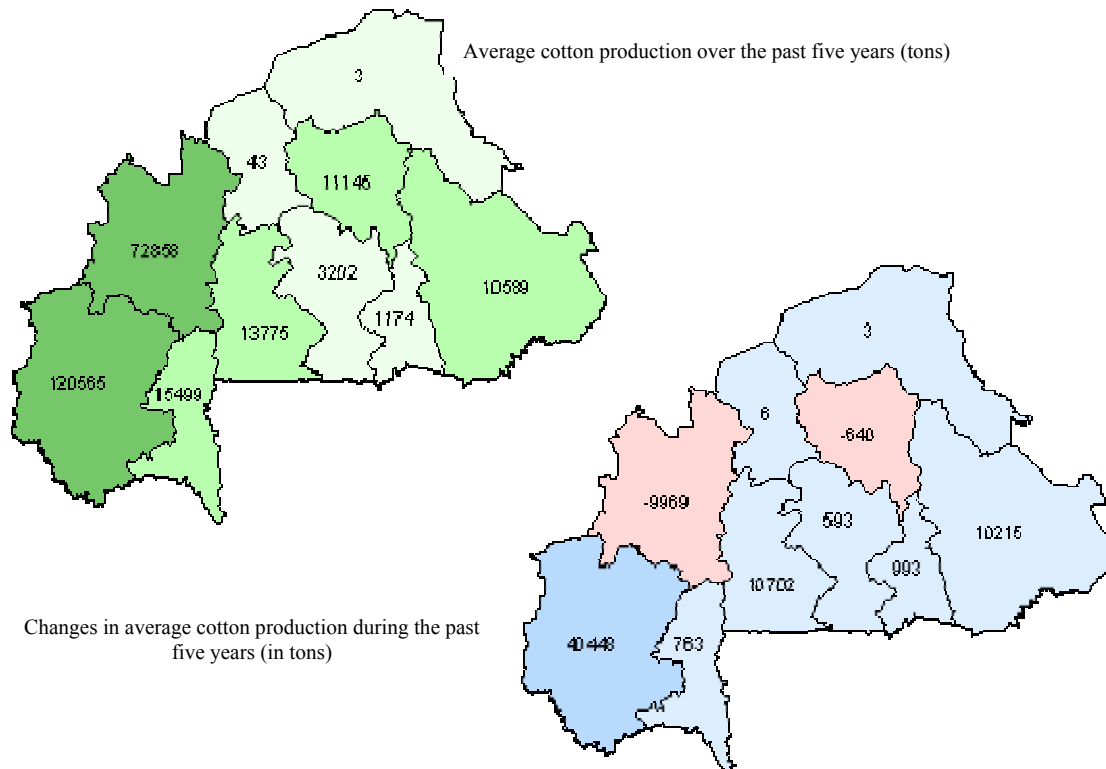
¹¹⁹ Solomon, A. *The Consequences of Structural Adjustment and Debt for Desertification and Food Security in Africa - A Literature Review and Discussion*. http://www.spaef.com/IJED_PUB/3_4/3_4_solomon.html.

¹²⁰ See: FAO (1996a), *supra*; Ouedraogo, M., *supra*; Burkina Faso (2000), *supra*.

¹²¹ Barbier, B. and C.L. Carpentier (2000). *The Conditions for Sustainability of Tropical Agriculture. Bioeconomic Models Applied to Five Contrasting Farming Systems*. Paper presented for the mini-symposium on modeling at the International Association of Agricultural Economists conference. Berlin. August.

lands are less degraded and more productive (see map 2).¹²² Maize and cotton are expected to become the dominant production in these sub-humid regions.¹²³ Where cotton production is newly introduced, it is already causing land degradation.¹²⁴

Map 2: Changes in the geographical distribution of cotton production in Burkina Faso¹²⁵



Under the pressure of incoming migrants, the intensity of agriculture in sub-humid regions is likely to increase in response to growing demand. Soil fragility, however, is a significant limiting factor to such intensification.¹²⁶ Demographic pressures are likely to lead to the abandonment of the fallow system used in sub-humid regions, thereby increasing pressure on the land.¹²⁷ On the other hand, the shift to cotton production may lead to higher rates of fertilizer application, thereby increasing soil productivity for both cotton and the food crops cultivated in rotation with cotton.¹²⁸ Indeed, where

¹²² Sahel and West Africa Club Secretariat and OECD (2005). *Economic and Social Importance of Cotton Production and Trade in West Africa: Role of Cotton in Regional Development, Trade and Livelihoods* (Draft), January. <http://www.oecd.org/dataoecd/19/8/34352756.pdf>.

¹²³ Barbier, B. and C.L. Carpentier (2000), *supra*.

¹²⁴ Sahel and West Africa Club Secretariat and OECD (2005), *supra*.

¹²⁵ Ministry of Economy and Finance, Burkina Faso (2000a). *Poverty Reduction Strategy Paper*. May 25. <http://www.imf.org/external/NP/prsp/2000/bfa/01/>.

¹²⁶ Secretariat of the United Nations Convention on Biological Diversity (CBD). *Country study - Burkina Faso Biodiversity – Chapter 2: A General Survey of Burkina Faso*. <http://bch-cbd.naturalsciences.be/burkina/bf-eng/implementation/doc/monography/chap2-5.htm>.

¹²⁷ Secretariat of the CBD, *supra*.

¹²⁸ Burkina Faso (2004). *Strategic Framework for the Development of the Cotton Sector in Burkina Faso*. June 18. <http://64.233.161.104/search?q=cache:ITbHC0VviC0J:www.forum-coton.org/docs/presentations/2.2-en.pdf+unpcb&hl=en>

fertilizers are applied on cotton areas, cereal yields were found to increase the following year, helping to improve food security.¹²⁹ The long-term sustainability of such intensification of land use for cotton production is questionable, however as the “demand placed by cotton plants on soil nutrients and water can result in soil degradation over time”.¹³⁰

Burkina Faso’s National Action Programme (NAP) recognises that the practice of intensifying production through the rotation of cotton, maize, and pulse has not diminished pressure on lands most exposed to desertification. The document mentions that desertification must therefore also be addressed in the sub-humid regions where cotton production is rapidly expanding.¹³¹ Indeed, severe land degradation has already been observed in the south and south-western parts of the country and has been attributed to the production of cash crops (cotton and groundnuts).¹³² Pollution from the use of fertilizers and pesticides has also been noticed in cotton producing areas.¹³³

The Impacts of Cotton Production on Rural Livelihoods

According to Burkina Faso’s Ministry of Economy and Finance, food-crop farmers had the highest incidence of poverty among socio-economic groups in 1998, followed by cash-crop farmers and the inactive.¹³⁴ Table 5 shows that between 1994 and 1998, the incidence of poverty increased in all groups except cash-crop farmers and the inactive. As noted by Burkina Faso’s Ministry of Economy and Finance, “[t]he incidence of poverty among cash crop farmers fell substantially, from 50.1 percent to 42.4 percent [between 1994 and 1998], but since the number of households growing cash crops increased during the period studied, they accounted for a higher proportion of the poor.” These figures suggest that cash-crop farmers are better off than other socio-economic groups. Farmers therefore face real opportunities to improve their incomes and livelihoods when they shift to cash-crop production, including cotton. According to the FAO, farmers growing a mix of maize and cotton have better incomes and nutrition than food-crop farmers.¹³⁵

Overall, over 10 million people in West Africa depend on cotton for their livelihoods and food security.¹³⁶ As production grew by 173% between 1993 and 1998, the incidence of poverty decreased by 16% in the region.¹³⁷ Cash-crop producers, however, are extremely vulnerable to fluctuations in world prices and exchange rates. For example, the decline in world price between 1997-98 and 2002-03 resulted in a 21% decline in cotton producers’ income per ha.¹³⁸ Higher incomes and improved living conditions are therefore achieved at the cost of greater vulnerability to external monetary and price shocks.

As shown above, the expansion and intensification of cotton production can intensify land degradation and desertification, with significant medium- and long-term impacts on poverty and food security. In addition, land degradation and migration have also generated land tenure disputes as competition for quality agricultural land is increasing.¹³⁹ Lastly, there is a risk that cotton producers end up occupying more productive lands at the expense of food-crop farmers, a great majority of

¹²⁹ Burkina Faso (2000). *supra*, p.29.

¹³⁰ Sahel and West Africa Club Secretariat and OECD (2005), *supra*.

¹³¹ Burkina Faso (2000), *supra*, p.29.

¹³² Ministry of Economy and Finance, Burkina Faso (2000), *supra*.

¹³³ Burkina Faso (2000), *supra*.

¹³⁴ Ministry of Economy and Finance, Burkina Faso (2000), *supra*.

¹³⁵ FAO (2005), *supra*, p.25.

¹³⁶ FAO (2005), *supra*, p.25.

¹³⁷ FAO (2005), *supra*, p.25.

¹³⁸ Burkina Faso (2004), *supra*.

¹³⁹ Ouedraogo, M., *supra*.

whom are women. Such an outcome would raise incomes among cash-crop producers in exchange for impoverishing food-crop producers.

Table 5: Incidence of poverty by socioeconomic group¹⁴⁰

Socioeconomic Groups	Incidence		Share	
	1994	1998	1994	1998
Public sector employees	2.2	5.9	0.2	0.5
Private sector employees	6.7	11.1	0.4	0.7
Craftsmen, businessmen	9.8	12.7	1.4	1.6
Other active workers	19.5	29.3	0.3	0.4
Cash crop farmers	50.1	42.4	11.8	15.7
Food crop farmers	51.5	53.4	78.9	77.1
Inactive	41.5	38.7	7.1	4.0
Total	44.5	45.3	100.0	100.0

Policy Implications for UNCCD Implementation

The expansion of cotton production has a series of impacts on land degradation and poverty in Burkina Faso that have implications for the implementation of the UNCCD. The UNCCD framework can play a role in making continuous support available to food-crop farmers with the objective to improve yields, strop degradation and thereby improve their livelihoods. The UNCCD can also be instrumental in raising awareness of the needs of this socio-economic group and making sure that the allocation of State resources and agricultural land does not contribute to its further marginalisation and impoverishment. The UNCCD participatory approach could also contribute to preventing and resolving land tenure disputes in the context of cash-crop expansion.

The UNCCD approach can also be instrumental in mitigating the impacts of the concentration and intensification of cotton production in the south and south-western regions of the country. Burkina Faso's Poverty Reduction Strategy Paper proposes to respond to land degradation problems associated with cotton production by expanding croplands, restoring degraded land, and intensifying production through increased mechanisation and inputs. While such a strategy can significantly increase yields and incomes, it may also lead to rapid land degradation in fragile, sub-humid lands. The UNCCD framework could be useful in promoting sustainable land management practices that would increase yields and maintain or improve the long-term productive capacity of the land. Such a strategy could release some pressure on the land and help prevent land disputes.

Export-Oriented Rice and Cotton Production in Pakistan

Agriculture represents 23% of Pakistan's GDP, employs approximately 46% of the workforce and is a significant source of foreign exchange earnings.¹⁴¹ The proportion of Pakistan's population living in

¹⁴⁰ INSD (1999). *Poverty Analysis in Burkina Faso*. Cited in Ministry of Economy and Finance, Burkina Faso. (2000), *supra*.

rural areas decreased from 72% in 1980 to 66% in 2002. Pakistan is a poor country, ranking 142nd out of 175 countries on the Human Development Index in 2002. In 2001, 19% of the population was undernourished.

Pakistan's crop production, including export crops such as rice and cotton, is mainly located in the provinces of Punjab and Sindh (See maps 3 and 4). Wheat, which is a staple food for a large portion of the population and produced for domestic markets, is by far the most important crop in Pakistan.¹⁴² Other important crops are cotton, rice, and sugarcane. Table 6 shows that cotton and rice production is concentrated in Punjab, which has by far the largest planted area and production of these two crops. Sindh also produces cotton and rice, but to a lesser extent. Sindh's yields, however, are higher than Punjab's. Cotton and rice production in other provinces of Pakistan remains marginal.

