

Revitalizing Irrigation in Sub-Saharan Africa



Proceedings of the Stakeholder Workshop held at the International Livestock Research Institute (ILRI) Campus, Addis Ababa, Ethiopia, February 4-6, 2013

CGIAR Research Program on Water, Land and Ecosystems

Irrigated Systems - Strategic Research Portfolio (SRP)

Front cover photo: David Brazier/IWMI

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Executive Summary

Reliable irrigation improves crop yields, makes multi-cropping possible, enables smallholders to cultivate high-value crops and provides year-round farm employment. Yet, less than 5% of the land area in Africa is irrigated and this mostly occurs in just three countries (Madagascar, South Africa and Sudan) and on commercial farms.

Smallholders mostly depend on rainfed agriculture. A switch to irrigated agriculture could have huge implications for these smallholder farmers, who can triple their food production by pumping their own water. This would introduce the stability they need to settle in one place, allowing them to earn a reliable income, feed their families and educate their children.

The Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) has identified land and water management as a priority, and intends to extend the area under sustainable land management and reliable water control systems to 20 million hectares (Mha) by 2015, which is an increase from its current 7 Mha.

In order to transform rainfed landscapes into profitable and sustainable irrigation systems in drought-prone areas, we need to generate scientific knowledge, policy tools and technical options which will help governments to invest wisely in irrigation schemes. Therefore, the CGIAR Research Program on Water, Land and Ecosystems (WLE), led by the International Water Management Institute (IWMI), organized a stakeholder workshop on '**Revitalizing irrigation in sub-Saharan Africa**' to assess the research needs to enhance the success of irrigation in sub-Saharan Africa (SSA).

The workshop was held on the campus of the International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia, on February 4-6, 2013. The primary objective of the workshop was to '**Identify technical, policy and institutional research needs to enhance success of irrigated agriculture in SSA**'. A wide range of stakeholders were invited to help define research needs and better formulate research teams. The workshop was attended by approximately 50 participants from more than 10 different countries.

The agenda for the three-day workshop involved 10 sessions, and an additional related half-day workshop on Decision Analysis. The participants formed four groups (East Africa, Southern Africa, West Africa and Pan-Africa) and deliberated and identified 11 research concepts which were worth pursuing in respective regions to enhance successful irrigated agricultural systems in sub-Saharan Africa. For each concept, the context of the concept, fit with regional development plans, potential outcomes, benefits and beneficiaries, impacts on equity among gender and ecosystems and novelty were identified. The 11 concepts identified are listed below.

1. Assessing water availability for sustainable use in different irrigated farming systems.
2. Optimized value chains for smallholder irrigation farmers.
3. Analyzing the performance of public-private partnership (PPP) models in irrigated agriculture.
4. Policy research: Enabling environment for water issues.
5. Enhancing water availability and productivity.
6. The success and failure factors of public smallholder schemes.
7. Review of agribusiness partnerships for smallholders.
8. Appropriate technologies for private irrigators, and the appropriate financing mechanisms/models.

9. Research management framework: Making sense of multiple research ideas and priorities.
10. Country growth/strategy framework: Helping countries and donors draw up sustainable equitable growth plans.
11. Data management framework: Making sense of multiple data needs and gathering for the other two frameworks (research management and country growth/strategy frameworks).

Considering the common concerns among regions, the need for research may be summarized as shown below:

- Drivers of successful public smallholder schemes, privately owned large irrigation schemes and public-private partnership models in irrigation system management.
- Assessing and enhancing the availability of water through watershed management, rainwater harvesting in small reservoirs and shallow groundwater development for multiple uses, including irrigation.
- Gender-equitable wealth creation through optimized value chains for high-value livestock and irrigated crop commodities.
- Mapping areas suitable for irrigation taking into account socioeconomic and agroecological constraints.
- Enhancing agribusiness partnerships for smallholders.

The workshop organizers would like to thank the CGIAR Research Program on Water, Land and Ecosystems (WLE) for sponsoring the workshop; Nadia Manning-Thomas, Consultant, for facilitating the workshop; Simon Langan, Senior Researcher - Agricultural Water Management and Head of Office, International Water Management Institute (IWMI), Addis Ababa, Ethiopia; Nigist Wagaye, Programme Management Officer, IWMI, Addis Ababa, Ethiopia; and Yemisrach Regassa, Senior Administrative Assistant, for logistical support at Addis Ababa; and Shalika Vyas, Program Assistant, IWMI, New Delhi, India, and Thor Windham-Wright, Communications and Research Uptake Coordinator – Africa, for compiling workshop materials, and preparation of a brief for participants and this final report.

S. A. Prathapar

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Theme Leader – Productive Water Use, International Water Management Institute (IWMI)

Organizers

IWMI

The International Water Management Institute (IWMI) is an international, non-profit research organization dedicated to improving the management of land and water resources for food, livelihoods and the environment. IWMI is a member of CGIAR, an international consortium of agricultural research centers. IWMI's mission is to improve the management of land and water resources for food, livelihoods and the environment. IWMI's vision, as reflected in the Institute's Strategic Plan, is water for a food-secure world. IWMI targets land and water management challenges faced by poor communities in the developing world. Research for development (R4D) is the core activity of IWMI. The Institute's research agenda is organized around four priority themes: Water Availability and Access; Productive Water Use; Water Quality, Health and Environment; and Water and Society. IWMI works through collaborative research with many partners in the North and South and targets policymakers, development agencies, individual farmers and private sector organizations. For more information, please visit <http://www.iwmi.cgiar.org/index.aspx>

WLE

The CGIAR Research Program on Water, Land and Ecosystems (WLE) is an ambitious twelve-year program that brings together innovative thinking on agriculture, natural resource management and poverty alleviation to deliver effective solutions for food security and environmental protection. Unmatched in CGIAR, both in terms of its scope and range of partners, the Program brings together specialists in CGIAR subject matter to solve pressing problems in specific focal regions. The vision of WLE is "a world in which agriculture thrives within vibrant ecosystems, and where communities have higher incomes, improved food security and the ability to continually improve their lives." For more information, please visit <http://wle.cgiar.org/>

Overview

This report provides an overview of the content of the presentations, discussions, and question and answer sessions that were held during the *Stakeholder Workshop on Revitalizing irrigation in sub-Saharan Africa*. Details of the workshop are arranged in chronological order.

The sections providing details of sessions 6, 7 and 8 (the group work) may be of particular interest, as they give an insight into the new research ideas developed by participants as part of the workshop process. These ideas may be further developed into full research project proposals in due course.

Session 1: Welcome and Opening

Timothy Williams, Director, Africa, International Water Management Institute (IWMI)

Summary of presentation

Expected outputs:

1. Research themes to exploit opportunities and provide solutions to constraints facing African countries in sustainable irrigation development.
2. Partnerships and alliances to undertake proposed research and promote research uptake.
3. Identification of funding opportunities.
4. Harvesting the institutional knowledge.
5. Creating awareness of WLE.
6. Look at what will be the practical research options.

Implementation approach:

- Research for development, which leads to development outcomes.
- CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources, which also coincide with the United Nations Millennium Development Goals (MDGs).
- Evidence-based solution – where do these solutions exist that allows us to change. Where no solutions exist, we need to research and find them.

CGIAR Research Program on Water, Land and Ecosystems (WLE): Andrew Noble, Program Director, WLE, and S. A. Prathapar, Leader, Irrigated Systems - Strategic Research Portfolio (SRP)

Summary of presentation

- Why are we working on WLE?
 - Change is happening rapidly.
 - Resource scarcity – we are consuming more than there is, which leads to water scarcity, land degradation and loss of ecosystem services.
 - External drivers: Massive movements of people.
 - Huge changes in economic growth and opportunities.
 - Irrigation fits well into all these.
- Challenges for humanity: Feeding 9 billion people in 2050.
- Vision: A world in which agriculture thrives within vibrant ecosystems, and where communities have higher incomes, improved food security and the ability to continually improve their lives.

Goals:

- Improving food security and livelihoods.
- Sharing benefits.
- Strengthening institutions, which are the key drivers of change and are important if we want to make a change.

