



**AFRICAN UNION**  
**SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT**  
**AU-SAFGRAD**

Promoting Agricultural Research for Development in Semi-Arid Zones of Africa  
*Promotion de la Recherche Agricole pour le Développement dans les Zones  
Semi-Arides de l'Afrique*

# **Sustainable Rural Livelihoods in Semi-Arid Areas of Africa:** *Issues and Responses*

**Background Paper**  
Prepared for the

International Conference on

**Development of Rural Livelihoods  
in Semi-Arid Areas of Africa :**  
*issues, challenges, opportunities*

April 29-30, Addis Ababa, Ethiopia. 2008



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## About AU/SAFGRAD

**B**ased in Ouagadougou, Burkina Faso, AU/SAFGRAD is one of the specialised technical offices within the department of rural economy and agriculture of the African Union Commission. Its mandate is to facilitate the advancement of agricultural and rural development within the semi-arid zones of Africa through advocacy, coordination and networking in the promotion of agricultural research, technology transfer and dissemination for the development of livelihoods in semi-arid zones of Africa. It designs and implements programmes and projects in accordance with this mandate.

## About the Conference

**T**he conference on 'Development of Rural Livelihoods in Semi-Arid areas of Africa' is intended to bring together producers, policy makers, researchers, development practitioners and strategic partners, with a view to (a) defining key issues that engender rural livelihood processes in semi-arid areas Africa, (b) ensuring that designed responses adequately address those issues, and (c) formulating a strategy for an effective and synchronized intervention that facilitates the transformation of rural livelihood processes in semi-arid areas of Africa.

## Acknowledgements

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## Abbreviations and acronyms

APRM	African Peer Review Mechanism
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU	African Union
AUC	African Union Commission
CAADP	Comprehensive African Agriculture Development Programme
CCD	Convention to Combat Desertification
CEAS-BF	Centre Ecologique Albert Schweitzer
CGIAR	Consultative Group on International Agricultural Research
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
COMESA	Common Market for East and Southern Africa
CORAF/WECARD	West and Central African Council for Agricultural Research and Development
CEN-SAD	Community of Sahel-Saharan States
DFID	Department for International Development, UK
EC	European Commission
ECCAS	Economic Community of Central African States



## ABBREVIATIONS AND ACRONYMS

ECOWAS	Economic Community of West-African States
EU	European Union
FAAP	Framework for African Agricultural Productivity
FAO	Food and Agriculture Organisation
FARA	Forum for Agricultural Research in Africa
GDP	Gross Domestic Product
GEF	Global Environment Fund
GM	Global Mechanism
IARC	International Agricultural Research Centres
ICARDA	International Centre for Agricultural Research in Dry Areas
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IDRC	International Development Research Centre, Canada
IFAD	International Fund for Agricultural Development
IFDC	International Centre for Soil Fertility and Agricultural Development
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
ISFM	Integrated Soil Fertility Management
IWMI	International Water Management Institute
LD	Land Degradation
MDG	Millennium Development Goals
MEA	Millennium Ecosystem Assessment

MIR	Marketing Inputs Regionally
MIS	Market Information System
NARS	National Agricultural Research Systems
NEPAD	New Partnership for Africa's Development
NGO	Non Governmental Organisation
OSS	Sahara and Sahel Observatory
R&D	Research and Development
REC	Regional Economic Community
SADC	Southern African Development Community
SAFGRAD	Semi-Arid Food Grains Research and Development
SAZ	Semi-Arid Zones of Africa
SLM	Sustainable Land Management
SOFITEX	Société des Fibres et Textiles
SPS	Sanitary and Phytosanitary Standards
SPO	Standard Phytosanitary Office
SRO	Sub-Regional Organisation
SSA	Sub-Saharan Africa
STC	Scientific and Technological Committee
UMA	Union du Maghreb Arabe
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United Nations Convention to Combat Desertification



The semi-arid zones of Africa cover areas extending from Senegal in the Western Africa to Djibouti in the Eastern Africa, through Tunisia in Northern Africa to South Africa in the Southern most tip of the continent (see map). Agricultural production (crops, livestock, etc.) as well as non-agricultural activities provide the basic means for rural livelihoods and also form the driving force for the promotion of the rural economies of the countries in these regions. Agriculture alone contributes between 30% & 40% to the GDP and provided employment for 80% of the population.

These areas are characterised by a predominantly hostile and marginal environments. Populations which inhabit these semi-arid areas therefore constantly face the severe impact of difficult environmental challenges to sustain their livelihoods. For example water is scarce due to limited and unreliable rainfall patterns; soils are poor in nutrients, infertile and susceptible to wind and water erosion. Furthermore, due to continuous environmental degradation, and the prevalence of invasive crops pests and animal disease pathogens, the areas become difficult to manage for agricultural and livestock production. The majority of people in these areas constantly experience food insecurity and are extremely vulnerable to the negative effects of climate change and desertification.

Technological and institutional responses aimed at addressing these challenges have largely been inadequate resulting in minimal desirable impacts due to a number of inter-related factors. In addition producers in semi-arid areas of Africa have benefited only marginally from emerging economic and market opportunities.



Unless concerted actions are taken at reversing the situation, communities living and working in semi-arid areas will remain marginalised with far-reaching consequences that might undermine efforts aimed at meeting the Millennium Development Goals (MDGs). It is noted that most African countries which face serious food shortages are also confronted with problems of aridity. But the rationale for prioritising programmes aimed at improvements of semi-arid rural livelihoods extends beyond national issues and highlights the enormous development challenges and potentials presented by the agro-ecology.

The major challenge remains to be improving the productivity of agriculture, diversify activities to emerging and rewarding markets, and open opportunities for non-farm work and migration pathways to lead rural populations out of poverty, while adapting and mitigating the impacts of climate change and desertification.

The Comprehensive Africa Agricultural Development Programme (CAADP) adopted at the 2<sup>nd</sup> Ordinary Session of the Assembly of the African Union held in Maputo, in July 2003, provides the appropriate framework for concerted actions to realise Africa's agricultural development potentials. In particular, CAADP highlights the significance of extending the area under sustainable land management and reliable water control systems, improving rural infrastructures and trade-related capacities for market access, increasing food supply and reducing hunger, and effective promotion of agricultural research, technology dissemination and adoption. The CAADP companion document further elaborates on the integration of livestock, forestry and fisheries sub-sectors into the mainstream CAADP framework to emphasize the relevance and significance of these sub-sectors in the rural economies and livelihoods.

Furthermore, the 2<sup>nd</sup> Extra-ordinary Session of the Assembly of the African Union held in Sirte, Libya, in February 2004 (Declaration on the Challenges of Implementing Integrated and Sustainable Development of Agriculture and Water in Africa) re-affirmed the Maputo Declaration on Agriculture and Food Security in Africa, and made specific

commitments that are central to speedy implementation of Africa's agricultural development. Such a focus on integrated and sustainable development in agriculture and water resources management is essential for the successful development of rural livelihoods in semi-arid zones.

However, rural livelihoods in semi-arid areas of Africa are faced with unique challenges (see Box 1), hence would require specific responses in the context of existing general frameworks.

### **Box 1: Characteristics of African farming systems**

**The recent InterAcademy Council study characterized farming systems in sub-Saharan Africa as follows (Eilitta, 2006):**

- ♦ Lack of single dominant farming system on which food security largely depends;
- ♦ Predominance of rain-fed agriculture as opposed to irrigated agriculture;
- ♦ Heterogeneity and diversity of farming systems and the importance of livestock;
- ♦ Key roles of women in agriculture and in ensuring household food security;
- ♦ Lack of functioning competitive markets;
- ♦ Under-investment in research and development and infrastructure;
- ♦ Dominance of weathered soils of poor inherent fertility;
- ♦ Lack of conducive economic and political enabling environments;
- ♦ Large and growing impact of human health on agriculture;
- ♦ Low and stagnant labour productivity and minimal mechanization;
- ♦ Predominance of customary land tenure.



The African Union Commission recently invited several international organisations and development partners that work on Africa's development to participate in a technical working group to brainstorm and identify the significant issues, challenges and opportunities related to development of rural livelihoods in semi-arid zones of Africa. The working group recommended a list of key themes for addressing these issues, which are:

- ♦ Access to and management of land and water resources;
- ♦ Productivity, technology, and innovation;
- ♦ Adaptation to and mitigation of impacts of climate change and desertification;
- ♦ Exploitation of national, regional and global market opportunities;
- ♦ Global, regional and national policies and institutions; and
- ♦ Strengthening local capacities

The purpose of this background paper is to identify and characterise the crucial issues that characterise each of these themes, elaborate on the important challenges and opportunities associated with them and, make specific recommendations of actions for addressing these issues.



# 1.

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## ACCESS TO AND MANAGEMENT OF LAND AND WATER RESOURCES

**A**ccess to and management of land and water resources is the major constraint for sustainable rural livelihoods in the semi-arid zones of Africa (SAZ). Indeed, land degradation and water scarcity pose serious threats to the achievement of sustainable livelihoods and economic growth by rural communities living in arid and semi-arid zones of Africa.

## 1.1. Issues of Land and Water Resources

### 1.1.1. *Land degradation and management*

In the semi-arid zones of Africa, the natural resource base for agricultural production is seriously affected by a variety of factors including soil degradation (erosion, soil fertility depletion, desertification etc.), water scarcity, poor water quality, siltation, deforestation, over-fishing and overgrazing. Natural resources are often used in an unsustainable manner, which results in production systems with declining returns to inputs. Land Degradation (LD) is defined by UNCCD as “a reduction or loss in arid, semi-arid and dry sub-humid areas of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest, and woodlands resulting from land uses or from a process or combination of processes, including those arising from biophysical factors (variation of climatic conditions, intrinsic characteristics of fragile soils, etc.) and anthropoid factors”. Such factors include the following:

- ♦ *Unsustainable agricultural practices*: reduction of fallow periods; inappropriate crop intensification, expansion of agriculture into marginal areas, poor water and irrigation system management; weak capacity for land-use planning and implementation; inappropriate agricultural policies and incentives leading to inefficient and wasteful use of land and water resources.
- ♦ *Overgrazing*: loss of vegetation cover of rangelands or pasture in areas where livestock densities exceed the carrying capacity of the environment. Overgrazing also leads to exposure of the land to water and wind erosion, breakdown of traditional land management protocols that regulate grazing; weak national policies and institutional capacity to sustainably manage rangelands; shrinking rangelands associated with rapid growth of human and livestock populations; increasing land use demands; as well as limitations in the movements of pastoralists along traditional corridors across national boundaries.
- ♦ *Deforestation in woodlands*: over harvesting of fuel wood for energy; conversion of woodlands for crop and livestock production; uncontrolled



forest fires to clear land or for hunting wildlife; illegal commercial logging; weak national policies, such as under pricing of timber stocks, agricultural subsidies favouring conversion, and fragmented and weak institutions that are unable to effectively conserve and manage forest resources.

The InterAcademy Council (2004) estimated that land degradation in Sub-Saharan Africa (SSA) is caused by soil water erosion (46%), wind erosion (36%), loss of nutrients (9%), physical deterioration (4%), and salinization (3%). Overgrazing (49%) followed by agricultural activities (24%), deforestation (14%) and overexploitation of vegetation cover (13%) constitute the primary causes of land degradation in rural areas. As a result of the inherent low soil fertility of African soils worsened by subsequent land degradation, only 16% of the land has soil of high quality and about 13% has soil of medium quality. About 9 million km<sup>2</sup> of high and medium quality soils support about 400 million people or about 45% of the African population (Bationo et al., 2006).

