WORKING PAPER 100

Opportunities for Private Sector Participation in Agricultural Water Development and Management

F.W.T. Penning De Vries, H. Sally and A. Inocencio

International Water Management Institute

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Table of Contents

List of Tables

List of Figures

List of Boxes

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List of Acronyms

ADB	-	African Development Bank
AFD	-	Agence Française de Développement
ApproTEC	-	Appropriate Technology for Enterprise Creation, recently renamed to KickStart
BBC	-	British Broadcasting Service
BCEAO	-	Banque Centrale des Etats de l'Afrique de l'Ouest
CAADP	-	Comprehensive Africa Agriculture Development Program of NEPAD
CBO	-	Community-based Organization
CECAM	-	Caisse d'Epargne et de Credit Agricole Mutuel
DFS	-	Decentralized Financial System
EW	-	Enterprise Works
FAO	-	Food and Agriculture Organization of the United Nations
FDI	-	Foreign Direct Investment
FO	-	Farmer Organization
GIE	-	Groupement d'Intérêt Economique
GO	-	Government Organization
HIV/AIDS	-	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IDE	-	International Development Enterprises
IFAD	-	International Fund for Agricultural Development
IFPRI	-	International Food Policy Research Institute
ILRI	-	International Livestock Research Institute
IMT	-	Irrigation Management Transfer
IWMI	-	International Water Management Institute
IWRM	-	Integrated Water Resource Management
FDI	-	foreign direct investment
LUSIP	-	Lower Usuthu Smallholder Irrigation Project
M&E	-	Monitoring and Evaluation
MSME	-	Micro, small, or medium enterprise
NEPAD	-	New Partnership for Africa's Development
NGO	-	Non-Government Organization
O&M	-	Operation and Maintenance
PPP	-	Public-Private Partnership
PSP	-	Private Sector Participation
ROSCA	-	Rotating Savings and Credit Association
RPO	-	Rural Producer Organizations
SIMI	-	Smallholder Irrigation Market Initiative
SME	-	Small and medium enterprise
SSA	-	sub-Saharan Africa
SSIP	-	Small-scale Irrigation Project
UNIDO	-	United Nations Industrial Development Organization
UPA	-	Urban and Peri-urban Agriculture
USAID	-	United States Agency of International Development
WB	-	World Bank
WUA	-	Water Users Association

Glossary

Bright Spots Households or communities that significantly improve their own livelihoods and environment with sustainable agricultural practices (Noble et al., 2005, Mati and Penning de Vries, 2005). These communities, with limited public investment (equivalent to a few hundreds of dollars per hectare) or without external funds, have found ways to escape the poverty spiral through innovation and recognition of (new) options. 'Drivers' of emergence of Bright Spots are either 'internal' (particularly leadership, social cooperation and innovation) or 'external' (access to information, hardware, markets, credits).

Capitals The factors that entrepreneurs need to own or have access to in reasonable quantities to generate an acceptable livelihood. Five capitals are recognized (Carney, D. 1998): natural capital (such as tenured land, or water accessed with treadle pumps, social capital (organizations and institutions, also legal frameworks), human capital (knowledge, skills, experience), financial capital (savings, loans, rotating funds), and physical capital (farm equipment, market information, and infrastructure). For successful and sustainable agriculture, all five capitals are needed in reasonable amounts. Direct and indirect investments can augment the amount of capitals in short supply. Since augmenting natural capital requires very quite different actions from augmenting human capital, we distinguish in this study the categories of the capitals that are needed.

Economic growth 'Economic growth' is characterized in many ways. Definitions on the Internet include:

- An increase in the nation's capacity to produce goods and services.
  www.frbsf.org/tools/gloss.html
- A sustained increase in total output or output per person for an economy over a long period of time. [FACS] An increase in the nation's capacity to produce goods and services. [FRBSF] (see also economics).
  www.garlic.com/~lynn/paygloss.htm
- Increase in the actual value of final goods and services produced by an economy.
  www.geog.ouc.bc.ca/conted/onlinecourses/enviroglos/e.html·
- An increase in per capita income, resulting from the increased production of goods and services.
  www.asset-analysis.com/glossary/glo_017.html
- The rate of increase in "real," i.e., inflation-adjusted, national income or national product between one time period and another. If all resources in the economy (labor, capital and land) are fully employed, the economy can grow no faster than the growth in these resources, as augmented by productivity gains. If, on the other hand, resources are not fully employed (for example, because workers are unemployed), there is no constraint on the economy's growth rate until full employment has been achieved.
  www.goiam.org/publications/winter2001journal/definitions.htm
- A quantitative measure of the change in size/volume of economic activity, usually calculated in terms of gross national product (GNP).
  www.cadi.ph/glossary_of_terms.htm

- An increase in the total wealth of a nation; if population grows faster than the economy, there may be real economic growth, but the share per person may decline.
  highered.mcgraw-hill.com/sites/0070294267/student_view0/glossary_e-l.html
- An upward trend in real GDP, reflecting expansion in the economy over time; it can be represented as an outward shift in the production possibilities curve (chapter 2).
  www.johnwiley.com.au/highered/eco2e/micro/stud-res/glossary.html
- The rate of change in output from one year to the next.
  www.yourmoney.cba.ca/eng/glossary.cfm
- Increased financial activity in real terms over time. It may include building infrastructure, resources, and public relations. It does not necessarily correspond to increased production of physical goods.
  fwie.fw.vt.edu/rhgiles/appendices/glosse.htm
- The process of increasing per capita income. *www.agtrade.org/defs.cfm*
- Steady and stable increase in the productive capacity of a nation's economy to increase national income. *www.jdar.org/dico/dico/E.htm*
- An increase in the production of goods and services. Economic growth is usually measured as the increase in gross domestic product over a specified period of time, after adjusting for inflation. 2. An increase in the capacity of an economy to produce due to more and/or better use of economic resources.
  wwmr.org/AUSB-globalecon/glossary.htm
- More economic activity, but that does not always mean that the activity is sustainable. Economic growth can occur with less economic activity. *agecon.uwyo.edu/EconDev/glossary.htm*
- An upward trend in the real output of goods and services.
  lms.thomsonelearning.com/hbcp/glossary/glossary.taf
- The change in the level of economic activity from one year to another. *www.whitehall.k12.mi.us/curriculum/socialstudies/glossaryofterms.htm*
- The increase in real value of the economy's production of goods and services. Most often expressed as Gross National Product, (GNP) or Gross Domestic Product, (GDP). *www.kvfs.com/glossary_all.htm*
- Steady growth in the productive capacity of the economy (and so a growth of national income). *www.cogsci.princeton.edu/cgi-bin/webwn*

Fertilization To supply nutrients to the soil, particularly nitrogen, phosphorus, potassium and sometimes so-called 'micro-nutrients' to increase their availability for crops. Without fertilization, the harvesting of crops often causes the natural content of nutrients in the soil to decline in a few decades to a level where production is no longer economical. There is a great variety in fertilizers, leguminous plants and trees that can add nitrogen to the soil, and in practices to increase and retain soil fertility (IFA, 1992; IFDC ...). It is generally effective to consider irrigation in combination with fertilization.

Food security "Food security depends on there being adequate food availability, access and utilization. Availability depends on production and market supply, and access to incomes that enable purchase of food. Food utilization depends on health conditions and food quality that enables it to meet nutritional needs. As such, food quality and safety are essential to food utilization and food security" (Worldbank, 2003, Box 1.4). Food security at the national level can hide much food insecurity in individual households.

Investments 'Direct' investments (as in purchase of equipment) and 'indirect' (as in creating training programs)

Irrigation To supply (dry land) with water by means of ditches, pipes, streams, sprinklers, drip kits, or with buckets. The purpose of irrigation is usually to stabilize or increase growth of crops. It should be accompanied by drainage of (some) excess water. Most crops grow best in moist but unsaturated soils, but some (like rice) grow best in saturated soils or even in soils with standing water. Rain is the common source of water from crops. Crops grown without any irrigation are called 'rainfed crops. These crops usually experience drought. Supplementary irrigation implies supplying water in addition to rain to overcome drought. 'Full irrigation' is achieved when rainwater is supplemented to such a level that any drought stress is prevented. It is generally effective to consider fertilization in combination with irrigation. Large scale, often state owned irrigation systems are said to have 'formal irrigation'; 'informal irrigation' refers to small scale systems of smallholders that are may not be linked.

Learning Alliance A group of organizations and individuals in a particular area with a shared interest in an innovation and the scaling-up of that innovation. A Learning Alliance is a structured platform of a range of partners with different concerns (the various end users) and capabilities (implementation, regulation, policy and legislation, research, learning; documentation and dissemination), and is designed to break down barriers to horizontal and vertical information sharing, and thus to speed up the process of identification, adaptation, and uptake of new innovation. A Learning Alliance follows a flexible but structured, re-iterative path to progress

Microfinance The financial sector that responds to the financial demand of low-income households through small and short-term loans predominantly for trading, services and micro-enterprise activities.

Micro, small and medium enterprises (MSME) Enterprises with less than 10 people are 'micro-enterprises'; those with less than 50 are considered 'small', and those with less than 250 people 'medium' (source: Intellectual Property Rights Helpdesk, European Commission DG Enterprise).

Enterprises can also be classified based on financial criteria.

'Micro-enterprises' can be classified into:

- *Subsistence micro-enterprises*. Those whose productivity is low and only generate income for immediate consumption. They work on the basis of 'getting by'. This is the largest segment and is largely made up of female heads of household engaged in retail trade or in personal services such as the sale of food
- *Simple accumulation micro-enterprise.* Those that generate income sufficient to cover cost of activities but without a surplus to permit capital investments.
- *Broad accumulation micro-enterprise*, or *'micro-top'*. Those with sufficient productivity to accumulate a surplus and invest it in the growth of the business.

Multiple-use systems The sum of the institutions, services, resources, and infrastructure that allow a community to manage its water resources and the domestic and productive uses of water effectively and inclusively.

Organizations Some of the many types and forms of organizations considered in this study are*:*

- CBO Community Based Organization
- GO Governmental Organization
- NGO Non Governmental Organization, national or international
- MSME and SME micro, small and medium size enterprises
- RPO Rural Producer Organization

Poverty Poverty is defined as an attribute of households or communities that have insufficient access to natural, social, human, financial and/or physical capital** to make a decent livelihood.

Private Sector The "private sector" includes farmers and MSMEs in agriculture: i.e. in crop production, livestock production, fisheries, in marketing these products, post harvest and food processing, and in supply chains for goods uses in the agricultural production process. It also includes organizations that facilitate investments by the private sector, such as NGO's.

Private Sector Participation Encouraging the investment process by investing in own property and enterprises, and by facilitation (such as by banks, NGOs, etc).

Public private partnership (PPP) Public-private partnerships are collaborative efforts between the public and private sectors in which each sector contributes to the planning, resources, and activities needed to accomplish a mutual objective. a relatively new and diverse body of theoretical and empirical literature suggests that public-private partnerships are a constructive means of enhancing the production of goods, services and technologies that would not otherwise be produced by either sector acting alone

Rural Producer Organization (RPO) An NGO or CBO that empowers rural people, builds rural capital and increases poor peoples voice in decision making. (Worldbank 2003, pg 1-49). Farmer organizations and commodity groups are examples.

Self selection by the poor Equipment is particularly adopted by the poorest smallholders, for whom it provides an entrance with a low threshold (cost, management skills, high mobility) into a more productive system. Once income is raised and poverty is reduced, the farmers generally invest in engine powered, more advanced and specialized equipment.

Urban and peri urban agriculture (UPA) Farming activities in and near cities (and sometimes physically far but with good transport) that provide significant quantities of food, particularly fresh food, to urbanites. UPA is often intensive agriculture with ample use of irrigation water (sometime of urban waste water), fertilizer and compost, and pesticides. UPA can play a major role in water and nutrients re-use, but can also contribute significantly to soil and water pollution.