Table 6: Crop area, production, and yield in Punjab and Sindh (2002-2003)¹⁴³

Province	Crop	Area harvested ('000 Ha)	Production (Mt)	Yield (kg/ha)
Punjab	Wheat	6097.3	15,355	2518
	Rice	1512.3	2,579.7	1706
	Cotton	2208.3	1303.57(*)	590
Sindh	Wheat	863.7	2,109.2	2442
	Rice	488.3	1,299.7	2662
	Cotton	542.6	415.33 (*)	756
Pakistan	Wheat	8033.9	19,183.3	2388
	Rice	2225.2	4,478.5	2013
	Cotton	2793.6	1736.72 (*)	622

(*) '000 Mt

Scant rainfalls in Punjab and Sindh make water-intensive crops such as rice and cotton highly dependent on irrigation. Consequently, Pakistan has developed an important irrigation system based on the five major rivers in the Indus plain: the surface distribution system comprises 58,000 km of canal conveyance and more than 1.6 million km of water courses, channels, and ditches that reach an area of 10.4 million ha.¹⁴⁴ Over 90% of Pakistan's agriculture is now irrigation based. Eighty-eight percent of Pakistan's irrigation occurs in Punjab and Sindh.

In 2004, 2.2 million ha of rice were cultivated in Pakistan for a total production of 7.6 million Mt. (See table 7). Increased rice production in recent years has been attributed to improved yields rather than expanded rice production. In 2003, 2.46 million ha were devoted to cotton in Pakistan for a total production of 7.3 million Mt. Cotton production, yields, and area harvested have been relatively stable over the last decade, as shown in table 8.

¹⁴¹ UNDP (2003c). *Human Development Report, Statistics: Pakistan*.

http://hdr.undp.org/statistics/data/cty/cty_f_BFA.html.

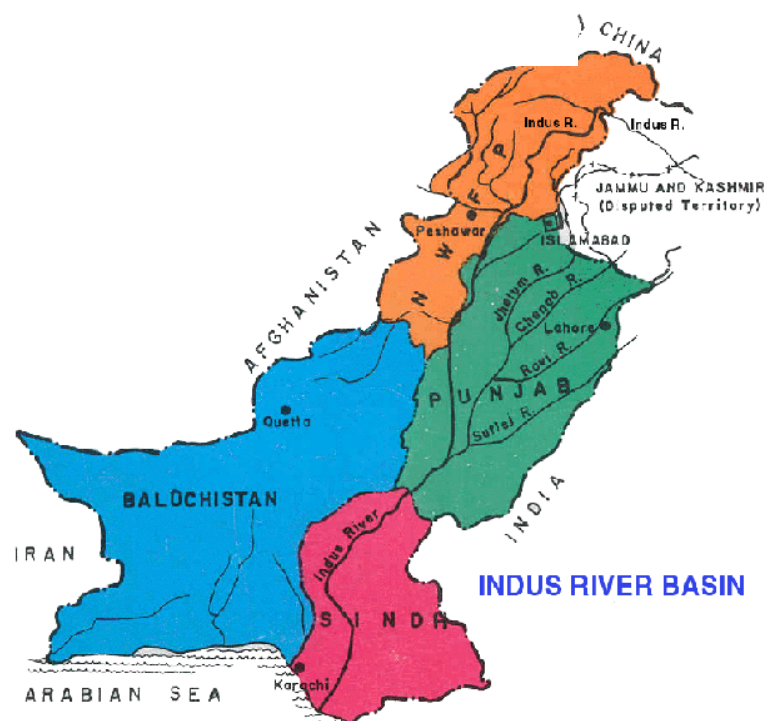
¹⁴² Federal Research Division, Library of Congress (1994). *Country Study: Pakistan*.

<http://countrystudies.us/pakistan/49.htm>

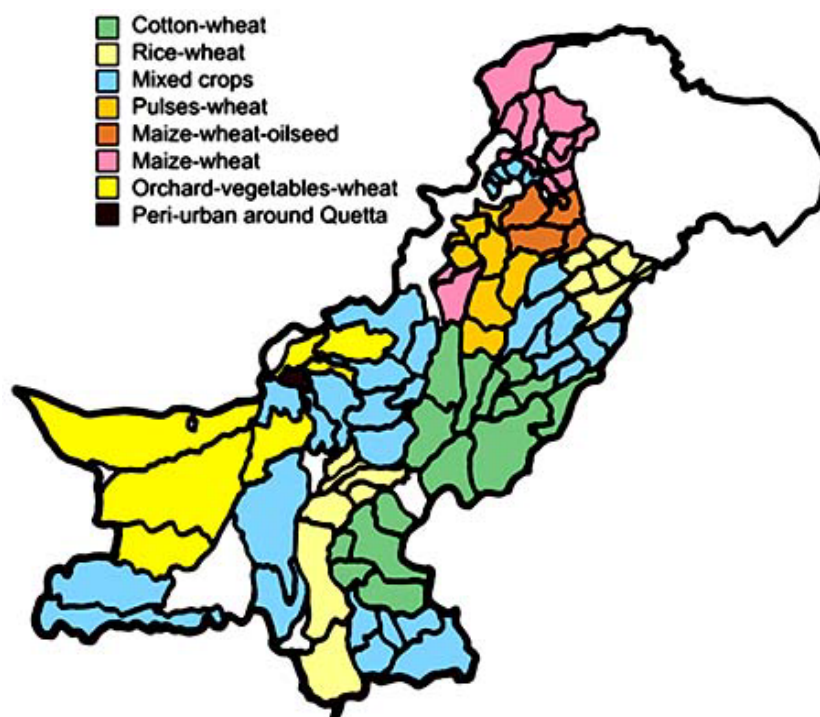
¹⁴³ Government of Pakistan, Ministry of Food, Agriculture and Livestock (2004). *Agriculture Perspective and Policy*. January. <http://www.pakistan.gov.pk/food-ministry/index.jsp>.

¹⁴⁴ FAO (1996b). *The State of Food and Agriculture. Asia and the Pacific, Regional Overview: Pakistan*. http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w1358e/w1358e08.htm.

Map 3: Provinces of Pakistan¹⁴⁵



Map 4: Crop production in Pakistan¹⁴⁶



¹⁴⁵ South Asian Floods (SAF). <http://www.southasianfloods.org/maps/mappak.html>.

¹⁴⁶ FAO (2004f). *Fertilizer Use by Crop in Pakistan*. <ftp://ftp.fao.org/docrep/fao/007/y5460e/y5460e00.pdf>.

Table 7: Paddy rice production in Pakistan¹⁴⁷

	1990-94	1995-99	2000-04
Area harvested ('000 Ha)	2,098	2,333	2,277
Production (Mt)	5,118	6,730	6,917
Yield (Kg/Ha)	2,435	2,879	3,037

* Provisional 2004 production data

Table 8: Cotton production in Pakistan¹⁴⁸

	1990-94	1995-99	2000-01	2001-02	2002-03
Area harvested ('000 Ha)	2,758	3,002	2,928	3,116	2,794
Production ('000 Mt)	1,648	1,673	1,826	1,805	1,737
Yield (Kg/Ha)	594	558	623	579	622

In past decades, cotton lint and milled paddy rice have been Pakistan's principal agricultural export products. Since 1994, milled paddy rice has dominated in terms of export value, reaching US\$ 460 million¹⁴⁹ and representing 46.5% of Pakistan's agricultural exports in 2002.¹⁵⁰ China, India, and Indonesia account for 60% of world rice production. Rice is an important food crop and most consuming countries are self-sufficient. Consequently, only 3% of worldwide production is exported yearly. The main rice exporters, which together account for 80% of exports, are Thailand, India, the United States, and China.¹⁵¹ Pakistan ranks as the sixth largest exporting country.¹⁵² Contrary to other Asian countries, rice is not a staple food in Pakistan. This enables Pakistan to export as much as 40% of its annual production.

As a result of national policies to maintain producer prices and food security, rice trade is still highly protected both in industrialized and developing countries.¹⁵³ Along with domestic reforms, modest trade liberalization in the context of multilateral and regional trade agreements has led to a twofold increase in rice trade both in volume and as a share of world consumption.¹⁵⁴ Despite these changes, several rice varieties remain highly protected and it is likely that world trade in rice would significantly increase as a result of further trade liberalisation. Should highly protected markets in Asia open to imported rice, Pakistan could be one of the countries benefiting from liberalisation – it

¹⁴⁷ FAO (2004d). *FAOSTAT - Agriculture Data*.

<http://faostat.fao.org/faostat/form?collection=Production.Crops.Primary&Domain=Production&servlet=1&hashulk=0&version=ext&language=EN>.

¹⁴⁸ United Nation National Fertilizer Development Center. *Pakistan - Statistics*.

http://www.fadinap.org/pakistan/CRP_AREA.htm.

¹⁴⁹ FAO (2002). *Key Statistics of Food and Agricultural External Trade. Exports: Pakistan, 2002*.

<http://www.fao.org/es/ess/toptrade/trade.asp>.

¹⁵⁰ FAO (2004g). *Food and Agricultural Indicators, Country : Pakistan*.

http://www.fao.org/es/ess/compendium_2004/pdf/ESS_PAK.pdf.

¹⁵¹ Morrissey, O. et al. (2005) *supra*.

¹⁵² Wailes, Eric J. *Rice: Global Trade, Protectionist Policies, And The Impact of Trade Liberalization*

<http://siteresources.worldbank.org/INTGAT/Resources/GATChapter10.pdf>

¹⁵³ Morrissey, O. et al. (2005), *supra*.

¹⁵⁴ Wailes, E.J. (2004). *FAO Rice Conference, Implications of the WTO Doha Round for the Rice Sector*. Rome, Italy. 12-13 February. <http://www.fao.org/rice2004/en/pdf/wailes.pdf>.

could significantly expand production of higher quality rice and seize new market shares in importing countries.

Accounting for approximately 10% of GDP and 55% of foreign exchange earnings,¹⁵⁵ cotton and transformed cotton products are also important to the Pakistani economy. Eight countries – China, the United States, India, Pakistan, Uzbekistan, Turkey, Brazil, and Australia – account for 80% of world cotton production. Approximately 26% of world cotton production is exported, with the top five exporters representing 70%.¹⁵⁶ About 30% to 40% of Pakistan's cotton is processed domestically and exported as cotton yarn, cloth, or garments. It is estimated that between two-thirds and three-quarters of raw cotton and transformed cotton products are exported.¹⁵⁷ Pakistan could benefit from the phasing out of cotton subsidies and so capture higher shares of the world market. Trade liberalisation could therefore lead to expanded cotton production in Pakistan. Such a scenario is made more likely by the promotion of rapid growth in agriculture proposed in Pakistan's Poverty Strategy Reduction Paper.¹⁵⁸

The Impacts of Rice and Cotton Production on Land Degradation and Desertification

About 80% of Pakistan's territory is arid and semi arid land, 12% is sub-humid, and 8% is humid land.¹⁵⁹ Ninety-five percent of Punjab and the entire territory of Sindh, the main rice and cotton producing provinces, are covered by drylands (see table 9). Overall, more than 55% of Pakistan's land is either affected or threatened by desertification.¹⁶⁰

Table 9: Land area per type of dryland in Punjab and Sindh (km²)¹⁶¹

Province	Sub humid	Semi arid	Arid	Other	Total
Punjab	17,014	59,678	119,310	10,197	206,199
Sindh	-	6,018	134,896	-	140,914
Pakistan	43,413	115,490	409,867	49,274	796,044

Land degradation is widespread in several regions of Pakistan and appears to be increasingly the reason for poor performance in the agricultural sector.¹⁶² The causes of land degradation differ among regions of Pakistan. In Punjab and Sindh, agriculture is the most important driver of land degradation

¹⁵⁵ Banuri, T. (1998) *Pakistan: Environmental Impact of Cotton Production and Trade*.
http://www.tradeknowledge.network.org/pdf/pk_Banuri.pdf.

¹⁵⁶ Morrissey, O. *et al.* (2005), *supra*.

¹⁵⁷ Banuri, T. (1998), *supra*.

¹⁵⁸ Poverty Reduction Strategy Paper Secretariat, Ministry of Finance, Government of Pakistan (2003).
Accelerating Economic Growth and Reducing Poverty: The Road Ahead.
http://poverty.worldbank.org/files/15020_Pakistan_PRSP.pdf

¹⁵⁹ Pakistan (2002), *supra*.

¹⁶⁰ Government of Pakistan. *Industrial Estates in Pakistan*. http://www.apo-tokyo.org/gp/e_public/penang_symp/Penang_Symp_P159-166.pdf.