SRP on 'Irrigated systems' has five clusters:

- Enhancing success of irrigation in SSA.
- Revitalizing public irrigation systems.
- Water management in the Eastern Gangetic Basin.
- Managing the saltwater balance in the Indus and Central Asian irrigation systems.
- Peri-urban agricultural water management.

Public canal irrigation systems:

- Irrigation system managers need better skills and capacity. There may also be a need to restructure some of the irrigation agencies.
- Cost recovery for operation and maintenance (O&M) – maintain canals frequently and how do we raise funds to maintain the canals?
- Irrigation system performance:
 - Drivers.
 - Change to CGIAR System Level Objectives (SLOs).
 - Adequacy, equity and reliability of water for Evapotranspiration.

The objective of this workshop: Identify technical, policy and institutional research needs to enhance success of irrigated agriculture in SSA.

Questions, answers and comments

Question no. 1: Where are we within the WLE cycle and what comes out of this workshop – is the money already there ready for direction or will the workshop outcomes feed into project proposals?

Answer: There is funding to start initiatives – if you have to take each cluster – funding for those projects are coming through WLE. This is a new way of doing business. It could open the door to everyone who has the skill to make a change which requires funding. What WLE should be doing is enabling the generation of the start and finding the funds for supporting projects. This is about providing guidance on the priorities for irrigation.

Question no. 2: What is the timescale – short-term – five years – 15 years?

Answer: The initial stage is 3 years, but these are long-term projects from CGIAR point of view and partners have long-term commitments. Also, since the research is transdisciplinary, this requires a long-term focus.

Question no. 3: How much is it linking with the investments that are going on (World Bank, European Union [EU], Japan International Cooperation Agency [JICA], etc., and private investments from the Middle East sovereign wealth funds, etc.)? It is a big challenge to know how to steer these very large investments in the right directions.

Answer: There are a lot of initiatives going on at national and regional level. To get a foothold in there is to achieve impact from research. Some of these initiatives are going ahead without detailed analysis and some are being pushed by development investors. We plan to provide the evidence-based decision making in these initiatives and programs, to ensure they are successful. National-level priorities are a key focus of this workshop.

Question no. 4: A common question from African governments is about investment and how to prioritize investments in irrigation versus rainfed water for agriculture. What's needed is a comparative analysis.

Answer: Governments are investing in both, irrigation and rainfed agriculture. So, the question is how to do this together to achieve the best outcome from these investments. Rainfed and irrigation are a continuum linked together to achieve the best impact. The SRPs are 'homes of expertise' on specific issues which can be brought to bear on projects and initiatives.

Session 2: A Look at East Africa (chaired by Tilahun Amede, International Crops Research Institute for the Semi-Arid Tropics [ICRISAT])

The status and challenges of irrigation and drainage development and research in Ethiopia - Abiti Getaneh, Ministry of Water and Energy of Ethiopia

Summary of presentation

- Ethiopia has many large flood events that it has not been able to effectively utilize.
- Population density in the East but water resources in the West – generally speaking.
- Total irrigable land potential in Ethiopia is **5.3 Mha**. This number is subdivided as shown below:
 - 3.7 Mha from gravity fed surface water.
 - 1.1 Mha from groundwater.
 - 0.5 Mha from rainwater harvesting.
- Current developed land (2.4%).
- Development plans (100%).

Current irrigated agricultural practices:

- Approximately 62% of the area under irrigation so far is located in the Rift Valley, while 29% is located in the Nile Basin.
- The remaining 9% is located in the Shebele-Juba Basin.
- Nearly 100% of the irrigated land is supplied from surface water, and groundwater use has just been started on a pilot scale.
- Surface irrigation is the most common irrigation method widely practiced.
- Sprinkler irrigation is practiced on about 2% of the irrigated area for sugarcane production by the government and some private enterprises.
- Spate irrigation and flood recession cropping are practiced in the lowland areas of the country.

Issues that have major research potential:

- Irrigation water losses and irrigation efficiency.
- Salinity.
- Irrigation water quality.
- Inconsistent and unstable irrigation institutions.
- Sustainable use of groundwater for irrigation.
- Sustainability of surface water and groundwater utilization.
- Water harvesting techniques and technologies.
- Reinforcement of policies and regulations.
- Environmental management.

It would be good to learn from institutions such as the Ghana Irrigation Development Authority (GIDA) and to see what knowledge could be transferred to Ethiopia.

Addressing constraints to success of irrigated agriculture in Kenya - Isaya Sijali, Kenya Agricultural Research Institute

Summary of presentation

Water productivity:

- Irrigation is important for increasing productivity in Kenya's arid and semi-arid lands (ASALs), accelerating economic growth and decreasing rural-urban migration.

The main constraints in the Kenyan irrigation sector are:

- inadequate documentation on water-use efficiencies in the public and private schemes (yields per unit of water extracted, i.e., water productivity), and
- inadequate research in water-use efficiencies, actual water loss through runoff, actual and potential water storage capacity, actual and potential groundwater capacity, and per capita water resources in Kenya.

Potential partners in this research include:

Kenya Agricultural Research Institute (KARI), Ministry of Agriculture (MoA), Kenya Irrigation and Drainage Association (KIDA), Universities, Kenya National Federation of Agricultural Producers (KENFAP), Farm Concern International

East Africa – questions, answers and comments

Question: How can we best target the rolling out of research results? What are the capacity needs?

Question: In talking about moving to 100% irrigation in Ethiopia – what will be the focus, large- or small-scale irrigation, foreign or local smallholder, and 100% by when?

Question: Regarding water-use efficiency – the amount you spend on researching this area limits the amount available for implementing alternatives to efficiency.

Question: What about the extent of the impacts of irrigation schemes on small-scale farmers – how much large-scale irrigation is inclusive of, and promoting, technological transfer to small-scale farmers?

Question: What is the ultimate objective in increasing irrigation, and, therefore, how to deploy irrigation?

Question: How well or badly is irrigation doing? Do you have comparisons between productivity and impacts of irrigated land versus land that has the potential to be irrigated?

Question: Why have we not seen any focus on productivity, or on the social and economic issues that will help prioritize research?

Question: What crops will be included in the analysis of water efficiency and crop productivity?

Question: In discussions around the performance of public irrigation systems, are we not being misled by talking about water efficiency?

Question: What modalities or models are there to encourage youth in Africa to stay in (profitable) farming?

Question: Could the spillover benefits from private irrigation development reach small-scale farmers and also public large-scale farms?

Question: Is there an irrigation strategy in Kenya or Ethiopia? If so, what are the objectives of these strategies?

Question: What about developing water fees for farmers? For example, working on opportunity costs, environmental costs, etc., and linking these costs to the value of output (for example, to a kilogram of sugar). How do we charge/adapt water fees linked to changing commodity prices?

Question: How can we compare the demographics and needs of small-scale farming with those of large scale farming?

Question: How can research further address and develop beneficial linkages between small-scale and commercial-scale irrigation opportunities, and the diverging constraints between small-scale and large-scale irrigation?

Answers (on Ethiopia):

The Ministry of Water and Energy of Ethiopia is partnering with universities to train national staff on irrigation engineering and hydro-engineering, with engineering as the primary priority. The target is to train 250 postgraduate engineers.

The first priority in irrigation development is food security. The time span of irrigation development is the next 7 years as part of the current 10-year plan. The government plans to use dams to collect annual floods in the South. This will be for small- to mid-scale irrigation as well as large-scale irrigation mostly for sugar production, but the government is also looking at other crops.

There is a strong need for a 'sustainable national irrigation authority'. The government needs assistance from IWMI in developing this 'national irrigation authority'.

We have a national irrigation policy and strategy, with plans to update this every 5 years.

We are starting to finance MSc students to work on water-use efficiency at the farm level, and we're working with university partners in developing curriculums based on what skills are needed in the country.

Addis Ababa University is working on this and also on the social and environmental issues related to the value of water. From this we understand that Ethiopian farmers with over 2 hectares of land will pay for irrigation water.

Answers (on Kenya):

We are targeting how to work with national organizations for project and program sustainability. In terms of capacity, farmers are the target through Water User Associations (WUAs), extension services and through exposure to national irrigation researchers.

We are looking into partnering with IAEA, among others, to examine developments in water-use efficiency.