Summary

This study examines ways to increase food security, reduce poverty and achieve economic growth in sub-Saharan Africa with 'water' through increased participation of the private sector and public-private partnerships. This report is a summary of the findings from a review of the literature and critical analysis thereof.

The 'private sector' includes all farmers, farm households, and agriculture-based micro, small and medium enterprises (MSMEs). That is: all entities involved in crop, livestock and fish production and marketing, in post-harvest activities and food processing, and in supply chains for the goods, services and information used in the process. The study examines different types of agricultural water development and management. These include smallholder subsistence farming, cultivation of profit-oriented high-value crops, and peri-urban agriculture, as well as successful examples of private sector involvement in various functions or processes, including planning, design, construction, operations and maintenance. The spotlight on 'water' does not imply that other factors, such as off farm employment, market development and education, are unimportant.

Our focus is on smallholder farmers and on private enterprise involvement in farm inputs and outputs. We examine how public sector actors, particularly government agencies and donors can facilitate private sector participation in 'water'. Different funding arrangements ranging from mobilizing savings and remittances to provision of micro-credit, equipment leasing, and contract farming are analyzed.

Not only is the number of specific recommendations to promote agricultural investments very large, they also address different actors and different subjects. Rather than preparing a comprehensive list of recommendations, *we have focused on creating a framework in which to locate such recommendations for interventions*. This framework takes the form of a 'what' and 'for whom?' matrix.

For the 'for whom?' axis in the matrix, we identify four categories of decision-making entities with respect to investments in agricultural water:

1. individual farm households;
2. farmer groups and communities;
3. micro, small and medium enterprises (MSMEs*); and
4. governments.

Successful and sustainable investment decisions for rural development require access to, and often an increase in, one or more of five types of assets or 'capitals**'. These capitals are briefly characterized as:

1. increasing *natural capital* (e.g., providing better access to water with a treadle pump, and acquiring property rights to land);
2. increasing *social capital* (e.g., creating organizations and institutions to empower the poor);
3. increasing *human capital* (e.g., providing education and teaching of skills);
4. increasing *financial capital* (e.g., micro-credit schemes and community level revolving funds);
5. increasing *physical capital* (e.g., making available farm equipment).

**: Terms with a double asterisk are defined in the Glossary at the end of this Chapter.
*: Abbreviations are explained in the list of acronyms (page *viii*).

These five capitals are on the 'in what?' axis of the matrix. The degree to which these capitals are already present in a household, community or enterprises varies enormously. In effective and efficient interventions to promote agricultural investments, the type(s) of capital lacking most in a particular case is/are the one(s) to target for development.

We conclude that the private sector can play a very much larger role in rural development. In part it can do so by committing significant private sources of funding. It is also necessary that this will happen because the overall level of public funding of agricultural investments has fallen and there is a trend that governments retreat and shift their role from one of direct participation in the production and marketing processes towards one of facilitation, legislation and enforcement. This evolution towards increased private sector leadership and a new role for the public sector requires substantial changes in public sector institutions and policies and in the climate for rural investments.

To allow this to happen, the priorities for change at the national level are to: (1) complete unfinished reforms, such as reducing public sector bureaucracies, privatizing state corporations, and devolving programs to lower levels of government; (2) formulate coherent national agricultural development strategies and innovative sector development programs; (3) develop mechanisms for producers and the private sector to participate in policy and program formulation and their implementation; and (4) develop capacities and institutions to carry out regulatory, information, policy, and negotiation functions.

Major conclusions of this study are:

- The private sector in the context of agricultural water is very large and diverse, ranging from poor smallholder farmers to micro, small and medium size enterprises. In sub-Saharan Africa, the sector includes millions of persons.
- The private sector has a very significant untapped investment potential (the equivalent of many billions of dollars in savings, remittances, labor, ingenuity, knowledge, assets) that can make a major contribution to agricultural investments, and help offset declining public investments. Public investments can leverage use of some of these private funds.
- Public-private partnerships, in principle, can improve the capacity of each player to address problems in agriculture that are difficult to solve by a single actor.
- Governments play a key role in creating an appropriate investment-friendly climate. For private sector participation, crucial are stable, non interventionist policies, robust institutions and a basic physical infrastructure, transparency and minimum levels of corruption.
- Community management of land and water resources is a long-held tradition. Collective initiatives and partnerships, integrated with suitable land and nutrient management practices, can be highly effective for both productive and domestic uses. They can be encouraged by means of training, exchange visits, and profitable innovations. Collective organizations should be inclusive and not occur at the expense of women, minorities or the poorest but in a way that empowers them and improves their lives.
- 'Brights Spots**' are communities that have improved their income, livelihoods and natural resources significantly despite an environment where degradation is widespread. Bright Spots often emerge due to 'drivers'. The main categories of drivers are strong local leaders, community organizations, innovations in technologies or practices, and/or by facilitation of these drivers by outsiders. These Bright Spots emerge often over only a few years of time and require an average investment of several hundred US$ per hectare from public

and private sources (note: this is around ten times cheaper than formal irrigation schemes: see Inocencio et al. 2005).

- Farming communities do not comprise homogeneous groups of households. Their objectives, capacities and asset base are very different. In interventions, the specific needs need to be recognized and met.
- Women are active participants at various stages of agricultural water development and management, both on-farm and as off-farm micro-entrepreneurs. Their activities are often constrained by insecurity of land tenure, inability to access credit, lack of agricultural training and inadequate access to extension services.
- MSMEs can provide a wide range of goods and services related to agricultural water but their growth and development depends on the creation of a conducive policy and institutional environment.
- Technological developments have allowed good quality farm equipment to become smaller, portable and easier to manage. Yet, in much of Sub-Saharan Africa, local distribution and service is poor so that this technology is not really accessible, financially and physically, to individual farmers and enterprises.
- Intensification of agriculture needs to go hand in hand with promotion of agricultural MSMEs. When considering investments in irrigation**, it is generally advisable to invest also in fertilization**.
- Urban and peri-urban agriculture are already important but still have a huge potential to improve household food security and reduce malnutrition among the urban poor, and to increase incomes of the producers. They require judicious, well-targeted assistance from public agencies to improve their overall performance and productivity in order to avoid local production being displaced by imports.
- Irrigation management transfer experiences suggest that it is desirable for some residual role for government in support of irrigators' associations: an oversight and regulatory role.

We formulate the following recommendations:

- Recognize that governments, donors, NGOs and farmer organizations have different roles in releasing the potential of the private sector for investments in water. 'Learning alliances**' that include representatives of (some of) these actors can help to propel particular interventions towards fruition and to achieve complementarity.
- The overall thrust of investments should be towards market creation, institutional development, capacity strengthening and technology development rather than on just one of these factors.
- In light of the heterogeneity of the private sector, solutions should be grounded on an assessment of 'site-specific' needs, capacity and outlook, rather than on 'one-size-fits-all' approaches to encouraging smallholder participation in agricultural water development and management.
- While investments in water are best effectuated through investments in human, social, financial, physical or natural capital, specific interventions by each of the key actors and with respect to each of these capitals may differ widely. Interventions should be planned carefully with a 'What and for Whom?' matrix in mind.

Recommendations for governments

- The government role should be one of enabler, facilitator, regulator and investor in public goods: providing the basic infrastructure (physical, institutional, information), implementing policies and rules (legal frameworks, regulations, standards), and creating a supportive investment climate for prospective micro, small and medium investors and entrepreneurs by transparent legislation and implementation and by reducing corruption at all levels.
- Governments can promote private sector participation by guaranteeing secure tenure of land and access to water for smallholders, and facilitating access to input and output markets. Providing and promoting affordable technologies (including best management practice) and information (cell phones!!) can assist the private sector to improve skills, awareness and particularly market opportunities.
- Adapting knowledge about 'water' from abroad to improve water use efficiency in the country, and generating new knowledge, is a typical role of government research organizations. Many African countries have hardly any capacity in this field. NGOs and research organizations have identified more effective ways to bring this knowledge to rural communities, and governments should restructure extension services accordingly. Participation of the private sector is required for sustainability and for scaling up and out effectively.

*For private sector and public-private partnerships***

- A much enhanced capacity is needed to deliver to households and communities the equipment and practices that make their land and water more productive. Many of these are known in the world but they are not accessible to African farmers. Opportunities to enhance capacity include Farmer Field Schools, imports of cheap equipment to kick start the local demand, local manufacturing, and support to distributors. Equipment, inputs and practices include small pumps, crop inputs (seeds, fertilizers, pesticides), small tools, 2-wheel tractors, seeds and seedlings, as well as the forward linkages (processing, storage and market outlets).
- Funding arrangement that can be promoted include micro-financing, equipment leasing, contract farming, revolving funds, and small agribusiness.
- The entrepreneurial capacity of women, both on-farm and off-farm should be encouraged through supportive policies and institutions, and equitable access to property and support services. The government should also promote a change in public attitudes about the role of women as producers.
- Public-private partnerships** and NGOs are learning from past mistakes and getting better at promoting entrepreneurship among smallholder farmers and MSME's by linking the private sector to emerging market farmers, particularly between urban centers and rural areas.
- Irrigation management transfer in small formal schemes from government to farmer organizations can be very effective, provided that the government maintains a residual role by providing technical services and promoting transparency.

For donors

- Donors can assist governments to create an enabling environment by establishing basic, large-scale infrastructure such as roads, electrification, basic and vocational education, and with support in research and extension capacity.
- Donors can work with governments to help the private sector to invest and assist the private sector to make direct investments (e.g., identify areas requiring priority attention to strengthen investor institutions).

Résumé

Ce rapport étudie les voies et moyens par lesquels la participation du secteur privé et la mise en place des partenariats public-privé dans le secteur de l'hydraulique agricole peuvent contribuer à améliorer la sécurité alimentaire, réduire la pauvreté et promouvoir la croissance économique. Il présente les résultats d'une revue et d'une analyse critique de la littérature.

D'après notre définition, le secteur privé comprend les exploitants et les ménages agricoles ainsi que les micros, petites et moyennes entreprises (MPME) impliquées dans toute la filière, allant de la production agricole (y compris l'élevage et l'aquaculture) à la commercialisation, aux autres activités post-récolte et à la fourniture de divers biens et services nécessaires à la production agricole.

L'étude aborde différentes catégories de développement et de gestion de l'hydraulique agricole, y compris la petite agriculture de subsistance, l'agriculture commerciale à haute valeur ajoutée et l'agriculture péri-urbaine. L'implication du secteur privé dans l'exécution de fonctions comme la conception, la réalisation, le fonctionnement et l'entretien des aménagements est également étudiée en vue d'identifier d'éventuels facteurs de réussite. Cependant, le fait de mettre l'accent sur l'eau ne veut pas dire que d'autres facteurs tels que les revenus non-agricoles, le développement des marchés et la formation ne soient pas importants.

L'étude est principalement centrée sur le petit exploitant agricole, mais inclut aussi la création de marchés et l'implication des entreprises privées dans les marchés d'intrants et la commercialisation de produits agricoles. Elle examine également comment le secteur public, notamment l'Etat et les bailleurs de fonds, peuvent faciliter la participation du secteur privé à l'hydraulique agricole. Divers mécanismes de financement allant de la mobilisation d'épargne des ménages et des transferts liés à l'émigration, à l'octroi de micro-crédit, la location-vente et l'exploitation sous contrat, sont étudiés.

Les recommandations spécifiques pour promouvoir les investissements agricoles sont non seulement très nombreuses mais elles concernent également des acteurs et des sujets très différents. De fait, au lieu de dresser une longue liste de recommandations, nous nous sommes plutôt intéressés à élaborer un cadre, sous la forme d'une matrice 'quoi' et 'pour qui', dans lequel on peut situer ces recommandations d'intervention.

Dans l'axe 'pour qui' quatre centres de prise de décision relative aux investissements dans l'hydraulique agricole sont identifiés :

1. les ménages agricoles ;
2. les organisations d'exploitants et les communautés villageoises;
3. les micros, petites et moyennes entreprises (MPME) ;
4. les gouvernements.