Thus, by reducing cultivable/exploitable lands, degradation aggravates the chronically difficult access to land by the poorest of the poor in the semi-arid zones. Indeed, up to two-thirds of Africa's productive land area is affected by land degradation, while about 100% is vulnerable (Bationo et al., 2006). The situation is worsened by the continuous demands for more agricultural land at a time when land degradation and/or poor land management continues to be a major challenge for sub-Saharan Africa. These increasing demands for land, coupled with continuing land degradation and heightened competition for water, mean that two-thirds of Africa's cropland could become effectively un-productive by 2025 (MEA, 2005).

Up to 75% of Africa's poor still live in rural areas and the most vulnerable among them are often relegated to the highly marginal lands where productivity is most at risk. If no remedial actions are taken, further land degradation will continue to adversely affect rural livelihoods and ecosystems. Most of the semi-arid ecosystems with high economic po-



tentials are also fragile, often marginal and highly vulnerable to land and water degradation through human-induced practices, such as heavy tillage or burning of crop residue.

According to FAO (2001) two major groups of factors significantly contribute to land degradation which strongly limits access to land in the semi-arid zones of Africa: these are:

*i) Institutional factors:* Lack of national mechanisms for coordination and investments for effective management of land degradation and the promotion of sustainable land management practices; low investments and support for agricultural research and extension; lack of mechanisms for easy access to credits, information, markets and the valuation of indigenous knowledge, in order to promote and sustain land productivity; (e.g. inadequate funding to support efforts to deal with the issues of land degradation); fragmentation of the institutional framework; and absence of an integrated approach to address these problems of land degradation and effective land use patterns.

*ii) Socio-economic factors:* rural population pressure; rapid urbanization and increased food needs; poor land tenure security due to inadequate or conflicting land tenure policies and systems; inability of health and educational services to strengthen the capacity of land users to work productively on the land and to make informed choices; inability to manage the health hazards associated with poor solid and liquid urban waste management; unfavourable markets, trade and price policies (e.g. the effect of withdrawal of fertilizer subsidies on increased agricultural production, the negative effects of subsidized imports of agricultural commodities distorting local markets, and the impact of taxation and other levies on the economic viability of dry land agriculture); low capacity of producers to adopt and implement new technologies caused by fragmentation of information and knowledge systems resulting in sub-optimal information being made available to local agricultural extension and other government services and lack of consensus between land users or managers and policy decision makers on appropriate land use practices;

poor adaptability of introduced new sustainable land management technologies; lack of environmental education to raise awareness and improve land management skills to people; and breakdown of customary land and water rights and other traditional mechanisms.

### *1.1.2 Water scarcity and conflicts / competition for access to water and land*

Arid and semi-arid zones of Africa are characterized by low erratic rainfall of up to 700mm per annum and periodic droughts. Arid regions are also severe drought-prone areas whereas semi-arid zones often experience water scarcity. When water resources are in short supply in the environment of marginalized populations, due to minor deficits in rainfall, this creates serious shortages of water and leads to fierce competition for water resources resulting in major communal conflicts.

In the arid and semi-arid zones, rainfall patterns are erratic. The rains fall mostly as heavy showers, leading to considerable run-off, so that water availability for rain-fed agricultural production is low while the potential evapo-transpiration is high. Thus, quantitative water scarcity is a serious concern in these semi-arid and arid regions. Scarcity of water in these areas (including aquifers, wells, rivers) is related to climate and is exacerbated by misuse, inefficiency, increasing populations and the pressures on water use for socio-economic development. All these factors contribute to increasing the competition for water and for the scarce reserves of moisture. Soil moisture stress is perhaps the overriding constraint to food production in Africa (Bationo et al., 2006). In most of semi-arid and arid Africa, the effect of low rainfall in agricultural production is compounded by the fact that the majority of the soils have poor water holding capacity. For example, only 10% of Africa's soils have high to very high water-holding capacity and while in 29% of soils, the water holding capacity is medium. As a consequence of the low rainfall patterns and soil quality, only 14% of Africa's land area is estimated to be relatively free from moisture stress. Furthermore, the incidence of drought has increased four times since 1975 while irrigation is available on only 3% of Africa's farmlands.



The availability of sufficient amounts of good quality water is fundamental to all biological processes, for maintenance of biodiversity and ecosystems, for human health, and for primary and secondary production functions. Nowadays, 69% of all water use in the world is for agriculture, with this proportion rising to 90% in some arid countries in Africa (Frenken, 2005). According to IWMI (2005), water use for agriculture in sub-Saharan Africa is highly limited to fewer than 2% of the total renewable water resource. Total withdrawals for agriculture in sub-Saharan Africa amount to 105 billion m<sup>3</sup>, which is less than 2% of the total renewable water resource. Most countries in the region have low levels of water storage infrastructure, averaging 543 m<sup>3</sup> per capita, compared to 2,428 m<sup>3</sup> in South America and well below the world average of 963 m<sup>3</sup> per capita. In view of the actual human population growth and the expansion of agriculture, it is absolutely vital to reconcile water demands for maintaining ecosystem functions and for producing foods to sustain agricultural production and livelihoods, especially in Africa's semi-arid zones, where agriculture and the natural environment are often the principal potential "growth engines" and the key to improving rural livelihoods through the removal of hunger and poverty reduction.

All these factors contribute to increasing the needs for water and a strong competition between user groups, and between agriculture and the other sectors such as water needs for the rapidly growing populations of cities, with an increasing pressure to transfer water from rural to urban areas. This means that agriculture will have to compete with the rapidly increasing urban sector, where municipal and industrial needs for water have dramatically escalated over the last two decades. About 88% of allocated water in Africa was for irrigation; 7% for municipal use; and 5% for industrial uses (AfDB et al., 2007). It is therefore crucially important that in considering the needs of water for agriculture and for the other sectors (municipal, industrial, etc.) as well as the potential for increasing food production, the consequences of shifting water resources from the agricultural sector, and ways to increase water availability, are key issues for the development of rural livelihoods in the semi-arid zones of Africa.



In addition, water quality is a major issue in water supply. In most African countries, water diverted to cities is often released after use without adequate treatment. In semi-arid areas, in particular, return flow from agriculture and multiple re-cycling and use of water lead to a rapid degradation in quality. Thus, polluted water is often used in cities with the associated health hazards. Pollution thus constitutes an additional problem to water scarcity in the semi-arid zones.

The major conflicts for land encountered in semi-arid areas of Africa are between livestock producers and farmers (cultivators), as well as increasingly between large scale agriculture (agri-business) and traditional land users. Conflicts for land also occur between urban/peri-urban agriculture and urbanisation due to rapidly increasing human populations placing high demands for and increased pressures on land resources. Indeed, formally, available land was 'under populated' to enable pastoralists and cultivators to pursue divergent interests. But urban demand for agricultural products and new agricultural production techniques have expanded farming onto land previously left to pastoralists. Apart from more farmers, fishermen and pastoralists making use of the same land area, the demands of cities for meat, fish and cereals induce many producers to keep larger herds in order to respond adequately to these demands. Furthermore, the relationships between farmers and herders in semi-arid regions of Africa, which have been described as 'symbiotic', are increasingly disappearing due to the breakdown of traditional social ties. However, it was emphasized that it is sometimes necessary for farmers and herders to compete for survival – a situation that can lead to conflict becoming a dominant feature of the relationship (Norwich et al., 1997).

### *1.1.3. Inefficient utilisation of water*

Irrigated agricultural production in sub-Saharan Africa is characterized as low attributed mainly to unreliable water supplies, and to poor water control and management practices (AfDB et al., 2007). Other factors such as low input use, poor crop husbandry, and difficulty in accessing profitable output markets are also cited. In Madagascar, for instance, irrigated paddy rice yields could be increased by 50-80 percent simply by

improved water control and in-field management (World Bank, 2003).

Also, in semi-arid areas in sub-Saharan Africa, adoption of in-field rainwater management for dryland cropping appears to be limited compared with the total area under dryland cropping in the region. A variety of rainwater management technologies exist which can increase the effectiveness of rainfall for crops and livestock production under dryland conditions but their viability needs to be sustained by improvements in water use efficiency.

According to the Comprehensive Assessment of Water Management in Agriculture (Molden, 2007), 75% of the additional food needed over the next decades could be met by bringing the production levels of the world's low-yield farmers up to 80% of what high-yield farmers get from comparable land. Better water management plays a key role in bridging that gap. Moreover, the greatest potential increases in yields are in rain-fed areas, where many of the world's poorest rural people live and where managing water is the key to such increases. Thus, improved water control and management accompanied by the adoption of improved technologies –such as high-yielding varieties, fertilizers, and improved husbandry practices are key issues for an integrated water resource management (Inocencio et al., 2007). Better soil and land management practices can increase water productivity, through irrigation and smaller scale interventions such as rainwater harvesting.

## **1.2. Opportunities**

### *1.2.1. Existing strategies of land and water management to reverse the trend of land degradation:*

Sustainable land management and water control systems have been identified in CAADP for priority attention to achieve sustainable development through considerable investments and developments in land and water programmes. Several initiatives also exist to support efforts aimed at addressing the critical issues of access to and management of land and water resources. For example, the African Development Bank and



the European Union have launched funding facility mechanisms to increase investments in rural water management, thus emphasizing the importance of water management for sustained rural development. Development partnerships with TerrAfrica aims to address land degradation by scaling up harmonized support for effective and efficient country-driven Sustainable Land Management (SLM) practices in Sub-Saharan Africa. The vision of TerrAfrica initiative is designed to operationalize Sustainable Land Management (SLM) objectives of CAADP and NEPAD's Action Plan for the Environment Initiative, currently being implemented through the Regional Economic Communities (RECs) in more than 20 countries. The philosophy of the TerrAfrica approach to Sustainable Land Management is to combine available and proven technologies, with policies, and activities aimed at achieving an integration of socio-economic principles with environmental concerns. This approach will enhance agricultural production, reduce the level of production risk, protect and conserve the natural resource base, provide a buffer against soil and water degradation, and will be economically viable, and socially acceptable (. 2006).

The Sustainable Land Management (SLM) approach is an appropriate response to land degradation. As defined in TerrAfrica, sustainable land management is based on stocktaking of the knowledge on the types, spatial distribution and severity of land degradation, and on the array of sustainable land management technologies that have been developed and, to some extent, used successfully. According to FAO (2001) the major SLM technologies available for use in global farming systems can be grouped as follows:

***SLM technologies:*** Applying integrated solutions for sustainable land management calls for the introduction of participatory methods in decision-making and implementation that emphasize training and capacity strengthening to ensure high levels of voluntary engagement by those who should have a stake in what is done. This approach recognizes that indigenous skills and the innovative capacity of smallholders represent a vital local resource for managing and conserving land and that participatory

methods allow these skills and technologies to be exploited (Molden, 2007). Agricultural production is the priority of resource-poor farmers and this can simultaneously improve the soil, reduce its vulnerability to erosion, and improve production, to achieve the objectives of productivity and conservation. Furthermore, cross-slope vegetative barriers, which can also be used as livestock fodder, are increasingly promoted in place of inert structures of earth or stones. In the TerrAfrica framework, the range of technologies in agriculture, animal production and forestry that can contribute to SLM are currently in use, and may constitute the basis for the integrated management of soil, water, weeds, crop and animal pests and diseases, and forest and biodiversity. These technologies include:

- ♦ Soil and water conservation and land protection practices, micro-catchments, water spreading, water harvesting, water storage in small ponds, etc.);
- ♦ Integrated Soil Fertility Management options (ISFM);
- ♦ Agroforestry, which incorporates trees into agricultural systems and stresses the multifunctional value of trees within those systems;
- ♦ Integrated pest management, which uses ecosystem resilience and diversity for pest, disease, and weed management and seeks to adopt informed use pesticides only when absolutely necessary;
- ♦ Integrated nutrient management, which seeks to balance the need to fix nitrogen within farming systems with the need to import inorganic and organic sources of nutrients and to reduce nutrient losses through erosion control;
- ♦ Integrated livestock systems, especially those that incorporate stall-fed dairy cattle, small stock, and poultry, which raise overall productivity, diversify production, use crop by-products, and produce manure;
- ♦ Aquaculture, which brings fish, shrimp, and other aquatic resources into farming systems, such as irrigated rice fields and fishponds. .



