

International cooperation for sustainable land and water management

SOLAW Background Thematic Report - TR16

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Abbreviations and acronyms

AfDB	African Development Bank
AFOLU	Agriculture, forestry and other land uses
AgWA	Partnership for Agricultural Water in Africa
ASEAN	Association of Southeast Asian Nations
AU	African Union
AWCI	Asian Water Cycle Initiative
CAADP	Comprehensive Africa Agriculture Development Programme
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEOS	Committee on Earth Observation Satellites
CXX	Chicago Climate Exchange
CGIAR	Consultative Group on International Agricultural Research
DFID	United Kingdom Department for International Development
ENSO	El Niño Southern Oscillation
ESA	European Space Agency
FAO	Food and Agriculture Organization of the United Nations
FCT	Forest Carbon Tracking Task
FDI	Foreign Direct Investments
GEF	Global Environmental Facility
GEO	Group on Earth Observation
GEOSS	Global Earth Observation System of Systems
GIS	Global Information Systems
GWP	Global Water Partnership
IDA	International Development Association
IFAD	International Fund for Agricultural Development
ILC	International Land Coalition
IWRM	Integrated Water Resources Management
LA	Latin America
LADA	Land Degradation Assessment in Drylands
L&W	Land and Water
MA	Millennium Ecosystem Assessment
MDGs	Millennium Development Goals
NAP	National level action programmes
NEPAD	New Economic Partnership for Africa's Development
OAU	Organization of American States
ODA	Official Development Assistance
OTC	Over the counter
PBA	Programme-Based Approach
PES	Payments for Ecosystem Services
PRS	Poverty Reduction Strategies
PRSP	Poverty Reduction Strategy Papers
REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

SADC	Southern African Development Community
SIDA	Swedish International Development Agency
SLWM	Sustainable Land and Water Management
SOLAW	State of Land and Water
SSA	Sub-Saharan Africa
SWAp	Sector-Wide Approach
UNCCD	United Nations Conventions to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nation Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WOCAT	World Overview of Conservation Approaches and Technologies
WTO	World Trade Organization
WWC	World Water Council

Executive summary

Introduction

Increasing competition over natural resources because of population and economic growth, climate change and other drivers is magnifying the challenges of natural resource management. As outcomes for food, water ecosystems, land degradation, and desertification increasingly transcend national boundaries there is greater need for international cooperation on land and water.

There has been a significant increase in international, regional, and private cooperation in natural resource management over the past few decades. This trend was driven by the realization that the benefits of natural resource management and the costs of their degradation transcend international borders. Climate change, air and water pollution, globalization, increasing competition over natural resources resulting from population and economic growth and other global changes have also driven cooperation in natural resource management.

Land and water (L&W) challenges have taken center stage in global environmental diplomacy and the United Nations, which has been a major force in coordinating international and regional cooperation. Following the 1972 United Nations Conference on Human Environment in Stockholm (also known as the Stockholm Conference), cooperation on environment and natural resource management has taken center stage in global environmental diplomacy. The Earth Summit in Rio de Janeiro in 1992 raised awareness of the environment and the need for enhanced natural resource management. Other international conferences and international and regional agreements have followed.

Despite these significant achievements, international and regional cooperation is still faced with a number of challenges. These include limited compliance with conventions and international laws, limited funding support for regional and international initiatives, and the slow progress in implementing the Paris Declaration on aid effectiveness, which supports the implementation of international cooperation on L&W. There are signs of increased non-cooperation and mistrust at the regional and international levels, which is a result of national unilateral actions in response to the food price crisis, the ongoing stalemate of the World Trade Organization (WTO) Doha Round, and unilateral biofuel policies and international land leases and purchases by several countries.

In the face of these challenges, the nature of emerging issues and international resolve for cooperation have created an environment for enhanced future cooperation.

International cooperation on land and water

Cooperation on land and water resources is motivated by scarcity and degradation and economics. There is a need to increase access and productivity, and ensure land and water remain a conduit for agricultural and economic growth and for the general advancement of human well-being. The United Nations system plays an important and unique role in international cooperation in regard to the management of land and water resources. It has facilitated a series of key meetings on the topic and helped establish a range of international organizations and programmes focussing on enhanced management and improved support to land and water. As a result, international cooperation on land and water has picked up, particularly after the 1972 Stockholm Conference and the 1992 United Nations Conference on Environment and Development (UNCED). Several UN agencies including the Food and Agriculture Organization of the United Nations (FAO), the United Nations

Environment Programme (UNEP) and the Bretton Woods Institutions hold the mandate or share responsibilities for promoting and coordinating natural resources and environmental policies and activities. The consultative process of the main United Nations conventions continues to set the rules for global governance of land and water by selecting policy options, shaping strategies and defining goals.

Other international organizations, donors, institutions and cooperatives have fostered international cooperation on land and water. For example, the International Land Coalition promotes policy advocacy. Formed by farmer organizations and other organizations (including the United Nations) it is mandated to support agrarian and land reform to enhance land rights and benefits to the poor. Most international efforts focus on either water (Global Water Partnership, GWP) or land (International Land Coalition, ILC), but aim to take both resources into account.

International cooperation on agricultural research has been one of the shining examples of successful cooperation and has achieved significant impacts on the livelihoods of the global community. Coordinated by the Consultative Group on International Agricultural Research (CGIAR), the cooperation includes 15 international centers of excellence that conduct research on crops, fish, water, livestock, forestry, agroforestry and food policies in collaboration with national agricultural research organizations.

Besides international cooperation efforts, several regional programmes have been developed, particularly for sub-Saharan Africa. Cooperation at the regional and river basin level has generally been more active and implementation-oriented. Transboundary river basin management is one form of regional cooperation that has expanded over the last five decades with international basin organizations operating in Latin America, Asia and sub-Saharan Africa. Finally, advances have been made to address the lack of data and knowledge sharing on land and water.

At the same time, multinational corporations have become important actors in land and water. While multinationals are important sources of technology transfer and foreign exchange earnings for developing countries, the legal systems of developing countries are often unsuited to protecting national interests when there are conflicts over rights and responsibilities for land and water resources. Given the limited scope of the paper, the focus is on the core processes of international cooperation spearheaded by the United Nations system.

Land, water and soil nutrient markets

The uneven spatial and temporal distribution of L&W creates conditions for international trade in L&W and its products and services. Different stages in economic development, globalization, and increased openness to trade, have created conditions for international cooperation and markets for L&W. These markets provide opportunities for cooperation and investment in the improvement of L&W in developing countries, for example through technology transfers from high-income countries. Since land is immovable, the nature of international land markets has been in the form of land acquisition by foreign investors in developing-countries. The recent rapid increase in international land acquisitions by high-income countries may not be maintained, but reveals a latent long-term demand for agricultural land, which is driven by the increasing demand for biofuel and growing scarcity of L&W resources in many high-income countries.

Recently, international trade in L&W ecosystem services has increased because of emerging global changes. Following the Rio Summit on Environment and Development, the Kyoto Protocol addressing global warming, and the Johannesburg Summit on Sustainable Development, as well as other international cooperation initia-

tives, payment for environmental services (PES) has become more important as a mechanism for the conservation of land and water resources. Accordingly, the volume of trade in carbon credits has increased rapidly.

Currently, the Clean Development Mechanism (CDM) excludes agriculture, but major efforts are underway to reverse this position, particularly by improving monitoring, reporting and verification processes related to agricultural mitigation strategies. Inclusion of agricultural carbon in the carbon market will enhance cooperation and climate-smart management practices.

The potential for mitigation through agriculture is large. For example in sub-Saharan Africa alone, it is estimated that agriculture carbon can contribute 17 percent of the global total mitigation potential, associated with the potential annual benefit stream for the region of US\$4.8 billion. These initiatives and efforts have enhanced international cooperation on issues addressing global objectives.

International water marketing has also increased rapidly. The global water market – largely in bottled water – currently exceeds US\$300 billion and is expected to rise as demand increases and fresh water resources decline. Globalization has increased opportunities for trading virtual water, that is water used in the production of a good or service, and has helped increase water and land-use efficiency, through trade of agricultural products between areas having relatively abundant land and water and those with scarce land and water, through technology transfer and public and private investments. However, current water subsidies and poor marketing undervalue water and could contribute to the depletion of water resources.

International markets for L&W are generally laudable and they can conserve natural resources and improve productivity through technology transfer in developing countries. Major concerns regarding the potential expropriation of L&W held by smallholders without legal title requires the establishment of internationally agreed codes of conduct, as well as improved national legal systems to ensure that international L&W deals do not disfavour the poor.

International investment in L&W

International investment and funding for L&W increased rapidly as a result of major famines and food shortages in the 1950s and 1960s, but declined sharply during the 1980s and 1990s owing to declining international food prices and increased donor alignment with national priorities. Official Development Assistance (ODA) support for agriculture alone declined from 18 percent of total support in 1979 to only 3.5 percent in 2004. Investment in L&W increased somewhat during the 2000s as a result of new international commitments, the food price crisis and acute water and land shortages. However, the level of investment in L&W resources remains far below identified needs and the level of dependence of people and economies on these resources.

Overall, total ODA has increased over the past decade, increasing from US\$57 billion in 1995 to US\$158 billion in 2008 (in constant terms). In absolute terms, support to L&W declined during the 1990s but has shown signs of recovery since 2005. However, in relative terms, support to L&W has been falling compared to total agricultural ODA. Support has been declining, partly because donors are increasingly harmonized with recipient country development programmes, which tend to allocate smaller budgets to L&W. For example, public expenditures for agriculture account for about 10 percent of agricultural GDP in developing countries.

Furthermore, the increased alignment of donors with the Millennium Development Goals and Poverty Reduction Strategy Papers (PRSPs) has stymied investments in L&W as these are not explicitly mentioned

among the targets. Moreover, declines in funding support tend to correspond with times when support is needed most. This pattern underscores the risks involved in international assistance and the need for recipient countries to make contingency plans for the short- and medium-term to address unexpected cuts in donor assistance and to reduce donor dependence over time. Donors need to realize that unpredictable cuts in donor support could derail achievements.

Some programmes that have seen large increases include World Bank and African Development Bank support to L&W. For example, World Bank support to agricultural water development doubled in 2006–2010 compared to 2000–2005.

On the other hand, most programmes that specifically focus on improved L&W for developing countries, such as the International Land Coalition or the Global Water Partnership, have relatively little funding. Moreover, they tend to depend on one or very few donors, and have been struggling to maintain or expand their funding base. As such, they have focused on leveraging funds from other donors, such as the Global Environment Facility (GEF) or the World Bank. For example, the International Land Coalition had a total budget of US\$1.5 million in 2005, which pales in comparison to the US\$9 billion spent annually by the World Bank on L&W.

In response to declining public funding support, the availability of new technologies, such as inexpensive Chinese pumps for groundwater, electricity and fuel subsidies for rural areas in several countries, private investment in irrigation development has soared since the early 1990s.

Lessons learned from international cooperation on L&W

International cooperation for land and water (L&W) is increasing owing to the transboundary nature of the benefits and costs of L&W management and emerging global issues. These particularly relate to climate change, growing demand for food, fiber, biofuel and the consequent demand for L&W. These trends offer opportunities for improved L&W management and the challenge of ensuring the poor smallholder L&W users benefit from these opportunities. However, the level of investment in L&W resources is still far from commensurate with the level of dependence of people and economies on these resources.

International cooperation on L&W has become a high priority in many institutions, and requires an enabling environment, particularly national-level support as well as new aid modalities. Key elements for the implementation of international cooperation on L&W include an inventory of supply of and demand for L&W resources and related goods and services, a shared diagnostic of main bottlenecks and opportunities for sustainable land and water management (SLWM) mainstreaming and upscaling, a toolkit of win-win approaches for sustainable L&W management, a shared vision for sustainable L&W and, importantly, a L&W implementation strategy and investment framework, which needs to be supported by efficient policy and institutional reforms (e.g. land tenure, trade, market, research and extension, land planning), a knowledge platform, as well as strong monitoring and evaluation (M&E) framework.