La réussite et la viabilité des investissements dans le domaine du développement rural dépendent de l'accès et de l'amélioration de cinq catégories différentes de 'capitaux', à savoir :

1. l'amélioration du *capital naturel* (par exemple, amélioration de l'accès à l'eau via une pompe à pédale et l'acquisition de titres fonciers) ;
2. l'amélioration du *capital social* (par exemple, mise en place d'organisations et d'institutions pour renforcer les capacités des plus démunis)
3. l'amélioration du *capital humain* (par exemple, formation et échange d'information)

4. l'amélioration du *capital financier* (par exemple, micro-crédit, fonds de roulement communautaire)
5. l'amélioration du *capital physique* (par exemple, fourniture du matériel agricole)

Ces cinq capitaux sont situés dans l'axe 'quoi' du cadre matriciel. L'amplitude de ces capitaux déjà présents au sein d'une entreprise, d'une communauté ou d'un ménage varie énormément. Pour des raisons d'efficacité et d'efficience, toute intervention liée à la promotion des investissements agricoles doit viser à combler le type du capital qui manque le plus.

Les résultats de cette étude montrent que le secteur privé peut jouer un rôle plus important dans le développement rural, en partie par le déploiement de ses considérables ressources financières. Ce soutien est d'autant plus nécessaire que les fonds publics consacrés aux investissements agricoles diminuent et que le rôle de l'Etat comme participant direct dans les processus de production et de commercialisation évolue vers la formulation et l'application des règles pour faciliter les interactions entre les différents participants du secteur hydro-agricole. Cette évolution est accompagnée par un accroissement du rôle du secteur privé et requiert la mise en œuvre de changements profonds dans les politiques, les institutions publiques et le climat général d'investissements.

Les priorités clés au niveau national sont de : (1) compléter la mise en œuvre des réformes telles que la réduction des bureaucraties publiques, la privatisation des entreprises étatiques, et la dévolution des responsabilités aux niveaux décentralisés du gouvernement ; (2) élaborer non seulement une stratégie nationale cohérente du secteur agricole mais aussi des programmes innovateurs pour leur mise en oeuvre sur le terrain ; (3) développer des mécanismes pour permettre aux producteurs et au secteur privé de contribuer à l'élaboration et l'application des politiques et programmes via des partenariats public-privé; et (4) renforcer les capacités institutionnelles pour l'exécution des fonctions de régulation, d'échange d'information, de définition des politiques, et de négociations.

Les autres résultats clés de cette étude sont les suivants :

- Le secteur privé, dans le cadre de l'hydraulique agricole, est très large et varié, allant des petits agriculteurs aux micros, petites et moyennes entreprises. En Afrique sub-saharienne, ce secteur comprend plusieurs millions de personnes.
- Le secteur privé possède un potentiel d'investissement considérable et inexploité (l'équivalent de plusieurs milliards de dollars US en épargne, main d'œuvre, ingéniosité, connaissances, biens) qui pourrait être mis à contribution pour le développement du secteur hydro-agricole et ainsi compenser la diminution des investissements publics. Les investissements publics pourraient servir de force de levier en faveur des fonds privés.
- Les partenariats public-privé ont, en principe, des possibilités pour améliorer la capacité des différents acteurs à traiter ensemble les problèmes agricoles qui ne peuvent être résolus individuellement par chacun des partenaires.
- Les gouvernements jouent un rôle clé dans la création d'un environnement propice aux investissements. Des facteurs cruciaux à la participation des entreprises privées dans le secteur hydro-agricole sont l'élaboration et le suivi de politiques stables et non-interventionnistes, le développement d'institutions robustes, la mise en place des infrastructures de base, la transparence, et de faibles niveaux de corruption.
- La gestion communautaire des terres et des ressources en eau est une tradition de longue date en Afrique sub-saharienne. Des initiatives collectives et des partenariats intégrés avec des pratiques adaptées de gestion de la terre et des nutriments, peuvent être très efficaces à

la fois pour les usages domestiques et productifs. Elles méritent d'être encouragées à travers la formation et l'exposition à des expériences réelles sur le terrain et les pratiques innovatrices et profitables. Cependant la mise en place et la promotion des organisations collectives ne doivent pas se faire au détriment des femmes, des minorités et des plus pauvres. Au contraire, de tels processus doivent renforcer les capacités de ces personnes et améliorer leur niveau de vie.

- Le terme 'Bright Spots' (voir glossaire) est employé pour décrire les communautés qui réussissent à améliorer, de manière significative, leurs revenus et niveaux de vie en dépit d'environnements caractérisés par une dégradation répandue. Les principales forces motrices de réussite sont des dirigeants locaux efficaces, des organisations communautaires, des technologies et pratiques innovatrices et la facilitation apportée par des personnalités et facteurs externes. Ces 'bright spots' n'émergent qu'après le passage d'un certain nombre d'années et nécessitent un investissement moyen d'environ quelques centaines de dollars US à l'hectare de la part des secteurs public et privé (N.B. ceci est environ dix fois moins cher que l'investissement nécessaire dans le secteur d'irrigation formel — cf. étude sur les coûts des aménagements hydro-agricoles).
- Les ménages agricoles ne sont pas homogènes. Ils poursuivent divers objectifs et les capacités et capitaux dont ils disposent sont différents; de fait ils auront besoin d'assistance et de soutien différents.
- Les femmes participent très activement aux divers stades du développement et de la gestion hydro-agricoles tant comme exploitantes que comme entrepreneurs. Cependant, l'insécurité foncière, les difficultés d'accès au crédit agricole et à la vulgarisation ainsi que leur manque de formation entravent leur capacité de développement.
- Des MPME peuvent fournir toute une gamme de biens et services nécessaires à l'hydraulique agricole mais leur croissance et leur développement ne peuvent pas se faire sans l'existence d'un environnement institutionnel et politique favorable.
- Des avancées technologiques ont rendu disponible du matériel agricole performant de taille réduite, portable et plus facile à utiliser et entretenir. Cependant dans la majeure partie de l'Afrique sub-saharienne, les réseaux de distribution et service après-vente sont tels que ces technologies ne sont pas réellement accessibles, financièrement et physiquement, aussi bien aux entreprises qu'aux exploitants individuels.
- L'intensification de l'agriculture doit aller de pair avec la promotion des MPME agricoles. Il est conseillé que tout investissement en irrigation s'accompagne également d'investissements en fertilisation.
- L'agriculture urbaine et péri-urbaine peut apporter une contribution très importante à la réalisation de la sécurité alimentaire des ménages, à la réduction de la malnutrition, et à l'augmentation des revenus. Mais l'amélioration des performances et de la productivité du secteur nécessite des interventions judicieuses et un soutien bien ciblé de la part des agences publiques.
- L'expérience liée au désengagement de l'Etat de la gestion directe des aménagements hydro-agricoles et le transfert de certaines responsabilités aux associations d'usagers montre qu'il est préférable que le gouvernement conserve un rôle de régulateur sur l'application et le respect des règles.

Les principales recommandations sont:

- Les gouvernements, les bailleurs de fonds, les ONGs et les organisations d'exploitants ont tous un rôle à jouer dans la mobilisation du potentiel du secteur privé à investir dans l'hydraulique agricole. Les partenariats entre différents acteurs sont particulièrement pertinents à cet égard afin de garantir la réussite des interventions et une complémentarité entre les différents efforts.
- Les investissements hydro-agricoles doivent être orientés vers la création des marchés, le développement institutionnel, le renforcement des capacités et le développement des technologies pour accroître la production agricole de manière intégrée plutôt que sur juste un de ces facteurs individuellement.
- Etant donnée l'hétérogénéité du secteur privé, les solutions 'passe-partout' en vue d'encourager sa participation au développement hydro-agricole risquent d'échouer. De fait, les solutions proposées doivent être fondées sur les enseignements tirés de vraies expériences de terrain tout en tenant compte des besoins, capacités et perspectives spécifiques du public cible.
- Des investissements en hydraulique agricole seraient mieux réalisés à travers des interventions visant le renforcement des capitaux humain, social, financier, physique ou naturel et doivent aborder des besoins réellement exprimés par les publics concernés. Les interventions spécifiques par chaque acteur vis-à-vis de chacun de ces capitaux ne seront pas les mêmes et doivent être soigneusement préparées à l'aide du cadre matriciel 'quoi' et 'pour qui'.

Recommandations à l'intention des gouvernements

- Le gouvernement doit jouer le rôle de facilitateur, régulateur et investisseur en ce qui concerne les biens publics : mise en place des infrastructures de base (physiques, institutionnelles, échange d'information), application des politiques et des réglementations (cadre légal, normes) et, en général, promotion d'un climat d'investissement qui favorise l'implication des micros, petits et moyens investisseurs par l'élaboration et l'application transparentes de législation et la réduction de la corruption à tous les niveaux.
- Les gouvernements peuvent aider la participation du secteur privé, surtout celle des petits agriculteurs, en garantissant l'accès à l'eau et à la terre et en facilitant l'accès aux marchés. La fourniture et la promotion des technologies appropriées, des bonnes pratiques de gestion et des moyens d'accès à l'information (e.g., téléphones portables) offrent davantage d'opportunités aux petits agriculteurs, et au secteur privé en général, pour améliorer leurs compétences et sensibilisation et accroître leurs possibilités de commercialisation.
- L'adaptation des connaissances sur « l'eau » venant de l'étranger ainsi que la génération de nouvelles connaissances et leur promotion dans le pays relèvent typiquement du mandat des institutions de recherche étatiques. Mais la capacité de beaucoup de pays africains dans ce domaine reste inadéquate. Des ONG et certains organismes de recherche ont mis au point des procédures appropriées pour transférer ces connaissances auprès des communautés rurales. Les services de vulgarisation méritent d'être restructurés en conséquence. La participation du secteur privé peut se révéler opportune.

Recommandations par rapport aux partenariats public-privé

- Une capacité accrue de faire connaître aux ménages et communautés en Afrique subsaharienne le matériel et les pratiques de gestion mondialement bien connus pour leur permettre d'améliorer la productivité des terres et de l'eau est une nécessité. La promotion des écoles paysannes «'farmer field schools'», l'importation de matériel peu coûteux pour faire démarrer la demande locale, la fabrication locale de matériel et le soutien aux filières de distribution font partie du « paquet» permettant le renforcement des capacités concernant la fourniture d'intrants (semences, engrais, produits phytosanitaires, petit matériel agricole etc.) et la commercialisation (stockage, post-récolte).
- Parmi les mécanismes de financement il faut envisager l'octroi de micro-credit, la location-vente du matériel, l'exploitation sous contrat et la mise en place des fonds de roulement.
- Le très fort esprit d'entreprise des femmes, aussi bien sur l'exploitation qu'en dehors, doit être encouragé par la mise en place de politiques et d'institutions appropriées et par l'accès équitable à la propriété et aux services d'appui et de formation.
- Les partenariats public-privés et les ONG sont bien placés pour promouvoir l'esprit d'entreprise chez les petits agriculteurs et les MPMEs par l'établissement de liens entre le secteur privé, les producteurs et les autres acteurs, surtout entre les centres urbains et les zones rurales.
- Le désengagement des gouvernements de la gestion directe des aménagements hydro-agricoles et le transfert des responsabilités aux associations d'exploitants est efficace si le gouvernement retient un rôle provisoire d'appui-conseil et encourage la transparence.

Recommandations envers les bailleurs de fonds

- Les bailleurs de fonds peuvent assister les gouvernements dans la mise en place des infrastructures de base telles que les routes, l'électrification, l'éducation et la formation et ainsi contribuer à la création d'un environnement susceptible d'attirer les investisseurs privés.
- Les bailleurs de fonds peuvent aussi aider directement les investissements du secteur privé, par exemple en identifiant des domaines ayant besoin d'attention prioritaire.

INTRODUCTION

The most visible agricultural water investments**[1] in Africa have been largely driven by national governments and international donors. However, reduced volumes of public investment in agriculture has led to growing awareness and explicit recognition of the roles that the private sector**, including farmers, can play in agricultural water development and management beyond the formal, public sector or by way of public-private partnerships. A key challenge is to create conditions and incentives to promote and facilitate much more private sector participation** in this sector.