¹⁶¹ Sandhu, G.R., *Sustainable Agriculture, NCS Sector Paper*, as quoted in Pakistan, *supra*. Data for Balochistan is incomplete. However this region is of less interest for this study as it is not a major cotton or rice producing region. Most of its agricultural land used as rangelands.

¹⁶² FAO (1996b). *The State of Food and Agriculture. Asia and the Pacific, Regional Overview: Pakistan*.
http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w1358e/w1358e08.htm.

and desertification. Rangelands are degrading due to heavy livestock pressure, and irrigated lands are affected by waterlogging and salinity. Agricultural activities and overstocking have also decreased the land vegetation cover, increasing wind and water erosion. In 1992, approximately 11 million ha were affected by water erosion in Pakistan and 2 million ha by wind erosion.¹⁶³

Inefficient irrigation systems and inadequate or underdeveloped drainage systems are a direct cause of the waterlogging and salinisation problems prevalent in Sindh and Punjab.¹⁶⁴ A study conducted in 2001 showed that 59% of the plots in Sindh and 24% of those in Punjab were affected by salinity or waterlogging.¹⁶⁵ It is estimated that Pakistan loses about 25% of its potential agricultural production every year due to waterlogging and salinity/sodicity.¹⁶⁶ Estimated costs associated with this lost production range from US\$ 221 to 357 million a year.¹⁶⁷

Cash crops such as cotton and rice play a significant role in the land degradation process. Indeed, the production of water-intensive crops on permeable soils is one of the main causes of waterlogging in Pakistan.¹⁶⁸ Table 10 shows that cotton and rice respectively require two and three times as much water as do wheat or maize. In addition to intensifying pressures on water resources in the Indus Plain, the expansion in cash-crop production could also aggravate land degradation problems in Sindh and Punjab. It should also be noted that the intensification of agriculture has led to insufficient crop rotation, which has decreased soil fertility in these provinces.¹⁶⁹

Table 10: Pakistan's main crops: Water requirements and area harvested¹⁷⁰

Crop	Water requirement per acre per year	Per cent of total cropped area
Wheat	33 cm	40%
Cotton	65 cm	13%
Rice	90 cm	11%
Sugarcane	133 cm	4%
Maize	35 cm	4%

Cotton and rice production also involves higher rates of agro-chemical application, with significant impacts on land quality. Overall, fertiliser use has doubled and pesticide use quintupled in Pakistan since the early 1980s.¹⁷¹ In Punjab, over 95% of the area devoted to cotton was treated with pesticides

¹⁶³ Government of Pakistan (1999). *Biodiversity Action Plan, Pakistan*. August. 78 p.

<http://www.biodiv.org/doc/world/pk/pk-nbsap-01-en.pdf>.

¹⁶⁴ World Bank (1994). *Pakistan: Irrigation and drainage: issues and options*. http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000009265_3961004183942.

¹⁶⁵ World Bank (2002). *Pakistan Poverty Assessment. Poverty in Pakistan: Vulnerabilities, Social Gaps, and Rural Dynamics. Chapter 4: Rural Nexus, Poverty and Productivity*. October 28. 202 pages. <http://siteresources.worldbank.org/PAKISTANEXTN/Resources/PovertyAssessment.pdf>.

¹⁶⁶ Government of Pakistan, *supra*.

¹⁶⁷ Hussain, A. (2003). *Poverty, Growth and Governance Pakistan*. UNDP National Development Report. 177 p. <http://www.un.org.pk/nhdr/nhdr-pak-2003.pdf>.

¹⁶⁸ Faruquee, R., and World Bank. (1995). *Pakistan's Agriculture: Is 3 to 4 Percent Annual Growth Sustainable?* January. http://econ.worldbank.org/files/438_wps1407.pdf.

¹⁶⁹ Faruquee, R. and World Bank. (1995), *supra*.

¹⁷⁰ Alam, S.M. and M.H. Naqui (2003). *Pakistan Agriculture*. <http://www.pakistaneconomist.com/database1/cover/c2003-28.asp>.

¹⁷¹ FAO (1996b), *supra*.

in 1991, compared with less than 10% before 1983.¹⁷² The use of pesticides and fertilisers has led to a significant increase in yields, but it has also increased soil contamination by chemicals.

Due to their intense reliance on water and agro-chemicals, cotton and rice production contribute significantly more to land degradation in Pakistan than do other crops such as wheat or maize. Unless irrigation, drainage, and chemical management systems are significantly improved, it is likely that the potential increase in production of these crops as a result of trade liberalisation will affect land degradation and desertification.

The Impacts of Rice and Cotton Production on Rural Livelihoods

The 1990s saw a slowdown in the average annual growth rate of major crops, including rice, cotton, wheat, and sugarcane, which together account for 85% of Pakistan's crop production. The growth rate of major crops declined from 3.34% in the 1980s to 2.38 % in the 1990s.¹⁷³ This decline is attributed in large part to water scarcity and to soil degradation resulting from improper irrigation and agricultural practices.

The combination of slower agricultural growth and persistent demographic pressure has contributed to a significant increase in rural poverty as well as a slowdown in export growth in the last 15 years. In fact, the proportion of Pakistan's population under the poverty line increased from 17% in 1986-87 to 32.6% in 1998-99.¹⁷⁴ As shown in table 11, the country's rural poverty rates are significantly higher than urban poverty rates. While the incidence of poverty slightly declined in rural areas of Punjab during the 1990s, it increased by more than 6% in Sindh over the same period. According to one study, cotton/wheat growing districts of Punjab and Sindh have the highest incidence of rural poverty in Pakistan. Rice growing districts in Sindh are also among the poorest of the country.¹⁷⁵ Furthermore, the highest incidence of poverty occurs in areas where incomes depend most heavily on crop production.

Table 11: Incidence of poverty (1990-1999)¹⁷⁶

	Urban			Rural			Total		
	90-91	93-94	98-99	90-91	93-94	98-99	90-91	93-94	98-99
Punjab	29.4	18.4	26.5	38.5	31.9	34.7	35.9	28.2	32.4
Sindh	24.1	13.9	19.0	30.8	31.5	37.1	27.6	23.4	29.2
National	28.0	17.2	24.2	36.9	33.4	35.9	34.0	28.6	32.6

Pakistan's growing rural population has led to the subdivision of land across generations and to a decrease in the average farm size: the proportion of farms smaller than five acres increased significantly in past decades and by 2000, they accounted for 57% of all farms.¹⁷⁷ Smaller farms provide less possibility for diversification and expose producers to price shocks. Consequently, the

¹⁷² Banuri, T. (1998), *supra*.

¹⁷³ Hussain, A. (2003), *supra*.

¹⁷⁴ Hussain, A. (2003), *supra*.

¹⁷⁵ Malik, S. J. (2005a), *Agricultural Growth and Rural Poverty A Review of the Evidence*. Pakistan Resident Mission Working Paper Series Working Paper No. 2, Asian Development Bank, January, 63 pages.

¹⁷⁶ Poverty Reduction Strategy Paper Secretariat, Ministry of Finance, Government of Pakistan (2003), *supra*.

¹⁷⁷ Malik, S. J. (2005a), *supra*.

unequal distribution of land makes it likely that future growth in cotton and rice production will benefit large farmers.¹⁷⁸

Moreover, as more inputs are required to maintain yields, smaller farmers who cannot afford them are affected to a greater degree by land degradation than are larger farmers. This phenomenon contributed to increased income inequality among farmers, which also grew between 1992 and 1999.¹⁷⁹ According to the government of Pakistan, waterlogging and salinity “are considered to be a primary cause of low yields and low cropping intensities in rural Pakistan. Combating this growing problem would yield significant productivity gains to many rural households.”¹⁸⁰ Rural poverty in the country is therefore directly related to land degradation caused by waterlogging and salinity.

Small farmers are also negatively affected by the structure of Pakistan’s commodities markets: 45% of rice producers, 96% of cotton producers, and 67% of wheat producers sell their crops to traders and landlords. Small farmers who sell their crops through such intermediaries receive lower prices than if they sold directly to government agencies at the official purchase price. They often do not have direct access to government agencies or are involved in dependence relationships with traders and landlords due to loans or other financial liabilities. In this context, with intermediaries acting as monopolies, small farmers tend to receive lower prices.¹⁸¹ In fact, the poorest farmers receive on average 7.44% less than the market price for their crops. Similar market distortions are also observed in the farm input market where the poorest farmers pay higher prices for fertilizers and pesticides.

Policy Implications for UNCCD Implementation

The UNCCD could provide a valuable framework to address the issues of waterlogging, salinization, and soil contamination that lead to land degradation, decreasing yields, and rural poverty in Pakistan. Pakistan’s NAP under the UNCCD already provides for the adoption of measures to address these issues. In the absence of decisive intervention to implement these measures and reverse current trends of land degradation, trade liberalisation could lead to declining yields, increased water scarcity, and rapidly growing rural poverty.

The participatory approach to resources management promoted by the UNCCD provides a useful approach to prevent the marginalization of small farmers in the context of increased competition for water and land resources. It can also play a role in facilitating access to fertilisers, thereby contributing to maintaining yields on degrading soils. The effective implementation of Pakistan’s NAP could also improve small farmers’ yields and incomes, thereby decreasing their vulnerability to intermediaries and improving their competitiveness and capacity to seize new opportunities created by trade liberalisation.

Export-Oriented Soybean Production in Brazil

Agriculture represented 6.1% of GDP and 16% of Brazil’s total labour in 2002.¹⁸² That year, the main agricultural products were soybeans (42,125 thousand Mt) indigenous cattle meat (7,311 thousand Mt), and indigenous chicken meat (7,051 thousand Mt).¹⁸³ Brazil’s potential farmland is estimated at 550 million ha, of which 228 million ha are currently cultivated (178 million ha are used for pasture

¹⁷⁸ Ibid.

¹⁷⁹ Hussain, A. (2003), *supra*.

¹⁸⁰ Poverty Reduction Strategy Paper Secretariat, Ministry of Finance, Government of Pakistan (2003), *supra*.

¹⁸¹ Hussain, A. (2003), *supra*.

¹⁸² FAO (2004b), *Food and Agricultural Indicators, Country : Brazil*.

http://www.fao.org/es/ess/compendium_2004/pdf/ESS_BRA.pdf.

¹⁸³ FAO (2004b), *supra*.

and 50 million ha for crops).¹⁸⁴ The agricultural sector is an important source of foreign exchange earnings, with agricultural products representing 35% of the total value of Brazilian exports. Brazil's main agricultural export products in 2002 were soybeans, soybean cake, and chicken meat, representing respectively 18.1%, 13.1%, and 8% of the value of agricultural exports.¹⁸⁵

In 2000, the soybean sector accounted for 6% of Brazil's GDP and employed 5.5 million people across the country (of which 900,000 were producers).¹⁸⁶ Soybean production occupied 18.4 million ha in 2002, an area representing 32.6% of Brazil's cropland.¹⁸⁷ The area under soybean cultivation increased significantly over the past decade. Combined with improved yields, this expansion has led to a considerable increase in production. For example, production almost doubled in the past ten years, from 25.7 Mt in 1995 to 49.2 Mt in 2004.¹⁸⁸ Table 12 shows the recent evolution in soybean production, harvested area, and yields.

Table 12: Soybean production in Brazil¹⁸⁹

	1990-94	1995-99	2000-04
Area Harvested ('000 Ha)	10,541	11,963	16,780
Production (Mt)	20,314,625	27,504,855	42,685,752
Yield (Kg/Ha)	1,922	2,295	2,553

Soybean production is mainly concentrated in the centre-west and southern regions of the country (see map 5). The centre-west is an area of 200 million ha that has considerable potential for further agricultural expansion through land conversion. In recent years, the region has experienced a significant expansion in soybean production, mainly driven by world demand. In comparison, production in the south remained stable. In 2002-03, the area harvested in the centre-west and the south was about the same. Production in the centre-west, however, surpassed the south's in 2002-03.¹⁹⁰

Brazil has become the largest exporter and the second-largest producer of soybeans in the world, close behind the United States.¹⁹¹ It is also the second-largest exporter of soybean cake, just after Argentina.¹⁹² In 2003, 38.7% of the soybean production was exported (19.9 million tons out of a total production of 51.4 million tons). This indicates that the growth in soybean production was mainly driven by international demand.¹⁹³ As can be seen in table 13, soybean exports multiplied by 5 in weight and value between 1990 and 2003, a trend that intensified since 2000. Exports of soybean cake and oil also progressed, but to a lesser extent. This phenomenal expansion is due to a

¹⁸⁴ FAO (2004c). *Fertilizer Use by Crop in Brazil*

http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5376e/y5376e00.htm

¹⁸⁵ FAO (2004a), *supra*.