***Legal frameworks, conventions, action plans, and national strategies:*** current policies, conventions and action plans in many African countries are designed to help to respond efficiently to the deteriorating state of the land and livelihoods development programmes. Indeed the development and adoption of national strategies, legal frameworks, action plans, international conventions provide opportunity for carrying out agricultural activities in a more sustainable manner that insure sustainable soil management. The vast majority of African countries subscribe to the UNCCD and monitor convention agreements. While providing prominence and a focus for environment issues, regional economic organizations still face major tasks and responsibilities, and sustainable land management programmes have to compete for staff and budgets with more established sector priorities.

***Decentralisation.*** This is a important issue for agricultural development in sub-Saharan Africa. Availability of relevant policies and the relative efficiency of the decision making process are important factors affecting land use and management. Although not yet effective in many cases, decentralisation facilitates the devolution of power and financial resources to local communities to enable easy decision making on the appropriate and sustainable use and management of land and water resources.

### *1.2.2. Available water for irrigation*

Productivity from irrigated lands is estimated to be approximately three times higher than that from rain-fed lands. Investing in irrigation development provides more insurance against erratic rainfall and stabilizes agricultural output, boosts crop productivity and allows farmers to diversify their productivity. This may be translated into increased farm incomes and achievement of improved and sustainable rural livelihoods.

Africa covers an area of about  $3,010 \times 10^6$  ha, out of which about  $230 \times 10^6$  ha represents natural water resources (Bationo et al., 2006). Growth projections suggest that by 2025, 80% of global food production will come from irrigated lands (AfDB et al., 2007). The irrigated land area in sub-Saharan Africa could be expanded by 330% to substantially

increase agricultural production especially as 85% of sub-Saharan Africa's irrigation potential remains untapped (Frenken, 2005). Moreover, many opportunities now exist for economically investing in irrigation in Sub-Saharan Africa (see Box 2), where it is projected that the irrigated area could be doubled by 2030. Thus there is an enormous potential for irrigation, in sub-Saharan Africa, to improving agricultural productivity and to diversifying agricultural production for improved livelihoods of rural communities.



**Box 2: Potentials for expanding irrigation in Sub-Saharan Africa**

Sub-Saharan Africa has considerable untapped potential for irrigation. Only 4 percent of the total cultivated area is under irrigation, with a mere 4 million hectares added in the last 40 years, far less than in any other region. Investment in irrigation projects steadily declined in the 1980s, partly in response to the many failed irrigation investments and partly because of poorer market opportunities and higher investment costs than in other regions. But with the new generation of better-designed irrigation projects, costs in Sub-Saharan Africa are now comparable to those in other regions, thanks to improvements in institutions, technology, and market opportunities for high-value products (see table below). These economic returns can be realized only if a significant share of the area is sown with higher-value crops. This underlines the need for complementary investments in roads, extension services, and access to markets. Small-scale irrigation is also showing recent successes, especially in Niger and the Fadama program in Nigeria.

**Rate of Returns on irrigation in sub-Saharan Africa**

	1970 - 74	1976 - 79	1980 - 84	1985 - 89	1990 - 94	1995 - 99
<b>Sub-Saharan Africa</b>						
Number of projects	3	1	11	15	4	3
Cost per hectare US\$	4,684	24,496	11,319	7,669	8,287	8,347
Average economic rate of return (%)	10	2	8	16	17	30
<b>Non Sub-Saharan Africa</b>						
Number of projects	21	66	75	41	49	6
Cost per hectare US\$	3,433	4,152	5,174	2,252	3,222	3,506
Average economic rate of return (%)	19	15	15	18	21	17

**Sources:** African Development Bank and others 2007; Carter and Danert 2007; IFAD 2005a; International Water Management Institute (IWMI) 2005; World Bank 2006. Note: Rates of return on externally financed irrigation projects in Sub-Saharan Africa and the rest of the world (two-thirds of which were in Asia) during 1970–99.

### *1.2.3. Existing land tenure policies that secure and sustainable land use and investments*

In many semi-arid areas of African countries, the traditional land tenure systems (for instance the predominance of customary systems in many West African countries) do not permit for sustainable long-term land use planning. In West-Africa (for instance in Burkina Faso), the development of new land tenure policies that insure full land ownership, and ease access to land, opens up opportunities for investments in sustainable land management.

## **1.3. Challenges**

Sustainable land management can only be successful where land users recognize the need for and benefits of sustainable land management or are provided with incentives. For the resource poor producers in the semi-arid zones, this may be achieved through:

- ♦ long term commitment for support to implementation of sustainable land management programmes;
- ♦ definition of land tenure policies that would facilitate access to land by the resource poor smallholder farming families;
- ♦ effective involvement of beneficiaries in the development of policies, planning and implementing of strategies.

Substantial investments for sustainable land management are needed and should include investments in facilities and systems including: (i) water-related infrastructure (storage, conveyance systems, irrigation schemes, irrigation systems, etc.), (ii) soil and conservation systems, (iii) research and development for SLM, with a focus on trade-offs between land uses and ecosystem goods and services; (iv) development and optimization of viable systems of crop-livestock-forest integration; and (v) development and wide-scale distribution of improved planting materials and (vi) post-harvest processing technologies.



The development of policies and operational strategies for land and water resources management at national and regional level is a priority action to reduce competition for these natural resources. Sustainable land management should be mainstreamed at policy level and intimately integrated with other development sector plans.

Problems associated with irrigation, such as inefficient systems causing water logging and salinization, are the major causes of declining crop yields on irrigated lands in the arid and semi-arid regions need to be tackled.

Also, there is an urgent need to invest in water storage for irrigation. The main challenge in SAZ will be to capture more of the available water resources. Therefore, the stakes of increasing water-use efficiencies of current irrigation systems is high, as some of them are estimated to waste up to 60% or more of diverted or pumped water (Frenken, 2005), thus enough water that can be saved to meet urban needs without compromising food production.

It then appears crucial to look for productivity breakthroughs that could change the economics of irrigation and for viable alternative water management technologies to improve rain-fed production in sub-Saharan Africa.

#### **1.4. Proposals for Action**

With a high rural population, Africa's long-term food security and prospects for sustained and equitable economic growth require that the challenge of land degradation be met through sustainable land management (SLM) strategies that address the socio-economic needs and aspirations of those who live and work on the land.

Lessons drawn from past experiences of UNCCD implementation as summarized by the Global Mechanism emphasize the need for:

- ♦ Increasing investments in SLM that would contribute to poverty reduction.

- ♦ Focusing clearly on the root causes of land degradation rather than its symptoms.
- ♦ Expanding understanding of land degradation within the context of the UNCCD process.
- ♦ Improving the documentation and analysis of successes and failures.
- ♦ Giving more importance to the role of enabling policy environment, legislation and efficient institutional systems (“SLM governance”).
- ♦ Improving the levels and targets of domestic and international funding support for sustainable land management programmes.
- ♦ Improving the levels of commitment and political will from national governments and donor agencies.
- ♦ Improving the delivery mechanisms for financial and technical support.
- ♦ Recognizing that successful returns on investment under a comprehensive SLM approach will take more time than is usually available in the traditional project cycle.

Specifically, the following recommendations aim to facilitate decision making at local level to improve land and water resources management:

- ♦ Improvement of tenure security and well-defined land rights to promote, incentives and competitiveness of smallholders;
- ♦ Effective decentralization for local policy and decision making for land use planning;
- ♦ Development of land market regulations, mechanisms for access to credit and information; and an enhanced level of empowerment of women entrepreneurs;
- ♦ Development and implementation of innovative mechanisms of investment in sustainable land management;
- ♦ Increase investments in irrigation;



- ♦ Increase use of agricultural inputs, particularly fertilizers, and high yielding crop varieties and livestock breeds;
- ♦ Investment in agricultural research, education, and training to improve water and nutrient use efficiency under rain-fed conditions;
- ♦ Development of action-oriented research for sustainable land and water management using participatory approaches;
- ♦ Dissemination of existing best practices of land and water management; and
- ♦ Improvement of producers' capacity to implement new technologies.

The following aspects are needed to promote rapid increases in agricultural productivity through in water management:

- ♦ Promote water storage and management for irrigation;
- ♦ Design water management strategies, associated with programmes aiming at improving the efficiency and productivity of water use;
- ♦ Invest in storage, pressurized irrigation conveyance systems, irrigation schemes associated with localized irrigation technologies and the promotion of high return agricultural production;
- ♦ Promote the use of marginal water quality (brackish and treated wastewater);
- ♦ Implement soil and conservation systems (rainwater harvesting, conservation agriculture, etc.);
- ♦ Systematically collect, treat and re-use urban wastewater for agricultural production, associated with the development of enhanced monitoring, health protection and education programs for wastewater reuse in agriculture; these actions offer new opportunities for irrigation where communities experience water scarcity; and
- ♦ Promote integrated water resources management strategies

## 2.

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# PRODUCTIVITY, TECHNOLOGY AND INNOVATION

**I**t is widely recognized that the most effective way to reduce poverty and improve food security in the long run is to raise the productivity of resources that poor people depend on for their livelihoods. In most African countries, these resources are agricultural land and labour. Furthermore, the option of agriculture-led development and the objective of achieving 6% agricultural growth as set out by African leaders require a more rapid and sustained increases in agricultural productivity.



## 2.1. Main Issues

In sub-Saharan Africa, agricultural growth has barely kept up with population growth rates such that the growth in per capita agricultural output is low and lags far behind other developing regions. Agricultural productivity measures the value of output for a given level of inputs. To increase agricultural productivity, the value of output must increase faster than the value of inputs. Gains in overall agricultural productivity can therefore come from changes in the physical productivity level through changes in the technologies employed in the production process, which results in more output (yields) per unit of input such as land or labour, or from changes in production and market costs leading to increased profitability of producers. Thus, increasing agricultural productivity not only relies on improved production efficiencies, such as through adoption of modern or improved technologies and practices, but also critically relies on many other factors such as adequate access to productive resources, well functioning markets and infrastructure, and a conducive policy environment involving stable macro-economic policies.

Currently, African agricultural productivity programmes are confronted with major constraints (FARA, 2006). Institutional issues (capacity weaknesses, insufficient end-user and private sector involvement), and ineffective producer support systems, and systemic fragmentation between elements of the overall innovation system (i.e. between research, extension, training, producers organisations, private sector, consumers' organisations) persist in most of Africa's agricultural productivity institutions and activities hampering progress in the sector. Indeed, in many African countries, access to key services (inputs, marketing, finance, research & technology, extension) has become very difficult, with state organizations often no longer providing the services, while the private sector has not adequately filled the vacuum.