Rainfed agriculture (i.e., crop production with rainfall and little or no irrigation**) accounts globally for 60% of food production, but for as much as 90% in Africa (Savenije, 1999) and for 80% of its employment. Rainfed agriculture generally produces much below its potential because rain is irregular and this makes investments in soil fertility too risky. Moderate investments in small scale water technologies (including equipment, training, and skills development) could enhance both stability and productivity of smallholder farming even to levels where commercial production becomes possible. As highlighted in the Inception Report of the Collaborative Program, FAO estimates that 75% of the agricultural growth required in sub-Saharan Africa (SSA*[2]) by 2030 will have to come from intensification (in the form of yield increases and higher cropping intensities), with the remaining 25% coming from arable land expansion. We believe that the large private sector needs to, and can, be unleashed to meet this requirement through intensification of many smallholder farms.

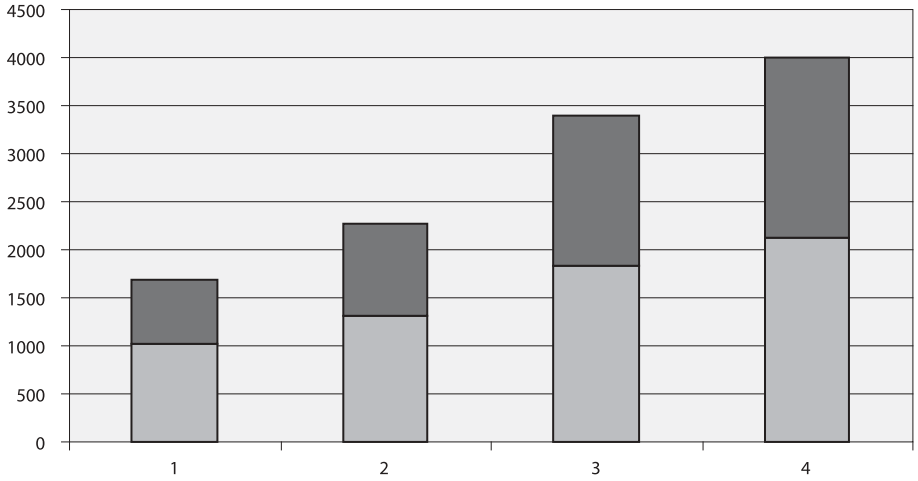
In agriculture, water and crop nutrients have a strong connection. Top yields can be obtained under proper crop management and with ample quantities of plant nutrients (from the soil or fertilization**) and water (from rain or irrigation**). Some nutrients and some water are provided by 'nature' but usually less than what crops can absorb so that yields remain low. However, these growth factors can be supplemented by the farmer (fertilization, irrigation). In crop production, water and nutrients, in principle, do not replace each other: irrigation does not reduce the need for nutrients, and fertilization does not reduce the need for water. On the contrary, irrigation increases the absorption capacity of crops for nutrients, and when these are provided growth increases. Similarly fertilization increases the capacity of the crop to use water and to grow if there is sufficient water. Because this leads to increases in quantity, quality and stability of yields, it is generally economically better to supply crops with both irrigation and nutrients than only one of these. Examples from successful irrigation and fertilization practices in sub-Saharan Africa include Penning de Vries and Djiteye (1982), Van Keulen and Van Heemst (1982), Barron (2004) and Fox (2003), and are explained with the Production Ecology approach advocated by the InterAcademy Council (Kazibwe et al, 2004).

Intensification requires water to stabilize and increase production, higher soil fertility to increase production and quality, improved genetic resources to meet market demands for produce quality, and increased farm management skills. A well-functioning agricultural sector therefore needs a wide range of 'providers': enterprises that sell farm-services (e.g., ploughing), advice (e.g., extension), inputs (seed, fertilizer, water, equipment, information, etc), move or buy produce (transport, food processing, selling, etc). Many of these are very small (micro-enterprises) or small, some are medium sized. This diverse group is here referred to as micro-SMEs (MSMEs). Intensification of agriculture needs to go hand in hand with intensification of agricultural MSMEs.

[1] **: Terms with a double asterisk are defined in the Glossary at the end of this Chapter.

[2] *: Abbreviations are explained in the list of acronyms (page viii).

Figure 1. A typical example of the response of crops to irrigation only (bar 2), fertilization only (3), irrigation plus fertilization (4) in comparison to no additional inputs (1). The data refer to on-farm trials in Burkina Faso with sorghum. Values in kg.ha^{-1}; the lower part of the bars represent the weight of stems and leaves, the upper part the grains. After: Fox and Rockstrom, 2003.



NEPAD (2003) recognizes that one of the four critical needs to move from dialogue to action in its Comprehensive Africa Agriculture Development Program (CAADP*) is "concerted action to promote private sector engagement and interest". In similar vein, the World Bank (1993) emphasizes the development of markets, pointing out that despite structural adjustments and efforts to provide the enabling environment for more private investment or private sector participation in irrigation, "markets [just] do not spring magically to life as the public sector downsizes". Indeed, there may well be instances where government investments (read 'interventions') were stifling local development by imposing rigid guidelines where flexibility was required (e.g., stimulating production when markets were unable to absorb the produce or guaranteeing fixed but low prices).

Governments must adjust their roles from being 'players' to being 'facilitators'. Public sector actors, particularly government agencies and also donors, continue to play a big role with respect to private sector investments. There is the priming of investments to kick start processes, but mainly there is a facilitation role whereby farmers and MSMEs** are encouraged to make investments.

Facilitation includes training, demonstration, information provision, adequate legislation, setting up institutions to empower farmers and MSMEs, quality control of agricultural inputs and produce, transfer of management of irrigation schemes to empowered farmers, arranging for credit schemes, etc. Facilitation, which requires effort and hence money, is probably more important than financial investment *per se*. Adequate legislation includes assuring rights to ownership and/or access to water and land.

This report is a synthesis of the material collated from a comprehensive review of the literature related to private sector participation in agriculture and water, and the key messages derived from a critical analysis thereof.

SCOPE OF THE STUDY

Study Objectives

The overall purpose of the 'private sector** participation' component of the collaborative program is to recommend ways to promote private sector participation in agricultural water development and management for poverty reduction, food security** and economic growth** in SSA.

The specific objectives of this study are:

- To show that the private sector is very large and diverse, and that it can be a major source for investments;
- To identify the do's and don'ts with respect to facilitation of private sector investments in agricultural water;
- To recommend practical ways by which governments and donors can promote private sector investments in agricultural water or to remove constraints.

Definition of Private Sector

Our definition of 'private sector**' includes farmers and agriculture-based MSMEs. That is: all entities involved in crop, livestock and fish production and marketing, in post-harvest activities and food processing, and in supply chains for goods, services and information used in the process. More specifically, the 'private sector' comprises:

- Farmers in rainfed and irrigated agriculture using their own financial resources, with or without external support;
- Irrigation technology manufacturers, dealers, distributors, and retailers;
- Irrigation development consulting firms, contracting firms;
- Non-governmental and community-based organizations, parastatals and private sector entities promoting irrigated agriculture in various ways;
- Emerging or spontaneous market linkage initiatives: e.g., support service providers, peri-urban agriculture, participants in out-grower schemes and contract farming;
- Private entities that operate and maintain irrigation schemes: irrigation management transfer (IMT*) is one such example, where individual farmers (or more usually, groups of farmers) take over responsibility for operation, maintenance and management of existing government-built irrigation schemes; private investments and participation in the creation of new agricultural water development facilities and the expansion/upgrading of existing schemes; and
- In general, entities providing input and output marketing services.

It is not always recognized that many poor smallholder farmers do have access to funds and are willing to invest in agricultural enterprises if conditions are promising. We examine ways in which governments, investments banks and donors can promote the participation of smallholder farmers and other private entities in agricultural water use. We emphasize smallholder farmers and small agricultural enterprises. This choice is motivated by the poverty reduction focus of the study. Furthermore, an FAO report (1997) acknowledges that: "a*mong the many private sector actors, farmers and their organizations are increasingly becoming important sources of additional investments. Results of some recent studies reported by the FAO Investment Centre (1997) show that farmers are in fact the most important agents of investment in food security. In the report, it is estimated that close to 75% of the total investment in agriculture in developing countries in the coming years, estimated at US$ 166 billion per year, will consist of private commitment by farmers and small scale investors…"*

Other private sector actors are not ignored, but given the overall magnitude and diversity of the private sector we need to strike a balance between the objectives of poverty reduction and long term economic growth.

METHODOLOGY

Poverty Reduction**, Food Security** and Economic Growth**

The study examines different types of agricultural water development and water use, including subsistence agriculture, cultivation of profit-oriented high-value crops, smallholder farming, and peri-urban agriculture, as well as successful examples of private sector involvement in various functions or processes, including planning, design, construction, operations and maintenance, rehabilitation and modernization.

Water can contribute to reducing poverty and increasing food security and economic growth. At the lowest level of availability of water, the priority is *water for food security*, i.e., water for domestic use and home food gardens. The next level is *water for commercial production*, such as through irrigation. This yields the farmer-entrepreneurs an (extra) income and can turn poverty into modest wealth. Where this process occurs at a large scale, *national economic growth* is attained. Actions should occur simultaneously in all three levels. For example, even the so-called subsistence farmers, often women, may sell some proportion of the crops (e.g., vegetables, fruits) that they produce, thereby entering the commercial world already at step one. There is not usually a hard and fast line between subsistence/food security and small-scale commercial production.

In recent studies in Asia, L. America and Africa, many examples of "Bright Spots' were found: communities that develop their livelihoods, incomes, and environments significantly despite widespread degradation around them (Noble et al., 2005). Analysis of how these Bright Spots emerged shows that key drivers of their development process are usually (1) strong individuals, (2) community organization, (3) new technologies and practices, and (4) external facilitators that help to create missing capitals. In addition to showing that some 0.5% of the African population is actually participating in or benefitting from such Bright Spots, and noting that many of them develop in just a few years, they also indicate that investments made from public and private source to create the Bright Spots are relatively modest (around 400 US$ per hectare, or about 10 times less than investments in formal irrigation schemes: see Inocencio et al., 2005).

At recent conferences (Haggblade 2004, NEPAD 2005) details were presented of significant African Successes in agriculture as well as lessons learned from them. The Conference recommended that African governments make the following investments to increase food security and improve livelihoods: (a) mobilize and empower smallholder farmers and farmer organizations, and (b) develop agricultural markets.

The Decision Making-Capitals Framework

The focus of the study is on the *decision-making* and *facilitation* processes needed to increase the *capitals* that are lacking. We do not concentrate on the financial investments only, because lack of financial capital is not always the factor that limits development most.

We emphasize investments in *water for agriculture*. Water is a 'natural capital**' (or natural resource). Investments in water come in an endless number of forms and shapes: improving the volume and access to water, improving the quality of water, improving the efficiency of water use, and improving institutions and policies that relate to water. Investments can address rainwater, groundwater, water from rivers or streams, water captured in storage facilities, piped water, and distribution of water.

The study distinguishes four categories of decision-making entities that play a role in investment decisions related to agricultural water:

- individual farm households;
- farmer groups and communities;
- micro, small and medium enterprises (MSMEs); and
- governments.

Each category has different objectives and constraints, different means for investment and pathways to follow, and varying needs for facilitation.

Investments in 'agricultural water', as indeed for any investment in agriculture, can aim to increase one or more of five different types of 'capital':

- increasing *natural capital* (such as by providing more water with treadle pumps, or acquiring property rights to land);
- increasing *social capital* (such as by creating organizations** and institutions to empower the poor);
- increasing *human capital* (such as providing education and teaching skills);
- increasing *financial capital* (such as through micro-credit schemes and community level revolving funds); and
- increasing *physical capital* (e.g., making available farm equipment, market information, infrastructure).