Commercial farms could be targeted as they could be doing more to use local and national experts (when/if they are available).

Objectives – research needs to engage at the national level to help move things forward on regional priorities and objectives. The key areas are food and income security, and environmental sustainability.

Currently, only 5% of the irrigation potential is exploited in Kenya.

Social and economic issues are often missed out in irrigation research and in the implementation of solutions.

The focus crops chosen for irrigation development projects and schemes should be according to the needs of the community and farmers (based on food security and profitability).

There is currently a disconnect between specific crops and their relevant irrigation potential.

Kenyan farmers are moving towards plastic tunnel use in a big way. Therefore, research needs to be carried out on the use of this method, and assess whether it pays to invest in it and what the trade-offs are.

Young farmers need to be engaged with a focus on technology. Workshops such as this one, which bring together policy learning across regions, are critical - *“this is why I’m here.”*

Irrigation is critical to the manifestos of both the main political parties in Kenya, but neither are considering irrigation research needs enough as part of this.

Why are farmers not progressing from subsistence to businesses through the use of technologies such as treadle pumps?

Efficiency of water and inequity of water supply are key issues that need to be addressed.

The focus should be on targeting irrigation for both food security and for income generation.

Comments:

The appropriateness of research with what needs to be achieved, and what and who is being targeted is critical. One solution that fits A (national strategy) may not be appropriate to B (farmers). What is of interest to farmers is key, and for this participatory research is needed.

Research needs: Need to know more about the links between large-scale irrigation systems and small-scale farmers as out-growers.

There is also a need to empower farmers to sign contracts to market products according to agreed prices and quantities.

Farmers closer to cities are more able and more willing to pay for water for irrigation.

Session 3: A Look at Southern Africa (chaired by Bruce Lankford, University of East Anglia, UK)

Private sector involvement in agriculture in the context of the Comprehensive Africa Agriculture Development Programme (CAADP) - Njabulo Zwane, Illovo Sugar Limited

Summary of presentation

- Why CAADP – increasing agricultural production, sustainable economic growth, and food and nutritional security.
- Integration and research financing are needed.
- Strengthen institutional arrangements.
- Investment plans and policy reforms.

Rationale for Irrigating Africa

- We have not used the full potential of what we have in terms of technology.
- Assist the government to implement projects for the rehabilitation of existing projects.
- Help countries identify policy and technical reforms that need to be undertaken to create a suitable environment for irrigation.
- Assist countries to mobilize additional national private sector and external resources to fund irrigation projects.

Some of the work carried out – experience over the last few years from small-scale farmers – including the private sector:

- Issues related to access to land.
- Political challenges.
- Competitors for other crops.
- World food price fluctuations.
- Fuel and electricity access, reliability and cost.

Institutional capacity and alignment:

- Many other actors who are actually working with the smallholder farmers.
- We have to look at the entire value chain from the logistics to the marketing, and packaging of the product itself.

Long-term financing of the system is needed, if the model is to be sustainable.

Conclusion: Encourage countries to go through with their investment plans and the private sector will be able to get involved.

Addressing irrigation policy, institutional and technological constraints through project design - Barnabas Mulenga, Irrigation Development Support Project

Summary of presentation

Addressing irrigation policy, institutional and technological constraints through project design: Irrigation Development and Support Project (IDSP) in Zambia.

The World Bank has provided around USD 200 million support for irrigation development in Zambia.

Zambia holds around 80% of the surface water of the Southern African Development Community (SADC) region.

Key irrigation development challenges:

- Local farmers shun treadle pumps, and Chinese motorized pumps are sold for not more than USD 50 more than the price of a treadle pump. These motorized pumps are very popular.
- Small dams of less than 9 m: Concept of water harvesting – is not sustainable in Zambia.
- Irrigation policy is skewed towards large-scale farmers.
- Labor is not cheap.
- Lack of complementary provisions – input market accessibility and lack of reliable markets and agro-services.
- Lack of conducive policies and a development policy framework – lack of directional guidance to incorporating partners on the approach to technology.
- The presenter said that Zambia needs IWMI's advice on what should be focused on and what is feasible for irrigation development in the country.

Improving water-use efficiency and basic infrastructure for smallholder farmers to make use of available water – Dr. Ricardo Maria, Instituto de Investigação Agrária de Moçambique (Institute of Agricultural Research of Mozambique) (IIAM), Mozambique

Summary of presentation

Dr. Maria made the point that, in Mozambique, farmers need dams for irrigation.

Challenges:

- Capacity of existing irrigation infrastructure.
- Limited capacity of agricultural support systems.
- Lack of agricultural policy conducive to development of irrigation systems.
- Lack of resources for rehabilitation and maintenance of existing irrigation schemes.
- Conflict of interest among institutions over agriculture and water.

What needs to be done:

- Policy and advocacy for institutional and legal reforms on water, and small-scale irrigation use and maintenance.

Comprehensive Africa Agriculture Development Programme (CAADP) – the case of South Africa - Njabulo Zwane, Illovo Sugar Limited

Summary of presentation

In this case, there are three categories of farmers:

- Medium-scale farmers (MSF).
- Small-scale growers.
- Registered farmers.

There is a shortfall of the MSF projects:

- Criteria of the selection.
- Majority of the farmers are 80% geared (economies of scale).
- 87% of the farms received no government support at any stage.

Financial intervention is aimed at re-establishing the use of irrigation systems, rehabilitating infrastructure, purchasing of new equipment and skills development.

Irrigation in South Africa - Mary-Jean Gabriel, Department of Agriculture, Forestry and Fisheries, South African Government

Summary of presentation

Only 1.6 Mha of agricultural land is currently irrigated, and around 50,000 hectares of this area is owned by smallholder farmers.

Some of the challenges include security of land tenure, access to water, funding, extension, lack of irrigation specialists, lack of training for farmers and water quality.

Governance structure is at the national, provincial and local levels. We work closely with the Department of Water Affairs. The Department of Rural Development deals with land usage.

With a view to training and capacity building, we participate in forums related to water use and irrigation.

Partnerships include:

Water quality task team; water use and irrigation working group; coordination committees on agricultural water; and forums with the Department of Water Affairs, Department of Rural Development and Department of Science and Technology, provincial departments of agriculture, South African Irrigation Institute, South African Regional Committee on Irrigation and Drainage, and International Committee on Irrigation and Drainage.

Strategic interventions:

Research support for eight projects. Support on issues related to water, agriculture, forestry and fisheries sectors. We also work with other departments and develop guidelines, and documentation is available on the website. We participate in a joint management committee with Lesotho and Mozambique as they are our end users. There are a lot of bilateral agreements with various countries all over Africa. We are involved in agreements along with IWMI, South Africa.

KwaZulu-Natal University is training agricultural engineers with support from the South African government.

Southern Africa – questions, answers and comments

Question: The framework management company – do we have enough figures to see the impact and what does the farmer get at the end? Do you have any figures (in the public domain)?

Question: Has there been an evaluation of the process that has been followed before?

Answer: CAADP: What we do in conjunction with the managing company. We assist the managing company – help farmers in terms of negotiation and help in developing the agreement; provide extension support, with training, ongoing work, surveying, mapping, soil testing, and pest management and disease control. Managing the harvesting data. In terms of figures: one of our interests is that we are planning to do some cost-benefit analyses.

There has been no involuntary resettlement in this scheme.

There was mistrust between the service providers and farmers, so Illovo Sugar Limited provided capacity building, negotiating facilities and activities in fora to resolve this.

Farmers have been able to access and be part of technical services through large- to small-scale interactions.

Question: Are you addressing issues of water quality and pollution in relation to climate change?

Answer: We are not looking at climate change and water quality. We look at the areas where smallholder farmers exist. We have a department of health that addresses water quality issues. The studies determine what crops should be grown and expanded in certain areas, for example, our maize area has been expanded. Other departments: they step in, but we work with them. Different government departments are working together, but there is still room for more cooperation.

We are assessing the risks to smallholders' crops as a result of pollution through irrigation.

Comment: The case in Ethiopia is different from the one in South Africa. It would be good to learn more about experiences in South Africa.

Question: What are the criteria for getting loans from the commercial banks? What are the viable rates?