The situation is worsened by the fragmented nature of support and by inadequate total investment in agricultural research and technology dissemination and adoption. These factors have resulted in:

- ♦ *Low land and labour productivity*: productivity levels in Africa, in terms of land and labour productivity, still lag far behind other developing regions. Within Africa, the situation is especially marked in Southern and Eastern Africa (excluding South Africa). Low growth rates in cereals yields and production in Africa have translated into falling per-capita food production and increased imports, contributing to high levels of food insecurity at national and domestic household levels (20% of African cereal consumption depends on imports, including food aid).

- ♦ *Low levels of investment* (due to the severe poverty of most poor producers)

- ♦ *Poor involvement of beneficiaries/end-user in technology generation*: indeed, lessons from across the African continent and elsewhere show that the effectiveness of agricultural technology generation and dissemination depends crucially on relevance and responsiveness to producer needs. At present, producers' needs and those of agri-business often do not sufficiently drive the orientation of agricultural research and extension services, causing lack of relevance and impact. Even when relevant, know-how and technologies are often not widely adopted by producers, further suggesting the lack of effectiveness in the dissemination of technologies. The difficulty of maintaining human capital in these systems, the bureaucratic environment of the public sector, and a chronic shortage of operating resources also constrain the performance of research, extension, training and education systems.

- ♦ *Low or none adoption of newly introduced technology packages*: this point is a direct consequence of the poor involvement of beneficiaries /end-users in the processes and approaches for technology generation but also could be aggravated by the low capacity of institutions and organizations.



## 2.2. Opportunities

### *2.2.1. Upgrading of the agricultural sector*

Agricultural production techniques in the semi-arid zones have evolved in the areas of mechanisation of tillage, seedling, weeding, and post harvest operations as well as the increased use of agricultural inputs (improved varieties, fertilizers, etc.). This trend of modernization of the agricultural production, which takes into consideration environmental issues is an asset to raising yields and labour productivity for rural populations, and empowering them to produce more market-oriented commodities.

### *2.2.2. The development of continental framework: FAAP*

The Framework for African Agricultural Productivity (FAAP) which is designed by FARA and subsequently endorsed by the AU to guide and assist stakeholders in African agricultural research and development is aimed at addressing the challenges of CAADP Pillar IV and in terms of achieving strengthened agricultural knowledge systems, delivering profitable and sustainable technologies that are widely adopted by producers and that will result in sustained agricultural growth. Achievement of the objectives of FAAP will require major improvements in African capacity for agricultural research, technology development, dissemination and adoption, together with enabling policies, improved markets and infrastructure. FAAP offers a great opportunity for the improvement of agricultural productivity. It is a tool to help stakeholders come together to bring the political, financial, and technical resources to address the problems of agricultural productivity and strengthen Africa's capacity for agricultural innovation. It brings together the essential ingredients needed for the evolution of African national agricultural productivity programmes; and elaborates on how best practices can be employed to improve the performance of agricultural productivity in Africa. Beyond improving the performance of individual initiatives, FAAP also highlights the need to replicate and expand such programmes through increased levels of investment.

### *2.2.3. Existing strategies of participatory development of technologies and innovations:*

Harnessing the development and poverty-reduction potential of agriculture depends critically on establishing ways to ensure the relevance of agricultural research activities to meet the continuing challenges facing poor and small-scale producers. In this regard, strategies for participatory development of technologies and innovations (e.g. participatory development of technologies and innovation systems through Farmers Field's School approach), have been developed by the scientific community to insure that end-users are actively engaged in the processes of agricultural research priority setting, planning and managing work programmes, and the establishment of national agricultural research strategies through participatory and multi-disciplinary processes—and their endorsement of these at national level through inclusion in national Poverty Reduction Strategies.

### *2.2.4. Strengthening producers' capacities:*

This concerns mainly producers' organizations, and producers' awareness, for increased access to knowledge, finance, and market opportunities. For example fruits and vegetables marketing is one of the fastest growing agricultural markets in developing countries, with production increasing by 3.6 % a year for fruits and 5.5 % for vegetables over 1980–2004 (World Bank, 2008). Under irrigation conditions in the semi-arid zones horticulture may generate incomes and employment. Relative to cereals, horticulture increases the returns on land about 10-fold (World Bank, 2008). It also generates considerable employment through production (about twice the labour input per hectare of cereals) and off-farm jobs in processing, packaging, and marketing. Fruits and vegetable production and marketing offer especially women opportunities for employment in the sector and income generation..

### *2.2.5. Site specific experiences of systems for the mitigation of agricultural production failure in the semi-arid zones:*

Specific technical, sociological and economic limitations to increased agricultural productivity in the semi-arid zones have been thoroughly



studied and solutions identified by research and development institutions at national (NARS), sub-regional (SRO), and international (CGIAR and non-CGIAR centres). The NARS of semi-arid countries have studied and improved local practices that substantially contribute to increased agricultural productivity (as elaborated for example in Box 3).

**Box 3: *Zai* and half-moon: two traditional techniques for the rehabilitation of degraded bare soils in the Sahel**

This case study shows how traditional soil management practices called *zai* and *half-moons* can combat land degradation and improve productivity of the sealed and crusted bare soils, previously abandoned as wasteland. The *zai* method (also called *tassa* in Niger or *towalen* in Mali), is a soil rehabilitation system that concentrates runoff water and organic matter in small pits (20–40 cm in diameter and 10–15 cm deep) dug manually during the dry season. A handful (0.3 kg) of animal manure or compost is supplied per pit, i.e. 9.5 t ha<sup>-1</sup>. Like *zai*, the half-moon is another method for the rehabilitation of sealed and crusted bare soils consisting of a basin of 2 m in diameter, dug with a hoe or a pick so as to break the crusted layer on the soil surface, and to collect the runoff water. The cultivated area is 6.3 m<sup>2</sup> for each half-moon. A barrowful (35 kg) of animal manure or compost is supplied in each half-moon, i.e. 14.6 t ha<sup>-1</sup>. The two techniques are combined with contour stone bunds that slow down runoff.

Several studies in the Sahel region reported that applying compost or animal manure allowed substantial gain in sorghum grain yields i.e. about 10–39 times (700–1500 kg ha<sup>-1</sup>) the yield obtained in the *zai* or half-moon basin without any amendment (< 100 kg ha<sup>-1</sup>). It is a simple solution to reclaim these degraded lands but also to rehabilitate the agroforestry cover in the Sudano-Sahelian semiarid area (Reij, 1994; Roose et al., 1999) as it allows, thanks to the plants seeds included in the manure, the regeneration of shrubs and trees in the *zai* pits.

Several studies reported the re-establishment on formerly bare soil of over 20 herbaceous species and 15 woody species following two consecutive years of *zai* in the central part of Burkina Faso.

**Box 3:**

The zaï method at present is still labor-intensive, about 60 working days for 1 ha. INERA scientists in Burkina Faso recommended a so-called 'mechanical zaï' that consists of making appropriate holes mechanically with animal-drawn tools (Dent IR12 for sandy soils, or Dent RS8 for other types of soils). This reduces by more than 90% the amount of time required for making the pits as it takes only 11 to 22 h ha<sup>-1</sup> to construct these pits with oxen that are well-fed with crop residues. This resulted into an economic benefit of 165000 cfa ha<sup>-1</sup> compared to only 17000 cfa ha<sup>-1</sup> with the manually dug zaï.

*Sources: Zougmore et al. (2003), Roose et al. (1999)*

Furthermore, institutions such as AU/SAFGRAD, AU/IBAR, ICRISAT, IWMI, ICARDA, WARDA, and IITA have focussed their activities in Africa's semi-arid zones, producing recommendations of relevant and efficient technologies for improved agricultural productivity. For example, research by ICRISAT, on the farming systems of the semi-arid tropics, where erratic rainfall, low soil fertility and extreme poverty impose great constraints on agricultural development, has developed mechanisms to conserve and breeding lines of the crops, namely sorghum, millet, groundnut, chickpea and pigeon pea which are of the greatest importance to the poor in semi-arid tropical countries. This research focus has been broadened to include exploring opportunities of increasing incomes by growing fruits, trees, vegetables, and speciality crops. The aim of this effort was to help developing countries to apply science and technology to increase crop productivity and food security, to reduce poverty and to protect the environment. Farming remains important but rural people in semi-arid areas are looking for diverse opportunities to improve food security, livelihood resilience, and stabilize their incomes.

Most households in the West African semi-arid tropics are facing substantial risks because of the consequences of practising rain-fed agriculture in a drought-prone environment. These households keep livestock



as a buffer stock to insulate their consumption from fluctuations in income (Fafchamps, et al., 1996).

ILRI has conducted several studies on extensive livestock production systems, which is one of the most common types of land use in the arid areas of Africa. Extensive livestock production systems are adaptable to highly variable environmental conditions. Animals can be regularly moved from one location to another to follow seasonal climatic patterns (for example, seasonal transhumance in the Sahelian countries and in Lesotho) or within a particular location to track local variability in the quality and quantity of forage (Sandford 1982; Behnke and Scoones 1992).

Moreover, additional flexibility is possible if livestock owners split their herds into small groups, keep several livestock species, or have access to good markets where they can sell animals when forage is in short supply and to buy new animals when conditions improve (Swallow 1994; Scoones 1994). Advances in animal production combined with improved animal health and feeding have formed the basis of the livestock "revolution" in developing countries. For instance, cross-breeding of dairy cows with exotic breeds has improved the livelihoods of smallholder farmers in high-potential areas.

In view of declining prices of grains and traditional tropical exports, producers in the semi-arid zones must seize the opportunity to diversify production of high-value livestock in response to rapidly growing domestic and international demands.

### **2.3. Challenges**

The most important challenge is how to strengthen African capacity for agricultural research and technology development, dissemination and adoption, together with enabling policies, improved markets and infrastructure (see Box 4). As clearly stipulated in the FAAP, the emerging

African agenda for improving agricultural productivity, profitability, and sustainability through innovation requires three principal elements,

namely (i) institutional reform, including the efficient use of resources for activities that are most likely to achieve productivity increases; (ii) increasing total investments in African agricultural research and development; and (iii) harmonising funding. Implementation of these elements would greatly contribute towards:

**Box 4: Increased investment in infrastructure lifts productivity and benefits the poor**

International Food Policy Research Institute (IFPRI) study evaluated the returns to public investments in rural Uganda. The results show that government investments in agricultural research have had the most favourable benefit-cost ratio for growth of all public investments and they raised more people above the poverty line for each 1 million Ugandan shillings (Ush) spent (Table 1).

**Roads**

Investments in roads also have a very attractive benefit-cost ratio and the second largest impact on poverty reduction. The impact of low-grade feeder roads on poverty is much larger than of high-grade roads, such as murram and tarmac roads mainly because feeder roads impact significantly on poverty reduction and agricultural productivity improvement, while murram and tarmac roads had no significant impact on agricultural productivity. The impacts of the murram and tarmac roads on poverty reduction are mainly through improved non-farm employment opportunities.

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**Box 4:*****Education***

Education investments, which rank third in terms of growth and poverty reduction, benefit the poor by lifting agricultural productivity and non-farm employment and increasing rural wages.