Furthermore, L&W cooperation is not an end in itself but contributes to larger development goals. These include the Millennium Development Goals (MDGs), overall food security and poverty alleviation objectives, broader environmental goals, such as biodiversity and ecosystem preservation and mitigation of natural disasters. As such, L&W cooperation should command resources from multiple programmes and funds.

The potential for international cooperation has increased recently as a result of several global changes, including raised concern about climate change, the recent food price crisis and associated land acquisitions,

as well as demand for ecotourism, fair-trade and labelling.

International programmes related to L&W may positively affect sustainable L&W management and poverty reduction. Planning for these L&W related positive developments across nations will enhance benefits and reduce the costs of investment.

Finally, it is expected that improved L&W cooperation will rapidly become a key factor in the development of the emerging green economy, which relies largely on the sustainable management of L&W resources.

1. Rationale for an international cooperation framework on land and water: context and trends

1.1 The international cooperation context – evolution of the development L&W Agenda

To meet the challenges of environment and development it is important to overcome confrontation and to foster a climate of genuine cooperation and solidarity. UNCED, Agenda 21.

Management of land and water resources (L&W) is common to a number of development agendas, from food security to economic and social development, from sustainable development and environmental protection to adaptation and mitigation of climate change.

International cooperation concerning land and water resources was first linked to food security and rural development. The green revolution, a global overhaul of the agriculture production system that originated in the mid 1940s, and between 1970 and 1990 more than doubled cereal production in Asia (Hazell, 2002), was technology centered¹. The Rockefeller and Ford foundation led the effort by building an international agricultural research system, a knowledge network that over time came to include the United States Agency for International Development (USAID), the World Bank, the CGIAR, the International Rice Research Center in the Philippines, and several other centers in Asia and in Latin America. This network coordinated national research agendas and exchange of knowledge; it subsidized research on new technologies and overcame market failures to facilitate technology transfer and diffusion of innovations in seed technology as well as irrigation and agronomic techniques and supported the adaptation of these technologies to local conditions in developing countries (Hazell 2002; World Bank 2007).

During the 1980s and 1990s, increasing externalities, from unregulated use of natural resources, caused environmental considerations to officially enter international discourse. Several L&W challenges, including water and air pollution, land degradation, as well as climate change have taken center stage in global diplomacy (Tolba, 1998; Sanwal, 2004) and, as a result, cooperation has increased over the last two decades. In the 1980s the United Nations responded to the growing calls from the global community and emerged as the heart of international cooperation; the place where global values, development principles, strategies and programmes of action are delineated. The global United Nations conferences that took place from the end of

¹ In some interpretations the technological approach was the result of a geopolitical strategy that meant to oppose agrarian reforms supported by socialist-type policies.

the 1980s helped shape a global development agenda, whose main components were summarized in the 2002 MDGs (Table 1).

International conferences and processes, guided by the United Nations, have spearheaded cooperation efforts on L&W (UNESCO 2009; Wolf *et al.*, 2005; Sanwal, 2004), and they have been critical for collecting evidence on the growing human interference with the environment and its bearings on poverty and food security, and for bringing this evidence to the attention of all governments. These conferences include the Rio Summit of 1992, the Millennium Summit of 2000, the 2002 Johannesburg Summit on Sustainable Development, and the global research synthesis efforts such as the Millennium Ecosystem Assessment, or the reports of the Intergovernmental Panel on Climate Change.

A conclusion reached at most international conferences and summits was that the critical role of international cooperation in support of the development agenda should be recognized. During preparation of the 2002 Monterrey Conference on financing for development, several analysis stressed the need for a substantial increase in ODA to assist developing countries to achieve their MDGs .The Monterrey Declaration called for improvement of ODA effectiveness through better coordination and harmonization between donors and recipients. One reason behind this urgency was the financial dependence of sub-Saharan agriculture on ODA (World Bank 2007). Inefficiencies in the aid system resulted in multiple, fragmented, overlapping and sometimes contradictory donor missions. Donors respond to incentives in their home countries and absence of coordination with the recipient country and with other donors often produced priorities that are not in line with those of the recipients, duplication of efforts, high transaction costs and ultimately a lack of results (World Bank 2007).

The 2003 Rome declaration on harmonization and the 2005 World Summit clarified that more financial resources were only part of the picture and that it was critical to improve aid effectiveness through the implementation of a number of principles. In 2005 international donors and recipient countries signed the Paris declaration on aid effectiveness and committed to uphold its key principles. These were country ownership and government leadership in shaping the development process, alignment of donor support to government priorities and strategies, harmonization of donor and national processes (i.e. coordination of efforts), emphasis on results, and mutual accountability (UNDESA 2010).

The signatories agreed to gradually move from a project-specific to a programme-based approach (PBA), where aid is mobilized in support of sector-wide development strategies (also called sector-wide approaches (SWAp), and can be considered a subsector of the PBAs); of a thematic area for example an environmental strategy, or of a national poverty reduction strategy (PRS). The shift is key to strengthening harmonization and country ownership and limiting the likelihood of donor-driven processes.

The programmatic approach aims to facilitate long-term aid commitments from donors, and helps to support the promotion of 'basket funding' where resources from different donors are pooled into a single fund, or budget support, where funds are made available to the government often tied to PRS strategies. These modalities avert the fragmentation of aid into specific activities; this increases flexibility in the use of funds, empowers local processes and priorities, and emphasizes local responsibility over programme design and implementation (Lavergne and Alba 2003).

1.2 The land and water challenge

The increasing competition over natural resources as a result of population and economic growth, climate change, and other drivers is magnifying the challenges of natural resource management. As outcomes for food, water ecosystems, land degradation, and desertification increasingly transcend national boundaries, increasing international cooperation for land and water is called for. At the same time, national governments and multinational corporations have become important actors in L&W, operating chiefly outside the UN sphere of cooperation.

According to the Comprehensive Assessment of Water in Agriculture (2007), over 1.5 billion people live in areas where water is already over-allocated to agriculture, environment, urban and industrial uses and land and soils continue to degrade. Many of these are in breadbasket areas such as the North China Plains or Central Asia, where there is no additional water for agriculture. The challenge in these areas is to increase the land- and water-efficiency of production while maintaining ecosystem resilience.

Another 1.2 billion people must cope with economic water and land scarcity, particularly in poverty-stricken areas of sub-Saharan Africa, South, and Southeast Asia and parts of Latin America. In these areas L&W are available in nature, but access is difficult and productivities are low owing to financial, infrastructural and human capacity constraints. Bruinsma (2009) estimates that agricultural production will need to increase 70 percent by 2050, chiefly through increased intensification (90 percent of total increase). As a result, expansion of arable land area is expected to be relatively minor, at 120 million ha, mostly in sub-Saharan Africa (SSA) and Latin America (LA), along with an area contraction of 50 million ha in the group of developed countries. Intensification on currently cultivated land will require further investment, and improved knowledge management of land, water and soils, including an estimated expansion of irrigation by 32 million ha (11 percent) and irrigation water withdrawals of 286 km³ in developing countries.

While estimates by other research groups differ somewhat, the overall trends are the same. This is even if management of agricultural landscapes changes dramatically according to the sustainable principles that have been identified, improved and refined since the 1992 Rio Summit. Increased intensification will still require many agricultural inputs, such as water and fertilizers, and increased cropping intensities, particularly if the aim is to control the rate of expansion into forested areas. The fragility of the global food system became apparent during the food price crisis of 2005–2008 and in some of the responses to that crisis. Other demands on L&W, such as from biofuels, urbanization, and industrialization, many of which transcend national boundaries because of international trade and globalization are further limiting L&W availability and quality for food production.

Other evidence of the internationalization of L&W resources issues include the recent flurry of land acquisitions, also dubbed 'land grabs', in part as a result of the food price crisis by high- and medium-income countries in SSA and other developing countries; growing water trade, both directly, in the form of bottled water, and virtually, through embedded water in crops, livestock and manufactured products (von Braun and Meinzen-Dick, 2009; de Fraiture *et al.*, 2004; Ramirez-Vallejo and Rogers 2010); and last, but not least, climate change that is both affected by and significantly impacts L&W resources' availability and quality.

International cooperation allows countries to summon resources (financial and technological) and knowledge to reduce uncertainty under growing L&W challenges, control the risks, and therefore manage and

sustainably use their shared resources. However, several problems hamper the strengthening and expansion of cooperative efforts, including the slow pace of progress of the implementation of the Paris Declaration on aid effectiveness (OECD 2008). There are signs of increased noncooperation and mistrust at the regional and international levels as a result of national unilateral actions in response to the food price crisis (von Braun 2008), the ongoing stalemate of the WTO Doha Round, unilateral biofuel policies of several countries, and the above-mentioned land- (and associated water-) grabbing flurry. This report examines the types of L&W management cooperation, their potential opportunities and challenges and steps that could be taken to enhance the benefits of cooperation.

While cooperation principally includes both multilateral and bilateral, transboundary and private-sector cooperation, given the limited scope of this paper, the focus is chiefly on international, multilateral cooperation.

TABLE 1: MAJOR UNITED NATIONS CONFERENCES ON SUSTAINABLE DEVELOPMENT

Summit	Year	Topics and goals	Outcomes related to L&W
United Nation Conference on the Human Environment	1972	Evidence of impact of human activities on the environment	Establishments of UNEP and several national environmental protection agencies
United Nations Conference on Environment and Development (UNCED) [Rio Summit]	1992	Rethink economic development in ways that also allow to halt the destruction of natural resources	1) Agenda 21 (programme of action) delineated principles for the integration of environment into socio economic and development policies. 2) Creation of two legally binding conventions: United Nations Conventions to Combat Desertification (UNCCD) and Convention on Biodiversity (CBD), and non-legally binding principles on sustainable management of forests.
Rio+5	1997	Assessments of progresses of Rio Principles	Identification of failures (particularly in tackling poverty), made obvious by falling levels of ODA, increasing national debts and failures in technology transfers
Millennium Assembly	2000	Global challenges must be managed in ways that distribute costs and burdens fairly	1) MDGs emerged as main commitment, and as a framework to guide cooperation for development within and outside the UN system. 2) Commitments to intensify international efforts in the management, conservation and sustainable development of all types of forests, and to stop the unsustainable exploitation of water resources by developing water management strategies at the regional, national and local levels.
United Nations Conference on Sustainable Development (Johannesburg)	2002	Governments to implement national sustainable development strategies (NSDS)	The plan of implementation called for all African countries to prepare food security strategies to raise agricultural productivity, by addressing shortages of water and investments in R&D.
World Food Summit (FAO)	1996, 2002 and 2009	Halving the number of undernourished people by 2015	Countries agreed to work to reverse the decline in domestic and international funding for agriculture and promote new investment in the sector, to improve governance of global food issues in partnership with relevant stakeholders from the public and private sectors
World Summit(FAO)	2005	Reiterating commitments to the MDGs	Member states committed themselves to supporting R&D 'to address the special needs of developing countries in the areas of health, agriculture, conservation, sustainable use of natural resources and environmental management, energy, forestry, and the impact of climate change' (para. 60).

Source: UNDESA 2007; <http://www.earthsummit.info/>; <http://www.un.org/esa/dsd/rio20/index.shtml>; <http://www.urbandrum.co.uk/earthsummit2012/> [all accessed May 2010]

Note: the list is not intended to cover all Conferences that addressed L&W issues. The conferences addressed different dimensions whose components are linked and sometimes overlapping. The Johannesburg plan of action addresses sustainable management of natural resources, not as an independent exercise per se, but in the context of poverty reduction, and food security. The combination of these conferences produces a comprehensive global development agenda.