¹⁸⁶ D'Alembert, J. et al. (2003), *Sustainability Assessment of Export-Led Growth in Soy Production in Brazil*. Brasília (Brazil), Gland (Switzerland): WWF-Brazil and WWF-International.

¹⁸⁷ FAO (2004c), *supra*.

¹⁸⁸ FAO (2004c), *supra*.

¹⁸⁹ FAO (2004d), *supra*.

¹⁹⁰ Flakerud, G. North Dakota State University and NDSU Extension Service (2003). *Brazil's Soybean Production and Impact*. EB-79, July. <http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/eb79w.htm>.

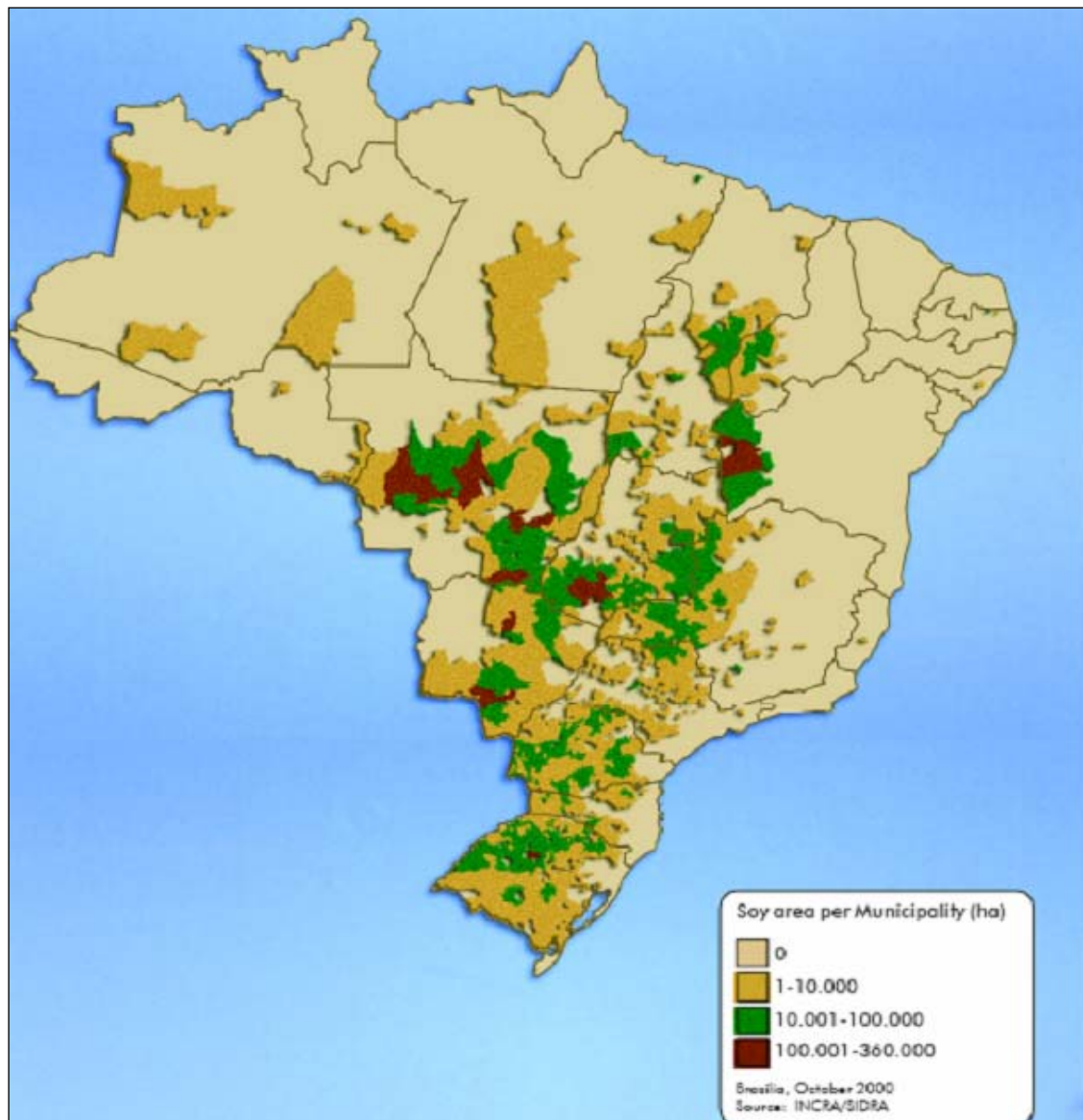
¹⁹¹ CONAB (2003). <http://www.conab.gov.br/>.

¹⁹² D'Alembert, J. et al. (2003), *supra*, p.20.

¹⁹³ FAO (2004c), *supra*.

combination of fiscal and macroeconomic policies introduced by Brazil, in addition to a growing world demand that increased by an average 5.4% per year between 1993 and 2002.¹⁹⁴

Map 5: Soybean production in Brazil¹⁹⁵



Given its comparative advantage, the capacity of its agro-industrial sector, and the availability of land to expand production, Brazil appears to be very well positioned to satisfy the expanding world demand for soybeans. Moreover, a decrease or elimination of subsidies to the soybean sector in developed countries in the context of the Doha Round could further strengthen Brazil's position on the world market, allowing it to capture new market shares. According to some estimates, soybean

¹⁹⁴ Flakerud, G. and North Dakota State University, NDSU Extension Service (2003), *supra*.

¹⁹⁵ Source: D'Alembert, J. et al. (2003), *supra*, p.20.

production could expand by as much as 10% as an outcome of the Doha Round; this could translate into an additional 1.8 million ha devoted to agricultural production, creating significant pressure on forests and land resources.¹⁹⁶

Table 13: Agricultural exports by commodity¹⁹⁷

	1990-94	1995-99	2000-03
Soybeans (Mt)	3,881,103	6,734,202	15,763,318
Soybeans ('000\$)	885,626	1,601,899	3,058,954
Soya bean cake (Mt)	8,968,041	10,750,584	11,694,808
Soya bean cake ('000\$)	1,675,172	2,133,078	2,129,762
Soya bean oil (Mt)	860,913	1,426,761	1,786,224
Soya bean oil ('000\$)	398,160	775,958	718,880

The Impacts of Soybean Production on Land Degradation in the Cerrado

While technically speaking, desertification only affects the Nordeste where Brazil's drylands are located, land degradation also affect other regions of the country. Desertification already affects or directly threatens 11% of Brazil's territory, including cropland areas.¹⁹⁸ According to the Brazilian Ministry of Environment, economic losses from land degradation and desertification could be as high as US\$ 800 million a year. The cost of recovering the areas most affected was estimated at US\$ 2 billion over a 20-year period.¹⁹⁹ It is generally recognized that other regions in Brazil might become directly threatened by land degradation in the coming years due to the expansion of intensive export-crop production activities.

Fifty-nine percent of Brazilian soybean production occurs in the Cerrado,²⁰⁰ an area characterized by natural grassland and some low trees, and a semi-humid tropical climate.²⁰¹ The Cerrado covers over 20% of Brazil's territory and consists of highly sensitive lands supporting important biodiversity, including forests. It is home to "an estimated 60,000 species of plants, animals and fungi".²⁰² Given that the Cerrado benefits from a semi-humid climate, land degradation in this ecosystem does not qualify under the UNCCD definition of desertification. It is nevertheless instructive in the UNCCD context to analyse how large-scale intensive monoculture is affecting this ecosystem.

Brazil's soybean sector is one of the best examples of the expansion of large-scale intensive agriculture that is often a result of liberalized trade. This expansion is occurring on fragile lands that

¹⁹⁶ Morrissey, O. *et al.* (2005), *supra*, p.17.

¹⁹⁷ FAO (2004d), *supra*.

¹⁹⁸ Cordeiro, E. (1998). *Climate Change and Desertification: Statement to the United Nations General Assembly*. New York. 22 October. <http://www.un.int/brazil/speech/98d-2com-clima.htm>.

¹⁹⁹ Brasil, Ministry of Science and Technology. *Desertification*. <http://www.mct.gov.br/sobre/Default.htm>.

²⁰⁰ The Cerrado also accounts for "43 percent of the Brazilian production of beef cattle, 23 percent of the coffee, 34 percent of the rice, [...] and 29 percent of the maize. In addition, there are 12 million ha planted with other annual and perennial crops and 50 million ha of natural and improved pastures." Source: FAO (2004c), *supra*.

²⁰¹ Hogan, D.J., J.M. Pinto da Cunha and R. L. do Carmo. *Population Distribution and Environmental Change in Brazil's Center-West Region*. Campinas, São Paulo, Brazil: Population Studies Center – NEPO, State University of Campinas, 13081-970. http://www.iussp.org/Brazil2001/s40/S41_P01_Hogan.pdf.

²⁰² D'Alembert J. *et al.* (2003), *supra*.

are vulnerable to such intensive use and that can be rapidly degraded following the dual process of expansion and intensification of agricultural production. It is therefore a classic example of the first trade-related driver of desertification described in the preceding section. Thus, an analysis of soybean production in the Cerrado can convey valuable lessons to UNCCD implementation in the likelihood that several affected countries develop large scale agro-industrial agriculture in the wake of the Doha Round.

The impacts of soybean production on land degradation in the Cerrado result from both the expansion of cropland and the intensification of production. Indeed, as export and production figures skyrocketed, the area under soybean cultivation also expanded rapidly from 9.4 million ha in 1992 to 18.5 million ha in 2003 while yields increased from 1,732 kg per ha in 1990 to 2,790 kg per ha in 2003.²⁰³ This clearly indicates that the areas dedicated to soy production have not only expanded, but that activity on the planted areas also intensified.

Soil erosion is foremost concern related to the impacts of expanded soybean production in the Cerrado.²⁰⁴ The Brazilian National Agricultural Research Centre underscores that 6 kilos of fertile soil are lost for each kilo of crop produced, while according to some estimates, 80% of Cerrado agricultural lands are degraded to a certain extent. Following the removal of natural vegetation, these agricultural lands are susceptible to intensive agricultural production, and since they are poor in nutrients and acids, they are vulnerable to soil erosion. Soil compaction caused by the increased mechanisation of agricultural has also made the remaining vegetation more vulnerable to short periods of drought.²⁰⁵

The conversion of forest to cropland has also become a significant problem in the centre-west region. Deforestation has led to a significant drop in precipitation in savannah regions and to longer dry seasons.²⁰⁶ Furthermore, expanded soybean cultivation has had a negative impact on wet fields, which play an important role in storing water during the rainy season. Stored water then feeds the drainage network in the dry season. In fact, since the beginning of agricultural expansion in the Cerrado, 6.2 thousand ha of wet fields have completely dried-up.²⁰⁷ Changes in local climates have also affected the natural regeneration of forests in the South Amazonian region.²⁰⁸

To minimize erosion, zero-till techniques have been introduced and are now applied on 70% of the Cerrado's cultivated area.²⁰⁹ When intensification is accompanied by the adoption of no-till techniques, land degradation can be mitigated.²¹⁰ Nevertheless, land degradation due to soil erosion, longer dry seasons, and deforestation remains an important concern in the region.

The Impacts of Soybean Production on Rural Livelihoods

The expansion of soybean production in Brazil has had important impacts on rural livelihoods in the south and centre-west regions of the country, including rural exodus and increased income disparities.

²⁰³ Brazilian Ministry of Agriculture, <http://www.agricultura.gov.br/pls/portal/url/ITEM/DEF82374B76BF837E0306B01A8C016F9>.

²⁰⁴ D'Alembert, J. *et al.* (2003), *supra*.

²⁰⁵ Spain, J.M., M.A. Ayarza and L. Vilela (1996). "Crop pasture rotations in the Brazilian Cerrados", in R.C. Pereira and L.C.B. Nasser (eds). *Proceedings of the First International Symposium on Tropical Savannas*. p.67.

²⁰⁶ D'Alembert, J. *et al.* (2003), *supra*, p.64.

²⁰⁷ D'Alembert, J. *et al.* (2003), *supra*, p.65.

²⁰⁸ Nobre, C.A., P.J. Sellers and J. Shukla (1991). "Amazonian deforestation and regional climate change". *Journal of Climate*. 4: 957-988.