Answer: CAADP: We have a special arrangement where the normal rate is 18% as long as they invest the money in agricultural development. We have moved away from land as being the focus for collateral, and we have different insurance packages. There are also ring-fenced funds for credit for agricultural development. Through partnerships with the banks, Illovo Sugar Limited is a guarantor and repayment is to be made post-harvesting. Illovo Sugar is trying to get other banks involved in creative ways.

Question: Why don't you set up cooperation with Madagascar as they have several years of experience in irrigation?

Comment: There is a huge difference between irrigation in South Africa (private-sector driven) and West Africa (food-security driven). Governments in West Africa don't have funds or the technical capacity to develop irrigation further. We should have more meetings between the two regions to share ideas, observations and experiences.

Question: How to make out-growers efficient suppliers for sugar production? Are there good examples out there?

Session 4: A Look at West Africa (chaired by Peter McCornick, International Water Management Institute [IWMI])

Ghana: Food security and national requirements - Ben Nyamadi, Ghana Irrigation Development Authority (GIDA)

Summary of presentation

The livelihoods of local farmers are critical, over and above food security. There is a need for assessing and documenting groundwater resources, and linking these with the sustainable extraction of groundwater for agriculture in Ghana.

Integration of the market and research into system level management need to be examined as well as institutional obligations. There is definitely a need for expansion of agriculture, and increasing operationalization to ensure maximum productivity of limited agricultural land is achieved.

According to the Ghana Shared Growth and Development Agenda (GSGDA), 30% of foreign investment must involve/reach local inhabitants and this includes irrigation and agriculture.

Water sector challenges:

- Irrigation has not made the expected impact.

Policy challenges:

- Irrigation is mainly supply driven.
- Low capacity in the construction of dams.
- High cost of construction.
- Organizational issues leading to frequent rehabilitation.
- Inadequate support services.
- Inadequate attention is paid to groundwater resources for irrigation.
- Inadequate information of small-scale private irrigators and their integration.

Research considerations:

- Irrigation management transfer that will be ideal for the Ghanaian environment.
- PPP model(s) needed to ensure sustainability – particularly with the out-grower system which is generally working well, but there has not been too much focus on irrigation (so far).
- Appropriate technology for small/medium-scale farmers for sustainable water management.
- Statistical information on the private (informal) small-scale sector and their integration.
- Availability and quality of groundwater resources for irrigation development.

Market development of low-cost irrigation technologies to improve production and productivity for smallholder farmers - Laurent Stravato, iDE Burkina Faso

Summary of presentation

Laurent provided an introduction to iDE and their work as social entrepreneurs.

Key question – why do poor farmers invest in mobile technology but not in irrigation for agriculture?

Micro-credit and groundwater are very important for irrigation development. There is a need to research the right scale, impact and cost-effectiveness. iDE asks farmers, *“What do you like that is applicable to you as a farmer with a lesser cost?”* iDE looks at production and productivity, water saving, time gain of using new technology or systems and irrigation efficiency, and tries to clearly show the return on investment. iDE tends to go for organic development and don't want to sell too much, but want to have fewer complaints about technologies or systems from the end users.

Opportunities and challenges for irrigation in Niger

Summary of presentation

The presentation was based on Niger's irrigation strategy. Two-thirds of the country consists of desert areas, and 11% is suitable for rainfed agriculture. Population growth is very high and, therefore, is not able to rely on rainfed agriculture alone. There are also land-degradation challenges which result in Niger being a food-insecure country. The Niger Valley crosses the country and is a very important source of water. There are four categories of irrigation:

1. Irrigation schemes built by the government.
2. Dry-season irrigation systems – no full water management and only used for dry-season irrigation of vegetables, supported by public services.
3. Small-scale private irrigation – a few hectares – funded by the World Bank.
4. Rainwater harvesting systems.

Constraints:

- Resistance within the public sector to economic reforms and liberalization.
- Technical issues – the country has efficient improved technologies and is open to new technologies, but there is no master plan for watershed/irrigation development.
- There is no farmer's union or lobby group to work on policy issues related to agriculture and irrigation.
- Lack of capacities to take over water management systems.
- Productivity of irrigated agriculture – the opportunity is there. Farmers require good/better skills to take advantage of incentives (packages).

- Size of irrigated land area is very small. Problems related to crop varieties and pest control exist.
- Lack of capacity of Niger farmers in using fertilizer, which leads to polluting the water.
- Lack of management – cost-benefit environmental intervention.
- There are also land-tenure issues.

Exploiting the agricultural potential of irrigation and drainage for rice production – Dr. Jide Olumeko, Federal Ministry of Agriculture and Rural Development, Nigeria

Summary of presentation

Annual rainfall in Nigeria ranges from 250 mm in the North to 4,000 mm in the South. Runoff is estimated at 250 billion cubic metres (Bm³) per year with surface water equal to 226 Bm³. Irrigable land stands at around 3 Mha. Informal irrigation is prominent, although river basin-scale and private investor-led formal irrigation also exist.

The challenges:

- Integrated dams and the possibility of exploiting both power generation and irrigation.
- Infrastructure maintenance.
- Subsidies not getting through to the end users.
- Keeping young farmers on the farm in a productive and lucrative way.
- High cost of equipment – irrigation accessories.
- Lack of information for farmers:
 - Crop water requirements at different crop development stages are not clearly known or understood.
 - Likewise, not enough is known or understood about evapotranspiration and consumptive water use.
 - The gross irrigation water requirement is also not well understood.
- Policy implementation.
- Ineffective handing of irrigation from a business perspective.
- Inadequate extension services.
- Power supply challenges.
- Lack of water user associations and the costs involved in obtaining water.
- Lack of effective collaboration among relevant stakeholders in the country.
- Lack of understanding of the economics of water use.

Effect of the challenges:

- Domestic rice production is mostly under rainfed cultivation.
- Nigeria is importing rice – around NGN 365 billion a year.
- Production and productivity are not given adequate attention.
- Post-harvest handling of rice is also a problem.

A number of options have the potential to improve the situation. For example: insurance for farmers, greater collaboration among ministries (energy, trade, etc.), capacity building initiatives, re-activation of extension department, sale of irrigation systems with a 50% subsidy to farmers, further exploitation of the by-products of crops to reduce the costs of products, better on-farm storage, development of a national food reserve, cluster farmers around a factory or other processing plant, and expand the out-grower system.

Overview of irrigated agriculture in Nigeria: Prospects and constraints - Sani Miko, Sasakawa Global 2000

Summary of presentation

- Complex working structure for irrigated agriculture – Federal Ministry of Water Resources (manages water), Federal Ministry of Agriculture and Rural Development (manages research and extension), and the Federal Ministry of Environment.
- Three irrigation schemes.
- Public, farmer-owned and residual flood (*Fadama*).
- Major crops - rice, wheat and vegetables – can bring income.

Irrigation potential of Nigeria:

- Five-percent of the land is suitable for irrigated agriculture.
- Thirteen river basin development authorities, and funded by the ministries of Agriculture and Rural Development, and Water Resources.

Constraints:

- Planning and design flaws.
- A bias towards investment in hardware (infrastructure and machinery), thereby neglecting the software requirements (policy formulation, institutional strengthening and capacity building).
- Inadequate financial resources for operations and maintenance.
- Inconsistency in government policy that established the River Basin Development Authorities (RBDAs).
- Corruption and rent-seeking.
- Lack of organized farmer groups and Water User Associations.

- Inadequate skills and manpower.
- Decay of irrigation infrastructure.

Researchable areas:

- Irrigation methods/water management techniques for crops.
- Salinity and groundwater problems (management and control).
- Water harvesting technologies.
- Socioeconomic studies on existing irrigation schemes.
- Sustainable use of poor-quality water for irrigation purposes.
- Deficit irrigation techniques.
- Evapotranspiration management.
- Bio-drainage for waterlogged areas.
- Participatory Irrigation Management (PIM).
- Cropping strategies to mitigate the effects of water scarcity.
- Drought mitigation through supplementary irrigation.
- Alternative water-lifting devices.
- Conflict resolution strategies on resource use.