2. International cooperation on land and water

2.1 Key international cooperation initiatives on land and water resources development

The United Nations system plays an important and unique role in the international cooperation management of land and water resources. It has facilitated a series of key meetings on the topic and helped establish a range of international organizations and programmes focusing on enhanced management and improved support for L&W. Most international efforts focus on either water (GWP) or land (ILC), but aim to take both resources into account. Along with international cooperation efforts, several regional programmes have been developed, particularly for sub-Saharan Africa.

Cooperation at the regional and river basin level has generally been more active and implementation oriented. Transboundary river basin management is one form of regional cooperation that has expanded over the last five decades with international basin organizations operating in Latin America, Asia, and sub-Saharan Africa. Finally, advances have been made to address the lack of data and knowledge sharing on L&W.

The United Nations system plays an important and unique role in international cooperation on management of land and water resources. Early efforts, focussing on food security and the fight against hunger, saw the establishment in 1945 of the Food and Agriculture Organization (FAO). In the midst of the Green Revolution, FAO, IFAD and the United Nations Development Programme (UNDP) cosponsored with the World Bank the creation of the CGIAR, which helped coordinate international agricultural research and continues to support agricultural development in defense of the poor (Box 1). Cooperation on L&W has picked up since the 1992 UNCED in Rio, where protection of the environment, biodiversity, and soil and water resources emerged as a key area for international cooperation toward global sustainable development.

Two direct outcomes of this conference were the UNCCD and CBD. Several UN agencies share responsibility for the promotion and the coordination of environmental policies and activities, including the FAO, UNEP and the Bretton Woods Institutions. The consultative process of the main UN conventions has set, and continues to set, the rules for the global governance of land and water resources by selecting policy options, shaping strategies, defining goals (UNDESA, 2010) and facilitating investments. Table 2 provides a representative list of the multilateral cooperation agreements on L&W.

Some of these international cooperative efforts, including the ILC, have set out to tackle the root causes of land degradation by acting as a “convenor of civil society, governmental, and intergovernmental stakeholders on land policies practices” (ILC Strategic framework 2007–2011). Given the general consensus in the research community regarding the positive link between secure land tenure and sustainable land management, the ILC has committed itself to ensuring access to land and water resources for the poor and protecting their land rights.

The UNCCD² has a broader mission. The Convention plays a key role in fostering action to combat land degradation by supporting the formation of NAPs and coordinating collaboration between donors and

² The term is not restricted to desertification per se, rather it indicates a degradation of land that manifests as the loss of land-use potential and the diminishing availability of both surface and groundwater resource. (Molden 2007).

TABLE 2: MAJOR INTERNATIONAL COOPERATION AGREEMENTS RELATED TO SUSTAINABLE MANAGEMENT OF L&W RESOURCES

	Objectives	Main activities	Main Achievements	Main obstacles
UN Convention to Combat Desertification (UNCCD)	Combating degradation of land and water (loss of land-use potential and diminishing availability of both surface and groundwater resources) and mitigating of drought, in dry areas, mostly. (UN process)	Supporting the formation of national level action plans (NAPs) and coordinating collaboration between donors and recipient countries	Provides very important awareness, political momentum, as well as normative framework on tackling desertification - and develops small-scale projects	Financial resources limited, variable political support, complex cross cutting topic, weak institutional anchorage, insufficient scientific evidence of status, causes and impact of desertification.
International Land Coalition	Increasing access to land resources by the poor and protect people with the most insecure land rights	Strong policy-advocacy mission toward supporting agrarian and land reforms to the advantage of the poor	Has built 83-member land coalitions in more 40 countries.	
Global Environmental Facility (GEF)	To foster international cooperation to prevent global environmental degradation and to rehabilitate degraded natural resources	Land degradation Portfolio includes: conservation and restoration of arid and semi-arid areas; integrated watershed management; soil conservation; afforestation; land tenure and access to natural resources.	By early 2009, GEF had invested US\$8.74 billion to support about 570 projects and more than 370 enabling activities related to land degradation, international waters, biodiversity, climate change, organic pollutants, and the reduction of ozone-depleting substances (GEF 2008)	Complex procedures for preparation and implementation. Insufficient synergies between focal areas, and difficulty to migrate into a programmatic approach
Global Water Partnership (GWP)	To foster integrated water resource management (IWRM) - to ensure the coordinated development and management of water, land, and related resources	Associates of GWP provide advice on management approaches, and help with research, development, and training on issues from protection of water resources to flood management to water-food security.	Some members contributed to promoting awareness of IWRM, and to the establishment of legislature in favor of IWRM (PARC 2008).	Problems with finding reliable funding
World Water Council (WWC)	To promote awareness, build political commitment and trigger action on critical water issues at all levels to facilitate the efficient sustainable management and use of water in all its dimensions	The council provides a discussion forum to reach a common strategic vision on water resources management, and catalyses initiatives and activities.	It is best known for its flagship conference, the World Water Forum	Lack the mechanisms to generate binding collective strategies on water.

Source: UNDESA 2010; <http://www.unccd.int/>; <http://www.landcoalition.org/>; <http://gefweb.org>; <http://www.gwpforum.org/servlet/PSP>; <http://www.worldwatercouncil.org/> [all accessed May 2010]

recipient countries. The articles of the convention and its regional annexes focus on integrated land and water management³ and biodiversity. The focus of the UNCCD on strengthening multi-stakeholder partnerships and community-based planning is key to supporting the implementation of its mission, but the complexity of the land degradation process and lack of funds, political support and coordination mechanisms, limit its

³ Land and Land Resources refers to a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface hydrology, the near surface sedimentary layers and associated groundwater and geohydrological reserve, the plant and animal populations, the human settlement patterns and the physical result of past and present human activity.

reach and results. The 10-year strategy of UNCCD – which started in 2007 – emphasizes sustainable land management as a key strategy for achieving its objective of combating desertification. The GEF, which in 2010 was designated as the primary financial mechanism of UNCCD, had incorporated land degradation as one of its focal areas in 2002. With US\$792 invested so far, the GEF is the largest global investor (grant) in SLM (GEF 2009).

Agenda 21, the Rio Summit plan of action, contains a specific chapter on freshwater resources that was largely informed by the 1992 Dublin Conference on Water and the Environment, and represents an elaboration of the Mar del Plata Action plan developed at the 1977 Mar Del Plata Conference (Salman, 2003) (Table 3). Following Rio, the global efforts to address water issues became more concerted; a sign of this was the establishment of two new institutions dedicated to water resources issues: the Global Water Partnership and the World Water Council.

The Global Water Partnership (GWP) was established in 1996 by the World Bank, the UNDP, and the Swedish International Development Agency (SIDA) to foster IWRM, and to ensure the coordinated development and management of water, land, and related resources. Some members of the partnership have contributed substantially to promoting awareness of IWRM, and to the establishment of legislature in favor of IWRM. At the same time, the organization has grappled with identifying sustainable funding streams (PARC 2008). The mission of the World Water Council is to act as a water resources management think tank, particularly by raising awareness of water-related problems and by providing advice to a range of water stakeholders regarding integrated resources management implementation.

TABLE 3: MAJOR WATER CONFERENCES

Summit	Year	Achievements
Mar del Plata Water Conference	1977	Mar del Plata Action Plan: focus the world’s attention on water global problems, called for governments to set plans of action for standards on water quality and quantity (many of the issues then identified are still valid and debated)
UNDP Global Consultation (New Delhi)	1990	New Delhi Statement calling for protection of the environment and health through integrated water management
International conference on Water and the Environment (Dublin)	1992	Dublin principles on competing uses of water, water as an economic good, and integrated water management through participatory approaches
First World Water Forum (Marrakech)	1997	Issuing of the Marrakech declaration, which recognizes the need for a better understanding of the complex issues, socio-economic, environmental, legal and institutional necessary to shape a global water policy.

BOX 1: INTERNATIONAL COOPERATION ON AGRICULTURAL RESEARCH: CGIAR

International agricultural research has been one example of international cooperation on L&W, among others, and has achieved impacts on the livelihoods of the global community. Coordinated by the CGIAR, 15 international centers have conducted research on crops, livestock, forestry, agroforestry, food policies, and related land and water resources in collaboration with national agricultural research institutions. One of the achievements of the CGIAR was support to the Green Revolution, which helped increase crop yield growth in developing countries by over 50 percent and production growth by 40 percent (Evenson and Gollin 2003).

Source: CGIAR 2010.

Overall cooperation on L&W resources has been motivated by scarcity and degradation, but also for economic reasons, to increase access and productivity, and to ensure that water and land are a conduit for agricultural and economic growth and for human well-being, particularly in developing countries, where a large share of the population directly relies on these resources for employment and income (World Bank, 2007).

2.2 International cooperation on land and water knowledge generation and sharing

The availability of accurate and timely data is critical for both managers and users of land and water resources, particularly in the context of sustainable development. New technologies are needed to monitor availability of water and nutrients in the soil, follow the trail of pollutants or the effects of land degradation. Accurate data on water quantity and quality helps decision-makers plan allocation and assess risks, while also increasing public accountability. Remote-sensing technologies are being used to map and monitor water productivity to better allocate water resources, or to determine whether groundwater is being over or even under exploited this knowledge creates the basis for regulating use (World Bank 2009).

Concern over climate change is increasing the pressure for better weather and climate services. Seasonal forecasts of El Niño Southern Oscillation (ENSO) type events in Indonesia and the Philippines has improved the ability to predict the date of onset of monsoon rainfall, hence increasing the capacity to plan rice planting and harvesting, and potentially assisting farmers with crop selection. These seasonal forecasts may improve food security (World Bank 2009; Naylor *et al.*, 2001). However, global hydrological data and observation networks are still inadequate and many countries have no access to data, which is partially the result of inadequate telecommunication systems, policy and security issues and lack of regulating agreements (WWAP, 2009).

These issues are similar on the land side. Improvements in land management depend on the availability of digital land use, land cover and soil maps, to monitor the availability of resources including soil erosion and fertility. Land-use maps are scarce and the soil maps currently in use are 10 to 30-years old, a long time given the rate of change for land use. The Global Soil Partnership, the Global Soil Map consortium, and the Land Degradation Assessment in Drylands (LADA) programme of FAO are posed to fill this gap thanks to recent developments in information and geospatial technology (Table 4). Satellite data, combined with Global Information Systems (GIS), can measure changes in land cover, monitor crop stress and yields, measure stream-flows, soil moisture and water storage and follow pollution plumes in water or in the soil.

The potential of these spatial technologies to aid correct management of L&W resources is enormous but still not sufficiently tapped, particularly in the poorest countries. Lack of data has been a key constraint to cooperation and investment in developing countries. Several knowledge-generation and knowledge-sharing initiatives have started in recent years (Table 4). The 1994 UNEP/FAO Digital Chart of the World or the 'open GIS' initiative strive to overcome the current proprietary system regulating the use of databases (available at: <http://gislounge.com/category/data/>). Cooperative efforts such as Global Earth Observation System of Systems (GEOSS) are providing critical opportunities for collecting data on a number of aspects related to L&W and making it available to a broad range of users both in developed and developing countries (Box 2).

However, efforts still need to be made to translate collected data for usability at the level of the end-user. Technology and instruments are important, but international cooperation has a very important role in

facilitating the harmonization, the standardization and the sharing of knowledge and capacity building through education and training. FAO and the World Bank are supporting local people in Africa and South Asia to develop simple technologies using local materials to monitor the status of their water resources (World Bank 2009).

FAO initiatives such as World Overview of Conservation Approaches and Technologies (WOCAT), the Land and Water digital series, and the State of Land and Water (SOLAW) programme of which this report is a component, further the understanding of land and water issues and diffuse information on the latest technologies and SLWM innovations. FAOSTAT is the largest global source of data and information. It has more than one million time series from over 210 countries on agriculture, nutrition, fisheries, forestry, food aid, land use and population. An independent evaluation showed that over 40 percent of respondents perceived that FAO provides better data compared to other sources (FAO 2008). However, while global data needs have been increasing, the FAOSTAT budget has been declining (FAO 2008). Funding for statistical activities fell by 33 percent from US\$36 million in 1994–1995 to US\$24 million in 2006–2007 (Ibid). FAO is undertaking many other initiatives for land and water information (Table 4).