***Health***

Government spending on health did not show a large impact on growth in agricultural productivity or on rural poverty. This is probably because much of the current expenditure is on prevention and treatment of HIV/AIDS-related diseases, for which the benefits are not captured in the relatively short data series available for this study.

***Win-win investment***

The implications for Uganda are that increasing current research intensity from the low level of about 0.5 percent of agricultural GDP would be a win-win investment. Increased investment priority should also be accorded to feeder roads and education.

- ♦ Strengthening agricultural support services (research, extension), with the active participation of the private sector;
- ♦ Empowering producers to become more active partners in agricultural productivity initiatives in such a way to ensure their meaningful participation in priority setting and work programmes implementation for research, extension, and training.
- ♦ Development of viable producer organisations that can represent the interests of farmers and pastoralists in public policy making, as well as open new market opportunities for their members with the required inputs and services.
- ♦ Upscaling of good agricultural production practices.

The improvement of advanced processing technologies and the reduction of losses in the food chain are factors that may contribute to the increase of added value of products.

**Table 1: Returns to government investments in rural Uganda**

Investment	Benefit/cost ratio	Reduction in numbers of poor per million Ush
Agricultural research & extension	22.7	107.2
Education	2.7	12.8
Feeder roads	20.9	83.9
Murram roads	n.s.	40.0
Tarmac roads	n.s.	41.4
Health	0.6	2.6

Source: Fan et al. (2003). Note: n.s. denotes effects were not statistically significant.

## 2.4. Proposals for Action

By 2050, Africa's population is projected to increase by 1.3 billion people. Sustainable development requires efforts to meet the food needs for this rapidly growing population, while conserving the natural resource base for future generations. One of the promising options is to increase agricultural productivity. In the semi-arid zones, where poor agricultural performance is related to difficult agro-climatic conditions and low investments in infrastructure that improve market access, the agricultural challenge will be to sustainably intensify and diversify production in agricultural farming systems, while improving infrastructure and markets.

The following actions are proposed to contribute towards addressing these constraints.

- ♦ Developing and/or implementing action plans for integrated soil fertility improvement.
- ♦ Capitalizing on site-specific technologies that are responsive to opportunities and constraints facing producers and that are efficient to boosting local agricultural productivity.



- ♦ Building strong partnerships between producers, researchers, and extension services including training services (training modules, etc.); these would help improve the capacity of producer organizations to participate more pro-actively in the generation and dissemination of agricultural technologies.
- ♦ Considering livestock as a key asset for the resource-poor farmers particularly in arid and semi-arid zones. Indeed, livestock is often the largest non-land asset for rural households. For example, in Burkina Faso and Ethiopia, livestock accounts for more than half of rural households' wealth. In arid and semi-arid areas of Africa and Asia, livestock can offer the only viable household agricultural commodity (see Box 5).
- ♦ Developing fisheries and aquaculture as highly promising sectors for satisfying domestic demands for fish and fisheries products as well as increasing international trade.
- ♦ Strengthening capacities for research and extension services to improve efficiency, accountability, and sustainability of the national agricultural technology generation and advisory systems, including strengthening partnerships and linkages with regional and international institutions;
- ♦ Sharing successful experiences at local, national and regional levels
- ♦ Increasing investments, and coordinated financial support for agricultural research and development
- ♦ Exploring the socio-economic potential, weaknesses and opportunities of the poultry sector.

**Box 5: Pastoralists' precarious livelihoods**

Pastoralism and agropastoralism are the main agricultural production systems in dryland areas. Itinerant herding, moving animals from place to place to follow water and pasture availability, has evolved over centuries and is well suited to sustaining life in areas where rainfall is unpredictable. Yet, pastoralists' livelihoods remain closely linked to weather conditions and thus are particularly vulnerable.

Pastoral strategies of herd diversity, flexibility, and mobility reflect rational and crucial survival mechanisms in erratic environments. Such strategies can be enhanced by policy, and some Sahelian countries (Burkina Faso, Mali, Mauritania, and Niger) have been promoting policy reforms aimed at legally recognizing the rights of pastoralists and improving the management of rangeland resources. But recent efforts to set aside extensive areas of marginal lands as national parks and biodiversity reserves, particularly in Africa, pose new challenges to pastoralism.

*Sources: Blench, 2001; Rass, 2006; Thornton and others, 2002.*



### 3.

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## CLIMATE CHANGE AND DESERTIFICATION

**C**limate change and desertification have attracted attention at international level notably during the 1998 Rio conference, leading to the establishment of international conventions including UNCCD and UNFCCC. These conventions have direct and indirect implications for rural livelihoods in semi-arid zones of Africa.

## A) Desertification

Desertification is defined as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities such as land clearing, overgrazing, deforestation, poor land tillage methods, poor soil fertility practices, etc (ICRISAT, 2007). Indeed, studies by UNEP (2006) estimated that 20.000 km<sup>2</sup> to 50.000 km<sup>2</sup> of land are degraded each year.

UNCCD came into effect in 1996 and has been ratified by 193 countries. Spurred by the conference of the parties (COP), UNCCD developed strategies for combating desertification. A Science and Technology Committee of UNCCD is assigned the function to validate the scientific quality of activities undertaken by UNCCD. During its 8<sup>th</sup> session in 2007, the Conference of Parties (COP8) adopted a strategic plan for 2008-2018, which highlights the integration of desertification control with other initiatives such as UNFCCC, UNCBD, MDGs, and the Johannesburg Declaration on Sustainable Development.

*At the global level:* Following the decisions of the Conference of Parties, the secretariat of UNCCD implements CCD activities with the support of the committee on science and technology (CST) who advises on issues such as biophysical, socio-economic aspects of desertification, monitoring tools and methods, alert systems, the production of atlas at global, regional and national scales, the setup of databases on desertification, the compilation of traditional knowledge. During the COP8 in Madrid, the adoption of a new strategic plan with triennial operational plans marks an important step in the implementation of the convention. Other actions include evaluation of the Land Degradation Assessment in Drylands (LADA) project, creation of scientific advisers and national focal points, greater commitment of the CST and the new funding mechanisms (GEF, GM) to support the operationalization of these plans.

*At continental level:* Implementation of the CCD in Africa is undertaken through mechanisms such as the Regional Action Plans for Combating Desertification also including the 6 thematic Programme Networks

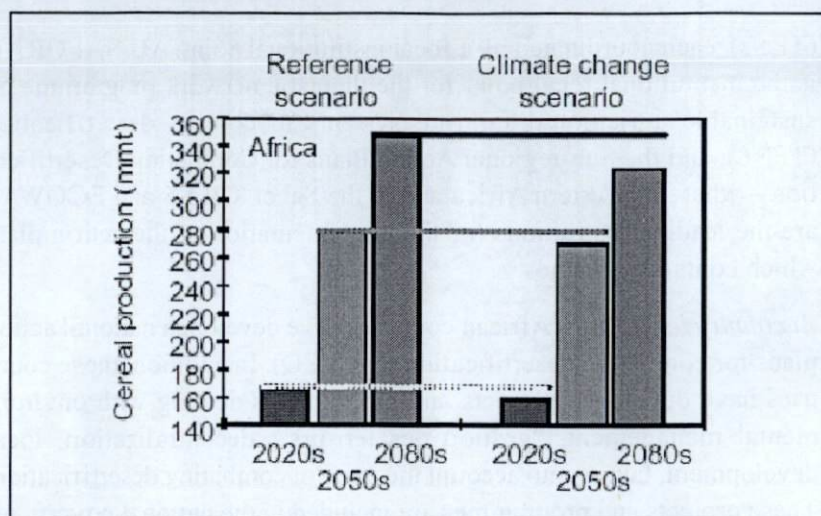


(TPNs), each coordinated by a focal institutional point. AU/SAFGRAD is the institutional focal point for the thematic network programme on sustainable agricultural farming systems to combat desertification (TPN6); and the Sub-regional Action Plans for Combating Desertification – where in Western Africa and in the Sahel, CILSS and ECOWAS are the leading institutions for the implementation of the action plan, which contains 8 themes.

*At country level:* Most African countries have developed national action plans for combating desertification (NAP/CD). In addition, these countries have developed projects and programmes dealing with environmental management, “gestion des terroirs”, decentralization, local development, taking into account the issue of combating desertification. These projects and programmes are included in the national poverty reduction strategies.

## **B) Climate change**

Climate change has had recurrent effects during the last four decades and induces significant impacts on the lives of human populations. These effects are manifested in multiple forms in the arid and semi-arid zones, and include: drought, flooding, temperature variation, and sand winds. Climate change is one of the serious threats to sustainable development as it induces adverse effects on human health, economic activities, water resources and the other natural resources. In the arid and semi-arid zones of Africa, the effects of climate change contribute to the reduction of agricultural production, thus increasing the risk of hunger. These effects are expected to become more pronounced in the immediate future. For example, cereal production in Africa under a reference scenario compared with the situation under climate change scenario (Parry M. et al., 1999), illustrates this trend (Figure 1).



**Fig1:** Cereal production in Africa under a reference scenario compared with the situation under climate change scenario

(Source: Parry M. et al., 1999).

International reaction to climate change started with the development of the UNFCCC in 1992, which came into effect in March 21, 1994 and now comprises 189 parties. In December 1997, the delegates met at Kyoto (Japan), and agreed on a protocol as a legal tool that commits industrialized countries and countries in economic transition to reduce greenhouse gas emissions, quantified per country. Climate change has attracted the attention of most political leaders in Africa, resulting in the Declaration of Head of States and of governments on climate change at the 2007 Addis Abeba Summit. Several actors such as NGOs and organisations of the civil society are taking into account the issue of climate change in their development agendas.



### 3.1. Major Issues:

#### 3.1.1. *Weak implementation of initiatives for combating desertification*

In Africa, arid and semi-arid zones subjected to desertification cover 43% of the continent with adverse effects on the lives of millions of rural populations. Initiatives and frameworks exist at global, continental and national level; however, implementation of the regional and sub-regional actions plans in Africa have severely been affected by the lack of financial resources.

#### 3.1.2. *Adaptation to climate change*

National and regional programmes are to be developed for implementation with the support of developed countries. The programme on adaptation to climate change in Africa is one of the ongoing initiatives launched in 2006 under the auspices of IDRC and DFID. Some countries have developed action plans for adaptation to climate change and efforts are underway to proceed with implementation of these plans. Implementation of these plans have not been fully effective.

#### 3.1.3. *Inter-action between climate change and desertification*

Climate change and desertification are strongly linked in several ways and this is the basis for seeking for synergies between these conventions through joint mechanisms and contact points. It is in this framework that the Arusha (Tanzania) international workshop on climate and desertification was organised by the WMO and the UNCCD in 2007.

However, it seems that, the international community has paid far more attention to climate change than to desertification. Indeed, the UNFCCC has attracted more support of northern partners while the issue of desertification was often perceived as problem of African countries. Resource mobilisation to address the combined effects of climate change and desertification should be of a priority in the years ahead.

In addition, lack of scientific reference to assist the implementation of actions related to these conventions has been observed. Indeed, in most countries research institutions have not been well involved in the definition of strategies and actions to be implemented, And, where some

NARS are involved, they are yet to develop adequate methodologies, with the active participation of targeted populations. Over the years, rural populations have acquired indigenous knowledge developed mechanisms to adapt to the situations created by climate change and desertification. Regrettably, this local knowledge is poorly documented, accumulated and shared; hence has been poorly exploited.

Although most countries have developed national strategies and programmes for combating desertification, and for adaptation to climate change, implementation of these action plans remains weak.