West Africa – questions, answers and comments

Questions:

- Gap between potential and actual irrigation.
- iDE: Where does iDE fits into the value chain – do you control the entire chain – have you archived all your experiences and how do we get access to it (very specific questions related to iDE)?
- How is livestock being considered in this (irrigated fodder, livelihoods and pastoralists)?
- Underperformance of irrigation systems and lack of capacities. How do we address these questions (especially the ones related to Nigeria)?
- How do we address the questions of corruption, through irrigation subsidies, for example, and conflict over water resources?
- Accountability – comparing best performance – what is the accountability around these investments?
- How do we involve the private sector more/effectively?

Answers by the presenters:

- **iDE presenter:** Volume and business model: importing the Asian model. We have business models for 5 years. Good models in India.

- **Nigeria's presenter (Sasakawa Global 2000):** Salinity – because of poor maintenance. Less training on how best to use the inputs. On subsidy – liberalize the issue of inputs. Conflict resolution – ILRI fodder project – ILRI acted as catalyst and mapped out strategies.
- **Nigeria's presenter:** The problem we have is seed qualities – dependency on the importation of machinery and chemicals (problem of fake agrochemicals being imported). We need a market-driven approach.
- **Ghana presenter:** Livestock aspect: Every irrigation project production system and livestock has been clearly taken care of. Socioeconomic issues: Ghana has completed policy and strategy development, the next step is to go into how we proceed with implementation. What are the business models for people to uptake and go into the detail - in the form of technical feasibilities? We are going to look at each small, medium and large scale, so that we can come up with a business proposal that fits all individual scales.
- **Presenter from Niger:** Niger has established an irrigation agency and extension services to handle issues about irrigation policy. In the 1980s, there was an economic change which led to a cut in public expenditure. A consequence of this economic change has been the degradation of irrigation infrastructure in Niger. Farmers are now going into debt to upkeep and manage the systems. The government is now thinking of reorganizing/modernizing irrigation development in Niger, and Niger's irrigation agency. All irrigation systems are managed by farmers. Niger is calling for assistance from research institutions to help with designing new irrigation policies for Niger and in helping to re-establish an effective Niger irrigation development agency.

Session 5: WLE Partner Institutions Panel Session (chaired by Timothy Williams, IWMI)

Representatives from some of the 14 WLE partner institutions provided a brief overview of their organization and organizational priorities with regards to irrigation development, and their involvement in WLE.

These organizations included: International Center for Agricultural Research in the Dry Areas (ICARDA), International Water Management Institute (IWMI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Food Policy Research Institute (IFPRI), Food and Agriculture Organization of the United Nations (FAO), and AfricaRice.

Questions, answers and comments

Question: In light of the presentations made yesterday and today regarding the irrigation sector, I want you to describe the way WLE should handle forming partnerships and alliances to raise these issues. What do you see as the main issue your institution is willing to address in terms of the WLE partnership?

AfricaRice: Food security issues. Technical issues: We are working on water self-sufficiency, irrigated systems, and lowland and rainfed systems. We come up with solutions with the farmers. The genetic improvement program addresses the food security issue separately.

FAO: There are opportunities for private irrigation. Is there hope for improving public irrigation schemes? Perhaps there is a need to focus on improving the performance of public schemes. SSA is still importing the majority of its food, so productivity has to rise and this will require more efficient and effective public irrigation schemes.

IFPRI: I think the big question is, should it be food security at a household level or food security at a regional level? How do you deploy the right irrigation schemes?

WLE defines the health issues. Nutrition aspects: Are you growing vegetables to eat or sugarcane to sell? Do you want to be self-sufficient in producing rice but import vegetables? It depends on what the people in the country want to do. WLE can bring that in along with ecosystem services and make sure that the negative environmental impacts that we have seen in other countries are avoided. There is an important capacity building component, linking the needs in the countries with the resources that exist.

ICRISAT: First concern: In Nigeria, there are challenges of maintenance. There is a lot of interest in irrigation in Africa and national structures are ready to invest in irrigation, but in terms of technicality there is a lot of over-designing without consulting the farmers. I am impressed by the participatory scheme design of engineers working closely with farmers, so that they can set up something that really works and really addresses a need.

Second concern: Efficiency of existing schemes: They shouldn't need external support. If you go to the irrigation systems – regardless of the investment – the users abandon schemes because they don't have market access. Linking markets to farmers is important.

Third concern: A lot of water is not reaching the farms.

Fourth concern: There are quite a few cases of an established irrigation scheme, but then a new donor moves in and moves the farmers onto a different scheme/system.

IWMI: A number of areas of interest are coming to light from yesterday's discussions. For example, we need to be looking at how to improve existing irrigation systems in ways that are acceptable to, and make a difference to, the poor. The PPP model is being implemented in many countries. We need to further analyze this to identify the strengths and weaknesses of the model.

Improving existing systems – irrigation management transfer is being followed by the World Bank and some nongovernmental organizations (NGOs), but the performance of these systems is not solid. Are there any improvements which can be made so that it works properly?

We need reforms in irrigation policies. Some policies are outdated in some countries. We need to customize our policies. Energy policies - can we think of subsidizing energy? It worked in India but with lots of early challenges. What is the smart way of doing that in Africa?

Irrigation issues: Many organizations are involved. Is there a way that we can advise governments to come up with solid structures to facilitate this?

Work from the demand side. Irrigated agriculture should be self-sustained and profitable for the farmers.

ICARDA: Research for development. We focus on what we have and start with the technology transfer. We need to identify, test, evaluate and introduce. This includes: technology transfer, development research, capacity development – lack of professional practitioners, young scientist development program – new graduate PhDs working with international research to solve problems.

Question: There is a need to look at irrigation in a catchment context. What do we mean by 'water-use efficiency'? Perhaps this needs to be more closely looked at to ensure that this really makes sense and that we all mean the same thing when we use this term. Capacity building should be learning by doing. How do we get more learning into the system? Perhaps farmers should have mentors from time to time?

Comment: WLE shouldn't work in a vacuum. We need to map this all out. We need to understand how the various projects and initiatives are all working together to avoid duplication of work.

Comment: There is a lot of development going on in terms of small-scale agriculture. Some of the constraints affecting farmers include getting access to credit and markets. There are a lot of groundwater resources, but there are also limits to what you can do with the groundwater in terms of sustainability.

Comment: Use of fertilizers in Africa has been stagnant for the last 40 years. Looking at the way forward, we should be looking at ecosystems and using more locally available resources to increase agricultural production and relying less on external inputs.

Comment: Will WLE have an executive function? WLE needs a 'military wing'.

Sessions 6, 7 and 8: Group Work – Developing New Research Project Ideas

In Sessions 6 and 7, participants were divided into four groups: East Africa, Southern Africa, West Africa and Pan-Africa. Each group was asked to conceptualize concept notes, which pinpointed to key research questions, objectives, activities, beneficiaries, actors, target countries and timescale for potential new research project proposals, with a view towards revitalizing irrigation in sub-Saharan Africa. Participants were generally engaged in the group which most closely reflected their region of expertise.

The following concept notes were formulated by each of the four groups:

Concept notes: East Africa

1. Assessing water availability for sustainable use in different irrigated farming systems.
2. Optimized value chains for smallholder irrigation farmers.

Concept notes: Southern Africa

1. The success and failure factors of public smallholder schemes.
2. Review of agribusiness partnerships for smallholders.
3. Appropriate technologies for private irrigators, and the appropriate financing mechanisms/models.

Concept notes: West Africa

4. Analyzing the performance of public-private partnership (PPP) models in irrigated agriculture.
5. Policy research: Enabling environment for water issues.
6. Enhancing water availability and productivity.

Concept notes: Pan-Africa

7. Research management framework: Making sense of multiple research ideas and priorities.
8. Country growth/strategy framework: Helping countries and donors draw up sustainable equitable growth plans.
9. Data management framework: Making sense of multiple data needs and gathering for the other two frameworks (research management and country growth/strategy frameworks).

East Africa

In context to new research priorities, it was noted that the governments of Kenya, Ethiopia and Tanzania had all expressed the expansion of both large- and small-scale irrigation as a priority. There is a desire to achieve this through horizontal expansion and vertical improvement, and there is recognition of the potential of the value-chain approach to contribute to this process. Tables 1 and 2 summarize the concept notes developed.