A recent global analysis of the impact of human activities on ecosystem services, the Millennium Ecosystem Assessment (MA) has had a vast educational impact, as well as influencing scientific research and policy. Some view that one of the greatest outcomes of the MA is to be attributed to the cooperation process itself (Norgaard 2007). The painstaking sharing of data and knowledge, and the confrontation of disciplinary perspectives, have produced a group of scientists with a deeper understanding of the complexity of the relationships between humans and the natural system, and are therefore able to inform research and policy-making.

In conclusion, a number of valid knowledge initiatives based on international cooperation have been implemented, but data produced are incomplete and insufficiently harmonized to meet the needs of decision-makers involved in the governance of land and water resources.

TABLE 4: PROGRAMMES FOR DATA GENERATION HARMONIZATION AND SHARING

	Goal related to L&W	URL
GEOSS	Earth Geospatial data network	http://www.earthobservations.org/
UNDP/FAO digital charts of the world	Provide information on land cover and population density	http://www.fao.org/docrep/009/a0310e/A0310E09.htm
Geonetwork	Support decision-making on L&W management through providing better access to spatial data and information	http://www.fao.org/geonetwork/srv/en/main.home
FAO Land and Water Digital media Series	Provides data as well as educational resources on land and water issues	http://www.fao.org/landandwater/lwdms.stm
Global soil partnership (under discussion)	Harmonization of global soil databases	http://www.fao.org/nr/water/news/soil-db.html ; http://www.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/index.html
WOCAT	Global network to disseminate knowledge of SLWM practices	http://www.fao.org/ag/agL/agll/wocat/default.stm
Global soil map	Soil analysis to inform land management practices	http://www.globalsoilmap.net/
LADA	Land degradation assessment in drylands	http://www.fao.org/nr/lada/
UN-Water	Fostering information-sharing and knowledge building across all UN agencies and external partners dealing with freshwater management	http://www.unwater.org/flashindex.html

BOX 2: GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS (GEOSS)

The global challenges posed by desertification, biodiversity loss and climate change have created an urgent need for an integrated system to monitor environmental changes, and provide the information needed to move toward a more sustainable management of natural resources. The Group on Earth Observation (GEO), a voluntary partnership of governments and international organizations, was created in 2005 with the mission of building a GEOSS to generate, disseminate, and manage earth observation data, collected from a vast array of observation systems (oceanic buoys, hydrological and meteorological stations, and satellites) and facilitate analysis in areas ranging from disaster risk mitigation, to adaptation to climate change, integrated water resource management, biodiversity conservation, sustainable agriculture and forestry, public health, and weather monitoring. An early achievement of GEOSS is the Asian Water Cycle Initiative (AWCI), which supports integrated water management in Asia, and shares data on water scarcity, water pollution and ecosystem degradation. Other examples are the PUMA project, which provided satellite stations and data analysis capability to a network of 53 African countries, and the AMESD African project, which supports decision-making for the management of water and agricultural resources. In 2008 GEO launched the Forest Carbon Tracking Task (FCT) in collaboration with FAO, the European Space Agency (ESA) and the Committee on Earth Observation Satellites (CEOS). The goal of FCT is to develop a system of forest observation and carbon monitoring, reporting and verification based on satellites, airborne and in situ forest measurement data, and thus support countries that wish to monitor their forests, and create a system of carbon accounting.

Source: <http://www.earthobservations.org>, and communication from Michael Williams GEOSS (External Relations Manager)

2.3 Regional cooperation on land and water

Cooperation in the Africa region

In the last several years various regional initiatives were created focussing on sustainable L&W management (Table 5). As a result of the high levels of land degradation in sub-Saharan Africa, many cooperative efforts involving protection of L&W resources were created in and for the Africa region. The most important programme for Africa is the Comprehensive Africa Agriculture Development Programme (CAADP), which was launched in 2002 by the New Partnership for Africa's Development (NEPAD), a programme of the Organization for African Unity (OAU). CAADP's mission is to address food security through projects on rural development and growth in the agricultural sector. Initially, the GEF mobilized US\$150 million for Pillar 1 of CAADP, which aims to increase the area under sustainable land and water management practices. Despite the efforts of UNCCD, CAADP, and other regional initiatives such as the Soil Fertility Initiative, launched in 1996 at the World Food Summit, and the Action Plan for the Environment, launched by NEPAD in 2003, the problem of soil degradation is still severe. Consultations between NEPAD, African countries, and various regional and international agencies led to the creation of the TerrAfrica initiative in 2005, with the objective of upscaling and mainstreaming SLM through a programmatic approach that follows the Paris declaration principles.

TerrAfrica is a partnership of African governments, regional and subregional programmes, NEPAD, the UNCCD, the World Bank, IFAD, the Africa Development Bank (AfDB) and other donors. TerrAfrica has been coordinating and harmonizing support for SLWM programmes, and is proposing to catalyze an additional US\$900 million to Pillar 1 of CAADP. The initiative has also been collecting and analysing data required for planning country, subregional and regional-level investment SLWM programmes. Examples include recent SLWM plans for Ethiopia and Uganda. Such plans are a first step to bringing landscape management to the attention of national decision-makers, supporting the effective prioritization of land management interven-

tions to address land degradation, and helping to balance the trade-offs that need to be made to ensure that landscapes can deliver a continuous stream of benefits. The Partnership for Agricultural Water Management in Africa (AgWA), is a similar arrangement that focusses on generating synergies between agricultural water management investors and professionals scattered among diverse organizations to enable them to work systematically toward the shared goal of improving agricultural productivity through better access to and use of water.

Cooperation on transboundary waters

Many regional programmes operate through river basins. Approximately 40 percent of the world's population live in transboundary river basins and more than 90 percent live in countries with basins that cross international borders (Sadoff and Grey, 2005). The 263 international water basins account for about 50 percent of global land area and 40 percent of freshwater resources (Giordano and Wolf, 2002). Five countries depend almost entirely on inflows from neighbouring countries. These are Egypt, Hungary, Mauritania, Botswana and Bulgaria (Gleick 1993). Cooperation between riparian states has overcome conflicts, demonstrating the desire and resolve to cooperate and take advantage of the benefits resulting from cooperation. Over 3 600 international water treaties were formulated between AD 805 to 1984, most were related to navigational issues (Giordano *et al.*, 2002).

Since the 1950s some treaties have started to deal with non-navigational issues, laying the groundwork for future cooperation over the equitable distribution of benefits and responsibilities. The UN Convention on the Law of the Non-Navigational Uses of International Water Courses codified rules for equitable use, obligations of protection and conservation of international water bodies, information exchange, and settlement of disputes (Wouters, 2000).

While the Convention has not entered into force because it has not been ratified by enough members, such initiatives have strengthened cooperation for the management and use of international rivers and water bodies. Progress on cooperation across river basins has led to significant economic and environmental achievements. Successes include planning by the Mekong River Commission to reduce flooding in the downstream delta area (Delgado *et al.*, 2009); and cooperation to collaboratively address the water hyacinth problem in the Lake Victoria basin in Eastern Africa (Foster and Briceño-Garmendia 2010).

Moreover, recent treaties have included agriculture, health, hydropower, environment, and other development, security and political issues. For example, in the Near East, water agreements included provisions on regional security, whereas India and Nepal linked water treaties with afforestation agreements (Giordano and Wolf, 2002). Linking water treaties with non-water objectives can increase benefits and lead to improved cooperation, thanks to the construction of a synergistic environment (Giordano *et al.*, 2002) (UNESCO, 2009). At the same time, regional cooperation on non-water objectives can foster riparian cooperation by including clauses related to L&W management.

Strong cooperation has been observed in regions where there is strong political commitment and country level policies having a strong emphasis on L&W. Despite the large number of river basin cooperation, higher degree of cooperation remains a challenge in regions where these conditions are not met. For example of the 18 river basin cooperations formed in sub-Saharan Africa since the 1960s, only four (Senegal, Volta, Niger and Gambia) have reached the fourth stage, which is a legally establish river basin authority that has evolved beyond a technical committee (Foster and Briceño-Garmendia 2010; Grey and Sadoff 2006). Cooperation in other river basins is still at the initial stages (Ibid).

TABLE 5: SELECTED REGIONAL COOPERATION EFFORTS ON L&W

Regional cooperation	Activities related to L&W	Source
Africa Agriculture Development Programme (CAADP)	Pillar 1 aims to extend area under SLWM	http://www.nepad-caadp.net/index.php
TerrAfrica	Promotion of partnerships between international, regional, and national stakeholders and local communities for country-level implementation of sustainable land management practices and policies	http://www.terrafrica.org/
Partnership for Agricultural Water in Africa (AgWA)	Coordination of countries, international and regional organizations efforts to support agricultural water management, through knowledge sharing, aid for synergies and harmonization of donors' programmes	http://www.agwaterforafrica.org/
Association of Southeast Asian Nations (ASEAN)	Establish mechanisms for sustainable development by protecting the region's environment and natural resources	ASEAN Ministerial Meeting on Environment 2009 (http://www.aseansec.org/19601.htm)
AU (African Union)	[a] Convention for the establishment of the African Centre for Fertilizer Development; b) African Convention on the Conservation of Nature and Natural Resources	http://www.africa-union.org/root/au/Documents/Treaties/treaties.htm
Organization of American States (OAS)	Equitable and efficient land-tenure systems and increased agricultural productivity	http://www1.umn.edu/humanrts/iachr/oascharter.html
Southern African Development Community (SADC)	Collaborative water management initiatives	Giordano and Wolf, 2002
European Union	Convention on Environmental Impact Assessment in a Transboundary Context (1991) and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992).	Giordano and Wolf, 2002

2.4 Effects of the multinational and private sector on land and water

Multinational corporations and the private sector have become important actors in L&W. For instance land and water management is affected by private sector demand for certified products. Growing demand in high-income countries, for organic or fair trade-certified products, has led to an expansion of areas cropped under rigorous environmental and social standards of production (World Bank 2007). Between 2005 and 2008 the total area planted to organically grown crops grew from 31 to 35 million ha, with Australia and Argentina being the top producers (Web site: <http://www.organic-world.net/496.html>). By providing niche markets, the private sector de facto increases the value of products; it increases the returns to investments of farmers, therefore encouraging further responsibility for protecting and sustainably managing the resources.

Multinationals are also important sources of technology transfer and foreign exchange earnings for developing countries. However the legal systems of developing countries are often unsuited to protecting national interests when there are conflicts over rights and responsibility for L&W resources.

3. International markets for land and water

Globalization and increased openness to trade have helped foster international markets that rest on L&W resources and the goods and services derived from them: from food to bottled water, to biofuels and carbon sequestration, to services such as water purification and water-flow regulations. These markets provide opportunities for cooperation and investments in developing-countries' L&W improvement, for example through technology transfers from high-income countries. However, major concerns regarding the potential expropriation of L&W held by smallholders without legal title require the establishment of internationally agreed codes of conduct as well as stronger national legal systems to ensure that the poor are not disfavoured in international L&W deals.