### 3.2 Opportunities

Clear opportunities exist to address the issue of interrelationships between climate change and desertification:

- ♦ *The call for effective linkages between the Rio conventions (CCD, FCC, CBD):* At international level, there has been awareness on the limitations caused by the lack of effective linkages between the Rio conventions; hence the call for a better interaction. Several initiatives are developed to strengthen the interrelationships through UNCCD programmes, the GEF (OP15), and the Global Mechanism (GM).

- ♦ There seems to exist also a *will from developed countries* to increase the economic aid and investments to countries in Africa through the G8 and other mechanisms in international agencies.

- ♦ In Africa there are several initiatives developed by AU, NEPAD, CILSS, the RECs, etc., including the *Green Wall for the Sahara initiative*. In addition, African governments are now more aware about the important linkages between food security, climate change and desertification. They have also encouraged development partners to pay greater attention to these issues and to assist with resource mobilisation to national support programmes.

- ♦ *Financial resources* are becoming more and more available for programmes on adaptation to climate change and desertification;



- ♦ Cross-sectoral interaction between business institutions at sub-regional and continental level with regard to the environment agenda of NEPAD.

### 3.3 Challenges

Developing efficient mechanisms for the management of climate change and desertification poses challenges not only to national governments but also to rural communities and to national research institutions. In this respect, the indigenous knowledge and management strategies developed by rural communities should be carefully collected, documented and shared. This information should constitute a valuable resource to inform research agendas on climate change and desertification as well as for planning new intervention approaches.

The development of new and adaptive innovations to climate change by the main users of research results also constitutes a challenge for the NARS as well as for the regional and international research organisations which seek to incorporate climate change and desertification in their agricultural research for development programmes.

A further challenge is to establish regional and sub-regional information networks for sharing of information on progress in research on climate change and desertification.

Similarly, the dynamics and the keen interest that currently exists should be maintained through sustainable mechanisms of finance. Therefore formulating adequate strategy for resource mobilisation also constitutes a challenge.

The insufficient or lack of communication/coordination among focal points at national, sub-regional and regional levels, as well as the capacity constraints of countries to develop bankable projects to secure funding are also important challenges to be faced.

### 3.4 Proposals for Action

In view of the importance of the combined effects of climate change and desertification, several actions should be considered by stakeholders involved or concerned with this problem.

- ♦ Collection, documentation and exploitation of local indigenous knowledge and strategies for the management of climate change and desertification. This knowledge base should be examined and improved in order to develop locally relevant and more efficient strategies for the management of climate change and desertification by local communities.
- ♦ Participatory research programmes should be implemented to develop strategies for managing climate change and desertification. This will consist of the following :
  - a) Understanding the factors governing climate change and desertification;
  - b) Studying the short, medium and long term impacts of different land management options;
  - c) Collecting meteorological and scientific data for use in monitoring the evolution of land characteristics; and
  - d) The development of adequate mechanisms for technology dissemination is a key accompanied by training, awareness raising and communication at local, national and regional levels.
- ♦ The communication strategy to be developed should be specific to each targeted group. Therefore, the existing innovations or those to be developed should be described in easily accessible language to each group.
- ♦ Problems related to climate change and linkages with desertification should be discussed by decision makers at local, national and regional levels.
- ♦ The synergic approach of the two phenomena also implies:



- a) The consideration of migration due to climate change and desertification (the so called 'Environmental Refugees') by decision makers at local, national, regional and international levels.
- b) Harmonisation of all the initiatives for climate change
- c) Development of adaptive technologies to climate change
- d) The implementation of decisions/declarations and initiatives in accordance with the commitment of stakeholders.
- e) Increases in investments for emergency actions due to climate change (e.g. floods) and the development of actions plans for severe droughts and floods.
- e) Formalization of dialogue and coordination between focal points at national and regional level and the development of joint Projects

Effective implementation of these recommended action plans should be supported by all stakeholders through sustainable financing mechanisms.

## 4.

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# INTEGRATING PRODUCTION WITH MARKETS

Rural livelihood processes in semi-arid areas need to adapt to various socio-economic and environmental changes such as privatization, price liberalisation, globalization, urbanization, desertification, climate change, and loss of biodiversity. These factors create opportunities to contribute to the economic development of semi-arid countries through more export, greater employment and increased rural incomes. One way to achieve this objective is to integrate agriculture into local, regional and global markets by satisfying the demand for products, marketing requirements at national, regional and international levels.

Markets opportunities concern:

- ♦ Agricultural products (crops, livestock, forestry, fishery and aquaculture);
- ♦ Agricultural inputs (seeds, pesticides, fertilizers, water, veterinary drugs, etc.);
- ♦ Capital (finance, lands);
- ♦ Labour and employment;
- ♦ Technologies, innovations and knowledge (experience sharing, intellectual property rights).



#### **4.1. Issues related to integrating agriculture into markets**

##### *4.2.1 Low competitiveness of agricultural products from semi-arid zones*

Agricultural products from the semi-arid zones of Africa have not been sufficiently competitive. High production and transaction costs, weakness of market-support services (risk management, financial services, transport, refrigeration, storage, SPO, etc.) and export of raw products are some of the reasons for non-competitiveness of semi-arid agricultural products. Subsidised agricultural products imported from developed countries to Africa distort the local markets and contribute to make agricultural products of semi-arid zones not competitive. For instance, in semi-arid areas of Africa, imported staple foods are often cheaper than locally produced ones (Africa imports 25% of its foods grains). Traditional export crops from the African continent compete with those from new suppliers from Asia and Latin America who offer to importing countries lower price products with standard required quality/safety.

##### *4.2.2 Poor relation between agricultural production and national, regional and international markets.*

Agricultural products of the semi-arid zones are poorly linked to markets because agricultural production is not market-led. This situation is due to the lack of market information service about prices and market opportunities, and end market requirements. Indeed, end markets determine the characteristics of the final product or service; and the demands of the end market drive quality and standards. Additionally, the characteristics of a product or service demanded by end-market consumers define how competitive advantage can be achieved. End markets for agricultural products can be domestic, regional, and/or international. Experience from the MIR Project conducted by IFDC in West Africa clearly illustrates this situation.

##### *4.2.3 Low added value of agricultural exports*

Agricultural export products of countries in the semi-arid zones are usually in the raw form, without any added value. Processing prior to export would give not only an added value but also would create employments for local populations.

*4.2.4 Political and institutional impediments to the development of national, regional and international markets.*

National policies dealing with price liberalisation, and those aiming at protecting certain developed countries, create bias in the markets. These are unfavourable for access of agricultural products from semi-arid zones into regional and international markets. However, some agreements have been signed to promote regional markets but full implementation of these agreements and operationalization of the markets is yet to be concluded. Customs barriers as well as the poor state of road infrastructures and low capacity of farmers to offer standard quality products remain constraints to the development of inter-regional markets.

*4.2.5 Lack of information and of competences for active and efficient participation in the multilateral negotiations processes.*

Globalisation has created new opportunities as well as constraints for new entrants into global markets. Various policies for product prices and for their subsidy are subjected to fierce negotiations for which most representatives from African countries are not well-performed.

### **4.3 Opportunities**

*4.3.1 Agro-ecological diversity offering favourable conditions for agricultural production.*

The semi-arid zone of Africa presents diverse ecologies as well as production systems that are unique conditions for some high potential niche crops or activities. Moreover, the rich local experience of managing these agro-systems, especially with regard to the adaptation to drought and climate change, offers possibilities for the participatory development and diffusion of technologies through agricultural innovation systems.

*4.3.2 Presence of promising national, regional and international potential markets for numerous agricultural products*

Apart from the potential of the market for staple food crops, opportunities exist for products of high added values such as fruits and vegetables, products from livestock, fishery, aquaculture, and horticulture. These



products are beginning to contribute significantly to the demand in markets (Table 2). Indeed, agricultural exports from Africa have increased over the years, from \$17 billion in 1996-99 to \$21 billion in 2002-05, equivalent to a growth rate of 2.3% per annum. Agricultural exports consisting of coffee, cocoa and tea, and the wide variety of foods (other food products group) together accounted for about 51% of total food exports followed by the fruits and vegetables group (21%) and sugar (6%). Encouraging growth rates in exports (above 3% per annum) were observed for dairy, meat, fruits and vegetables, beverages and spices during 1996-2005. Unlike the case in imports, where they accounted for 13%, non-food agricultural products account for 21% of Africa's agricultural exports. A number of agricultural raw materials, like cotton and hides and skins, fall within this category (FAO, 2007).

There are also investments and business opportunities for products of the agricultural sector such as wildlife, aquaculture, hunting, Arabic gum, and honey. Based on specific crops (ex: *Jatropha*) that can be produced in the semi-arid zones, bio-fuels offer a potential source of renewable energy and possible large new markets for agricultural producers. Some countries have been aggressively encouraging bio-fuel production as oil prices are rising and concerns over energy security and the environment have increased. But few current bio-fuels programs are economically viable (World Bank, 2008), and most have social and environmental costs, including upward pressure on food prices, intensified competition for land and water, and deforestation. Thus, national bio-fuel strategies need to be based on a thorough assessment of these opportunities and costs.

Most African agricultural products are by default organic and environmental-friendly. Through their eco-labelling, these products may achieve greater competitiveness in international markets.

**Table 2: Overview of trends in Africa's Agriculture and Food Trade**

	1996-99 (million US\$)	%	2002-05 (million US\$)	%	Growth rate (per annum)
Agricultural Products (total)	1,701.8		2,137.1		2.3
Agricultural Exports					
Total Food (excluding Fish)	1,319.3	100	1,690.4	100	2.5
Cereals	644	4.9	868	5.1	3.0
Oils and Fats	545	4.1	622	3.7	1.3
Oilseeds	243	1.8	282	1.7	1.5
Dairy Products	112	0.9	197	1.2	5.8
Meat and Meat Products	119	0.9	245	1.5	7.5
Sugar	944	7.2	993	5.9	0.5
Vegetables and Fruits	2,538	19.2	3,557	21.0	3.4
Beverages	347	2.6	844	5.0	9.3
Live Animals	165	1.3	315	1.9	6.7
Coffee, Cocoa, Tea	4,357	33.0	4,363	25.8	0.0
Spices	95	0.7	237	1.4	9.6
Other food products	3,084	23.4	4,380	25.9	3.6
Non-food Agriculture	3,824		4,467		1.6
Total food as % of agriculture	78		79		

Source: FAO (2007)

#### *4.3.3 Existence of technologies, innovations and knowledge to improve productivity and competitiveness of agricultural products*

Technologies, innovations and knowledge are available for improving agricultural production in semi-arid zones of Africa. But these technologies need to be adopted by resource-poor producers. The impact of these technologies on the economic development of semi-arid countries depends on the support of national governments and the private sector to



extension service, access to credit, markets reforms, investments in infrastructures and education and health policies.

## **4.4 Challenges**

### *4.4.1 Satisfying the needs and requirements of the market*

In order to allow the agricultural sector to play its role as the driving force for the development of the semi-arid zones, production has to be determined by the needs of markets. Countries in the semi-arid zones must not only exploit niche markets (high added value crops, etc.), but also to introduce competitive and high quality products into the domestic, regional and international markets.

### *4.4.2 Development of capacities for effective participation in multilateral negotiations.*

The capacity of Africa to effectively participate in multilateral negotiations to improve its bargaining power still leaves much to be desired.