CN 1: Assessing water availability for sustainable use in different irrigated farming systems.

Context	Irrigation has immense potential to close the yield gaps present in the region.
Fit with regional focus	Expansion of small- and large-scale irrigation identified as a priority for the governments of the region.
Outcome	Improved livelihoods through well-informed and designed water policies; database creation.
Benefits	Reliable, equitable and sustainable development of water infrastructure will ultimately lead to: Productivity increase, gender-focused income growth, diversified work opportunities and improvements in access to water for the poor.
Beneficiaries	Smallholder farmers, and public and private investors in large irrigation schemes.
Main target	Policymakers, water resource managers.
Countries	Kenya, Ethiopia and Tanzania
Pro-poor/gender issues	Improved information for water resources development and planning will benefit all sectors and stakeholders; incorporating gender-responsive and equitable resource endowment plans.
Impact on ecosystems	Underutilized and vulnerable components of the ecosystem will be identified, and its resilience improved.
Objectives	<ul style="list-style-type: none"> Quantification of spatial and temporal variability of available water to sustainably support irrigation.
Novelty	Comprehensive and reliable database of water resources; the type and extent of interventions to improve irrigation will be determined based on reliable data, leading to sustainable intensification and crop diversification.
Knowledge gaps	Lack of data for comprehensive analysis.
Partners	NGOs, implementing partners (CGIAR, FAO), ministries, National Agricultural Research Systems (NARS) and universities.
Design	<p>The project will undertake the following activities:</p> <ul style="list-style-type: none"> Review of available information, with a mapping exercise. Inventory of ongoing activities in the region to improve irrigation management, extent of irrigation and use of water-measuring withdrawal rates. Modeling scenarios of change. A validation feedback process. Institutional analysis, development of ET map(s).
Resources	Three-year time frame.

Table 1. Concept note 1.

CN 2: Optimized value chains for smallholder irrigation farmers.

Context	Smallholder irrigation suffers from many constraints; the value chain approach may help in identifying the constraints and opportunities for the same. In particular, identification and removal of constraints to irrigation management will ensure that smallholder incomes and livelihoods are not constrained by water.
Fit with regional focus	Appreciation of potential of value chain, and water is an important input which adds value to smallholders' productivity.
Outcome	Improved livelihoods through efficient and optimum value unconstrained by irrigation services.
Benefits	Increase in revenues, improvement in livelihoods.
Beneficiaries	Smallholder farmers and consumers.
Main target	Agents of the irrigation value chain - farmers, service providers and consumers.
Countries	Kenya, Ethiopia and Tanzania.
Pro-poor/gender issues	Smallholder irrigation is intricately linked with poverty and gender issues of the region. Most of the irrigation activities are carried out by women. Therefore, the project will be developed by focusing on women as being the primary beneficiary.
Impact on ecosystems	Indirect impacts resulting from improved livelihoods of local communities.
Objectives	<ul style="list-style-type: none"> • Identify constraints and opportunities, especially how they affect women farmers. • Availability, access and water efficiency, and the role of wastewater in the value chain.
Novelty	New and consistent approach to analyzing irrigation system performance and future investments in the irrigation sector in the region.
Knowledge gaps	Very few have carried out value chain mapping for the region. There has been some work on mapping of the value chains for rainfed crops in Kenya.
Partners	NGOs, implementing partners (CGIAR, FAO), ministries, National Agricultural Research Systems (NARS) and universities.
Design	Key activities to include: <ul style="list-style-type: none"> • Mapping value chains (typology, actors, etc.). • Holistic, participatory research/analysis. • Economic analysis. • Development of models of the value chain of irrigated systems.
Resources	Three-year time frame.

Table 2. Concept note 2.

Southern Africa

The overall goal was expressed as ‘efforts to improve food security and income of smallholders’, with a timescale of 15 years to develop long-term partnerships. Tables 3, 4 and 5 summarize the concept notes developed.

CN 1: The success and failure factors of public smallholder schemes.

Context	Smallholder agriculture is an integral part of this region, but their success had been variable. There is a need to identify and promote conditions that lead to success of smallholder agriculture.
Fit with regional focus	Many governments have initiated multiple public schemes for smallholder agriculture, but a thorough analysis is deemed essential for making such future policy discourse on these issues.
Outcome	Informed public policy for smallholders.
Benefits	Better policies will help in moving a step closer to better incomes from increased production.
Beneficiaries	Small-scale farmers, commercial farmers, pastoralists, private sector, and local and national governments.
Main target	Farmer organizations, government agencies, research organizations and local communities.
Countries	South Africa, Zambia and Mozambique (Southern and Central).
Pro-poor/gender issues	Smallholder agriculture directly linked with gender and poverty issues. The project has a direct bearing on them.
Impact on ecosystems	No direct impact.
Objectives	To provide information on the problem in order to improve intervention (e.g., redesign, incentives for policy, training and markets).
Novelty	Policy analysis specific to smallholders will be a relatively new concept.
Knowledge gaps	Not many studies have been carried out to review smallholder-specific public policy.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	Activities to include an inventory (e.g., were lessons learned implemented?), identification of successful and failing schemes, and factor mapping (including policy, design, crops, actual intervention process, etc.).
Resources	Three- to five-year time frame.

Table 3. Concept note 1.

CN 2: Review of agribusiness partnerships for smallholders.

Context	Novel models of public/private partnerships are being attempted in the region, and their success has been variable. Need to understand socio-policy conditions which promote a win-win situation for smallholders, especially women farmers.
Fit with regional focus	Governments of this region have expressed interest in studies which will help them in providing the necessary information about PPP models for smallholders.
Outcome	Improved partnerships, sustainable agribusiness models.
Benefits	Increased production, realizing better income.
Beneficiaries	Small-scale farmers, commercial farmers, pastoralists, private sector, and local and national governments.
Main target	Farmer organizations, government agencies, research organizations and local communities.
Countries	Countries and crops indicated were: Mozambique, South Africa and Zambia (sugarcane), Zambia (vegetables), and Zambia and South Africa (other crops).
Pro-poor/gender issues	Project targets smallholder agriculture, therefore direct impact on poverty and gender issues.
Impact on ecosystems	Indirect Impact through sustainable PPP models.
Objectives	To understand pre- and post-conditions which favor successful PPP models that increase profit for smallholders.
Novelty	PPP does not burden the governments to invest, but to create an enabling environment where equitable benefit sharing is assured.
Knowledge gaps	Detailed analysis of performance management of such initiatives is missing.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	Activities to include: reviewing existing models and factual experiences/benefits in SADC (factual net incomes, risks, etc.), choosing field sites for comparative in-depth research, and the subsequent derivation of appropriate models.
Resources	Three- to five-year time frame.

Table 4. Concept note 2.

CN 3: Appropriate technologies for private irrigators, and the appropriate financing mechanisms/models.

Context	Private irrigation – especially large schemes to produce for global markets - is expected to play an increasingly important role in the agriculture sector.
Fit with regional focus	Many governments believe private irrigation may provide solutions in the future for various issues of the water sector, and they are, therefore, interested in the study which carries out their detailed analysis of technological and financial requirements.
Outcome	Better designed technologies for the private sector.
Benefits	Increased production, better irrigation services.
Beneficiaries	Small-scale farmers, commercial farmers, pastoralists, private sector, and local and national governments.
Main target	Farmer organizations, government agencies, research organizations and local communities.
Countries	Mozambique (river diversions), Zambia (peri-urban).
Pro-poor/gender issues	The project will also look into alternatives for providing private irrigation for smallholders and thus indirectly affecting such issues.
Impact on ecosystems	Indirect impact through efficient service deliveries resulting in better yields.
Objectives	To better support and inform supply-driven irrigation interventions. Activities to include: the development of an inventory of technologies, and site selection for comparative in-depth field research.
Novelty	A novel concept, which will help in making informed decisions.
Knowledge gaps	Wide lacuna in research for analyzing private irrigation services and their requirements for technological/financial issues.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	A number of crosscutting issues to be considered across the three research questions (concept notes) were noted, including: <ul style="list-style-type: none"> • Management organization within the community; intervention process – were farmers even consulted? • Markets – proximity to towns, possibilities in remote or pastoralist areas, Exchange visits.
Resources	Three- to five-year time frame.