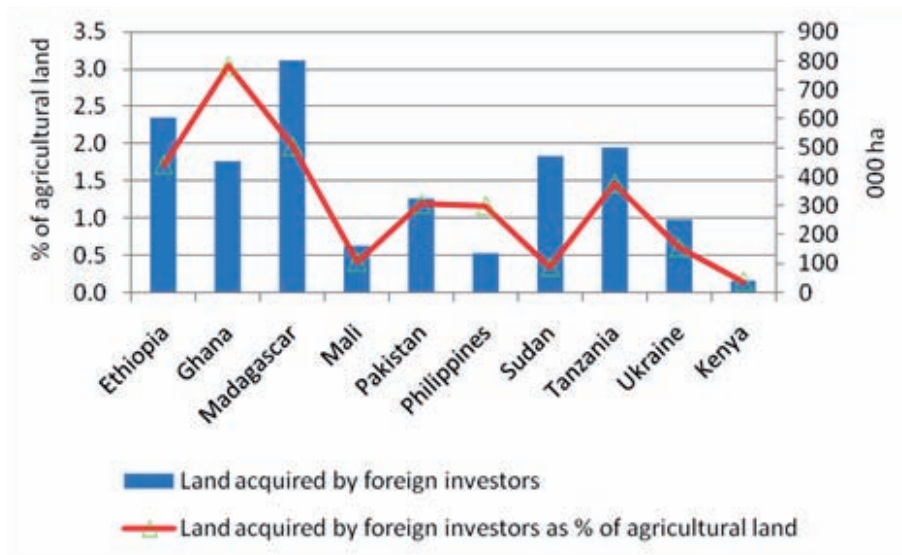
In most developing countries land markets rarely exist and water remains under- or unpriced, which commonly leads to overuse. Similarly, fertilizer subsidies, which are widespread in Asia and increasingly used in parts of Africa, result in overuse and unbalanced applications that often result in increased pollution levels and reduced efficiency in the allocation of resources. This section reviews the potential for land and water markets and for PES schemes to improve land and water allocation and efficiency. While parts of international land markets are recognized, water and soil nutrient markets generally remain hidden, and have generally only been assessed in research studies. Similar to land markets, however, such markets would benefit from some form of international regulation to prevent potential adverse impacts on the poor.

3.1 International land markets

The potential for land to produce goods and services varies significantly across regions. Although agro and water technologies have succeeded in increasing land productivity even in less fertile areas, differences in land and water endowments and in access to production technologies remain, and create the space for international land markets. Following the 2007 and 2008 food price crisis, the energy crisis, and the rush for biofuels production, land acquisition or lease by foreign investors in developing countries increased abruptly (Cotula *et al.*, 2009; von Braun and Meinzen-Dick, 2009). National food security, and concern related to competition for water resources and future water availability for energy and food production, have been key drivers behind these land purchases. The global income growth, particularly in China, India, and other emerging economies, as well as globalization has also contributed to the increasing demand for agricultural land (Regmi *et al.*, 2008). Arab countries as well as China have been at the forefront of these land acquisitions (von Braun and Meinzen-Dick 2009). Finally, mistrust in the stability of the global food market, after the food price crisis in 2007–2008, which triggered export restrictions in some countries further worsening the crisis, also encouraged this phenomenon.

In the space of five years acquired land accounted for a large share of agricultural land in several countries (Figure 1). Even though the speed at which the demand for land in 2004–2008 increased is unlikely to be maintained, recent growth suggests that demand for agricultural land by wealthy, natural resource-scarce countries could be long term. The new international land market provides an opportunity for cooperation and investments in the agriculture sector, for example through technology transfers from high-income countries. However, given rising concerns over expropriation of land held by farmers with no legal title, and over application of environmental standards, an internationally agreed code of conduct should be established to ensure that the poor are not disfavoured (see Section 5 for more details), and that land management is fully compatible with the land-use planning of the country.

FIGURE 1: LAND ACQUISITION BY FOREIGN INVESTORS IN SELECTED COUNTRIES 2004–2009



Sources: Ethiopia, Ghana, Madagascar, Mali, and Sudan data [Cotula et al., 2009]; Pakistan, Philippines, Tanzania, Ukraine and Kenya [von Braun and Meinzen-Dick 2009]; Agricultural area [FAOSTAT online: <http://faostat.fao.org/site/377/default.aspx#ancor>].

3.2 International water markets

Freshwater is unevenly distributed across space and time. This pattern creates a comparative advantage for some countries to produce water-intensive products (e.g. beef and rice) and export them to water-deficit countries. Large-scale international trade of freshwater has faced a number of challenges, including fears of depletion of water resources in water-abundant countries and fears over the potential role of private companies in claiming water access and use rights (Hoekstra 2010). The global water market currently exceeds US\$300 billion and is expected to rise as demand increases and freshwater resources decline. In terms of value, bottled water industry is the largest channel of water trading (Gleick 2004).

Globalization offers opportunities for trading virtual water, that is water used in the production of a good or service. A well-functioning global trade system would induce countries to either export or import goods based on their natural resource endowment: water and/or land poor countries would be net importers of agricultural commodities produced by water-abundant countries. Such a system would be more likely to achieve an optimal use of both land and water resources. Many countries in the Near East and North Africa are already net importers of agricultural goods, therefore importing large volumes of virtual water. Jordan imports about 6 km³ of virtual water per year and withdraws only 1 km³ from domestic sources (Hoekstra and Chapagain, 2008). Table 6 shows the level of water savings resulting from international virtual water trading.

Although virtual trade offers opportunities for more efficient water use, it also poses the risk of water depletion in water-surplus countries and dependence on external water in importing countries (Hoekstra 2010). Moreover, as de Fraiture *et al.* (2004), Rosegrant *et al.* (2002) and others have shown, water productivity improvements are far more important than increased virtual water trade for conserving water, also because water scarcity plays a modest role in global trading patterns as compared to economic and political considerations. Despite this, the current debate on globalization and the international trade negotiations through the WTO should consider the water balance equation in the planning and coordination of cooperation in international trade.

TABLE 6: VIRTUAL WATER TRADE OF SELECTED COUNTRIES

	Total use of domestic water resources in the agricultural sector (km ³ /yr)	Water saving due to import of agricultural products (km ³ /yr)	Water loss owing to export of agricultural products (km ³ /yr)	Net water saving owing to trade in agricultural products (km ³ /yr)	Ratio of net water saving to use of domestic water
China	-	79	23	56	0.08
Mexico	94	83	18	65	0.69
Morocco	37	29	1.6	27	0.73
Italy	60	87	28	59	0.98
Algeria	23	46	0.5	45	1.96
Japan	21	96	1.9	94	4.48

Source: Hoekstra (2010)

3.3 Payment for environmental services (PES)

PES systems exist for watershed services, biodiversity conservation and reduction of carbon emissions. According to the FAO, the two global environmental service markets – carbon emission reductions and biodiversity conservation have the greatest potential for bringing new streams of finance into the agricultural sector of developing countries (<http://www.fao.org/es/esa/pesal/index.html>).

For example the African agriculture sector has an estimated 17 percent of the global total mitigation potential. This could translate into annual value streams for sub-Saharan Africa of US\$4.8 billion (Bryan *et al.*, 2009 based on Smith *et al.*, 2007). Currently, however, payments for carbon sequestration through agricultural practices is excluded from major carbon markets, i.e. CDM under the Kyoto protocol, and the European Union emissions trading scheme.

The voluntary carbon markets, financed by companies wanting to offset their carbon footprint as a way of corporate responsibility, can be separated into two categories, the Chicago Climate Exchange (CCX) and the ‘over-the-counter’ (OTC) market. Currently, compliance markets and voluntary carbon markets, account for less than 2 percent of the global carbon market (Capoor and Ambrosi 2009) but are increasing.

The CCX is the world’s only voluntary cap-and-trade system, while the OTC market is the non-binding offset market. The CCX is the only market with a considerable share of agricultural soil projects. However, from 2007 to 2008, this share fell from 48 to 15 percent. According to Hamilton *et al.* (2009), the drop in agricultural soil projects was in part the result of the growth of the programme itself and in part to modifications made to the agricultural soil protocol, which has led to a slowdown of the verification process. New initiatives encourage the rewarding of carbon sequestration in all landscapes including agriculture, forestry and other land uses (AFOLU). AFOLU is being considered under Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD++). AFOLU Pilot projects are being implemented in developing countries under voluntary carbon standards. AFOLU and other carbon credit programmes that include agriculture and forest provide opportunities to simultaneously achieving poverty reduction, food security and climate (Donor Platform 2010).

However, several challenges are hampering the inclusion of smallholders from developing countries into the global carbon markets. These include, among others: weak property rights, which limit farmers’ willing-

ness to invest in long-term L&W management practices, low institutional capacity, high transaction costs of registering and certifying carbon credits, low prices of certified emissions, and limited scope of allowable land management activities under afforestation and reforestation programmes under the clean development mechanism. Other obstacles are represented by a lack of commitment in developing countries to invest in climate change adaptation and mitigation. To overcome these challenges, renewed efforts to include AFOLU and other carbon credit initiatives will require setting up special funds that specifically finance the adoption of sustainable land management practices by smallholder farmers. Such funds should also be supported by other programmes that address other development issues such as institutional capacity of smallholder farmers, land tenure and transactions costs.

4. International investments and funding for L&W

International investment and funding for L&W increased rapidly as a result of major famines and food shortages in the 1950s and 1960s, but declined sharply during the 1980s and 1990s as a result of declining international food prices and increased donor alignment with national priorities. Investments on L&W increased somewhat during the 2000s as a result of new international commitments, the food price crisis, and acute water and land shortages. However, the level of investment in L&W resources remains far below identified needs and the level of dependence of people and economies on these resources.

In the 1950s and 1960s, following a series of famines and food shortages, investments in L&W increased particularly in the Asia region, where national governments directed the largest share of expenditure toward agriculture and irrigation development, as a major component of the green revolution. In the 1980s and 1990s, as a result of a long-term decline in international food prices, investments in L&W slowly tapered off or were redirected toward urban sectors and institution-building (Rosegrant *et al.*, 2001; 2002).

The 2000 Millennium Summit, the 2002 Monterrey Consensus on Financing for Development, the 2005 World Summit, and the 2005 Paris Declaration on aid effectiveness revived international investment and funding for agriculture and L&W. In particular, the Monterrey Declaration included commitments on resource mobilization, ODA, and trade and debt relief, suggesting the need for improved coordination and harmonization between donors and recipients to increase the effectiveness of ODA.

While funding levels over the last ten years have increased for some regions and sectors, overall ODA support, as a share of GDP, has remained below the target level of 0.7 percent in many developed countries (UNDESA 2010). Furthermore, while ODA is significant for L&W, most investments in L&W are funded privately by end users. Foreign Direct Investments (FDI) has steadily increased over the last several decades, but remains heavily concentrated in East Asia and the Pacific and Latin America and the Caribbean. While FDI declined in the early 2000s, the long-term trend suggests future increases, including in the sub-Saharan region (Winpenny 2010). The following, briefly describes trends in ODA and other key international investors in L&W.

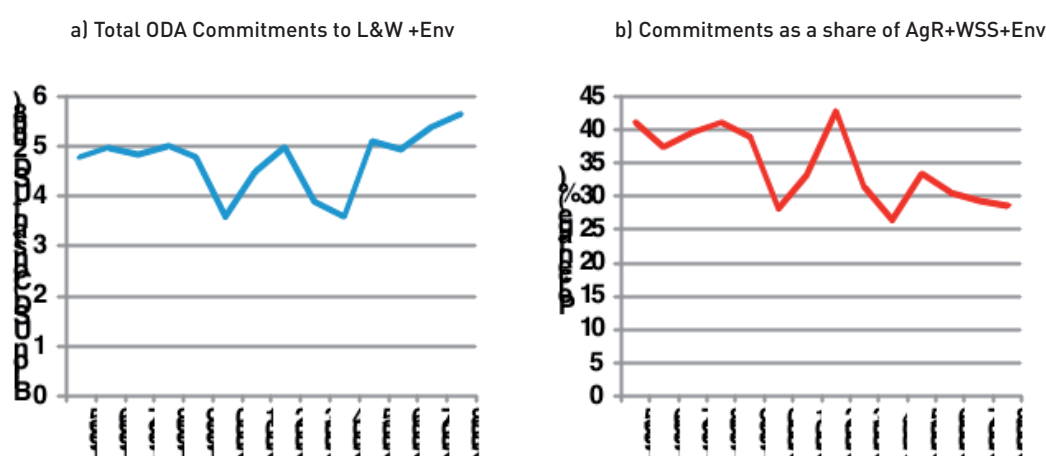
4.1 ODA support to L&W in developing countries

Overall, total donor assistance to all sectors in developing countries has shown an upward trend over the past decade, increasing from US\$57 billion in 1995 to US\$158 billion in 2008 (in constant terms)⁴. Support to L&W⁵ has suffered a couple of major falls in the 1990s, and stagnated until recovery in 2005 (Figure 2a). Although in absolute terms the 2008 amount of ODA directed toward L&W grew past the 1995 level (Figure 2a), support for L&W has been falling when measured as a share of the total ODA directed toward agriculture and rural development (AgR), water supply and sanitation and general environmental protection (Figure 2b).