²⁰⁹ D'Alembert, J. *et al.* (2003), *supra*.

²¹⁰ Landers *et al.* (2003). *Land-use intensification through zero-tillage as a viable solution for mitigating deforestation*, Embrapa, 2003.

In the south, the expansion of soybean production that occurred in the 1960s and 1970s led to the displacement of small farmers and to a massive rural exodus.²¹¹ The impacts of expanded soybean production on rural livelihoods in the centre-west were less intense, since the Cerrado region was generally undeveloped and population density was very low.

The development of a capital-intensive, low-labour form of agricultural production in the centre-west, however, still led to a declining rural population. Whereas 32% of the centre-west's population lived in rural areas in 1980, this proportion had dropped to 13% by 2000. This was due both to rapid urbanization and to the consolidation of the agricultural sector into low-labour industrial production. As a result, rural labourers migrated to urban centres.²¹² Indeed, the soybean sector today is very capitalized and concentrated and is not a significant source of employment; soybean farms in the centre-west are very large with two-thirds of them covering more than 1,000 ha.²¹³

With expanded soybean production, small farmers who were unable to acquire the lands and technologies required to shift from subsistence production to soybean monoculture were excluded. As a result, for every small farmer who found a job in soybean production, 11 were left out and became unemployed.²¹⁴ Small farmers who remained in the countryside despite low employment opportunities were pushed to more marginal lands and often found themselves forced to practice unsustainable survival activities ranging from agricultural production on deforested land to the exploitation of forest products.²¹⁵

Expanded soybean production also intensified income disparities since significant gaps developed between large export-crop producers and small food-crop farmers. Soybeans producers have better access to capital, farm inputs, and agricultural technologies and so benefit from higher yields. Food-crop farmers, on the other hand, lack access to farm inputs, credit, and mechanised techniques. As a result, their yields are far below what is achievable, due in part to low rates of fertilizer application and to the lower productivity of their lands. According to FAO, "this is particularly the case with subsistence farming, which is practiced in the poorer areas of the country [...] and in which practically no mineral fertilizers are used."²¹⁶

It appears, therefore, that the expansion of large-scale, agro-industrial soybean production has not generated rural employment or facilitated access to farm inputs for small farmers. While soybean production generates significant overall economic activity and foreign currency revenues for Brazil, it seems that the model of soybean production expansion has led to the concentration and consolidation of production with at best modest positive impacts on rural livelihoods in terms of employment and income. Indeed, in many cases the impacts have been negative, with the marginalization of small farmers and the release of rural labour that has fuelled urban poverty in Brazil.

Policy Implications for UNCCD Implementation

As already mentioned, although technically speaking the expansion of soybean production in Brazil is not taking place in areas affected by desertification, it is nevertheless leading to large-scale land

²¹¹ D'Alembert, J. *et al.* (2003), *supra*.

²¹² D'Alembert, J. *et al.* (2003), *supra*.

²¹³ Economic Research Service/USDA (2001). *Argentina & Brazil Sharpen Their Competitive Edge*. Agricultural Outlook/September. <http://ers.usda.gov/publications/AgOutlook/sep2001/ao284j.pdf>

²¹⁴ Bickel, U. (2004). *Brasil: Expansão da soja, conflitos sócio- ecológicos e segurança alimentar*. Tese de Mestrado em agronomia tropical, Universidade de Bonn, p. 66.

²¹⁵ Giordano, S. R. (2000). *Gestão ambiental no sistema agroindustrial*. Economia e gestão dos negócios agroalimentares. São Paulo, PENSA. pp. 255- 281.

²¹⁶ FAO (2004c), *supra*.

degradation on vulnerable lands. It can therefore serve as a useful example to help analyse the value-added of the UNCCD approach to address such issues.

The UNCCD framework provides a useful policy framework to prevent land degradation resulting from the expansion/intensification of large scale industrial monocultures. Indeed, it can serve as a catalyst for the early adoption of appropriate mitigation plans promoting sustainable land management practices. Such plans could include the possibility of mixed land uses that preserve some forest cover to reduce soil erosion, or the dissemination of better management techniques among cash-crop producers. In this context, the key would be to mainstream UNCCD action programmes into agricultural trade expansion strategies as a valuable instrument for facilitating long-term sustainability in agricultural production through sustainable land use practices.

In terms of protecting rural livelihoods, the UNCCD could play a useful role in improving living conditions for small farmers and landless peasants by supporting the participatory, sustainable management of marginal lands. Action programmes to combat desertification could also serve to promote better access to farm inputs as a means to prevent land degradation. Moreover, by improving yields and small-farmer livelihoods, targeted interventions under the framework of desertification action programmes could improve rural incomes and employment opportunities, thereby attenuating migration pressures on urban areas.

IV. The Doha Round: Policy Implications for the UNCCD

The Doha declaration contains a general commitment towards sustainable development²¹⁷ and voices an intention to enhance the mutual supportiveness between the multilateral trade regime and Multilateral Environmental Agreements (MEAs).²¹⁸ This statement of principles, however, does not provide a mandate to analyse the potential impacts of the Doha Round on the progress of MEA objectives or to submit the negotiated texts to a sustainability assessment. There is therefore little, if any, consideration of environmental issues such as desertification in the current negotiation process.

Based on the analysis conducted in the three case studies presented in this study, it appears that agricultural trade liberalisation in the context of the Doha Round may generate significant impacts on land degradation and rural livelihoods in the world's drylands. This section seeks to identify some policy implications for the UNCCD based on the analysis conducted thus far and on some reasonable assumptions regarding the potential outcomes of the Doha Round in agriculture.

Anticipating the Outcomes of the Doha Round

The Doha negotiation mandate on agriculture aims for "substantial improvements in market access; reductions of, with a view to phasing out, all forms of export subsidies; and substantial reductions in trade-distorting domestic support."²¹⁹ The mandate also recognises the principle of special and differentiated treatment for developing countries and its concrete application in the outcomes of the negotiations. The Doha Development Agenda rests on the assumption that agricultural trade liberalisation will raise agricultural exports and incomes in the rural developing world, thereby contributing to alleviating rural poverty. As shown in section II, such theoretical assumptions may not fully materialise in the absence of appropriate policy interventions that seek to resolve persistent

²¹⁷ World Trade Organisation (2001), *supra*, par. 6.

²¹⁸ World Trade Organisation (2001), *supra*, par. 31.

²¹⁹ World Trade Organisation (2001), *supra*, par. 13.

structural inequities in the world commodities market and to improve agricultural productivity and rural infrastructure development in drylands.

Evaluations of the potential results of the Doha Round differ according to the methodologies used by different authors and on the optimistic or pessimistic scenarios on which they build their analyses. According to one scenario developed in the context of the Millennium Project, a possible outcome of the Doha Round would be the complete elimination of agricultural export subsidies and a 40% cut in bound tariffs. Under this scenario, developing countries as a group would receive 40% of global welfare gains, or approximately \$20 billion, whereas low-income countries would receive welfare gains of about \$800 million, or about 1.7% of the global welfare gains arising from trade liberalization.²²⁰ Other studies conclude that partial to complete trade liberalization could generate a 50% growth in world agricultural trade²²¹ and bring welfare gains of about \$20-25 billion to developing countries.²²²

Generally speaking, exporting countries are likely to benefit from improved market access and reduced subsidies, but food importing countries could be hurt if trade liberalization leads to price increases for staple foods.²²³ Others argue that higher agricultural prices following agricultural trade liberalisation should not hurt food importing countries since it is estimated that price increases will be within the range of current fluctuations caused by price volatility and exchange rates.²²⁴ Moreover, in some cases, dryland food crop producers could benefit from higher prices on the domestic market if the Doha Round results in the reduction of developed country surpluses, thereby preventing import surges and restoring their competitiveness on national markets.

In a report published in 2004, WWF, the World Bank, ICTSD, and the government of the Netherlands anticipated that the Doha Round will lead to short-term international price increases but that “the long-term prognosis is for a continued downward price trend, suggesting that poverty alleviation, and its environmental benefits, will be limited”.²²⁵ The report suggests that due to the complexity of supply chains, commodity price increases may be absorbed in the supply chain and be marginal or inexistent at the farm gate. This could be especially problematic for small-scale cash-crop farmers in Pakistan, Burkina Faso, and elsewhere who engage in contract farming. In addition, it is expected that price volatility will persist and still hurt developing country farmers. Overall, the study estimates that the gains of liberalisation will be small and lead to little reduction in rural poverty. The restructuring of agriculture that may result from liberalisation, however, can have major implications for poverty, land ownership, production technologies, and natural resource use.

Another report produced by the Millennium Project argues that even the most optimistic liberalization scenario as an outcome of the Doha Round would only bring benefits in the range of 1-2% of GDP in the poorest countries.²²⁶ Another study finds that market reforms, including price and trade liberalisation, have had mixed impacts on drylands and other less-favoured areas because of weak infrastructure and high transportation costs that prevent dryland farmers from accessing world

²²⁰ See Hoekman, B., A Nicita and M. Olarreaga (2004). *Can Doha Deliver a Development Round?* Background paper prepared for the Report of the Task Force on Trade. UN Millennium Project. New York.

²²¹ Andersen, K. (2004). *Agricultural Trade Reform and Poverty Reduction in Developing Countries*. World Bank Policy Research Working Paper 3396, September.

²²² Beghin, J., D. Roland-Holst, and D. van der Mensbrugge (2002), *Global Agricultural Trade and the Doha Round, What are the Implications for North and South?* Paper presented to the OECD/World Bank Global Forum on Agriculture. May 23-24. Paris: OECD, cited in Vitalis, V. (2004), *supra*, p.11.

²²³ Sachs, J. *et al.* (2004), *supra*, p. 177.

²²⁴ See Andersen, K. (2004), *supra*.

²²⁵ WWF (2004), *supra*.

²²⁶ Sachs, J. *et al.* (2004), *supra*, p.181.

markets.²²⁷ This is especially problematic for Burkina Faso's farmers who are isolated from world markets. Moreover, according to the Millennium Project, trade liberalization will not directly provide the kind of investment in infrastructure and transportation that would be needed to lift rural drylands out of poverty. Also, the increased revenues originating from trade will not be sufficient to finance these investments.²²⁸

The removal of trade barriers is likely to lead to an important disruption of livelihoods in rural drylands where large portions of the workforce are still tied to the agricultural sector. If barriers to agricultural imports are removed too quickly, it can lead to the massive release of rural labour and to substantial unemployment and underemployment if the manufacturing sector does not absorb released rural labour. Such outcomes can fuel urban poverty and lead to dangerous levels of social and economic instability.²²⁹

A sustainability impact assessment of the Doha Round, in which case studies were conducted in food importing countries (Egypt and Senegal) and food exporting countries (India, Argentina, and Indonesia), found that "vulnerable groups especially small-scale farmers and the rural poor in general may be negatively affected by liberalisation."²³⁰ The assessment concludes, that "[s]mall-scale farmers are potentially impacted on several fronts including increased competition from international markets, an inability to adequately improve productivity in an increasingly competitive domestic market, and commodity price/food security impacts."²³¹ In all cases except for some low income developing countries, the assessment finds that trade liberalisation hurts small farmers and exacerbates rural income inequalities, although some cash crop producers may benefit. It also forecasts potential negative impacts in terms of food security for food-importing countries. These conclusions are in line with the observations made in the case studies presented in the previous section.

The actual impacts of trade liberalisation will depend a great deal on policies that accompany trade liberalisation. Indeed, measures to support the insertion of small farmers on world markets will be key to alleviating poverty in the rural developing world. These measures include the development of transportation infrastructures, investment in agricultural productivity, improved access to credit and farm inputs, capacity building in land management, introduction of market coordination mechanisms and insurance schemes, and a series of other policies that will allow small farmers to seize new market opportunities. A significant proportion of small farmers in dryland areas are involved in subsistence agriculture, however, which cannot be easily converted to producing exportable commodities.²³²

There is also a need to address the concentrations of local economic and political power that "force small farmers to access market on highly adverse terms."²³³ The inclusion of small farmers in world commodities markets on equitable terms is essential if agricultural trade liberalisation is to realise its full potential for poverty alleviation in drylands,²³⁴ otherwise, there is a risk that it will lead to further

²²⁷ Hazell, P. (2001). *Strategies for the Sustainable Development of Dryland Areas*. Washington D.C.: International Food Policy Research Institute. September. p. 10.