## **4.5 Proposals for Action**

### *4.5.1 Implementation of adequate policies for producer incentives*

Agricultural products from the semi-arid zones are not competitive even when access to markets is ensured, as demonstrated by the case of traditional export products such as cotton. Box 6 contrasts the effect of liberalisation. It is therefore necessary that the incentive policies for agricultural products be adopted in order to increase the earnings of producers.

**Box 6: Zambia and Burkina Faso: contrasting experiences in liberalizing domestic cotton markets**

**Zambia—production triples, after some fixes.**

Zambia's cotton sector continues to evolve after market liberalization, with significant impacts on productivity and quality. In 1995 the government sold the Lint Company of Zambia, the government parastatal, to two private companies, Clark Cotton and Lornho, later acquired by Dunavant. To ensure access by participating farmers to extension services and inputs (on loan), the two companies implemented outgrower schemes, contracting with smallholders. The costs of the inputs were to be paid by farmers upon sale of their seed cotton. But the rapid entry of other buyers created overcapacity in ginning and fierce buyer competition. The outgrower schemes began to fail because of rampant side-selling by farmers to other traders offering high prices without grading and defaults on input loans. As the defaults increased, the cost of credit increased, which led to more defaults or exits from the outgrower program. Production in 2000 was less than half that in 1998. After 2000 many agents and buyers exited the industry, leaving two dominant companies. Dunavant used distributors to improve credit repayments. Distributors were responsible for identifying farmers, providing inputs and technical advice, and collecting produce on behalf of Dunavant. The distributors' remuneration was directly tied to the amount of credit recovered, on an increasing scale. Dunavant established inspection points in all buying stations to enforce quality standards. National production tripled between 2000 and 2003, and credit repayments improved from about 65 percent to more than 90 percent. There are now more than 300,000 cotton producing farmers in Zambia.

**Burkina Faso—losses of \$128 million.**

The government tried to reduce inefficiencies by changing the structure of ownership of SOFITEX, the cotton parastatal, in 1999. It allowed producers, represented by the *Union Nationale des Producteurs de Coton du Burkina Faso*, to take up 30 percent ownership, empowering farmers to oversee the management of SOFITEX and ensure professional management.



**Box 6:**

But the institutional changes at SOFITEX did not improve its financial position. Supporting and stabilizing domestic cotton prices as world prices declined produced financial losses of \$128 million from 2004/05 to 2006/07.

**Sources:** Bonjean, Combes, and Sturgess 2003; Food Security Research Project (FSRP) 2000; Christopher Gilbert, personal communication, 2007; Tschirley, Zulu, and Shaffer 2004.

*4.5.2 Set up a regional market information system (MIS) to be related to national MIS*

Access to markets under favourable conditions assumes that the information is timely and reliable on opportunities, needs and prices in these markets. Thus establishing regional information systems on markets should be a priority and intimately related to similar information systems operating at national level. New information and communication technologies offer opportunities for such actions that are effective in different regions of the world and even in West Africa (Box 7)

**Box 7: Innovative uses of information technology to link farmers to markets in India and West Africa**

**E-Choupal and its rural Internet kiosks**

Between 2000 and 2007, the agribusiness division of ITC Limited set up 6,400 Internet kiosks called e-Choupals in nine Indian states, reaching about 38,000 villages and 4 million farmers. ITC establishes an Internet facility in a village and appoints and trains an operator (*sanchalak*) from among the farmers in the village. The *sanchalak* operates the computer to enable farmers to get free information on domestic and global market prices, weather, and farming practices. The e-Choupal also allows farmers to buy a range of consumer goods and agricultural inputs and services (sourced from other companies).

**Box 7:**

The e-Choupal serves as a purchase centre for ITC for 13 agricultural commodities, with the *sanchalak* acting as the commission agent in purchasing the produce and organizing its delivery to ITC. In 2006/07 ITC purchased about 2 million tons of wheat, soybeans, coffee, shrimp, and pulses valued at \$400 million through the e-Choupal network. This direct purchasing cuts marketing costs for both farmers and ITC. It improves price transparency and allows better grading of produce. It also allows farmers to realize a bigger share of the final price.

**Trade Net, a West African trading platform with Internet and mobile phones**

Trade Net, a Ghana-based trading platform, allows users to sign up for short message service (SMS) alerts for commodities and markets of their choice and receive instant alerts for offers to buy or sell as soon as anyone else on the network has submitted an offer on their mobile phone. Users can also request and receive real-time prices for more than 80 commodities from 400 markets across West Africa. Individual users can advertise their goods and offers on free Web sites with their own Internet addresses, and farmer and trader groups can set up Web sites to manage all these services for their members. The Ghana Agricultural Producers and Traders Organization ([www.tradenet.biz/gapto](http://www.tradenet.biz/gapto)) is a major beneficiary. In 2006 it concluded trade deals worth \$60,000 with other producer and trader organizations in Burkina Faso, Mali, and Nigeria. These deals involved purchasing tomatoes, onions, and potatoes without middlemen, reducing the transaction costs substantially.

*Source:* Kofi Debrah, personal communication, 2007; DeMaagd and Moore 2006; Shivakumar, personal communication, 2007

**4.5.3 Develop decision making tools for multilateral negotiations**

Participants to different trade negotiations as well as international conventions on the environment should be well-equipped with current knowledge and negotiation skills. This requires the development of negotiation support tools and the training of participants on the specific



kinds of negotiation. It is also necessary to strengthen the capacities of professional agricultural organisations for members to lobby products and inputs prices, and to negotiate favourable credits conditions.

#### *4.5.4 Strengthen public-private sectors partnership.*

Warranty of access to markets with advantages for African producers could be obtained only through a partnership between national governments and the private sector, including producers' organisations and the civil society, particularly the consumers. This will require strengthening the capacities of each of these stakeholders and establishing good governance.

In the same way, it is important that there are clearly defined roles for each actor. Thus, governments should be responsible for the development of markets by facilitating investment by the private sector. Governments should also strengthen their capacities for the coordination and support of research and extension.

#### *4.5.5 Develop rural infrastructures with an impact on the development and access to markets*

The development of infrastructures (roads, stocking stores, manufacturing factories for agricultural products, stock routes, holding ground, slaughter houses, etc.) is key to the development of national, regional and international markets. The competitiveness of products from semi-arid zones is often burdened by the excess transaction costs, the problems of quality due to poor storage and conservation. The outcomes of such investments are highly beneficial in terms of market development. Box 8 illustrates the impacts of road infrastructures on markets and productivity.

**Box 8: Impacts of road infrastructure on markets and productivity**

Rural road development has the potential to reduce transport costs and generate market activity. Experiences from Vietnam, Georgia and Madagascar highlight that:

- ♦ Road rehabilitation increased the variety of goods that households sold in the market
- ♦ Encouraged greater participation in trade and services.
- ♦ Increased the opportunities for off-farm and female employment.
- ♦ Suggest that a 50 percent reduction in travel time per kilometre on roads would increase rice production by 1 percent in Madagascar.

Policy should focus more on the complementary role of rural roads. Past policy has fixated on the supply of rural roads as a catalyst to development and market activity. Poor road conditions often coincide with a number of other bottlenecks inhibiting agricultural productivity and economic development. Road benefits depend heavily on interactions with other infrastructure and geographical, community, and household characteristics.

For example, one study in Vietnam found that four to six years after road rehabilitation, road transport services were more likely to respond where markets were already established and natural disasters were relatively infrequent.

Road improvement has a general income effect that could generate demand for services from poor providers. The net effect is an empirical question. The picture that emerges from recent, more methodologically rigorous impact evaluations is a complex one. In Nepal, better road access benefited the poor and the non poor, but the proportionate gains were higher for the non poor. Dercon and others (2006) find that access to all-weather roads in 15 villages in Ethiopia reduced the incidence of poverty by 6.7 percent. Given the heterogeneity of impacts, more attention needs to go to beneficiary selection, recognizing that tradeoffs exist.

Moreover, roads may need to be provided as part of a package of interventions that helps certain groups benefit more than they would have and that protects or compensates those who may lose. The governance and institutional settings are also important in determining impacts. Road project funds may not end up funding what was intended and hence have no impact. Infrastructure expenditures present opportunities for graft and the diversion of resources. Finally, the lack of funding and institutional arrangements for routine maintenance can significantly reduce the impacts of newly improved roads.



**Box 86:**

How much roads matter depends on a range of factors? Of course, roads matter to economic development, but how much they matter depends on a number of other factors. Comprehensive approaches are needed that are compatible with how local institutions work in practice, including what they are capable of delivering. This may require fashioning a whole package of cross-sectoral investments (roads *and* complementary investments) and policy changes that will ensure a higher efficiency impact, as well as more desirable poverty and equity outcomes.

*Sources:* Limao and Venables 2001; Van der Walle 2007.

## 5.

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# POLICIES AND INSTITUTIONS

### 5.1. Main Issues

#### *5.1 Effectiveness of Policies and Institutions*

National policies and institutions are established to provide the framework for agricultural and rural development, especially to address issues of rural poverty reduction, and economic development. However, experience in the semi-arid zones of Africa, inform that these policies and institutions do not seem to have fully achieved their objectives. Innovative reforms of policies and institutions are therefore urgently required to improve the efficiency and effectiveness of agricultural development as the engine to drive rural economic development of the semi-arid zones of Africa.

#### *5.1.2 Government disengagement*

National governments have prematurely disengaged from involvement in productive sectors without insuring that the private sector is capable of effectively taking over these responsibilities. Thus the private sector remains ineffective due to constraints associated with access to financial services, and unfavourable investment policies. Public spending patterns by national governments for agricultural development in semi-arid areas of Africa reveal inadequate interest and investments in rural and community development. Table 3 and Figure 3 show that public expenditure on agriculture in sub-Saharan Africa is consistently lower than in other sub-regions and countries.



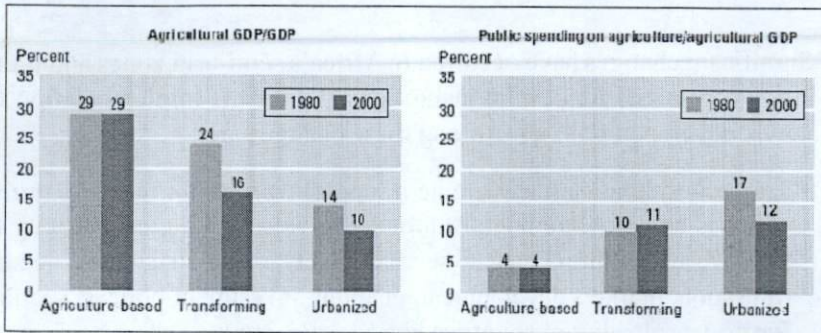
National agricultural research systems in Africa continue to face major constraints which hamper effective delivery of research outputs. According to FARA (2005), these constraints are most evident in the areas of agricultural research management, financial and resource allocation and management, scientific capacity to conduct high quality research and ineffective collaboration and partnerships with development partners. While investments in agricultural research and development (R&D) increased by 3% in China and India, it increased only by 1.5% in Africa, where some countries even show decreases in investments in R&D. These difficulties in policies and institutional performance have significant negative effects on agricultural and rural development efforts in semi-arid areas of Africa.