Table 5. Concept note 3.

Questions and comments:

- We need to allocate appropriate financing mechanisms for continuity and sustainability among the private irrigators.
- Didn't see any inclusion of livestock. The by-products of sugarcane can be used for meat production.
- Smallholder agribusiness partnerships – research question – the main question with regards to profit is, profit for whom?
- Are there other criteria to investigate with regard to food security and nutritional health?
- It would be good to conduct research that looks at a sample of the small- and large-scale partnership agribusiness schemes in SSA.
- Smallholder schemes – the countries represented are South Africa, Mozambique and Zambia – how can we derive generic outcomes and apply these to other countries?

West Africa

The West Africa group pinpointed three research areas: Public-Private Partnership (PPP) models, enabling environment and technical issues (enhanced water availability and productivity). Tables 6, 7 and 8 summarize the concept notes developed.

CN 1: Analyzing the performance of public-private partnership (PPP) models in irrigated agriculture.

Context	Various models of PPP have been attempted in the region, and their success had been variable. Hence, replication of PPP models should be based on an understanding of pre- and post-requisites of successful models, and a thorough analysis of existing models is necessary.
Fit with regional focus	The government has shown a keen interest in engaging with the private sector to improve agriculture. Performance analysis will help policymakers further.
Outcome	Informed decisions made by policymakers on such partnerships based on this analysis.
Benefits	Improved partnerships, leading to enhanced production and income.
Beneficiaries	Government agencies, private companies, small-scale farmers and commercial farmers.
Main target	Policymakers, end beneficiaries - Smallholders and large-scale farmers.
Countries	A selection of countries from across Africa.
Pro-poor/gender issues	The project will aim at analyzing PPP routes for smallholder irrigation, and an enabling environment necessary for its success.
Impact on ecosystems	Indirect impact in terms of increased production from such partnerships.
Objectives	<ul style="list-style-type: none"> • Determine pre- and post-requisites of successful PPP models. • Find ways of streamlining the best models in existing government plans. • Discover what PPP models are already being used (inventory, establish baseline). • Evaluate the performance of different PPP models.
Novelty	PPPs take advantage of positive attributes of both sectors, and hence should lead to a win-win situation.
Knowledge gaps	Detailed analysis of performance management of such initiatives is missing.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	Key activities to include: <ul style="list-style-type: none"> • Inventorize existing PPP models in the region. • Analyze their performance with respect to finances, natural resource-use efficiency, equity in benefit-sharing and overall improvement in the livelihoods of the poor.
Resources	Two-year time frame.

Table 6. Concept note 1.

CN 2: Policy research: Enabling environment for water issues.

Context	Policy research is essential in determining the degree of conflicts and convergence among public policies to enhance livelihoods of the poor and resilience of the ecosystem they rely on.
Fit with regional focus	With multiple government schemes available, it becomes necessary to analyze such policy discourse and its implications.
Outcome	Enhanced knowledge about agricultural policies and an enabling environment required for their success.
Benefits	Better and informed policy planning in the future.
Beneficiaries	Small-scale farmers, commercial farmers, pastoralists, private sector, and local and national governments.
Main target	Farmer organizations, government agencies, research organizations and local communities.
Countries	Across Africa.
Pro-poor/gender issues	Policy research will also focus on gender and poverty issues, as these are some of the most precarious issues in sub-Saharan Africa.
Impact on ecosystems	Indirect impact by policies related to ecological systems.
Objectives	<ul style="list-style-type: none"> • Develop an inventory of good practices. • Analyze the following: <ul style="list-style-type: none"> – Government policies in relation to water resources used for irrigation, in particular. – Access to inputs, including energy. – Taxes. – Governance. – Prices. – Enhancing capacity. • Explore the potential of further/alternative financing (e.g., soft loans). • Analyze access to inputs, including energy.
Novelty	A novel concept and will help in making informed decisions.
Knowledge gaps	Detailed analysis of performance management of such initiatives is missing.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	Key activities to include: <ul style="list-style-type: none"> • Analyzing existing policies and associated synergies, redundancies and conflicts.
Resources	Three- to five-year time frame.

Table 7. Concept note 2.

CN 3: Enhancing water availability and productivity.

Context	Most parts of Western Africa is water scarce. Yet, water productivity is low. Quantification of water resources with respect to time and space, and their productivity at local, subregional and regional scales is essential to develop socio-technical interventions to improve water productivity.
Fit with regional focus	Many regional governments are keen and seek guidance on developing policies which lead to improvements in water productivity.
Outcome	Increased water-use efficiency and certainty of availability of both surface water and groundwater resources within constraints of climatic variability.
Benefits	Increased availability of water will not only benefit agriculture, but also other sectors which use water too.
Beneficiaries	Small-scale farmers, commercial farmers, pastoralists, private sector, and local and national governments.
Main target	Farmer organizations, government agencies, research organizations and local communities.
Countries	Niger (Niger and Madger basins), Burkina Faso (Volta and Mohoun basins), Ghana (Volta Basin) and Nigeria (Niger, Ogunosun, Chad and Upper Beune river basins).
Pro-poor/gender issues	Increased efficiency will help smallholders and women in realizing increased incomes; larger availability of water will have to be coupled with access to such resources by poorer sections, in order to succeed.
Impact on ecosystems	Increased water productivity will minimize extraction of water that could have been left for ecosystems.
Objectives and Project Design	<ul style="list-style-type: none"> • Reduce erosion, decrease siltation/sediment accumulation in storage infrastructure. <ul style="list-style-type: none"> – Educate farmers not to farm within a certain range from a water body. – Assess watershed management programs. – Conduct Integrated Water Resources Management (IWRM) multi-stakeholder dialogue on catchment management. – pilot test incentive programs/payment for environmental services. – carry out water quality monitoring. • Reduce the cost of rehabilitating storage infrastructure. • Improve water quality through watershed management. • Improve crop productivity, production and income: <ul style="list-style-type: none"> – Crop water requirements and water-use efficiency. – Water balance and water productivity assessment at catchment and plot level. • Generally, reduce the cost of crop production using and analyzing low-cost technologies.
Novelty	Informed interventions to support ecosystem resilience.
Knowledge gaps	Efficient technologies which increase water productivity have not been locally adapted to suit endemic conditions. The study will aim to address such issues.
Partners	Farmer organizations, government agencies, research organizations and local communities.
Design	Review and analysis of improved technologies will be undertaken.
Resources	3-5 years.

Table 8. Concept note 3.

Pan-Africa

This group proposed three frameworks to guide and structure the WLE process, its relevance and impact:

1. Research management framework.
2. Country growth/strategy framework.
3. Data management framework.

Tables 9, 10 and 11 summarize the concept notes developed for each of the proposed frameworks.

CN 1: Research management framework: Making sense of multiple research ideas and priorities.

Context	How do you design a research framework to assist WLE with structuring research themes that fit the idea of revitalizing irrigation in SSA.
Outcome	Better designed technologies for the private sector.
Benefits	Increased production, better irrigation services.
Beneficiaries	Eventually - all countries.
Main target	WLE partners.
Countries	Mozambique (river diversions), Zambia (peri-urban).
Pro-poor/gender issues	Indirect impact.
Objectives	Develop a conceptual framework to organize research themes and priorities. What is this framework – how might it appear or be designed?
Novelty	A novel concept, which will help in making informed decisions.
Knowledge gaps	Very few research management frameworks that are applicable to the region exist.
Partners	WLE
Design	<ul style="list-style-type: none"> • What is the 2-d or 3-d or n-d matrix? • Identify rows and columns – examples: <ul style="list-style-type: none"> ○ Rows = themes (irrigation typologies, crop typologies, sectors). ○ Columns = crosscutting issues (scale, institutions, capacity). • Outputs = development objectives.
Resources	Two months.

Table 9. Concept note 1.

CN 2: Country growth/strategy framework: Helping countries and donors draw up sustainable equitable growth plans.