²²⁸ Sachs, J. et al. (2004), *supra*, p.177.

²²⁹ Weisbrot, M. and Baker, D. (2000). *The Relative Impact of Trade Liberalization on Developing Countries*. Washington, DC: Centre for Economic and Policy Research.
http://www.cepr.net/relative_impact_of_trade_liberal.htm. Accessed February 25, 2005.

²³⁰ Maltais, A., M. Nilsson and Å. Persson (2002). *Sustainability Impact Assessment of WTO Negotiations in the Major Food Crops Sector*. Stockholm: Stockholm Environment Institute. May. pp. 147-148.

²³¹ Maltais, A., M. Nilsson and Å. Persson (2002), *supra*, p.11.

²³² Vitalis, V. (2004), *supra*, p.13.

²³³ DFID. (2004b). *supra*, p.13.

²³⁴ DFID (2002), *supra*, p.10.

exclusion and marginalisation of poor communities. Unfortunately, resources are lacking in developing countries – especially in LDCs – to provide support to small farmers and to otherwise address these concerns.

As seen in the case studies, agricultural trade liberalisation carries a significant risk of land degradation, especially if small-scale production is replaced by large-scale intensive monocultures. Negative impacts can also result from the expansion of agricultural production onto marginal lands, either for the production of cash crops or for survival agriculture following the marginalisation of segments of the rural population. On the other hand, by improving access to capital, technologies, and farm inputs, and by allowing the dissemination of better land management techniques, trade liberalisation could also lead to the improvement of soil quality. Such outcomes, however, are not likely to occur without the support of State policy or fiscal incentives. Developing countries would benefit from increased support in this regard.

So far, the shift to intensive export crops in countries such as Brazil and Mexico has been accompanied by deforestation, extensive land degradation, and the marginalization of subsistence farmers who are pushed off their lands by expanding export cultures or forced out of production by cheaper imports. The experience of Pakistan also shows that water- and agro-chemical-intensive export crops such as rice and cotton can exacerbate land degradation. In the context of the Doha Round, one study predicts that in India, “[t]he continuing loss of topsoil as a result of land degradation is likely to cause adverse impact on farm production.”²³⁵ The same study finds that in Tanzania, there is a risk of land degradation due to the extension and/or intensification of agricultural production following agricultural trade liberalisation. It also warns of a risk of exacerbated conflict over land uses between pastoralist herders and small-scale farmers.²³⁶ Such perverse outcomes on land degradation are avoidable provided that appropriate policies are put in place in affected developing countries. This is where the UNCCD can offer a valuable framework for action.

Policy Recommendations for UNCCD Implementation

The UNCCD can play a role in addressing the two trade-related drivers of land degradation analysed in this report: the expansion and intensification of export-oriented agriculture, and the marginalisation of small farmers. As shown in the case studies presented in section III, it can do so by contributing to the improvement of land management and agricultural practices, and by actively supporting small farmers by securing their resource base, building their capacity, improving their agricultural practices, and facilitating their access to farm inputs and financial resources.

First, UNCCD provides a framework for the development and implementation of policy interventions that can improve land management in the export crop sector to ensure that the expansion of large-scale intensive export monoculture does not affect long-term agricultural growth by leading to widespread land degradation. The UNCCD can serve as a catalyst for the early adoption of appropriate mitigation plans promoting sustainable land management practices. Such an approach would be useful in successful large-scale commodities exporting countries, such as Brazil. It would also be valuable in Pakistan where intensive use of irrigation and agrochemicals is leading to serious land degradation issues.

Second, the Convention can also provide a basis for intervention aimed at building small farmers’ capacity, improving their productivity, and breaking their isolation through infrastructure development. In addition, measures can also be adopted under the UNCCD framework to reduce small farmers’ vulnerability to climate variations or price/exchange rate shocks that may force them

²³⁵ Morrissey, O. *et al.* (2005) *supra*, p.18.

²³⁶ Morrissey, O. *et al.* (2005) *supra*, p.19.

to resort to destructive survival patterns. Moreover, in the context of increased competition for scarce land and water resources, participatory resources management principles promoted under the UNCCD can secure small farmers' access to resource bases and prevent their displacement by large-scale export-oriented agriculture. As revealed in the case studies, such strategies would be relevant in Pakistan, Burkina Faso, and Brazil.

The Millennium Project also supports measures to combat desertification as key way to improve rural livelihoods and promote economic growth. In its report on *Ending Africa's Poverty Trap*, the Millennium Project argues that the structural impediments to raising agricultural productivity in Africa's rural drylands can only be overcome with an intensive investment program in well-targeted interventions that mostly fall within the UNCCD framework.²³⁷ These interventions include improving agricultural varieties, providing better access to fertilizers, introducing new agroforestry techniques, developing small scale water management systems and irrigation techniques, and investing in transport infrastructure and education.²³⁸ The Millennium Project also recommends "a massive replenishment of soil nutrients for smallholder farmers on lands with nutrient depleted soils, through free or subsidized distribution of chemical fertilizers and agroforestry, by no later than the end of 2006".²³⁹ Moreover, it recommends that measures be taken to improve dryland farmers' access to markets, including investing in storage, marketing, and agro-processing, and improving access to credit.²⁴⁰ While these recommendations focus on West Africa, they are also relevant in Pakistan where poverty and land degradation trends could be reversed through such an approach.

The UNCCD can therefore play an important role in improving land productivity and land management practices in rural drylands. Investments in activities to combat land degradation and improve land productivity would raise rural incomes and generate savings that could be used to invest in improved land and water management, infrastructure, and human resources. As mentioned in an UNCCD report, however, strategies to improve land productivity and rural incomes often prioritize "increased application of external inputs, especially chemical fertilizers and improved seed varieties" as well as "activities to raise rural incomes focused on agricultural commercialization, regionalization of crop production and increased production of cash and export crops."²⁴¹ According to the report, "these activities may not address the root causes of poor land management and declining yields, and would not necessarily benefit the poorest and most degraded regions or the poorest households."²⁴²

The UNCCD can play a role in expanding the focus of current strategies to improve productivity and alleviate poverty by specifically promoting measures to support small farmers. According to a report published by WWF, ICTSD, the World Bank, and the Netherlands government, key strategies to alleviate poverty in the context of agricultural trade liberalisation include strengthening and raising the productivity of subsistence farming, promoting local markets, protecting the assets of the rural poor, strengthening the management capacity of the poor, and creating investment opportunities with and for the poor.²⁴³

These strategies fall within UNCCD's area of intervention. Furthermore, examples of governmental policies and programmes that may directly affect land degradation and poverty in the context of liberalising agricultural markets include land tenure frameworks and tenure security; land-use planning, particularly for marginal environments; price controls for agricultural commodities; the

²³⁷ Sachs, J. *et al.* (2004), *supra*.

²³⁸ Sachs, J. *et al.* (2004), *supra*.

²³⁹ UN Millennium Project (2005b). *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*. New York. p.xxi.

²⁴⁰ Sachs, J. *et al.* (2004), *supra*.

²⁴¹ UNCCD (2005), *supra*, p.12.

²⁴² UNCCD (2005), *supra*, p.12.

²⁴³ WWF (2004), *supra*.

development of commodity processing facilities; the development of markets; investment in transportation infrastructure; and investment in agricultural research and extension.²⁴⁴

The UNCCD can be instrumental in implementing such strategies and policy measures, provided that its framework is mainstreamed into rural and agricultural development strategies. The development of targeted joint programmes involving economic, environmental, and agriculture departments, and designed to specifically address the impacts of trade liberalisation on rural livelihoods and land degradation would facilitate such mainstreaming by focusing on concrete actions rather than on principles or broad national strategies.

Moreover, such a concerted, targeted approach would be easier to finance, and its results more easily measurable than broad, far-reaching national programmes. Indeed, joint action programmes to prevent land degradation and alleviate poverty make economic sense in the context of PRSPs and national export development strategies since their objective is to preserve the environmental resource base that serves as the basis for the export sector and to maximise the positive impacts of trade on poor segments of rural populations. This aligns activities to combat desertification with major economic and international developmental processes, including the Doha Round and the MDGs.

In this perspective, National Action Programmes could be adapted to include concrete measures that reflect the challenges and opportunities generated by the new environment created by national and international liberalisation of the agricultural sector. Article 10.2 (b) of the Convention allows for such modification of NAPs to reflect changing circumstances and different socio-economic conditions.²⁴⁵ A first step could be to undertake national assessments of the potential impacts of trade liberalisation on desertification so as to identify areas in which intervention is most needed to avoid perverse impacts and maximise positive ones on rural livelihoods and land degradation.

Such assessments could lead to national roundtables where stakeholders – donors; economic, agriculture, and environment departments; UNCCD focal points; and others – would define and adopt strategic, targeted interventions. These roundtables would adopt a joint action programme on trade, poverty, and desertification that would be implemented as agricultural trade is gradually liberalised. Ideally, these action programmes could provide for the continuous monitoring of impacts and for periodic revisions designed to adapt to the unforeseen impacts of trade liberalisation.

At the multilateral level, the CRIC could hold a special session on the impacts of agricultural trade liberalisation on desertification. Such a session could help to document national impacts and facilitate the exchange of expertise and best practices with a view to enhancing UNCCD's effectiveness in the context of rapid macro-economic and land-use changes that are often associated with trade liberalisation.

Overall, by clearly establishing and documenting the relationship between agricultural trade liberalisation, poverty, and land degradation in drylands, the case for enhanced financial support for UNCCD implementation could be strengthened in the context of the MDGs. In this regard, this report has provided an overview of these issues, although more research will be needed at the country level.

²⁴⁴ UNCCD (2005), *supra*, p.16.

²⁴⁵ UNCCD. Art. 10.2: National Action Programmes (b) "allow for modifications to be made in response to changing circumstances and be sufficiently flexible at the local level to cope with different socio-economic, biological and geo-physical conditions".

Conclusion

Given the high prevalence of extreme poverty and hunger among small farmers in rural drylands, strategies to achieve the MDG's poverty and hunger alleviation targets need to consider the livelihoods of these populations. This could be best done by addressing the drivers of the land degradation/poverty spiral, including those arising from agricultural trade liberalisation. This report has shown that trade liberalisation intervenes in the complex interactions that link rural livelihoods, land degradation, and development in rural dryland areas. The objective of this report was to document these interrelations and to analyse their impacts on the achievement of UNCCD's objectives.

By opening new markets for cash crops produced by farmers in developing countries, agricultural trade liberalisation is seen as a key strategy to raise rural incomes. As shown in the report, due to structural flaws in commodities markets and to what has been described as the "poverty trap" of rural drylands in the developing world, trade liberalisation may not generate the broad-based, sustainable growth in agricultural production predicted by economic theory. On the contrary, there is a significant risk that agricultural trade liberalisation will lead to accelerated land degradation through the extension and intensification of agricultural production, thus deteriorating the rural resource base of developing countries. Moreover, in the absence of appropriate policies supporting small farmers and landless peasants, there is a risk that these populations will not benefit from trade liberalisation but rather be further marginalised in terms of their access to markets and resources, and that eventually they will be forced to migrate or resort to unsustainable survival strategies.

Such outcomes are not inevitable, however, and the UNCCD can provide a framework under which action can be taken to avert these risks. The UNCCD area of intervention and expertise focuses on poverty and agriculture in the rural world. The Convention is a valuable tool with which to establish priorities for raising agricultural productivity and improving land management practices, thus supporting competitiveness and higher rural incomes. This provides a unique opportunity to raise the profile of the UNCCD as a key supporting tool for increasing agricultural productivity and supporting broad-based rural development in the context of the MDGs and the Doha Round.

Nevertheless, while the UNCCD constitutes a strategic instrument on paper, to mobilise developing countries' economic and agriculture departments as well as the multilateral and bilateral donor community, it has to bring concrete added value to the MDGs and to trade liberalisation processes. The key, therefore, is to find a niche for the Convention as a supporting tool. This report suggests that such a niche may reside in targeted joint action programmes on trade, land degradation, and rural poverty that would assemble key stakeholders under a common strategic platform.

This method would represent a significant departure from the current approach taken by NAPs, which favour broad, comprehensive national strategies on desertification. The mainstreaming of NAPs into development strategies and their funding by donors have proven difficult thus far. Linking targeted strategies to combat desertification to trade liberalisation and poverty alleviation processes could facilitate the mainstreaming of some of UNCCD's objectives and provisions and enhance its value as a supporting instrument.