### *5.1.3 Impacts of global trade policies*

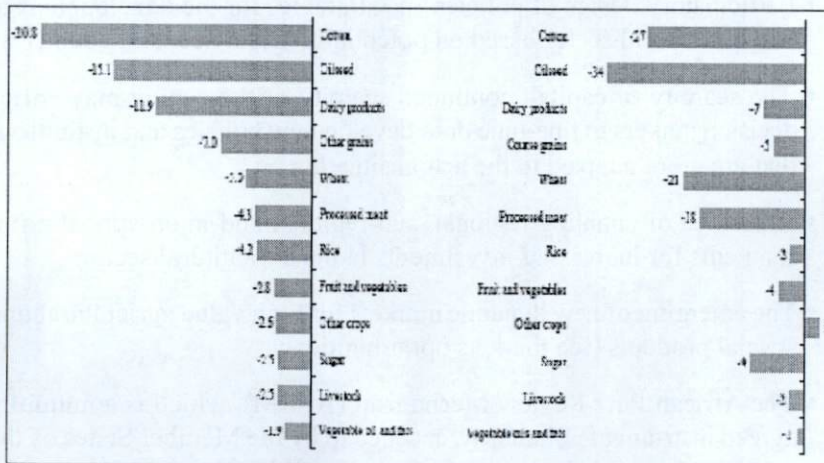
Global trade has also not been fully beneficial to developing countries, especially the countries in the semi-arid zones (see as Figure 4a, b) where global trade in agricultural commodities do not seem to be particularly favourable for producers in these zones.

**Table 3: Public spending on agriculture as share of agricultural GDP (%)**

	SS-Africa		South Asia		China	
	1980	2004	1980	2004	1980	2004
Public spending on agriculture as share of agricultural GDP (%)	6.7	3.7	11.0	6.7	12.2	7.7
Share of agricultural GDP (%)	28.7	29.2	34.5	18.2	30.1	13.1



**Figure 3:** Public spending on agriculture is lowest in the agriculture-based countries, while their share of agriculture in GDP is highest



**Figure 4a:** Real international commodity prices have been suppressed by current global trade policies (% of price)

**Figure 4b:** Trade share losses to developing countries due to current global trade policies (% point to developing country trade shares)

(Source: World Bank 2008)



## 5.2 Opportunities

Significant changes have occurred in Africa's semi-arid zones and there are opportunities for several institutions and for the implementation of newly developed policies. Among these changes are:

- ♦ The reconsideration of government supporting roles for the agricultural sector in terms of building institutional services and human capacity to improve agriculture (financial services, R&D, risk management, decentralisation, markets development, enabling investment policies such as fertilizers subsidies in countries like Malawi, etc.);
- ♦ Good governance as condition for access to international support;
- ♦ Better defined roles of all stakeholders in agricultural development initiatives;
- ♦ Participatory design of policies and strategies for the development of the agricultural sector based on potentialities and needs of countries;
- ♦ The scarcity of capital: continued scarcity of the capital may entice decision makers to fine-tune or to develop new policies and institutions that are more adapted to the actual situation.
- ♦ Existence of enabling regional, sub-regional and international environments for increasing investments in the agricultural sector;
- ♦ The emerging of new dynamic markets for high value agricultural and special products (see markets opportunities);
- ♦ The African Peer Review Mechanism (APRM), which is a mutually agreed instrument voluntarily, acceded to by the Member States of the African Union (AU) as an African self-monitoring mechanism. The APRM is a bold, unique and innovative approach designed and implemented by Africans for Africa in order to establish a strategic re-orientation towards the validation of universal as well as African values and accelerate the process of intra-African cooperation and integration. Its mandate is to ensure that the policies and practices of

participating countries conform to the agreed values in the following four focus areas: democracy and political governance; economic governance; corporate governance; and socio-economic development. National ownership and leadership by the participating country are essential factors underpinning the effectiveness of the APRM. The APRM process is designed to be open and participatory and is also guided by the principles of transparency, accountability, technical competence, credibility and it should be free from manipulation.

### 5.3 Challenges

The major challenge is that of formulating and implementing policies and institutions that have impact on achievement of food security and promote competitiveness of agricultural production of semi-arid areas of Africa in global trade. This means that inequity in global trade and regional developments have to be eliminated. To meet this challenge, efforts from public sector, private sector, civil society and international and regional agencies or and institutions are needed. Hence, the specific challenges that must be faced include how to:

- ♦ enhance active participation of the rural populations through investments in rural infrastructure (education, water supply, health, etc.) and rural employment;
- ♦ increase agricultural productivity through incentive policies, access to products and inputs markets;
- ♦ improve access to financial services;
- ♦ promote application of science and technology to agricultural production, processing, utilization and marketing;
- ♦ strengthen the capacity of producers' organisations;
- ♦ deliberately encourage education of women.



## 5.4 Proposals for Action

- ♦ Institutional reforms for effective implementation of policies, strategies and programmes for agricultural development (liberalisation of domestic trade, development of efficient input (seeds and fertilizers) and credit markets, etc.;
- ♦ Harmonisation of national policies with policies endorsed at regional level;
- ♦ Strengthening agricultural research institutions (at national, sub-regional, regional levels) to make them highly effective and deliver results;
- ♦ Strengthening national agricultural extension services;
- ♦ Adaptation of academic training institutions (Universities, professional training schools and centres) to countries' development challenges and the requirements of employers in the agricultural industry;
- ♦ Reforming financial institutions to develop microfinance to reach small-holders and private sector;
- ♦ Creation of mechanisms to manage risk of production in semi-arid zones;
- ♦ Strengthening professional agricultural organisations (assist producers in forming producers' organisation, developing producers' training and advisory services.) so that they can respond to markets needs and to effectively participate in regional and international negotiations, and conflict resolutions.
- ♦ Increasing international competitiveness of agricultural products through high quality processing and value-addition.
- ♦ Implementing policies that support crops with a comparative advantage in semi-arid areas, remove taxes on some imported goods, support irrigation saving systems and water harvesting technologies.

## 6.

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# STRENGTHENING LOCAL CAPACITIES

### 6. 1 Main Issues

The majority of agricultural producers in semi-arid areas of Africa are small scale resource-poor farmers who exert considerable pressures on their meagre resources for production. In order to solve the chronic food shortage and environmental problems that affect these populations, national governments, with the support of development partners, have developed and implemented a variety of development projects and programmes designed to increase their agricultural productivity, encourage income generation in order to achieve sustainable and improved rural livelihoods. Unfortunately, some of these projects and programmes did not achieve the expected levels of impact on the lives of rural populations partly because of the “top-down” and minimal participatory approach adopted in project implementation. Indeed, some of these programmes were formulated without adequate participation from the intended target beneficiaries, therefore inadequate attention was paid to their peculiar circumstances. Because of the low impact of these programmes, the living conditions of the populations have remained low with increased levels of poverty, notably among women, the elderly and other vulnerable groups.

In most cases, these populations have poor access to social services and strongly limited access to credits and agricultural extension services. In order to minimize the effects of these problems, most countries have es-



tablished and implemented rural livelihoods and economic recovery programmes. However significant progress in the achievement of the objectives of these programmes is hampered by several key factors such as:

- 6.1.1 Limited financial and technical capacities of producers and local operators*
- 6.1.2 Difficult conditions imposed for acquiring access to credits for agricultural production.*
- 6.1.3 Lack of legislative and statutory regulations to guide the local governance bodies.*
- 6.1.4 Problems related to land tenure, and to the management of common natural resources*
- 6.1.5 Local consultation frameworks are dormant and therefore do not promote information sharing among stakeholders;*
- 6.1.6 Low capacity of agricultural extension services to provide advisory services due to the collapse of extension programmes following the structural adjustment programmes.*

Effective dissemination of technologies and the transfer of innovations are hampered by poor communications systems and networking arrangements. Consequently, local populations did not benefit fully from these advances which would have positively influenced food security and the sound management of natural resources.

## **6.2 Opportunities**

Prevailing international development environment abounds with opportunities for the implementation of programmes for capacity strengthening at local level through the ongoing initiatives in various countries. These include the National Poverty Reduction Programmes associated with continental initiatives such as CAADP, and sub-regional agricultural productivity frameworks, as well as the Action Plans for combating desertification at national, sub-regional and regional levels.

There are success stories of local capacity strengthening thanks to local or decentralised development projects. These experiences may serve as catalysts and references.

The increasing awareness of populations regarding the requisite implications of development programmes and the actual weaknesses due to the low organisational and material capacities is also an asset for their mobilisation.

### **6.3 Challenges**

Local development is confronted with a number of compounding challenges, these are:

- ♦ The nature of administrative and juridical reforms which will enable local communities to function effectively and for them to be aware of their responsibilities in the development process, especially in the process of decision making for local development plans and programmes and management of local natural resources.
- ♦ Mechanisms for full participation of local populations in development processes, through targeted actions of training, information, and awareness rising,
- ♦ Mechanisms for resource mobilisation to sustainably finance local development programmes, create more employment opportunities including non-farm income generation activities for the youth, and increase capacities of the stakeholders,
- ♦ Establishment of appropriate methods for the transfer of innovations involving the participation of the all stakeholders.

### **6.4 Proposals for Action**

The failure of the «top down» approach has led to the development of alternative novel approaches involving some decentralisation and engaging local populations after strengthening their capacities to partici-



pate effectively in the development process. In order to achieve these objectives, some of the following major constraints need to be overcome:

#### *6.4.1 Institutional, legislative and political issues :*

- ♦ In most countries, the regulatory instruments governing land tenure should be harmonized with responsibilities of local governments to facilitate the participation of local communities in decision making and implementation of development programmes.
- ♦ Capacities of communities need to be strengthened through training to increase their technical capacities, information dissemination and awareness raising through appropriate mechanisms, notably rural broadcasting, consultation and information exchange networks (visits between villages); and organisational capacity strengthening of producers' and private sector organisations.
- ♦ The participation of all stakeholders is necessary to encourage them in decision making, taking into account the social marginalised groups, especially women, the elderly and the youths.
- ♦ Mobilisation of local communities should be sustained through long-term support. To this end, there is a need to support initiatives through micro-credits and the promotion of income generation activities, particularly for women and the youth.

The development, dissemination and adoption of innovations should be implemented through an approach that guarantees the participation of the different local stakeholders, notably the producers' organisations. In this regard, the activities of agricultural research institutions should involve effective networking of producers' organizations to promote the dissemination and adoption of agricultural technologies.

#### *6.4.2 Supporting mechanisms of local communities*

This concerns strengthening the capacities of agricultural extension services and service providers in terms of:

- ♦ establishing and strengthening models of participatory agricultural extension services which are responsible for effective dissemination of technical messages;
- ♦ providing the enabling environment for agricultural research organizations to adopt the participatory approach to conducting research involving users of research outputs;
- ♦ encouraging agricultural training institutions to re-design their training curricula and training methodologies to increase the practical content and relevance in response to the evolving requirements of the agricultural industry.

## STAKEHOLDERS

The involvement of relevant stakeholders is vital for the success of interventions to address the issues discussed. The list could be long but the most relevant stakeholders include the following:

- ♦ *The Private sector*, including producer organizations, local service providers,
- ♦ NGOs and Civil society organizations, as well as local governance institutions,
- ♦ *The Public sector*, including national governments (in order for creating an enabling environment, defining access to and management arrangements for land and water resources, providing agricultural statistics and timely information on markets, etc.), elected representatives, extension services, and agricultural research and training institutions.
- ♦ *Sub-regional, regional and international organizations & specialised agencies*, including development partner institutions, regional and continental bodies, such as AU, NEPAD, RECs, FARA, SROs, IARCs, UN Agencies, etc.



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