For successful and sustainable agriculture, (access to) all five capitals is needed in reasonable amounts. Some of these capitals may already be present to an adequate degree, while one or two others may be in short supply. Successful investments can be created by increasing those one or two critical capitals. Augmenting 'natural capital' requires quite different actions from augmenting 'human capital', and the same for the other capitals. To operationalize these concepts, we construct a matrix of Decision Making and Capitals where the four categories of decision-making occupy the rows and the five capitals represent the columns.

In the Decision Making - Capitals matrix (Table 1), each cell contains situations that deal with increasing one type of capital for one category of decision makers. In each cell, some examples are given of specific and successful interventions for purposes of illustration.

The Decision making - Capitals matrix includes an extra column to present the types of facilitators for such a decision. Even though we focus our recommendations on governments and investment banks, other actors also play a key role; and partnerships with MSMEs and NGOs are particularly crucial. Note that many of the interventions that may be required do not need financial support directly, but do need resources to facilitate the process.

When all capitals are available to an adequate degree, production processes are more efficient and hence yield a higher return on investments than when one or more capitals are lacking. This is an important consideration for investment decisions. In many cases, investments in 'agricultural water' should go hand in hand with investments in land and in farm management. Two examples may illustrate this point: (i) investment in water may increase land productivity by 50%, but improving soil fertility at the same time can increase land productivity 300% or more; (ii) the integrated management of different sources and uses (domestic and productive) water in 'multiple use systems' in communities improves livelihoods and increases the returns on investments. Of the many possible types of agricultural investments, we focus on those where water as an entry point is likely to be successful.

Private Sector Agricultural Water Investments

A review of the formal and informal literature on agricultural water investments in Africa was carried out with the following four foci: (1) investments that depend on decisions made by individual farm households (with attention to the role women play in decisions making, and including the conditions under which off-farm incomes are invested in agriculture), (2) decisions made by small communities and groups of farmers, (3) decisions made by MSMEs, (4) decisions made by governments, major donors and investment banks about the private sector investment opportunities. Asian experiences were scrutinized for relevance in the African situation.

Knowledge, from formal and informal sources, about successful agricultural water investments by and for members of the private sector was compiled and analyzed. We also drew on experiences acquired in the field of SMEs outside agriculture. This provides an overview of the current types and levels of investment by the private sector as well as examples of how the public sector can facilitate this process. The insights into the 'what', 'why' and 'who' in decision making for investments form the basis for the formulation of recommendations to governments and investment banks.

Table 1. Matrix of Decision-making and Capitals and some examples of such decisions on investments to increase the capital.

Investment Decisions: Dimensions (horizontal) and Types (vertical)	Capacity to effectuate investment decisions (types of facilitators)	Capitals in which investments have top priority				
		Human capital (skill, health, knowledge, labor, ambition)	Social capital (organizations, institutions, policies, laws)	Financial capital (income, savings, loans)	Natural capital (water, land, plant and animal genetic resources, climate)	Physical capital (purchased inputs, equipment, infrastructure)
Individual farm households (special attention to women, HIV victims, under privileged persons)	Family, friends, CBO, NGO, RPO, GO	*e.g., provide information and training on technologies and best practices in land and water management*	*e.g,. increase awareness of benefits of collective organizations*	*e.g., arrange farm output markets; facilitate access to banking and micro-credit*	*e.g., improve security of for land and water tenure*	*e.g., offer baskets of technologies*
Farmer groups and Communities (RPOs, WUAs, FOs)	CBO, GO, NGO, PPP, RPO, WUA, SME	*e.g., organize exchange visits and study tours*	*e.g., create technology information centers; promote learning alliances and networks;*	*e.g., create and manage revolving funds and communal funding schemes*	*e.g., judicious development of land and water; arrange for communal land and water rights*	*e.g., encourage local manufacturing of inputs and post-harvest processing; improve access roads*
Enterprises (MSMEs)	Development banks; PPP; industrial partners, GO	*e.g., sponsor agricultural training programs and study; contract farming*	*e.g., participate in public-private partnerships, including RPOs and WUAs, learning alliances*	*e.g., identify opportunities for contract farming, credit schemes*	*e.g. develop private sector service providers*	*e.g., adopt improved techniques, norms and standards*
Government	International financial and development institutions; international trade and research organizations	*e.g., develop and support training and extension services for agricultural production*	*e.g., encourage community organizations and appropriate institutional framework*	*e.g., provide a good investment climate (incentives, market connections)*	*e.g., develop effective land and water laws at national and provincial levels*	*e.g., provide basic infrastructure for improved input and output market access*

Notes: RPOs-Rural Producer Organization**; WUA- Water Users Association; FO - Farmers' Organizations; MSME - Micro, small and medium enterprise; CBO- Community Based Organization; NGO- Non-government Organization; GO – Government Organization; PPP- Public-Private Partnership; SME- Small and medium enterprise

THE INVESTMENT ENVIRONMENT

Actors and their Roles

The rural sector is a key to poverty reduction, not only by developing agricultural production, improving productivity and promoting diversification of productive activities, but also by improving access to markets, and reducing income inequalities. The overall thrust of this study is to find effective ways of attracting and enhancing investments to improve the human (training, education), social (policies, institutions), financial (income, credit), physical (equipment, infrastructure) and natural (land, water) capital of rural populations.

The value of participation of the private sector for efficient outcomes in agriculture is now well recognized. But there is also a need for a suitable public sector regulatory framework to ensure equitable distribution of benefits from efficiency-related improvements. The World Bank (2003a) suggests that government's functions could include environmental monitoring, auditing, regulation of land and water markets and establishing the policy framework within which the private sector can function. This may require policy and institutional changes that provide incentives (for example, taxes, subsidies, water rights, land ownership or tenure of use) that incorporate principles of equity within the context of customary rights, and provide a workable basis for water transfers among owners and users. Also when the focus is on water, 'land is a key asset for the rural and urban poor' (World Bank, 2004).

While more recent programs focus on recovery of operation and maintenance costs, relatively little has been done on recovery of investment costs. The question of economic incentives and financial sustainability of investments is particularly important for future expansion and intensification of existing irrigation schemes. Policy and institutional adjustments will require improved interaction between ministries of agriculture, finance, planning, and environment.

Innovative examples of private sector participation in irrigation and drainage include those from Niger (privately owned, inexpensive, and simple pumping technologies, promoted through a nongovernmental project implementation unit), Mali (redefining responsibilities and core activities of the Office du Niger, a public sector organization), with most commercial activities being progressively transferred to farmers or other economic agents), and India (increased role for farmers and the private sector in a participative approach to sustainable groundwater management and surface irrigation system/services management).

Markets

Well-functioning agricultural markets are critical to agricultural growth and structural change. The promotion of private sector investment in markets requires an enabling environment that provides security, and scope for income generation. It also needs a stable macroeconomic climate with adequate commercial laws and financial services, a well-functioning legal system, and adequate infrastructure (World Bank 2003a).

Competitiveness and regional integration through markets take on added importance in sub-Saharan Africa in the context of market liberalization (AFD 2004). The emergence of regional free-trade areas could stimulate market access and investments and overcome the constraint of relatively small size of internal markets in many SSA countries (NEPAD 2005).

Investment Sources

One of the ways by which money enters poor regions of the world, including Africa, is in the form of remittances that immigrant workers in more developed countries send back to their relatives. For instance, recent reports by the BBC (2004a, 2004b) state that the sums sent home to relatives add up to billions of dollars each year, and thought to exceed the amount of economic aid given by rich countries to poor countries by more than a quarter. Ratha (2003) shows that the US$ 72.3 billion sent to developing countries in 2001 was equivalent to 42% of all foreign investment and far higher than official flows and private non-FDI* flows. He also emphasizes that remittances are more stable than private capital flows which tend to follow a 'boom and bust' trend. The World Bank (2003b) highlights the point that at $80 billion in 2002, remittances were about double the level of official aid–related inflows and now rank second in importance only to FDI in the overall external financing of developing countries.

While most of these funds are used by the families for food, education, health, mobility and other priority items, significant amounts could be invested in agriculture if proper and rapid returns would be assured. BBC (2004b) gives an example from Ghana where remittances are ploughed back into a mango and cashew nut farm that now also provides employment for up to 20 workers. Ultimately, ventures such as these could be expected to contribute actively to modernizing rural economies and participate in the creation or consolidation of viable agricultural enterprises.

Creation of revolving funds in communities or groups (a social capital) is a way by which farmer organizations are known to make more of their private financial capital, often savings, available for investment in their farms.

Goldring (2004) analyzes the large volume of remittances to Mexican rural families and shows that these remittances are beneficial for the families that receive them, but most of it is used to cover cost of food and education and community services and little for commercial activities. He argues that harnessing part of these funds for development requires new ways of thinking about commercial investments in communities. We have no direct evidence for Africa, but the picture may well be the same. The challenge to governments is therefore how to divert part of these remittances towards productive investments in agriculture? What incentives must be provided so that this potentially huge resource can be harnessed to make a significant contribution to improving rural livelihoods? Examples are: improvements in fiscal policies, relaxation of exchange controls, streamlining financial sector infrastructure, and reducing transaction costs etc.

Leveraging Private Investments with Public Funds

Profitability is a major motivation for private investors in agricultural water, as in any other private-sector undertaking – a willingness to take risks must be rewarded by commensurate returns to investments. Whoever invests expects to own or control the facilities. Greater private sector involvement in the financing of water infrastructure faces challenges and dilemmas (SIWI 2004). It is unlikely that the public sector alone can be relied upon to make all future investments in water. However, such investments may not be a sufficiently attractive proposition for the private sector which tends to focus on short-term financial viability, low risks, high returns and short payback periods.

The profit motivation of the private sector, sometimes seen as 'amoral', may have been the reason for governments to ignore for a long time the potential contributions of private irrigation to food security, poverty reduction, job creation, etc. (Bangoura 2002, Gadelle 2002). Although progress

has been made in private sector participation, especially in vegetable and fruit production, gaps still exist. Successful approaches such as those used by NGOs like International Development Enterprises (IDE) and Enterprise Works to promote treadle pumps (discussed later in the text) merit particularly attention for application elsewhere.

Private investment in agricultural water might be directed towards five areas (Abernethy 2002):

- Funding of recurrent costs of operation, maintenance and management especially for existing users of irrigation schemes;
- Providing capital to extend existing systems;
- Constructing new facilities;
- Improving existing technologies;
- Providing support services, such as marketing or contracted maintenance.

Seckler (1989) enumerates six conditions for feasible private-sector irrigation:

- Additional costs of conversion to irrigated agriculture must be offset by commensurate increases in agricultural production;
- Availability of good quality land and water in proximity to each other;
- Reliable and economic supply of inputs and labor to realize the production potential;
- Markets for the purchase of these inputs and the sale of produce;
- Reasonable transport facilities between production areas and markets;
- Input and output prices are at the right level and stable.

Constraints and Opportunities

The factors that can exert a positive influence on private sector participation in agricultural water development and management include:

- reducing the cost of physical infrastructure and making available a wider range of appropriate and cost-effective technological options (e.g., to allow use of deeper aquifers, achieve water-saving, develop affordable pumps);
- strengthening or putting in place effective support services for credit and marketing, and systems to provide technical assistance for the operation and management of farms including post-harvest operations and storage;
- creating a more supportive legal and institutional framework including clear demarcation of roles and responsibilities of the various role-players, especially for governments that may oscillate between lack of control and micro-management;

- ensuring the long-term viability and sustainability of projects after the end of external financing, drawing on proven and successful approaches.

These items cover the following cells in the Decision-Capital matrix: IS, IF, IN, IP, CS, CF, CN, CP, MS, MF, MN, MP[3]:

INVESTMENT DECISIONS MADE BY INDIVIDUAL FARM HOUSEHOLDS

Who are they?

Smallholder farmers make important personal investments, irrespective of whether they run their own farms or operate as participants in government-sponsored schemes. Most rural investments are self-financed. Mobilizing the savings of smallholder farmers or using non-farm income or remittances is usually a good starting-point. If the venture is successful and once they have acquired some experience, farmers may enter into commercial loan arrangements.