The stakes of agricultural trade liberalisation are high in the world's rural drylands. In the absence of appropriate policy interventions and investments, it is unlikely that trade will lead to a generalised increase in rural incomes. Rather, it could lead to the exclusion of small farmers and to the deterioration of the agricultural resource base. The development community needs to take on the challenge of drylands agricultural productivity and to support the equitable inclusion of dryland farmers into world trade. Under current conditions, the economic boom promised through trade liberalisation is likely to turn to dust for millions of rural dwellers.

Bibliography

Agarwal, A., S. Narain and A. Sharna (eds.) (1999), *Green Politics*. New Delhi: Centre for Science and Environment.

Aksoy, A. and J.C. Beghin (eds.) (2004). *Global Agricultural Trade and Developing Countries*. Washington, D.C.: World Bank.

Alam, S.M. and M.H. Naqui (2003). *Pakistan Agriculture*.
<http://www.pakistaneconomist.com/database1/cover/c2003-28.asp>.

American Association for the Advancement of Science. *Atlas of Population and Environment*.
<http://atlas.aaas.org/index.php?part=2&sec=eco&sub=deserts>. Accessed February 11, 2005.

Andersen, K. (2004). *Agricultural Trade Reform and Poverty Reduction in Developing Countries*. World Bank Policy Research Working Paper 3396, September.

Banuri, T. (1998) *Pakistan: Environmental Impact of Cotton Production and Trade*.
http://www.tradeknowledgenetwork.org/pdf/pk_Banuri.pdf.

Barbier, B. and C.L. Carpentier (2000). *The Conditions for Sustainability of Tropical Agriculture. Bioeconomic Models Applied to Five Contrasting Farming Systems*. Paper presented for the mini-symposium on modeling at the International Association of Agricultural Economists conference. Berlin. August.

Beghin, J., D. Roland-Holst, and D. van der Mensbrugge (2002), *Global Agricultural Trade and the Doha Round, What are the Implications for North and South?* Paper presented to the OECD/World Bank Global Forum on Agriculture. May 23-24. Paris: OECD.

Bickel, U. (2004). *Brasil: Expansão da soja, conflitos sócio- ecológicos e segurança alimentar*. Tese de Mestrado em agronomia tropical, Universidade de Bonn.

Brasil, Ministry of Science and Techology. Desertification. <http://www.mct.gov.br/sobre/Default.htm>.

Brazilian Ministry of Agriculture,
<http://www.agricultura.gov.br/pls/portal/url/ITEM/DEF82374B76BF837E0306B01A8C016F9>.

Burkina Faso (2000). *Programme d'action national de lutte contre la désertification*. 90 p.
http://www.unccd.int/actionprogrammes/africa/national/2000/burkina_faso-fre.pdf.

Burkina Faso (2004). *Strategic Framework for the Development of the Cotton Sector in Burkina Faso*. June 18. <http://64.233.161.104/search?q=cache:ITbHC0VviC0J:www.forum-coton.org/docs/presentations/2.2-en.pdf+unpcb&hl=en>.

Commission for Environmental Cooperation (CEC). (2004), *Maize and Biodiversity: The Effects of Transgenic Maize in Mexico*. Montreal, CEC Secretariat. http://www.cec.org/files/PDF//Maize-and-Biodiversity_en.pdf

CONAB (2003). <http://www.conab.gov.br/>.

Cordeiro, E. (1998). Climate Change and Desertification: Statement to the United Nations General Assembly. New York. 22 October. <http://www.un.int/brazil/speech/98d-2com-clima.htm>.

D'Alembert, J. et al. (2003), Sustainability Assessment of Export-Led Growth in Soy Production in Brazil. Brasília (Brazil), Gland (Switzerland): WWF-Brazil and WWF-International.

Demeke, B. Is Globalization Bad for the Environment? International Trade and Land Degradation in Developing Countries: The Case of Small Open Economy. Department of Agricultural and Applied Economics, University of Wisconsin-Madison.

DFID (2003). Agriculture and Poverty Reduction: Unlocking the Potential. DFID Policy Paper, December.

DFID (2004a). Agriculture, Growth and Poverty Reduction. Working Paper. October.

DFID (2004b). Making Agricultural Markets Work for the Poor. Working Paper for the Renewable Natural Resources and Agriculture Team, DFID Policy Division. September.

DFID (2004c). Official Development Assistance to Agriculture. Working Paper. November.

DFID (2004d). Agricultural Trade and Poverty Reduction: Opportunity or Threat? Working paper. August.

DFID (2004e). Concentration in Food Supply and Retail Chains, Working paper. 2004.

DFID (2004f). Agriculture, Hunger and Food Security. Working Paper. August 2004.

Dobie, P. (2001). Poverty and the Drylands. Nairobi: UNDP Drylands Development Centre. September.

Economic Research Service/USDA (2001). Argentina & Brazil Sharpen Their Competitive Edge. Agricultural Outlook/September. <http://ers.usda.gov/publications/AgOutlook/sep2001/ao284j.pdf>.

European Environmental Agency. http://glossary.eea.eu.int/EEAGlossary/S/soil_salinisation.

FAO (1996a). The State of Food and Agriculture, Regional Review: Burkina Faso. http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w1358e/w1358e08.htm.

FAO (1996b). The State of Food and Agriculture. Asia and the Pacific, Regional Overview: Pakistan. http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/w1358e/w1358e08.htm.

FAO (2002). Key Statistics of Food and Agricultural External Trade. Exports: Pakistan, 2002. <http://www.fao.org/es/ess/toptrade/trade.asp>.

FAO (2003). Key Statistics of Food and Agriculture External Trade. 2003. Exports, Cotton Lint. <http://www.fao.org/es/ess/toptrade/trade.asp>.

FAO (2004a) - http://www.fao.org/es/ess/compendium_2004/list.asp.

FAO (2004b). Food and Agricultural Indicators, Country : Brazil. http://www.fao.org/es/ess/compendium_2004/pdf/ESS_BRA.pdf.

- FAO (2004c). Fertilizer Use by Crop in Brazil
http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5376e/y5376e00.htm.
- FAO (2004d). FAOSTAT - Agriculture Data.
http://faostat.fao.org/faostat/form?collection=Production.Crops.Primary&Domain=Production&serve_t=1&hasbulk=0&version=ext&language=EN.
- FAO (2004e). Food and Agricultural Indicators, Country : Burkina Faso.
http://www.fao.org/es/ess/compendium_2004/pdf/ESS_BKF.pdf.
- FAO (2004f). Fertilizer Use by Crop in Pakistan.
<ftp://ftp.fao.org/docrep/fao/007/y5460e/y5460e00.pdf>.
- FAO (2004g). Food and Agricultural Indicators, Country : Pakistan.
http://www.fao.org/es/ess/compendium_2004/pdf/ESS_PAK.pdf.
- FAO (2005). The State of Agricultural Commodity Markets. Rome: FAO.
http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5419e/y5419e00.htm.
- Faruquee, R., and World Bank. (1995). Pakistan's Agriculture: Is 3 to 4 Percent Annual Growth Sustainable? January. http://econ.worldbank.org/files/438_wps1407.pdf.
- Federal Research Division, Library of Congress (1994). Country Study: Pakistan.
<http://countrystudies.us/pakistan/49.htm>.
- Flaskerud, G. North Dakota State University and NDSU Extension Service (2003). Brazil's Soybean Production and Impact. EB-79, July.
<http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/eb79w.htm>.
- Gillson, I. et al. (2004). Understanding the Impact of OECD Agricultural and Trade Policies on Developing Countries and Poor People in those Countries – Piloting an Approach with Cotton. Working draft. Overseas Development Institute, March, www.odi.org.uk/iedg/cotton_report.html.
- Giordano, S. R. (2000). Gestão ambiental no sistema agroindustrial. Economia e gestão dos negócios agroalimentares. São Paulo, PENSA.
- Government of Pakistan. Industrial Estates in Pakistan. http://www.apo-tokyo.org/gp/e_publi/penang_symp/Penang_Symp_P159-166.pdf.
- Government of Pakistan (1999). Biodiversity Action Plan, Pakistan. August. 78 p.
<http://www.biodiv.org/doc/world/pk/pk-nbsap-01-en.pdf>.
- Government of Pakistan (2002). National Action Programme to Combat Desertification in Pakistan. August. 33 p. <http://www.unccd.int/actionprogrammes/asia/national/2002/pakistan-eng.pdf>.
- Government of Pakistan, Ministry of Food, Agriculture and Livestock (2004). Agriculture Perspective and Policy. January. <http://www.pakistan.gov.pk/food-ministry/index.jsp>.
- Green, D. (2004). Fostering Pro-sustainable Development Agriculture Trade Reform : Strategic Options Facing Developing Countries. Paper prepared for the Strategic Dialogue on Agriculture, Trade Negotiations, Poverty and Sustainability. Windsor, July 14 – 16. pp.3-4.

GTZ. Fact Sheet Desertification. www.gtz.de/desert.

Harou, P.A. (2002). "What is the Role of Markets in Altering the Sensitivity of Arid Land Systems to Perturbation?" in Reynolds, J.F. and D.M. Stafford Smith (2002).

Hazell, P. (2001). Strategies for the Sustainable Development of Dryland Areas. Washington D.C.: International Food Policy Research Institute. September.

Hoekman, B., A Nicita and M. Olarreaga. "Can Doha Deliver a Development Round?" Background paper prepared for the Report of the Task Force on Trade. UN Millennium Project. New York. 2004.

Hogan, D.J., J.M. Pinto da Cunha and R. L. do Carmo. Population Distribution and Environmental Change in Brazil's Center-West Region. Campinas, São Paulo, Brazil: Population Studies Center – NEPO, State University of Campinas, 13081-970.
http://www.iussp.org/Brazil2001/s40/S41_P01_Hogan.pdf.

Hussain, A. (2003). Poverty, Growth and Governance Pakistan. UNDP National Development Report. 177 p. <http://www.un.org.pk/nhdr/nhdr-pak-2003.pdf>.

ICTSD (2003). "Cotton & Special Products Crop Up in WTO Agriculture Group", in Bridges Weekly. Volume 7, number 27. July 28. <http://www.ictsd.org/weekly/03-07-28/story4.htm>.

ICTSD (2004). "Coton: l'AproCA, pour défendre les intérêts des producteurs" AllAfrica.com, 28 December.

IFAD (2001). Rural Poverty Report 2001 - The Challenge of Ending Rural Poverty. Oxford: Oxford University Press.

Kydd, J. and A. Dorward (2001). "The Washington consensus on poor country agriculture: analysis, prescription and institutional gaps". In Development Policy Review 19(4): 467–478.

Landers *et al.* (2003). Land-use intensification through zero-tillage as a viable solution for mitigating de-forestation, Embrapa, 2003.

Lines, T. (2004). Commodities Trade, Poverty Alleviation and Sustainable Development: The Re-emerging Debate. Paper Presented at UNCTAD XI, Sao Paulo, Brazil, June 15th.

Lin, L., J. Piesse and C. Thirtle, (2001). Agricultural Productivity and Poverty in Developing Countries. Extension to DFID Report No. 7946. DFID: London. Cited in DFID (2002). Better Livelihoods for Poor People: The Role of Agriculture. Issues Paper. May.

Madeley, J. (2000). Trade and Hunger – An Overview of Case Studies on the Impact of Trade Liberalization on Food Security. Stockholm: Forum Syd. October.

Malik, S. J. (2005a) *Agricultural Growth and Rural Poverty A Review of the Evidence*. Pakistan Resident Mission Working Paper Series Working Paper No. 2, Asian Development Bank, January, 63 pages.

Malik, S. J. (2005b). What Are the Strategic Issues in Poverty Reduction Through Agriculture, cited in Rafiq, G.M. (2005). “Poverty Incidence Highest in Punjab and Sindh Cotton/Wheat Growing Areas” in Business Recorder. March 18.

<http://www.brecorder.com/index.php?id=211015&currPageNo=1&query=&search=&term=&supDate>.

Maltais, A., M. Nilsson and Å. Persson (2002). Sustainability Impact Assessment of WTO Negotiations in the Major Food Crops Sector. Stockholm: Stockholm Environment Institute. May.