Context	How do you design a strategy framework to assist African countries and donors (and other players) to develop realistic estimates/plans for achieving their irrigation objectives?
Outcome	Better planning for irrigation management.
Benefits	Multiple partners will be benefited.
Beneficiaries	Eventually - all countries.
Main target	WLE partners.
Countries	Pilot study = Ghana, Burkina Faso, Tanzania.
Other issues	Access to key data, understand the uncertainty, benchmarking, future projections (land area, growth, etc.). The framework needs to be practical and refine as gain experience. Meet security, poverty reduction and natural resource management objectives.
Objectives	Develop a reasoning support tool to allow governments to make investments in irrigated subsystems at a range of scales (nested systems).
Novelty	A novel concept, which will help in making informed decisions.
Knowledge gaps	Very few research management frameworks applicable to the region exist.
Partners	To be determined; countries under pilot study.
Design	Identify participating country(ies), WLE and project team members, conceptual and research framework.
Resources	1 year.

Table 10. Concept note 2.

CN 3: Data management framework: Making sense of multiple data needs and gathering for the other two frameworks (Research management and Country growth/strategy).

Context	How do you design a data management framework to assist African countries develop realistic estimates/plans for achieving their irrigation objectives?
Outcome	Better planning for irrigation management.
Benefits	Multiple partners will be benefited.
Beneficiaries	Eventually - all countries.
Main target	Ghana, Burkina Faso, Tanzania.
Countries	Ghana, Burkina Faso, Tanzania.
Other issues	Access to key data, understand the uncertainty, benchmarking, future projections (land area, growth, etc.).
Impact on ecosystems	Indirect impact.
Objectives	<ul style="list-style-type: none"> • Design data management and decision support systems, so that this fits with the country strategy frameworks. • Create the baseline and know what strengths to build on, and in which catchments/basins.
Novelty	A novel concept, which will help in making informed decisions.
Knowledge gaps	Very few research management frameworks applicable to the region exist.
Partners	WLE partners, country partners.
Design	Identify data needs; analysis; existing data; new data, e.g., irrigation types, hectares, farmers, crop production, dollars, calories, water consumption and poverty alleviation.
Resources	1 year.

Table 11. Concept note 3.

Questions, answers and comments:

Question: What about the practicality? I am not aware of any country taking a model from one country and using it in another country.

Answer: It is WLE’s role to turn quite ambitious programs into ones that are credible and can be expedited.

Question: Regarding the data management issue, how realistic is it to achieve within one year? It is cost-intensive and needs participation of statistical expertise.

Answer: From the short discussion today, we don’t have an answer yet. This would be an early study on what is achievable and useful. There will be a lot of existing data.

Comment: It would be useful to identify what the data needs are (those which can be practically used very quickly).

Comment: I found this proposal very useful but too rigid. It should include research into the changes in livelihoods and details of what is driving the change such as land fragmentation, population pressure, etc.

Answer: There is a need for going to all scales, including the pan-Africa scale. Can Africa feed itself? Are there kinds of the questions that should be able to be answered out of this?

Answer: Mapping current pressures is also important. What is going on, what has happened and how successful it has been also need to be looked into.

Comment: We have to be very careful. You have to abide by the policies of the government of the country you are researching, and these policies have to be taken into consideration.

Question: What about looking at crosscutting issues?

Question: Can we have a research question on enhancing irrigated systems? Can we look at factors, such as social or institutional, which are preventing the systems from working effectively, and what about enhancing the use of ecosystem services?

Question: We have not explored other issues around ecosystem services. Can we explore research questions around these components?

Question: A key thing that needs to be considered is, what is the role of irrigation in the development of Africa? What is important for a farmer at the household level, to a commercial enterprise and what is important at a national policy level, etc.

Question: I like that you focused on data. My question is, who manages the data? Some countries might not be willing to share data. How do we get data that countries consider sensitive?

Answer: It is a very important point. Data management will be the critical area of WLE.

Workshop Program

A three-day stakeholder workshop convened by the CGIAR Research Program on Water, Land and Ecosystems (WLE) in collaboration with the International Water Management Institute (IWMI).

Day 1 – February 4, 2013 (Monday)

Session	Time	Chair (C)/ Rapporteur (R)	Activities
Session 1 - Welcome and opening	9:00-10:30	Timothy Williams (C)	<ul style="list-style-type: none"> • Welcome address by Timothy Williams • Introduction to WLE and SRP on Irrigated systems - Co-presentation by Andrew Noble and S. A. Prathapar • Understanding the WLE partner roles and interests - panel discussion with (4) partners, interviewed by Timothy Williams (TBC)
Session 2 - A look at East Africa	11:00-12:30	Tilahun Amede (C)	<ul style="list-style-type: none"> • Four presentations by representatives from Ethiopia (2), Kenya and Tanzania • Question and Answer • Observations from ‘East Africa Review Panel’ (3-4 persons to be tasked with making observations of trends, etc., of needs, opportunities, etc.)¹ • Open discussion

¹ Note: Observation panels will be made up of one representative from WLE, one representative from another region, one donor/global and possibly one other

Session	Time	Chair (C)/ Rapporteur (R)	Activities
Session 3 - A look at Southern Africa	2:00-3:30	Bruce Lankford (C)	<ul style="list-style-type: none"> • Three to five presentations by representatives from South Africa (3), Zambia (2) and Mozambique • Question and Answer • Observations from ‘Southern Africa Review Panel’ (3-4 persons to be tasked with making observations of trends, etc., of needs, opportunities, etc.) • Open discussion
Session 4 - A look at West Africa	4:00-5:30	Peter McCornick (C)	<ul style="list-style-type: none"> • Seven presentations by representatives from Burkina Faso (2), Ghana, Niger (2) and Nigeria (2) • Question and Answer • Observations from ‘West Africa Review Panel’ (3-4 persons to be tasked with making observations of trends, etc., of needs, opportunities, etc.) • Open discussion

Day 2 - February 5, 2013 (Tuesday)

Session	Time	Chair (C)/ Rapporteur (R)	Activities
Session 5 - WLE partner institutions panel session - Unlocking the potential of irrigation: some other perspectives	9:00-10:30	Timothy Williams	<ul style="list-style-type: none"> • Presentation by New Partnership for Africa’s Development (NEPAD) on ‘Unlocking the Irrigation Potential in Africa through the Comprehensive Africa Agriculture Development Programme (CAADP)’ by Tobias • Other presentations from donors or global partners or other projects • Discussion on driving forces and goals of irrigation
Session 6 - Group work I - Establishing the goals	11:00-12:30		<ul style="list-style-type: none"> • Group work in regional groups (East Africa, Southern Africa and West Africa) and global group • Group work to discuss and identify the following: <ul style="list-style-type: none"> - Development goals of the countries/region - State of irrigation, needs and goals for enhancing irrigation - What do we still need to do/what do we still need to know - identifying research questions
Session 7 - Group work II - How to achieve the goals, what do we need	2:00-3:30		<ul style="list-style-type: none"> • Group work continues, focusing on: <ul style="list-style-type: none"> - What kind of research activities are needed (and possible)? - What kind of products are needed from this (data, publications, capacity building, policy influence, etc.)? How should these be made available? - Who are the key actors to be involved?
Session 8 - Showcasing group work results	4:00-5:30		<ul style="list-style-type: none"> • Each group has 10 minutes to ‘present’ their group work results • Question and Answer, comments, suggestions from others • Nomination of teams to continue Concept Note development

Day 3 - February 6, 2013 (Wednesday)

Session	Time	Chair (C)/ Rapporteur (R)	Activities
Session 9 - WLE/Irrigated systems SRP - presentation of ideas from workshop	9:00-10:30		<ul style="list-style-type: none"> • Presentation of ideas collated from the workshop by WLE Irrigated systems SRP team • Review by participants
Session 10 - Open discussion	11:00-12:30		<ul style="list-style-type: none"> • Open discussion based on topics suggested by participants (e.g., topics that have not been covered or still need more discussion, etc.) before the break
Session 11 - Decision analysis	2:00-3:30	Keith Shepherd	<ul style="list-style-type: none"> • Decision analysis (Keith Shepherd)
Session 12 - Way forward and closing	4:00-5:30		<ul style="list-style-type: none"> • Way forward • Thank you and closing (S. A. Prathapar)

List of Participants

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