The investment capacity (and financing needs) of farmers depend on factors such as their sources of income, socio-economic status and asset base, skills and experience, commercial orientation (FAO 2003), costs of non-farm family needs and on his/her own perspectives for the future of the farm.

The following types of farmer–investors can be identified, according to their income from agriculture and their demand for financial services (FAO 2003):

- *Subsistence farmers* desiring to increase their cash income through the sale of surplus production on the market — they would normally require savings deposit services and, in some cases, short–term loans;

- *Part–time farmers* with mainly non–agricultural income (e.g., trade, small–scale processing, casual wage labor, etc.) who invest in farm assets to diversify their income or acquire assets that will appreciate over time. They typically use loans for non–agricultural activities and invest the proceeds in agriculture or repay loans invested into agriculture out of their non–agricultural income;

- *Civil servants* (such as pensioners, retrenched staff, demobilized military personnel) seeking new careers after retirement or retrenchment may need a variety of financial services and often bring significant funds or a moderate income for investments.

- *Emerging commercial farmers* obtaining at least 50% of their income through selling farm produce in the market – this group would make productive investments to increase the profitability of existing farming activities or to diversify into new activities.

[3] These codes refer to the cells in the Decision Making – Capital matrix of Table 1. The first character stands for I=individual households, C=communities & groups, M=MSMEs; G=government; the second character stands for S=social, H=human, F=financial, N=natural and P=physical capital.

Smallholder Private Initiatives

Farmer-controlled small-scale irrigation systems have a better record of performance than government-controlled schemes (FAO 2000; Abubakar 2002; and Rosegrant, *et al*. 1995). These types of schemes include systems that range in size from 1-100 ha (with larger sizes controlled by WUAs, cooperatives, voluntary groups, and other associations, and the smaller ones by individuals) to irrigated gardens 0.1-0.5 ha in size. Farmers do better when they build, own and operate the schemes themselves [IF, IN, IP] rather than those built, owned or operated by the government.

A range of technologies and techniques for water collection and distribution in small-scale irrigation systems offers new opportunities for the production of horticultural crops for domestic and international markets (Gyamfi 2002, Freeman and Silim 2002, Freidburg 1997, Purcell 1997). Fruits and vegetables are now Kenya's third-leading foreign exchange earner. Over 100,000 smallholders in addition to commercial producers, exporters and equipment suppliers have benefited (Minot and Ngigi, 2003). Sijali and Okumu (2003) highlight the potential benefits for smallholder farmers through the adoption of low-cost drip irrigation. In order for irrigation technologies to be adopted by smallholder farmers, they need to be affordable (low investment cost, low operation and maintenance costs) and easy to install and operate (van Leeuwen 2002).

Availability of inexpensive smallholder technology could be a strong driving force for rural development. Innovations in the last decades brought many types of equipment and engines and pumps that can be purchased, operated and maintained by individuals or small communities. These provide a large boost to the Asian smallholder farmers. In sub-Saharan Africa, however, individualized equipment remains expensive and has yet made little inroads. Given the large number of women farmers and an increasing number of child-farmers, more attention to (trans)portable farm equipment would be very valuable.

Tiffen (2003) shows that policies that increase the purchasing power of local urban communities are becoming more relevant than those that promote exports. Domestic markets have an enormous potential for growth (NEPAD, 2005). Farmers also have a remarkable capacity to adjust their investment decisions in response to changes in technologies and product and factor markets. The increasing tendency in the 1990s of better-off farmers in some parts of West Africa to invest in livestock to take advantage of rising urban demand and higher prices for meat is a case in point. The evolution of dairy farming in Eastern Africa has followed similar pathways (Ngigi 2003; Ahmed, *et al*. 2003). Yet, excessive state control of markets, shifting policies, and unpredictable exchange rates sometimes come in the way of farmer investment initiatives. The provision of certain types of services and infrastructure related to agricultural water and research is better made collectively; overall, a judicious mix of public and private investments seems to be required. [IS, IF].

Private sector participation has, historically, been a strong part of the chain around export crops. However, exporters of fruits and vegetables are coming under increasing pressures due to food safety regulations and quantity requirements imposed by the importing countries. In addition, there is a high level of risk since markets tend to get saturated, the competition becomes more intense, and import/export regulations may change.

Potential agro-entrepreneurs face formidable barriers to entry that may effectively limit participation to those who already possess some assets, skills, credentials and contacts (for acquiring credit and securing markets). Some general constraints include:

- High transaction costs of marketing and hence a reduction in producer profits;
- Lack of infrastructure such as cold storage facilities;

- Inadequate road networks, resulting in reduced competitiveness;
- Lack of reliable suppliers and service providers;
- Lack of clarity in regard to land tenure and water rights;
- Difficult access to long-term loans and credits

Urban and Peri-urban Agriculture**

Urban and peri-urban agriculture (UPA) provide an important contribution to urban household food security, reducing malnutrition, and improving livelihoods, especially given the rising levels of urbanization in Africa and growth in the disposable income of urbanites. It is estimated that there are 800 million people practicing UPA worldwide, of which 150 million are producing full-time (Sawio et al. 2001). The proximity of relatively large markets in nearby cities and the demand for fresh fruits and vegetables from the urban middle class are key driving forces. UPA's share of vegetables, fruits, fish, meat and dairy products consumed in cities is thought to be almost 50%. Peri-urban agriculture includes many small irrigation schemes that provide much food for cities. Often, these schemes are not captured in national statistics of irrigated areas, and are neglected by governments. However, surveys have revealed that in cities like Kumasi in Ghana, the extent of seasonal peri-urban vegetable irrigation is around 12,000 ha, which is more than twice the area under formal irrigation schemes in the whole country (8600 ha) (P. Drechsel, pers. comm.).

A review of the literature and studies on the profitability and sustainability of UPA in Africa and Asia (Danso et al. 2003) reveals the huge diversity of such production systems: horticulture (vegetables and fruits), livestock (poultry, goats, sheep, cattle), agroforestry, and aquaculture. The scale of operations ranges from backyard farming for household consumption to market-oriented open-space production. Open-space production can be very profitable – households are able to lift themselves above the poverty line with income levels sometimes exceeding official minimum wages. They are sometimes able to collect the start-up capital requirements to expand into 'higher-level' entrepreneurial ventures such as flower production, poultry-farming, vegetable gardens, and aquaculture, with the promise of even higher returns.

UPA is faced with serious constraints in security and quality of the natural resources and in competing imports of agricultural products. UPA is practiced in areas that are generally under the jurisdiction of municipal authorities or urban management institutions. Those areas are often used without formal authorization but with varying degrees of tolerance. Water is generally drawn from rivers or watercourses that drain urban centers and into which municipal and industrial wastewater is discharged with little treatment and no monitoring. Increasing property values in and around urban centers and adverse environmental impacts (health risks associated with wastewater use, land and water pollution, nutrient depletion and erosion) can pose a serious threat to UPA [IH, IS, IF, IN, IP]

Development support to UPA should not result in it being *taken over* by the government (Barry 2002). Rather, what is needed is participatory development in urban and peri-urban farming to enable proper integration between the public sector (e.g., land-use planning, wastewater treatment etc.) and agricultural use of land and water by farmers. For example, treatment of urban wastewater and its subsequent use in urban agriculture requires government planning, investment and extension services. [IS, IN, IP]

Widespread use of hardware for lifting and distributing water also gives rise to new opportunities for equipment suppliers, maintenance and repair services. Income gains from small-scale commercialized irrigated farming lead to an increase in demand for improved irrigation technologies by farmers (Purcell, 1997, Abubakar, 2002).

Summing Up: Farm Households

Effective investment decisions in agricultural water development and management made by individual households can address improvement in any of the five capital categories. To raise the efficiency of their enterprises and returns to their investments, they may need to enhance particularly their human capital (e.g., by learning skills in improved cultivation practices), social capital (e.g., setting up farmer organizations), physical capital (e.g., better access to technology, information and markets),

Box 1.

Summary of results from case studies of smallholder pump-based irrigation in West Africa (Source: Gay 1994; Abubakar 2002)

Overall Result:

Farmers were making profits, though sometimes affected by price fluctuations and increased levels of competition.

Factors for success:

1. *Recent technological progress has resulted in smaller, lighter and more reliable pumps; they can therefore be transported easily from place to place and can be taken home every evening, avoiding the possibility of theft.*
2. *The (infrequent) repairs could be easily done by local mechanics and artisans, thereby providing an additional source of employment and income to this socio-professional category.*
3. *The low cost of pumps allowed cost recovery within a single season of horticulture cultivation.*
4. *Coupled with relatively trouble-free operation and inexpensive maintenance, they have a positive impact on farm budgets and profitability.*
5. *The increasing demand for horticulture products among urban consumers.*

Constraints:

1. *Increased competition and periodic saturation of the market; post-harvest processing, value-addition, and better organization among farmers are suggested as possible remedies.*
2. *Some farmers face difficulties in assembling the initial capital needed for the purchase of a pump; solution = possibility of providing access to credit facilities?*
3. *Sub-optimal agricultural and water management practices that depress profitability; provision of suitable technical advice and support services to correct these shortcomings.*
4. *Difficult access to water; lowering of aquifer levels, especially in the dry season, may limit possibilities for cultivation and expansion.*

natural capital (e.g., bringing wetlands under cultivation) and/or financial capital (savings, remittances, micro-credit). There is a need to base solutions on a proper assessment of their 'site-specific' needs, capacity and outlook. [IH, IC, IS, IF, IN, IP].

Farmers and other private sector groups can contribute significant financial and non-financial contributions for agricultural investments if the conditions allow rapid, fair and secure returns. Well-targeted public investments that create a conducive investment climate and facilitate the enhancement of the five capitals needed for development can leverage major private contributions for agricultural investments.

Women have important roles on farm and in off-farm activities. But their productivity and investments are often constrained by insecurity of land tenure, inability to access credit (because of lack of collateral), and lack of training and access to agricultural extension. In dual farming systems, women may not be motivated to make investments in irrigation because it significantly increases their farm labor and they may not be able to profit from the extra income (Safilios-Rothschild, 1991). When the construction of catchments, dams and wells can diminish their daily burden in searching for water, they are extremely motivated to contribute most of the labor, as was found in semi-arid areas of Kenya (Safilios-Rothschild, 1990).

While UPA has a huge potential to improve household food security, reduce malnutrition, and increase income levels, judicious, well-targeted assistance from relevant public agencies to UPA farmers (e.g., regarding treatment of urban wastewater and its subsequent use in urban agriculture) can improve its performance and productivity.

Governments must continue to play a key role in creating an appropriate investment-friendly climate that will encourage further private sector participation in agricultural water development and management.

INVESTMENT DECISIONS MADE BY COMMUNITIES AND GROUPS

Desirable Organizational Attributes

Irrigator groups must assume the entire responsibility for planning and implementing certain tasks, instead of these being done by a (public) agency [CH, CS, CF], because implementing a task or a challenge has an important formative role in developing organizational strength, such as the need to make rules, determining how tasks will be carried out, mobilizing the requisite resources, etc (Ostrom 1992 and Yoder 1994).

In this context, it is worthwhile recapitulating the set of principles for the sustainability of locally-created irrigator organizations that was developed by Ostrom (1992) based on an extensive analysis of experiences from many countries. Each of these principles addresses one of the aspects of good organization as summarized in the box below. [CH, CS]

Studies of successful small-scale irrigation schemes in the Sahel (Brown and Nooter 1992; Rosegrant and Perez 1995; David 2000) identified the following common characteristics, recognizing that the criteria for success can vary, given the multiple uses and users of irrigation systems:

- The use of simple technologies (such as low-lift pumps drawing water from shallow aquifers, rivers or streams), with affordable levels of capital investment, maintenance and replacement costs;

- The assurance of a secure supply and individual control of water;

- A supporting infrastructure that facilitates access to inputs and to markets;
- Institutional arrangements that are private and individual; in the case of collective arrangements, the most effective are extended family groups, with water users' associations and co-operatives at the other end of the scale;
- A judicious choice of technology and crops that offers high financial returns and makes farming profitable;
- The farmer is an active and committed participant in project design and implementation.