Mellor, J. (2000). “Agricultural Growth, Rural Employment, and Poverty Reduction – Non-tradables, Public Expenditure and Balanced Growth”, in Poverty or Prosperity: Rural People in a Globalized Economy. Proceedings from the World Bank Rural Week, March 28-31.

Ministère de l’Agriculture, de l’Hydraulique et des Ressources halieutiques, Burkina Faso. Résumé du Plan d’action pour la mécanisation agricole.

<http://www.agriculture.gov.bf/documents/mecanisation.php>.

Ministère de l’Environnement et de l’Eau, Burkina Faso (2002). Évaluation nationale de la mise en oeuvre de l’Agenda 21 et des conventions issues de Rio au Burkina Faso, March, 36 p.

<http://www.sommetjohannesburg.org/pays/frame-burkina.html>.

Ministry of Economy and Finance, Burkina Faso (2004). Poverty Reduction Strategy Paper, Progress Report 2000-2002. <http://www.imf.org/external/pubs/ft/scr/2004/cr0478.pdf>.

Ministry of Economy and Finance, Burkina Faso (2000a). Poverty Reduction Strategy Paper. May 25. <http://www.imf.org/external/NP/prsp/2000/bfa/01/>.

Morrissey, O. et al. (2005). Sustainability Impact Assessment of Proposed WTO Negotiations – Interim Report for the Agriculture Sector Study. Impact Assessment Research Centre, Institute for Development Policy and Management, University of Manchester. UK. p.18. www.sia-trade.org.

Murray, S. et al. (1999). <http://www.undp.org/seed/unso/concepts&programs/pub-hm/dryland-population.pdf>.

Nadal, A. (2000). The Environmental & Social Impacts of Economic Liberalization on Corn Production in Mexico. Gland, Switzerland and Oxford, UK: WWF International and Oxfam GB.

Nadal, A. and T. Wise (2004). The Environmental Cost of Agricultural Trade Liberalisation: Mexico-US Maize Trade Under NAFTA. Working Group on Development and the Environment in the Americas, Discussion paper #4, June.

Nelson, M. et al. (1997). Report of the Study on CGIAR Research Priorities for Marginal Lands. TAC Working Document. Technical Advisory Committee Secretariat, FAO. March, cited in Scherr, S. (1999). “Dryland Degradation and Poverty” in World Bank (1999). Drylands, Poverty and Development. Proceedings of the June 15 and 16, 1999 World Bank Round Table. Washington: World Bank, November.

Nobre, C.A., P.J. Sellers and J. Shukla (1991). “Amazonian deforestation and regional climate change”. Journal of Climate. 4: 957-988.

OECD (2003). Agricultural Trade and Poverty: Making Policy Analysis Count. Paris: OECD.

OECD (2004). Agricultural Policies in OECD Countries at a Glance. Paris: OECD.

Oldeman, L.R., R.T.A. Hakkeling and W.G. Sombroek (1991). World Map of the Status of Human-Induced Soil Degradation: An Explanatory Note. Second Revised Edition. Wageningen and Nairobi: International Soil Reference and Information Centre (ISRIC) and UNEP.

Ouedraogo, M. Land Tenure and Rural Development in Burkina Faso: Issues and Strategies.
http://www.iied.org/docs/drylands/dry_ip112eng.pdf.

Oxfam (2002a). Boxing Match in Agricultural Trade: Will WTO Negotiations Knock Out the World's Poorest Farmers?. Oxfam Briefing Paper #32. November.

Oxfam (2002b), Rigged Rules and Double Standards: Trade Globalization and the Fight against Poverty. Oxfam.

Oxfam International (2004), White Gold Turns to Dust, Oxfam Briefing Paper #58. Oxfam, March.

Pakistan. National Action Plan to Combat Desertification and Drought.
<http://www.pakistan.gov.pk/environment-division/publications/napchp.pdf>.

Pakistan (2002). National Report of Pakistan on the Implementation of UNCCD. April.
<http://www.unccd.int/cop/reports/asia/national/2002/pakistan-eng.pdf>.

Pomadera, C. and C. Murillo (2003). The Relationship between Trade and Sustainable Development of Agriculture in Central America. Winnipeg: IISD.

Poverty Reduction Strategy Paper Secretariat, Ministry of Finance, Government of Pakistan (2003). Accelerating Economic Growth and Reducing Poverty: The Road Ahead.
http://poverty.worldbank.org/files/15020_Pakistan_PRSP.pdf.

Reynolds, J.F. and D.M. Stafford Smith (2002). Do Humans Cause Deserts? in Reynolds, J.F. and D.M. Stafford Smith (2002) Global Desertification: Do Humans Cause Deserts? Dahlem Workshop Report 88. Berlin: Dahlem University Press.

Robbins, P. (2003). Stolen Fruit: The Tropical Commodities Disaster. London: Zed Books.

Roncoli, M.C. et al. Farmers' Behavioral Responses To Seasonal Rainfall Forecasts In The Sahel-Sudan.
<http://64.233.161.104/search?q=cache:9nFgIdaAwtYJ:conference.ifas.ufl.edu/ifsa/papers/c/c10.doc+Drought+cotton+Burkina+Faso&hl=en>.

Sachs, J. et al. (2004). "Ending Africa's Poverty Trap" in Brainard, W.C. and G.L. Perry (eds.) (2004). Brooking Papers on Economic Activity 1:2004. Washington D.C.: Brookings Institution Press. p.122. <http://www.unmillenniumproject.org/reports/secretariatdocs.htm>.

Sahel and West Africa Club Secretariat and OECD (2005). Economic and Social Importance of Cotton Production and Trade in West Africa: Role of Cotton in Regional Development, Trade and Livelihoods (Draft), January. <http://www.oecd.org/dataoecd/19/8/34352756.pdf>.

Schnepf, R.D., Erik Dohlman and Christine Bolling (2001). Agriculture in Brazil and Argentina: Developments and Prospects for Major Field Crops. Agriculture and Trade Report No. WRS013.

Economic Research Service, USDA. Soybeans, Agriculture, and Policy in Brazil, <http://ers.usda.gov/publications/wrs013/wrs013f.pdf>.

Secretariat of the United Nations Convention on Biological Diversity (CBD). Country study - Burkina Faso Biodiversity – Chapter 2: A General Survey of Burkina Faso. <http://bch-cbd.naturalsciences.be/burkina/bf-eng/implementation/doc/monography/chap2-5.htm>.

Secretariat of the United Nations Convention on Biological Diversity (2001). Global Biodiversity Outlook 2001. Montreal.

Secretariat of the UNCCD (2005). Mainstreaming of National Action Programmes and their Contribution to Overall Poverty Eradication. Report to CRIC.3, Bonn, 2-11 May. Advanced copy.

Secretariat of the UNCCD (2002). National Report, Brazil. <http://www.unccd.int/>.

Secretariat of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (2004). Preserving our Common Ground: UNCCD 10 Years on. Bonn: UNCCD Secretariat.

Sharma, M. et al. (1996). Overcoming Malnutrition: Is There an Ecoregional Dimension? Food, Agriculture, and the Environment Discussion Paper 10. Washington, D.C.: International Food Policy Research Institute. February.

Solomon, A. The Consequences of Structural Adjustment and Debt for Desertification and Food Security in Africa - A Literature Review and Discussion. http://www.spaef.com/IJED_PUB/3_4/3_4_solomon.html.

South Asian Floods (SAF). <http://www.southasianfloods.org/maps/mappak.html>.

Spain, J.M., M.A. Ayarza and L. Vilela (1996). “Crop pasture rotations in the Brazilian Cerrados”, in R.C. Pereira and L.C.B. Nasser (eds). Proceedings of the First International Symposium on Tropical Savannas.

Strutt, A. (1998). Trade Liberalisation and Land Degradation in Indonesia. Australian Centre for International Agricultural Research.

Toulmin, C. (1994). « Combating Desertification : Encouraging Local Action Within a Global Framework », in Bergesen, H.O. and G. Parmann (eds.). Green Globe Yearbook of International Cooperation on Environment and Development 1994. Oxford: Oxford University Press.

UNCTAD (2004). The Least Developed Countries Report 2004, Overview. New York: UNCTAD.

UNDP (2003a). Human Development Report - 2003 Millennium Development Goals: A Compact Among Nations to End Human Poverty. New York: UNDP.

UNDP (2003b). Human Development Report, Statistics: Burkina Faso. http://hdr.undp.org/statistics/data/cty/cty_f_BFA.html.

UNDP (2003c). Human Development Report, Statistics: Pakistan. http://hdr.undp.org/statistics/data/cty/cty_f_BFA.html.

- UNDP (2003d). Human Development Report, Statistics: Brazil.
http://hdr.undp.org/statistics/data/cty/cty_f_BRA.html
- UNEP (2002). Global Environment Outlook 3 (GEO-3). Past Present and Future Perspectives.
- UNEP (2003). Global Environment Outlook 3 (GEO-3), New York: UNEP.
- United Nations (2002). Plan of Implementation of the World Summit on Sustainable Development. Johannesburg, 4 September. Chapter II, par.7 (I).
- United Nation National Fertilizer Development Center. Pakistan - Statistics.
http://www.fadinap.org/pakistan/CRP_AREA.htm.
- UN Millennium Project (2005a). Halving Hunger: It Can be Done. Task Force on Hunger.
- UN Millennium Project (2005b). Investing in Development: A Practical Plan to Achieve the Millennium Development Goals. New York.
- USDA (2004). Rice: Situation and Outlook Yearbook.
<http://www.ers.usda.gov/publications/so/view.asp?f=field/rcs-bby/>.
- US Environmental Protection Agency, Terminology Reference System.
http://oaspub.epa.gov/trs/trs_proc_qry.navigate_term?p_term_id=26480&p_term_cd=TERMDIS.
- Vitalis, V. (2004). Trade, Agriculture, the Environment and Development: Reaping the Benefits of a Win-Win-Win. Paper presented at a Strategic Dialogue on Agriculture, Trade Negotiations, Poverty and Sustainability, Windsor, UK: ICTSD-IIED. July 14-16.
- Vorley, B. (2002). Sustaining Agriculture: Policy, Governance, and the Future of Family-based Farming. A Synthesis Report of the Collaborative Research Project 'Policies that Work for Sustainable Agriculture and Regenerating Rural Livelihoods'. London, UK: IIED.
- Wailles, E. and J. Rice: Global Trade, Protectionist Policies, and the Impact of Trade Liberalization, <http://siteresources.worldbank.org/INTGAT/Resources/GATChapter10.pdf>.
- Wailles, E.J. (2004). FAO Rice Conference, Implications of the WTO Doha Round for the Rice Sector. Rome, Italy. 12-13 February. <http://www.fao.org/rice2004/en/pdf/wailles.pdf>.
- Way, S.A. (2005). "Examining the Linkages Between Poverty and Land Degradation: From Blaming the Poor Towards Recognising the Rights of the Poor in Marginal Dryland Areas" in Johnson, P.M., K. Mayrand and M. Paquin (eds.). Governing Global Desertification – Linking Environmental Degradation, Poverty and Participation. London: Ashgate Press (forthcoming).
- Weisbrot, M. and Baker, D. (2000). The Relative Impact of Trade Liberalization on Developing Countries. Washington, DC: Centre for Economic and Policy Research.
http://www.cepr.net/relative_impact_of_trade_liberal.htm.
- World Bank (1994). Pakistan: Irrigation and drainage: issues and options. http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000009265_3961004183942.

World Bank (2002). Pakistan Poverty Assessment. Poverty in Pakistan: Vulnerabilities, Social Gaps, and Rural Dynamics. Chapter 4: Rural Nexus, Poverty and Productivity. October 28. 202 pages. <http://siteresources.worldbank.org/PAKISTANEXTN/Resources/PovertyAssessment.pdf>.

World Trade Organization (1995). Trade Policy Review Pakistan. February. http://www.wto.org/english/tratop_e/tpr_e/tp1_e.htm.

World Trade Organisation (2001). Doha WTO Ministerial 2001: Ministerial Declaration. Doha, Qatar, 20 November. WT/MIN(01)/DEC/1, par. 3.

World Trade Organisation (2004). Trade Policy Review: Burkina Faso. Trade Policies by Sector. 21 p. http://www.wto.org/english/tratop_e/tpr_e/s132-4_e.doc.

WWF (2004). From Trade Negotiations to Global Adjustment Preparatory Phase Summary Report Paris June 14. <http://www.panda.org/downloads/policy/ntoasummary.pdf>.