ODA directed to the nine subsectors comprising the L&W group for this analysis (see Supplemental (Information) shows stable or decreasing trends, except for aid to agricultural water resources and environmental policy and management, both showing a positive trend (Figure 3).

Increasing aid to these two subsectors is behind the apparent increasing trend for the L&W group in the last few years (see Figure 3a). The most activities in support of the Environmental Policy subsector were undertaken by France and the European Union, which were the top donors in 2008. France committed more than US\$200 million of untied funds for adaptation to climate change in Indonesia, 58 million for the protection of watersheds in Tunisia and 43 million for the development of a wind park in Yunnan, China⁷.

FIGURE 2: ODA COMMITMENTS TO THE L&W SECTOR



Source: OECD - CRS Database

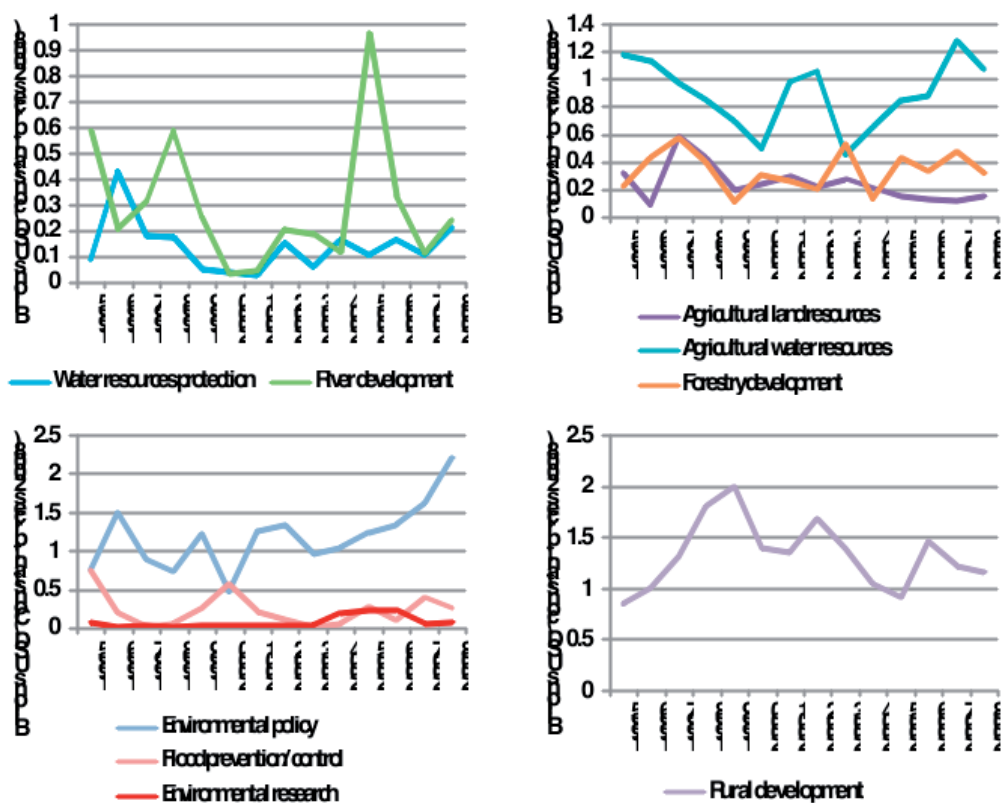
Note: b) this shows commitments⁶ to the nine subsectors identifying L&W (see supplemental information), as a share of total ODA directed toward water supply and sanitation, agriculture or forestry and fishery, general environmental protection and rural development. AgR was used to simplify the language and indicates the agriculture forestry fishery sector+ rural development sector.

⁴ The values are in constant 2008 US dollars

⁵ See the supplemental information section for details on the methodology used in this section

⁶ Commitments were chosen as these data are of better quality compared to disbursement. "The completeness of CRS commitments for DAC members has improved from 70 percent in 1995 to over 90 percent in 2000 and reached nearly 100 percent starting from the 2003 flows" <http://stats.oecd.org/qwids/about.html> [accessed May2010]

FIGURE 3: ODA COMMITMENTS TO THE NINE SUBSECTORS PRESENTED ACCORDING TO THEIR SECTOR OF AFFILIATION
 FIGURE 3A LEFT AND 3B RIGHT



Source: CRS Database of OECD (Accessed June 2010)

Note: The Sectors of affiliation in clockwise order starting from the top left figure are: Water supply and sanitation, Agriculture/Forestry and Fishery, General Environmental Protection, and Other Multisector.

Japan, the IDA and the United States were the main donors in 2008 for projects in the Agricultural Water Resources, subsector, with 430, 242 and 212 million respectively. A large share of aid went to irrigation projects in Iraq and Afghanistan. Japan also committed a total of about US\$300 million for the construction and rehabilitation of irrigation systems in Indonesia. These are a critical adaptation measure, as Indonesia faces increased rainfall variability associated with the effects of climate change on ENSO events. Japan also committed US\$100 million to Pakistan to improve irrigation systems in Punjab. The United States committed more than US\$100 million to irrigation projects in Armenia (details from the OECD-CRS database accessed June 2010).

Private investment in irrigation development has soared since the early 1990s because of declining public funding support in the 1990s, the availability of new technologies, such as cheap Chinese pumps for groundwater, and subsidies in several countries for rural electricity and fuel. As a result, more than half of India's food is currently produced using irrigation from groundwater (Barker and Rosegrant 2007). Furthermore, use of groundwater for irrigation has expanded rapidly in Bangladesh, China, and Vietnam and has started to take a hold in parts of sub-Saharan Africa.

⁷ Details from the CRS Aid Activity Database of the OECD

Despite international calls for projects to support land and soil conservation management, ODA for the Agriculture Land Resources subsector has been falling since the late 1990s. In 1997, ODA was at almost US\$600 million, with IDA and Japan contributing jointly US\$500 million for drainage works in Pakistan, and the European Union providing US\$12 million for conservation of water and land resources in Honduras. By 2008 the number of activities increased fivefold, but ODA dropped to US\$140 million, with the highest loan being US\$17 million from Germany to Ethiopia for sustainable land management activities, and 13 million from Italy to Kenya for development of the Sigor Wei-Wei agricultural scheme. Japan is also the major donor to Forestry Development. In 2008 Japan committed US\$120 million to India for Uttar Pradesh Participatory Forest Management Project, and US\$30 Million to Tunisia for Integrated Reforestation Project.

4.2 Major investors and regions for L&W sectors

As key L&W investors, the World Bank and the African Development Bank have committed to increased investment for re-engagement in agriculture and water in sub-Saharan Africa, after many years of declining investment (see Table 7). The food price crisis and climate change has driven other multilateral and bilateral donors, such as the Asian Development Bank, the United Kingdom Department for International Development (DFID), and German Assistance to increase support to agriculture and food security which, in turn, affect land and water resources. World Bank support to irrigation in Africa, for example, doubled in 2006–2010 as compared to 2000–2005 (World Bank, personal communication).

Japan, Germany and the United States are major bilateral donors to L&W, but support has fluctuated significantly over the years given changes in the national political context, budgets, priorities and external factors (Figure 4). For instance, ODA for agriculture water resources fell twice, which drove the fall in total ODA for the L&W sector (see Figure 2 and 3). This fall in support was linked to Japan withdrawing aid between 1998 and 2000 and then again in 2003 and 2004. The Asian financial and economic crisis of 1997–1998, and the 2002 stock market downturn most likely caused this fall. This pattern underscores the risks involved in international assistance and the need for recipient countries to make contingent plans in the short- and medium-term to address unexpected cuts in donor assistance and to reduce donor dependence in the long-run.

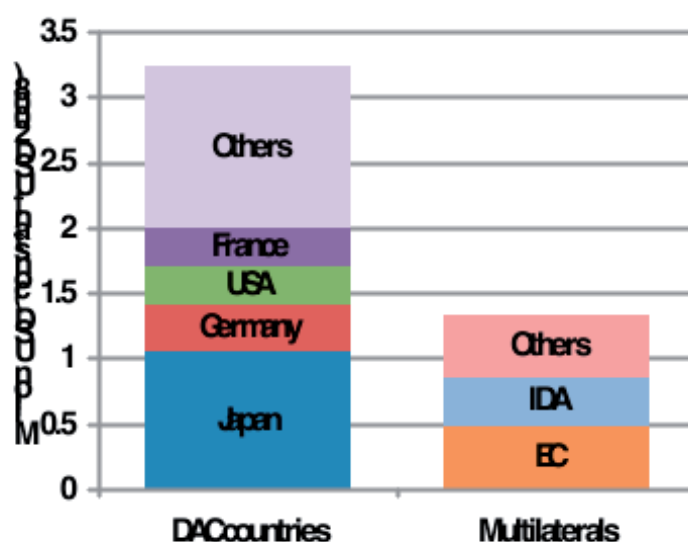
TABLE 7: INVESTMENTS IN INFRASTRUCTURE DEVELOPMENT IN THE IRRIGATION AND DRAINAGE SECTOR, 1961-2002 BY AFRICAN DEVELOPMENT BANK, ASIAN DEVELOPMENT BANK, INTER AMERICAN DEVELOPMENT BANK, AND WORLD BANK

Region*	Investment (Billion 1995 US dollars)								
	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-04
SSA	0.2010	0.0161	0.4524	0.5358	0.7054	0.4384	0.7901	0.2129	0.4138
MENA	0.0840	0.4612	0.5020	0.7411	0.6328	0.7283	1.2302	0.6418	1.0199
LAC	0.6250	1.2110	2.0120	2.5610	1.5480	1.4190	1.3570	0.4510	0.3505
EAP	0.1770	0.8280	1.3480	5.0010	2.9730	1.7390	1.6060	0.8700	0.7291
SA	1.0230	0.3840	0.3120	1.7140	2.5530	1.8350	1.4450	1.3630	0.4024
India	0.3240	0.1660	0.8040	2.2290	3.4320	1.6290	0.7470	0.6620	0.4440
China	0.0000	0.0000	0.0000	0.0000	0.2600	0.4410	1.5920	1.2150	0.2473
Total	2.4340	3.0663	5.4304	12.7819	12.1042	8.2297	8.7673	5.4157	3.6063

Source: Rosegrant et al. (2005) based on African Development Bank, Asian Development Bank, Inter American Development Bank, World Bank; compiled by authors and Upali Amarasinghe.

Note: SSA – sub-Saharan Africa; MENA – Near East and North Africa; LAC – Latin America and Caribbean; EAP – East Asia and Pacific (excluding China); SA – South Asia (Excluding India)

FIGURE 4: MAJOR DONORS TO LAND AND WATER



Source: OECD – CRS Database (accessed June 2010)
 Note: The figure reflects average aid between 2000 and 2008

During 1997–2007, the World Bank spent a total of US\$26 billion on irrigation, US\$21 billion on groundwater, US\$16 billion on floods, US\$10 billion on droughts, and US\$13 billion on watershed management, with most funds going to the Asia region (World Bank 2010). Comparable data for investments in sustainable land management and other land-focused support are not available.