The accountability of such groups to *all* their members rather than just to a section such as influential farmers or those in one part of the system, or to the irrigation agency is of particular importance (Cernea and Meinzen-Dick (1994). [CH, CS, CF]

Box 2.

Principles for the sustainability of locally-created irrigator organizations (after Ostrom 1992)

a. ***Clarity:*** *there are clear boundaries and rules about who has rights to water.*
b. ***Equity:*** *rules ensure that each member's contributions and benefits are in balance.*
c. ***Flexibility:*** *rules can be modified by collective decision of the members.*
d. ***Transparency and accountability:*** *monitoring of conditions and actions is done by users or by people accountable to them.*
e. ***Compliance with rules:*** *violators of rules receive* graduated *penalties, decided by other users or by people accountable to them.*
f. ***Conflict resolution:*** *arrangements exist for settling conflicts, among users or between users and officials, quickly and at low cost.*
g. ***Autonomy:*** *government authorities recognize the users' right to devise their own organization and rules.*
h. ***Decentralization:*** *there are different levels of organization, which deal with different functions and decisions.*

Bright Spots and their Drivers

While the overall picture of rural development in Africa is still bleak, as noted above there are already many 'Bright Spots'**, i.e., households or communities that significantly improve their own livelihoods and environment with sustainable agricultural practices (Noble et al., 2005; Mati and Penning de Vries, 2005). These communities, with limited public investment (equivalent to a few hundreds of dollars per hectare) or without external funds, have found ways to escape the poverty spiral through innovation and recognition of (new) options. 'Drivers' of emergence of Bright Spots are either 'internal' (particularly leadership, social cooperation and innovation) or 'external' (access to information, hardware, markets, credits). We suggest that we must understand the emergence of

Bright Spots sufficiently before starting programs to create many more of them; further understanding of conditions for, and limits to, upscaling is also needed.

In evaluating the drivers associated with the development of 'Bright Spots', ten elements were identified as being of importance:

- *Quick and tangible benefits*. Immediate tangible benefits to the community or individual are a prerequisite for the development of a 'Bright' spot. For example this may include increased yields within the first year of implementing changes; or a reduction in the costs of labor.

- *Low risk of failure.* Resource poor farmers by their very nature are risk-averse; hence any change to the current *status quo* must have a low level of risk associated with it.

- *Market opportunities*. If there is to be a change in practices that are contingent on the production of a new or alternative crops/products, markets need to be present and assured to effect this change.

- *Aspiration for change*. This reflects an internal demand by an individual or community for change that may be driven by faith or wish to try something different.

- *Innovation and appropriate technologies*. External and internal innovations, new technologies and information are important components in change. With respect to internal innovation and appropriate technologies, this includes the revival of traditional/local knowledge. External innovations reflect new developments in techniques and technologies that if adopted effect a positive change to the production system. This includes new skills and knowledge that contributed to the development of a 'Bright' spot.

- *Leadership*. Often a single individual or group may become the champions for change. In addition, the initial involvement of an external facilitator such as an NGO or government agency may be required to take on this role.

- *Social Capital*. These are community organizations, networks, and partnerships (private as well as public) that develop in order to promote change. They have the elements of bonding, bridging and linking within the community.

- *Participatory approach*. Deliberative processes that actively involve the community in the decision making process. This has a strong element of learning and teaching and involves the establishment of a partnership between farmers and the development workers.

- *Property rights*. The element of individual property rights and ownership may enhance the willingness of individuals to investment in assets thereby facilitating change.

- *Supportive policies*. Changes in policies at the local, regional and national levels will facilitate the development of 'Bright' spots.

A total of 110 cases from the SAFE project (Pretty and Hines, 2001) and a further survey undertaken by Noble *et al.* (2004) contained sufficient information to estimate the extent and impact of Bright Spots in Africa. On average these Bright Spots sustained 4.6 persons per hectare with a

range of 0.2 to 13.1. In total, 1.79 million farmers on 1.91 million hectares have adopted improved land and water management strategies that have had a significant impact on yield and the environment. The largest number of farmers impacted on through the development of Bright Spots was under rainfed humid systems, followed by smallholder irrigated schemes. Wetland rice-based and coastal artisanal fishing were under-represented in the cases collected.

Sub-Saharan Africa's population is 629 million people of whom 384 million are classified as agricultural (Dixon *et al*., 2001). The total area under cultivation or permanent crops is estimated to be 173 million hectares (FAOSTAT). The direct extent of impact of the documented Bright Spots in the study of Noble et al (2004) from an area and population perspective is 1 and 0.5 % respectively. It is likely that this fraction is much underestimated. Although these figures appear to be low there is cause for optimism in that there is clear evidence that farmers are adopting improved, sustainable production practices that have a positive impact on food security at the household level, improved livelihoods (increased income) and tangible benefits to the environment as a whole. The potential benefits associated with the adoption of sustainable farming systems on carbon sequestration and water productivity have been shown to be significant (Pretty et al., 2002; 2004). Unfortunately for farmers, these positive environmental and financial benefits that would accrue through the development of Bright Spots lie beyond the 'farm gate'.

The development of a Bright Spot has had a significant impact on agricultural productivity as measured in changes in yields in crops before and after the adoption of improved production practices. A weighted average increase in relative yield based on area of adoption and average productivity increases for the 110 projects analyzed was estimated to be 2.56. The largest increase in yields were observed in rainfed highland systems (2.96) whilst the lowest in urban based systems (1.71). Interestingly, the largest benefits from Bright Spots were observed among farms with initially the lowest yield and so probably with the poorest farmers.

Government Withdrawal and Irrigation Management Transfer

The disengagement of public agencies from direct involvement in the operation and maintenance of irrigation schemes creates opportunities (and pressures) for various forms of private-sector participation to take over responsibility for functions such as water management, maintenance of physical facilities, procurement of inputs, and marketing. Benefits and limitations of management transfer of government-sponsored irrigation schemes (IMT) to the user communities is perhaps the most well known of these. In addition, there are also domestic *cum* productive use water systems in communities, and rainwater harvesting and storage structures created and maintained by collective organizations. The literature on Bright Spots (Noble, *et al.* 2004) and emerging entrepreneurship (see Odeh, in Banuri & Nakam 2002) provide further examples.

IMT maybe described as 'the relocation of responsibility and authority for irrigation management from government agencies to non-government organizations, such as water user associations (Vermillion and Sagardoy 1999). IMT may involve total or partial transfer of management functions or of authority. After transfer, it is not necessary for the services or functions to always be provided by farmer organizations; the can be done by a variety of other entities, including private sector operators, who act as service providers to the farmer-clients. According to Abernethy (2002), IMT encourages demand-led production of irrigated products while helping to reduce government control and encouraging private sector participation, with the emphasis shifting to profitability rather than on welfare activity – e.g., choice of high value crops to attract capital investment and generate attractive returns to capital. [CH, CF, CP]

The implementation of IMT policies requires the existence of some kind of organization of the irrigators, with which the government can negotiate and arrange the transfers. Evidence from IMT experiences in Sri Lanka, India, Indonesia, Nepal, Mexico and Colombia (Samad 2002) suggests that for irrigation management transfer to work there should be functional water users associations (WUAs) that can take over responsibilities for operation and maintenance (O&M) of the irrigation facilities including formulation of O&M plans and budget, setting and collecting water fees, and having the right to contract and raise funds [CH, CS, CF, CP]. If there is no pre-existing organization appropriate for the implementation of the policy objective, then the government must take steps to promote the formation of such an organization. The essential problem in this regard is that these organizations tend to remain dependent on government, and their leaders look to government agencies (rather than to their own members) as the source of their legitimacy, and in many cases the source of their financial support (Abernethy et al. 2000). On the other hand, the members and office-holders, being aware that the existence of the organization is important to government policy objectives, may take advantage of this state of affairs to extract concessions and subsidies from government. [CH, CS, CF]. A later study by Shah et al. (2002) provides more insights into the potential for successful IMT in African irrigation (see paragraph 2.77).

IMT experiences in West Africa suggest that it is desirable to maintain a residual role for government in support of the irrigators' associations: either a regulatory role or providing specific technical support services (through an appropriate agency) in such areas as planning and design, operational guidance, marketing, and helping to achieve financial transparency (Abernethy and Sally 2000). Any involvement of the central government should be clearly defined and restricted so that the associations become truly independent and not permanently accountable to the government. [CS, CF].

The development of private irrigation in the Senegal River delta has contributed significantly to the expansion of irrigated area, and has had favorable economic impacts notably by encouraging the entry of youth, women and the urban population into irrigated agriculture (Dia 2002). This was facilitated by the land reform of 1983, which granted access to land by individuals and farmer cooperatives (Darghouth 1990). Government disengagement from agricultural production and providing support services is expected to give rise to opportunities for collective groups and farmer organizations to acquire new skills and greater professionalism (Legoupil et al. 2000). But achieving this is not always within the means and capacity of these organizations, at least not overnight, and not without some (external) assistance. Hence, the emergence of new categories of stakeholders (service providers) who, on a commercial and contractual basis, either provide technical and management assistance to farmer organizations, or who perform tasks which the farmers are not qualified or ill-equipped to do. Such a trend could give rise to employment opportunities for young graduates and former employees of public sector rural development agencies, as well as the development and use of appropriate management tools. However, such (emerging) service providers would have to demonstrate to their future clients that the benefits that will accrue justify the additional expenditure involved. [CH, CS, CF, CP]

A comparative study of international IMT experience by Shah et al. (2002) indicates that the transfer of public irrigation schemes is unlikely to succeed in African smallholder irrigation. The main obstacle is the absence of broad-based multisectoral institutional reforms including improved access to credit, input and output markets, secure land and water rights, and effective extension and support services. They also emphasize that irrigated agriculture as the main source of household income is a pre-requisite to successful IMT—where plots are too small or farmers have more lucrative alternatives, they will not invest in the social capital required to manage irrigation schemes.

They underline that it is only when these conditions prevail that the income-creating and livelihood-improving potential of private smallholder irrigation can be fully realized. [CS, CS, CN].

Irrigation management transfer results in a special situation where private-sector type management and production take place on public-owned systems, raising a number of financial and institutional questions. For example: have the rights and responsibilities of the different parties (government, farmer organization, individual farmer), as well as the ownership of assets and facilities been clearly enunciated? Have the "rules of disengagement" been discussed with and agreed to by all participants? What residual role, if any, must governments play? What should be the (future) relationship between the farmers and the bureaucracies? The scope for direct large-scale private-sector participation in government-sponsored irrigation schemes seems to be limited unless adequate answers are provided to these questions. In irrigation schemes, few farmer organizations are financially independent and self-sustaining. They face enormous challenges in accumulating sufficient working capital and savings without which they would be unable to meet even the recurrent costs of operating and maintaining facilities, leave alone coping with the costs of major repair and renewal, ultimately resulting in deficits in major maintenance. Most of these organizations would be technically bankrupt if they were private-sector businesses. [CH, CS, CF, CN, CP].

Recent activities to organize communities ('integrated development', Omar and Younis 2005) and training (farmer field schools, Khisa and Heineman 2005) provide more optimistic examples of development of social capital, and the way in which external agents can facilitate their emergence. Most of these refer to upland farming where often sharing of water is not a large issue and sharing of knowledge provides win-win situations. There seems to be much opportunity for more of such developments with relatively low cost for facilitation and significant investments by the private sector participants.

Collective Rainwater Harvesting and Storage Facilities

There is tremendous scope for individual households and communities to use rainwater harvesting and other inexpensive water development options in an integrated fashion, together with suitable land and nutrient management practices, for both productive and domestic uses (de Lange and Penning de Vries 2003). But there are also several challenges, mostly attitudinal rather than technical, that have to be overcome to transfer and up-scale such innovations. An interesting example of how groups of women in a poor rural community in Uganda learned to harness rainwater and thereby improve the quality of their lives is described by Rusagira *et al.* (2002). They not only learnt to build tanks to collect rainwater from the roofs of their houses for domestic and productive use but they also earn money by building tanks for neighbors. In an in-depth field and desk study for semi-arid zones of SSA, Barron (2004) shows that economic returns in rain water harvesting are possible after 2-7 years after investment in a small dam and a sealant (to reduce leakage) through use of the stored water to stabilize and increase production.