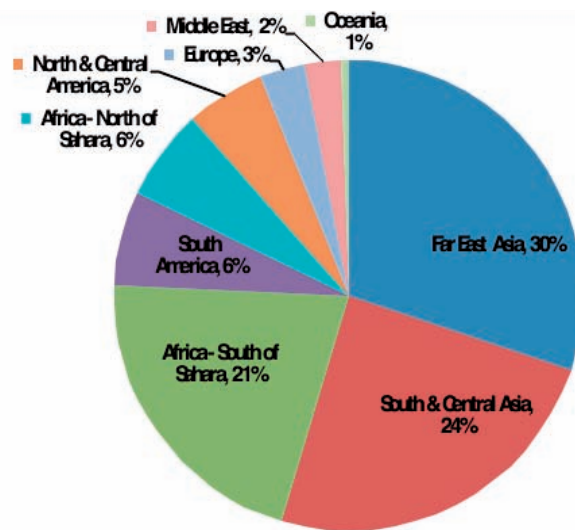
On average, between 1995 and 2008 total ODA support to L&W from all donors was to East Asia (30 percent) followed by South and Central Asia (24 percent) and sub-Saharan Africa (21 percent) (Figure 5). As an example, between 2004 and 2005 aid to the river development subsector of L&W, increased eightfold as a result of the almost US\$900 million from Japan, of which US\$770 were directed to Malaysia for the Pahang-Selangor Raw Water Transfer Project, and more than US\$90 million for the Lower Solo River Improvement Project in Indonesia.

Specifically, programmes focusing on improved L&W in developing countries tend to depend on one or very few donors, and have struggled to maintain or expand their funding base. As such, countries have focused on leveraging funds from other donors, such as the GEF or World Bank. However, overall investment remains far below estimated investment needs. Citing the Framework and Vision estimates of the World Water Council and Global Water Partnership (WWC/GWP), Winpenny (2010) suggests investment requirements for agricultural water of US\$40 billion annually by 2025 (up from US\$25–30 billion today) and cites a report by the Stockholm Environment Institute that suggests investment needs of US\$67 billion annually by 2030.

4.3 Aid effectiveness in the land and water sector

As highlighted by the 2002 Monterrey Declaration, increasing the amount of aid goes only so far. The processes of aid delivery are critical to its effectiveness and need to be improved. In other words, the focus should shift from the amount of funding to improving the returns from funding.

FIGURE 5: DISTRIBUTION OF AID TO L&W BY REGION, AVERAGE 1995–2008



Source: ODA data, CRS Database of OECD, [accessed June 2010]

An 2008 OECD survey on the implementation of the Paris Declaration on aid effectiveness showed that since 2005 progress has been made in coordination and alignment with the countries' development programmes, but progress is slow. Change requires that donors and recipient countries commit to working together (Table 8). For instance: the quality of the countries' systems to manage donor funds it is still inadequate. As a result, donor countries have been reluctant to direct aid through these systems, hence jeopardizing the recipients' ownership of the aid process. However, it appears that donors have not used the country's systems even when the quality of these systems is well above average (OECD 2009).

In the context of L&W, improved harmonization through sector-wide approaches (SWAp)⁶, a subset of the programme-based approaches (PBAs), has produced some good results. PBAs are intended to improve accountability and achievement of agreed-upon outcomes. The planned and coordinated nature of PBAs is in contrast to the previous project-approach where funds were tied to specific activities whose outcomes were often dependent on events and circumstances beyond the immediate control and competence of the project itself (Lavergne and Alba 2003).

In 2007 aid directed to Uganda's poverty-reduction strategy, linked to coherent agricultural reform, ensured long-term commitments from donors. The use of a basket-funding approach for the agricultural development programme in Tanzania helped reduce fragmentation of financial flows into single projects (World Bank 2007). In general improvements are still needed. For example, in 2008 about 40 percent of the aid to the Agricultural Land Resources subsector was still tied (OECD 2010).

In contrast, based on data from the CRS Database of the OECD, in 2008 only 0.1 percent of total funds committed to the agricultural water resources subsector was tied. On the other hand, the OECD finding that only 46 percent of aid was disbursed according to schedule (see Table 8), is reason to be concerned about water-related activities. Projects for irrigation (agricultural water resources subsector) or for river development or protection of water resources often requires significant upfront investment with long-term returns.

⁶ Sector wide approaches (SWAp) are part of the programme-based approach (PBAs) which support several of the Paris principles.

TABLE 8. PROGRESS OF THE PRINCIPLES OF THE PARIS DECLARATION AS OF THE OECD SURVEY OF 2008

Principles	Indicators	Status as of 2008 survey	Target for 2010	OECD judgment
Ownership	Developing countries must lead the design and implementation of their development process.	Less than 25 % have long-term national development strategies with clear priorities linked to their budget	75%	Off-track, needs special effort
	Strengthening and use of country systems to reinforce country ownership.	36 % of all countries improved the quality of the public financial management (PFM) systems	50%	On track
Alignment	Aid must follow the priorities outlined in each country's development strategy	The proportion of coordinated (aligned) technical cooperation grew to 60 %	50 % (exceeded)	Exceeded
	Aid must be untied	Substantial improvement - untied aid grew to 88 %	Improvement over time	On track
	Donors must increase use of country systems and avoid using parallel project implementation units	Declined number of PIU (parallel project implementation units)	Must decline by two-thirds	Requiring effort
	Donors must channel aid through country public financial and procurement systems	A little more than 40 % of the aid is channeled through the country systems	80%	Off-track, needs special effort
Harmonization	Donors must convert two-thirds of their activities from project to programme based	Only 47 % of all aid flows is delivered through programme-based approaches (PBAs)	66 % into PBAs	Off-track, needs special effort
	Donors must coordinate better their missions and activities to reduce duplication of efforts and high transaction costs	Coordination of missions among donors is still low. Joint missions 20 %; joint analytical work 40 %	40 % and 66 % respectively	Off-track, needs special effort
Managing for results	More focus needed on the end result. Impact of aid must be measured using frameworks to monitor and assess development results	Less than 10 % of the countries have these frameworks in place	35%	Off-track, needs special effort
Mutual accountability	Donors must be accountable for the impact of their aid, and recipient countries must account transparently for the use of the aid.	Only 26 % of countries have established mechanisms with donors for assessing the implementation of mutual commitments on aid effectiveness	100%	Off-track, needs special effort
	Domestic accountability and transparency - record of aid in the national budget to allow scrutiny by parliament	Less than half of the aid is recorded in national country budgets	85%	Requiring effort
	Predictability of aid flow must be ensured, as it jeopardizes a country ability to plan	Only 46 % of the aid was disbursed according to schedule	71%	Requiring effort

Source: OECD report on the Paris declaration progresses

Note: The first column describes the five main principles of the Paris declaration. The indicators in the second column are used by the OECD to monitor the progress of the Paris Declaration. Data are from a 2007 survey and were published in 2008.

Therefore, secured financing is critical to maintaining progress in these sectors.

As shown in Figure 4b, investments in L&W, as a share of total ODA, have been declining as donors have increasingly aligned and harmonized their support to national investment programmes. Hence the downward trend in ODA investment in L&W also reflects the low investment of recipient countries in the sector. For example, public expenditures in agriculture account for only 10 percent of agricultural GDP in developing countries (Fan *et al.*, 2009). Furthermore, the increased alignment of donors with the Millennium Development Goals and Poverty Reduction Strategy Papers has stymied investments in L&W as these are not explicitly mentioned among the targets. As a result, aid has been shifting to macroeconomic and institution-building activities, including support to anti-corruption measures, education, welfare services, population, freedom of the media, and the government and civil society sector (OECD 2010).

4.4 Increased investments through Green Economy drivers?

In this first decade of the new century governments worldwide are faced with multiple threats. Increasing pressure on natural resources, from population growth and climate change, is affecting food and energy security. Food and fuel prices increases and the financial meltdown are making these challenges increasingly urgent and difficult. Many have suggested that a complete overhaul of the global business model is required. A new low-carbon green economy, which recognizes and assigns the right value to natural capital, is needed to mitigate climate change and adapt to its impacts, and to control externalities as varied as overuse of water resources, pollution, land degradation and loss of topsoil, as well as fisheries collapse.

The fiscal stimulus packages prepared by many countries in response to the recent financial crisis dedicated a good share of funds to green projects, many related to energy efficiency and low-carbon technologies, others include river restoration and water management (World Bank 2009; Robins *et al.*, 2009).

The green stimulus was a signal that the economic downturn was taken as an opportunity to invest in the green sector, i.e. restoring growth through investment in restructuring of the economic system. It also shows that moving toward a green economy requires substantial initial public investment and regulation, as well as a private sector ready to pick up the challenge and deliver on new technologies and markets.

In developing countries, which are the most vulnerable to climate change and to degradation of land and water resources. There is also the need to increase capacity both in the public and private sector. Therefore, financial cooperation from donors will be critical in supporting the transition to a green economy. International support could shift the balance and provide a critical incentive to developing countries to take the opportunity to own the process by redirecting investments towards a natural-capital based economy. Some institutions are leading the cooperation effort. In 2009, UNEP launched its Green Economy Initiative, which assists governments to redirect policies and investments toward sectors such as clean technologies, renewable energy, water services and sustainable agriculture and forests.

5. Key lessons for international cooperation on L&W

International cooperation on L&W requires a supportive enabling environment, particularly national-level support. Key elements required for the implementation of international cooperation on L&W include an inventory of supply of and demand for L&W resources, a toolkit of approaches for sustainable L&W management, a shared vision for sustainable L&W and, importantly, a L&W implementation strategy and investment framework, which needs to be supported by a strong monitoring and evaluation (M&E) framework.

Furthermore, cooperation on L&W is not an end in itself but contributes to broader development goals, such as the MDGs and overall food security and poverty alleviation objectives, and to environmental goals, such as biodiversity and ecosystem preservation and mitigation of natural disasters. As such, it should command resources from multiple programmes and funds.

The potential for international cooperation has increased as a result of several global changes, including increasing concern over climate change, the recent food price crisis and associated land acquisitions, as well as demand for ecotourism, fair-trade, and labelling.

5.1 Enabling environment

International cooperation from the global to the regional or watershed level supports sustainable management of L&W through changes in national and local policies. Recent international efforts to increase support to agriculture have created impetus in developing countries to invest more in L&W. An assessment of achievement of the Maputo Declaration, which set a target of 10 percent of government budget allocation to agriculture by 2008, showed that eight countries (Burkina Faso, Ethiopia, Mali, Malawi, Ghana, Niger, Senegal and Zimbabwe) have achieved or surpassed this target (Fan *et al.*, 2009). A considerable increase was also revealed in the share of budget allocated to agriculture by some countries – especially those spending less than 5 percent of their budgets on agriculture before 2003 (Chilonda *et al.*, 2009).

Along with the need for a conducive overall enabling environment, the following conditions are important for strong and sustainable L&W programmes in developing countries

Inventory of supply of and demand for L&W resources

A shared diagnostic among cooperative partners on the situation or status of the L&W resources potential, health, degradation; an inventory of the demand for goods and services derived from L&W; status of bottlenecks for the adoption of sustainable L&W management technologies and approaches at institutional, budgetary, and policy level. The diagnostic should be simple, rapid, transparent, scientifically validated and serve as a reference for international cooperation.

Toolkit of approaches for sustainable L&W management

Such a toolkit presents the common knowledge of solutions, options, lessons on sustainable L&W management, including what works, where and how, as well as conditions for success, up take bottlenecks, and best

approaches (landscape, participatory, watershed management), best-bet basket of technologies (conservation agriculture agroforestry, organic farming, crop livestock integration), new opportunities, and promising technological developments with benefit and risk assessment.

Shared vision for sustainable L&W

Such a shared vision needs to include a proper definition and agreement on common priorities and on the broad development objectives and strategies that should be addressed by SLWM, for example, enhanced food security, improved rural livelihoods, or agricultural mitigation.

L&W implementation strategy and investment framework

The framework would describe how the shared vision for sustainable L&W can be implemented with tangible milestones, human and financial resource requirements, and details roles and responsibilities of the various actors (public, CBOs and private). Such a (national-level) framework would be supported by a sound cost-benefit analysis, and should identify strategic investments that are able to create a rapid increase of the adoption of L&W best practices. Many international cooperation initiatives have been established without attention to the costs involved, particularly transaction costs, including costs of partnerships and costs required for long-term engagement, without which sustainability is elusive. Finally, much more funding should be allocated to L&W investments, considering their win-win benefits for most development priorities.

Strong institutional support for implementation

Cooperation for sustainable L&W requires strong institutions with sustainable budgetary support, strong monitoring and evaluation, conflict resolution mechanisms and other mechanisms for accountability. An effective conflict mechanism is a precondition for sustainable and effective cooperation. Studies have shown that active and passive institutional involvement in conflict resolution increases compliance with agreements (Mitchell and Hensel 2004). Furthermore, enhanced international cooperation on L&W requires adaptable institutions to take into account changing needs, and good databases and knowledge sharing mechanisms on L&W. Equitable and fair distribution of the benefits of cooperation is key to sustainable L&W management, including the allocation of benefits and costs of cooperation across the cooperation's parties (Sadoff and Grey, 2005). Mechanisms for ensuring the equitable and fair distribution of benefits from cooperation involve context-specific fair redistribution or compensation (Ibid).

Monitoring and evaluation (M&E) framework

The L&W implementation strategy and investment framework needs to be accompanied by a simple, comprehensive, and transparent M&E framework that focuses on both performance and impact aspects of the strategy. Indicators to be measured would draw from the inventory on supply and demand of L&W and could include changes in the poor's access to L&W; changes in water and soil health indicators; changes in agricultural productivity; and changes in rural poverty and increase in the adoption of L&W.

5.2 Sustainable L&W management as the vehicle to achieve broader development goals

L&W cooperation is not an end in itself but contributes to larger development goals, such as the MDGs and overall food security and poverty alleviation objectives. As such, it should commend resources from multiple programmes and funds. Key linkages between broader development goals and sustainable L&W include (according to FAO):

Rural poverty

Reducing rural poverty depends directly on the productivity and profitability of land- and water-based activities, all of which are threatened by land and water degradation.

Food security

National-level food security depends heavily on sustainable production of food from land and water which, in turn, requires sustainable L&W management. In addition, sustainable L&W management can reduce dependence on net food imports and thus conserve important financial resources.

Provision of a range of livelihood products such as wood, fibre and biofuels

As with food crops, land and water degradation reduces the productivity of natural resources in producing other provisioning services, such as fibers, building materials, or bioenergy, as well as non-timber forest products.

Mitigation and adaptation to climate change

It has been demonstrated that many L&W practices increase soil carbon sequestration, and can reduce greenhouse gas emissions from agricultural. They often contribute to adaptation to climate change by increasing resilience in the face of climate variability and extreme events. Therefore, it is increasingly recognized that the on-the-ground response to climate change in agriculture needs to rely on the upscaling of SLWM.

Preserving biodiversity

Reduction of biodiversity partly results from the trend toward monoculture and to inadequate land and water use or land planning; matching of land and water use with land potential, thereby promoting diverse landscapes and products and adapted land-use systems is important to preserving remaining biodiversity levels.

Maintenance of ecosystem functions

Sustainable L&W can support other ecological functions or services, including the breakdown of waste products, pollination, soil biological activity that maintains nutrient and organic matter cycles and biological control of pests and diseases. These important regulatory functions and the process of soil formation can only be maintained through appropriate SLWM practices.

Natural disaster prevention/mitigation

Moreover, sustainable L&W management can increase the resilience of ecosystems, thereby reducing the risk of natural disasters, such as floods, droughts, hailstorms, or pest infestations. Prevention of floods and storm damage requires appropriate L&W planning and management. Interventions include avoiding building of settlements on flood plains and steep slopes; management of watersheds and wetlands (e.g. tree planting and/or management of forests in the upper parts of catchments, soil and water conservation or erosion control; conservation agriculture; wetland management for flow regulation, buffering and filtration of sediments). Management of drought and pest infestation requires adapted crop, livestock and forest management systems including diversified production systems.

Social stability

Well-being and social stability in rural areas is directly related to the feasibility and security of earning a living from natural resources, and therefore to issues of access to land and water resources, security of tenure and capacity to manage these resources in the most profitable and sustainable manner, through SLWM.

5.3 Increased potential for international cooperation on L&W

The potential for international cooperation has increased recently as a result of several global changes, including concern about climate change, the recent food price crisis and associated land acquisitions. Increased investments in response to these global threats may positively affect sustainable L&W management efforts and poverty reduction. Specific opportunities for increased international cooperation in L&W include, in particular (drawing on FAO materials):

Bioenergy

The pros and cons of biofuel production are still strongly debated. However, if biofuels are produced using sustainable L&W management, farm incomes can be increased while maintaining or enhancing benefits for the environment. Smallholders can produce biofuels as a source of local energy, or for commercial production for national and international markets. However, tradeoffs between soil carbon accumulation and the opportunity costs of L&W resources need to be considered to fully understand the environmental contribution of bio-energy.

Fairtrade

Besides paying farmers a premium price for their produce, Fairtrade is involved in building human and social capital within the participating communities, as well as promoting good farm management practices that emphasise long-term sustainable production. Today, more than five million people across 58 developing countries benefit from Fairtrade.

Payments for environmental services

PES is a relatively new source of funding that has considerable potential for expansion as part of a comprehensive programme for sustainable L&W management. Today, it mostly concerns water resources in transboundary river basin management, and climate change through the global carbon market. Thus, PES are providing financial incentives to land users in upstream catchment areas to conserve biodiversity or adopt SLWM for the maintenance of water quality and quantity downstream. PES through the carbon market have significant potential but still need to refine their implementation mechanisms to allow poor land users to benefit from them. In this context, international cooperation on L&W would need to target a new set of institutions or mechanisms supporting smallholder agriculture within the global climate change negotiations.

Green/organic labels and certifications

There are numerous examples of organic agriculture systems and labels in commercial and subsistence sectors. With a tradition of low-input agriculture and resource-use efficiency, organic agriculture is a very promising form of SLWM, especially for restoring organic matter and nutrients and reducing the risk of pollution from agrochemicals. Smallholder farmers can benefit from commodity-specific certification programmes, for example, by forming cooperatives or by participating in contract-farming arrangements. Examples include coffee, tea, cocoa, non-timber forest products and cotton. Furthermore, consumers often associate healthy and safe food with organic food.

Ecotourism

There is strong consumer demand for ecotourism, with dramatic growth forecasts. The key to sustainable ecotourism is sustainable ecosystem management with benefit sharing among local populations. Functioning ecosystems are key to thriving ecotourism, providing incentives for those involved to invest in their conserva-

tion. Ecotourism has recently prompted a much greater market for 'green labels' for example, demonstrating the responsibility of tourism initiatives in working to improve the environment.

Environmental interest groups

Many of these may be actively engaged in SLWM partnerships. However, even where not directly associated, these groups are often well financed and are calling for and willing to pay for SLWM to address climate change impacts and enhance biodiversity, water quality and quantity, among others.

Climate change

As mentioned, concern over about climate change represents an opportunity and stimulus for international cooperation. It will likely have large positive spillover effects for combating land degradation, food insecurity and for poverty reduction, and will greatly enhance the benefits and reduce costs of investment in land and water.

New green revolution (agriculture)

Improving the performance of the agricultural sector requires a new 'green (agriculture) economy', that will incorporate the best elements of the old 'green revolution' (notably improved adapted crop varieties and livestock breeds) into the more holistic and environmental friendly SLWM approach that takes an ecosystem/landscape approach to respond to global environmental threats, land degradation, biodiversity loss and, in particular, climate change. Such green agriculture is an important initiative proposed by the Rio plus 20 programme.

Foreign direct investments from governments and multinationals

Recent rapid increases in FDI in agriculture in developing countries creates both opportunities and challenges. These include employment opportunities, potential transfer of L&W technologies to smallholder farmers, development of rural infrastructure and greater food security in the host countries and on the global market. Potentially negative impacts of local and foreign land acquisitions include loss of land rights for landholders without formal title deeds. Investors from high income countries, where there are higher environmental standards and better enforcement, may use cheaper inputs or land management practices that could contribute to land degradation, environmental pollution and over-exploitation of water and other resources in developing countries. As for other international trade and foreign direct investment, there is a need to establish rules of engagement to ensure that foreign investments are beneficial to the host countries and to the land users who could lose their land permanently or temporarily.

These rules could include: transparency in negotiation and trade deals; protection of investors; compensation of land users; respect for existing land rights; focus on investments with benefits for local communities; and assessment of potentially positive or negative environmental impacts (Von Braun and Meinzen-Dick 2009; Coutila *et al.*, 2009). Because of the transnational nature of land acquisition, no single institutional mechanism will ensure favourable outcomes for all parties involved. Rather, cooperation through international law, government policies, and the involvement of civil society, the media, and local communities are needed to ensure that the land transactions follow the rules of engagement described above.

In conclusion, L&W international cooperation is likely to increase drastically during the next decade, in response to the multiple challenges and opportunities linked to the management of natural resources, as described above. A new global L&W governance is emerging, and will need to specify clearly the roles and the responsibilities of international and regional organizations, national institutions, the private sector and the

communities using the land. Such new governance will rely on the strong political commitment of governments and development agencies. It is expected that this report will provide useful guidance to all partners concerned.

Supplemental Information – L&W definition (applies to Section 7.4 – ODA analysis)

To analyse specific support for L&W, Section 7.4 makes use of ODA data from the CRS Aid Activity Database of OECD (available at: <http://stats.oecd.org/Index.aspx?DatasetCode=CRSNEW>). The data is based on all commitments in constant 2008 US \$ million, and covers nine subsectors in the following sectors: water supply and sanitation, agriculture forestry and fishery, general environmental protection and other multisectors. The nine subsectors, identified by the OECD with specific CRS Purpose Codes, are:

1. Water resources protection (14015)
2. River development (14040)
3. Agricultural land resources (31130)
4. Agricultural water resources (31140)
5. Forestry development (31220)
6. Environmental policy and administrative management (41010)
7. Flood prevention/control (41050)
8. Environmental research (41082)
9. Rural development (43040)

The table below provides details of the activities included in each subsector and is taken from the full list of OECD purpose code definitions. The full list can be downloaded as a Word document from the OECD website by typing ‘purpose codes’ into the search box.

Water supply and sanitation	
Water resources protection	Inland surface waters (rivers, lakes, etc.); conservation and rehabilitation of groundwater; prevention of water contamination from agrochemicals, industrial effluents.
River development	Integrated river basin projects; river flow control; dams and reservoirs, excluding dams primarily for irrigation (31140) and hydropower (23065) and activities related to river transport (21040).
Agriculture	
Agricultural land resources	Including soil degradation control; soil improvement; drainage of waterlogged areas; soil desalination; agricultural land surveys; land reclamation; erosion control, desertification control.
Agricultural water resources	Irrigation, reservoirs, hydraulic structures, groundwater exploitation for agricultural use.
Forestry	
Forestry development	Afforestation for industrial and rural consumption; exploitation and utilization; erosion control, desertification control; integrated forestry projects.
General environmental protection	
Environmental policy and administrative management	Non-sector specific.
Environmental policy and administrative management	Environmental policy, laws, regulations and economic instruments; administrative institutions and practices; environmental and land-use planning and decision-making procedures; seminars, meetings; miscellaneous conservation and protection measures not specified below.
Flood prevention/control	Floods from rivers or the sea; including sea water intrusion control and sea level rise related activities.
Environmental research	Including establishment of databases, inventories/accounts of physical and natural resources; environmental profiles and impact studies if not sector specific.
Other multisector	
Rural development	Integrated rural development projects; e.g. regional development planning; promotion of decentralized and multi-sectoral competence for planning, coordination and management; implementation of regional development and measures (including natural reserve management); land management; land-use planning; land settlement and resettlement activities, excluding resettlement of refugees and internally displaced persons (72010); functional integration of rural and urban areas; geographical information systems.

7. References

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