Collective rainwater harvesting structures for agricultural production have been known for hundreds of years in many countries. Yet, recent attempts to encourage farmers in semi-arid zones are often disappointing, for the following reasons: (i) people often do not understand the principles and get inadequate training, (ii) transaction costs are high, (iii) outside institutions are often needed to get them started, (iv) too little focus on 'risk' and how to handle it, and (v) cooperation with different people (i.e., not worked together before) is difficult (Oweis et al. 1999).

Community management of land and water resources has been a long-held tradition in certain parts of Africa, governed by local social structures and norms (Mati and Penning de Vries 2003).

However, the performance of community participation in water and irrigation management has been mixed. Communities with a tradition of self-help activities tend to do better. Among the reasons for failure they observe that villagers' motivation to do voluntary work is undermined by over-reliance on donations or paid labor projects in the same area. They outline some of the key attributes of sustainable community water development and management:

- The community must be proactive and self-confident to be able to construct, operate and maintain its own water systems on a sustainable basis;
- The community is fully aware of the costs and benefits of different approaches; usually, the simpler and more affordable, the better the chance of sustainability;
- An external agent may be invited as an equal partner, but the roles and responsibilities of each party must be agreed to by all parties;
- Policies and codes of conduct must be clearly spelt out with practical deterrent measures for defaulters, and possibilities for rewarding those who excel.

Multiple Use Systems**

In rural and peri-urban areas, everyone uses water for various 'domestic' purposes and many people use or could use water for 'productive' purposes to earn an income, such as gardening, field crops, livestock, brick making. Yet in most cases, water sources, uses and users are not well integrated, leaving much scope for improvements in water use efficiency, livelihoods, and equitable water use. Examples of such improvements are: more accessible and cleaner water for households, expanded water services that allow productive uses, more reliable water supplies through new institutions that enable effective interactions between end users and providers of water. Such improvements increase the ability of water users to pay for installation and maintenance of the systems, which in turn prepares the ground for accelerated upscaling and implementation (IWMI 2003). In communities with 'multiple use water systems', an optimal combination is achieved of water from multiple sources (included piped water) and for multiple uses (principally domestic and productive uses) by multiple users (gender, different household poverty levels). An optimum combination enables healthy livelihoods and efficient agricultural production. The efficiency is such that the returns on investment are high and the ability to pay is increased (Moriarty et al., 2004).

Learning Alliances** have been proposed as a new and effective form of collective development and operation of multiple use systems (Penning de Vries et al, 2005) and for management of natural resources (Gonsalves and Mendoza 2003). For multiple use systems, a Learning Alliance is a group of stakeholders of a multiple use system in a district or catchment that discusses together how best to use the water. That Alliance typically includes (representatives of) different types of water users (irrigators, cattle raisers, beer brewers) and (representatives of) suppliers of water and water services (well operators, water vendors, municipality). Since there is a large structural element of learning involved (about the other participants, about opportunities, about problems with implementation) a learning alliance follows an iterative approach to progress rather than a linear log-frame style (Hagmann, 2004). Learning Alliances are natural fora for farmers, small enterprises, NGOs and authorities to collaborate and can be seen as informal PPPs. District level, regional and national level learning alliances may be needed (Penning de Vries et al 2005).

Summing Up: Investments by Communities and Groups

There are already numerous Bright Spots. To support the drivers that can lead to their out- and upscaling is a form of bottom-up development that needs broad recognition and active promotion. Small public funds for facilitation can leverage significant investment contributions from the private sector.

While collective approaches to improve agricultural water use can work very well, they do need a significant degree of willingness and ability in the communities to collaborate. There are situations where this has declined (inward and outward migration, war), but also examples where the collaborative spirit can be brought into a community by training, examples and profitable innovations. Learning Alliances are a form of collaborative action in which farmers, private sector SME's, NGOs and government organizations that can be a tool to jointly develop and manage water systems.

Irrigation management transfer, provision of support services, and rainwater harvesting and storage are some of the situations where collective action by communities and groups can be highly effective. But the collective organizations should not exclude the poorest, women, and minorities, but be inclusive and accountable to *all* their members.

INVESTMENTS IN MICRO, SMALL AND MEDIUM ENTERPRISES (MSMEs)

Characteristics of MSMEs

MSMEs have the potential to serve a wide range of agricultural needs ranging from provision of physical inputs (seeds, fertilizers, agro-chemicals, tools, machinery) through enterprise-specific services such as short and long term credit, technical, financial planning and management consulting to services in collection, transport, preparation, processing and marketing of agricultural produce (Eriksen 1991).

MSMEs in Africa tend to concentrate on a few areas of activity, largely producing goods and services for domestic markets. MSMEs have a hard time joining the formal economy because the requirements for legal recognition are often complicated and expensive. Due to difficulties in obtaining credit from the formal financial sector, MSMEs resort to informal sources of credit (usually at high rates of interest). Development agencies, such as USAID and UNIDO, provide assistance to promote MSME growth and development, especially export-orientation, increased employment and incomes, technology uptake, and thereby contribute to overall economic growth.

There is a high degree of diversity among MSMEs with medium-sized businesses coexisting with subsistence activities. The enterprises are forced to operate in highly competitive niches where the markets are also relatively small in size. MSMEs have shown great creativity in adapting to reality, particularly from the standpoint of technology.

In rural SSA, a fundamental investment question is whether to deploy scarce resources for promoting small enterprises which will benefit many, as opposed to large but fewer enterprises. For example, micro enterprises in Niger include many household businesses and agro-processing industries providing agriculture-related commercial services like inputs, equipment, land preparation, equipment repair and maintenance, marketing, and storage (World Bank-Africa Region 1995). These activities are low-paying and part-time but provide supplemental household income. We conclude that promoting SMEs is an effective way to "promote private sector participation .. for .. poverty reduction, food security and economic growth" (paragraph 2.8); the promotion should take the form of facilitation of the acquisition of capitals and their effective deployment, as well as ensuring support of governments to provide rural infrastructure.

Technology Development, Manufacture and Promotion

The manufacturing sub-sector in SSA shows some modest involvement in the manufacture of small-scale irrigation equipment. Table 2 below illustrates the availability of irrigation equipment, including local manufacturing capacity and imports, in selected East and Southern African countries. In South Africa, private sector firms manufacture a range of small-scale irrigation equipment including manually operated and small motorized pumps which are ideally suited to small-scale farming (Koegelenberg 1997). In principle, these companies have the capacity to manufacture relevant and suitable equipment for small-scale farmers in other countries.

Table 2. *Examples of availability of irrigation equipment in five sub-Saharan African countries*

Country	Locally Manufactured	Imported
Ethiopia	Hand pumps and animal drawn pumps; and small to medium sized centrifugal pumps (Akaki Pump factory); there is potential for local manufacture of simple water lifting devices such as swing basket, the Archimedean screw, water wheel, Persian wheel, rope and bucket lift, circular two bucket lift, counterpoise bucket lift	Diesel powered centrifugal pumps imported from India; electric motor driven pumps imported from North Korea
Malawi	Hand pumps including rope and washer pumps; treadle pump manufacture is being explored	All mechanical and electric pumps are imported; light weight sprinkler pipes are imported
Tanzania	Hand pumps for domestic water supply for shallow bore-holes, treadle pumps	Deep well pumps, mono-bloc and submersible pumps from European countries and South Africa
Zambia	Treadle pumps are manufactured; PVC pipes are also manufactured	Irrigation pumps imported from South Africa, Zimbabwe, Europe, India and China; interest in local manufacture; start joint ventures with Indian companies
Zimbabwe	Sprinkler & micro-irrigation equipment is manufactured but still expensive; capacity to manufacture all types of pumps, pipes and equipment is good	Many components of irrigation equipment are imported; mostly from Europe and USA

Source: FAO, World Bank - IPTRID 1997

Box 3.

The ApproTEC approach to treadle pump promotion
(source: ApproTEC 2002, 2005)

- *identify small-scale enterprise opportunities;*
- *develop the technology needed for the enterprises;*
- *work with the private sector to manufacture and distribute the (new) technology;*
- *market and promote the technology;*
- *provide marketing, business and product development services to micro-enterprises;*
- *monitor impacts for feedback.*

In Kenya and Tanzania, the NGO, Appropriate Technology for Enterprise Creation (ApproTEC) is developing and promoting technologies that can be used by entrepreneurs to establish and run profitable small-scale enterprises. ApproTEC encourages and assists micro and small enterprises to distribute (as dealers or retailers) these technologies to make them widely available. It also works with small and medium enterprises to mass produce the technologies. The main water-related technology promoted is different models of the treadle pump (costing the equivalent of US$ 25-75)[4].

Enterprise Works (EW), another NGO, promotes treadle pumps for horticulture in West Africa through commercially-oriented collaboration with local-level development agencies and entrepreneurs. This includes doing market surveys to determine needs and potential, identification of appropriate technology solutions, manufacturing and sales support, and then quality control (Beaujault and Dotson 2002). In Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger and Senegal, the treadle pump was promoted as an alternative to the motorized pumps and the traditional bucket and rope methods of drawing water for agriculture. Initial observations indicate that EW has been successful in demonstrating the advantages of the 'inexpensive' treadle pumps over the other technologies.

Box 4.

The Enterprise Works approach to treadle pump promotion
(source: ***Beaujault and Dotson 2000)***

- *studying the irrigated sector to identify constraints;*
- *identifying suitable technologies likely to address the constraints;*
- *evaluating the market potential for these technologies and for the ensuing products;*
- *establishing and supporting the production and sale of these technologies;*
- *developing markets for the products;*
- *ensuring quality control in manufacturing and utilization especially at the beginning of technology production; and*
- *exiting from the activity when the system can operate independently*

In addition to treadle pumps, EW intervenes in the following sectors related to irrigation on a small scale in West Africa: (a) support for marketing of PVC pipes and development of well drilling, with Agence Nigérienne de Promotion de l'Irrigation Privée (ANPIP) in Niger; (b) testing of inexpensive, motorized irrigation equipment, with Association des Professionnels de l'Irrigation Privée et Activitées Connexes (APIPAC) in Burkina Faso; and (c) support for marketing of onions in Mali.

[4] However, it is worth noting that ApproTEC is examining expansion to West Africa but may import pumps from China because they are so much cheaper than those manufactured anywhere in Africa (Nick Moon, personal communication)

The Smallholder Irrigation Market Initiative (SIMI; Winrock and IDE, 2002) is an initiative of International Development Enterprises (IDE) and Winrock International (WI) and builds on the phenomenal successes with treadle pumps in South Asia (Shah and Keller, 2002). SIMI* aims at working with multilateral and bilateral donors, industries, research institutions, nongovernmental organizations, and local communities to facilitate smallholder farmers' access to affordable irrigation, based on the premise that micro-irrigation has the potential to be a significant catalyst for rural poverty alleviation by encouraging a shift from subsistence agriculture to the production of marketable and high value cash crops. MSMEs participate through the creation of sustainable 'supply chains' to deliver goods and services required by the smallholders to enable them to make this transition. SIMI goes beyond the dissemination of affordable smallholder irrigation technologies and aims at a comprehensive approach to creating market systems. While the main focus is on smallholder farmers, the initiative includes market creation and private enterprise involvement in the input and output markets.

Constraints to Growth of Local Manufacture and Servicing of Equipment

Among the main backward linkages created by agribusiness are the supply of irrigation-related goods and services, in addition to seed, fertilizer and phytosanitary product supply. Items in the former category include manufacturing-dealerships-retailerships of micro technologies such as treadle pumps and motor pumps, spare parts supply, maintenance and repairs, and well-drilling in areas where groundwater could be tapped (e.g., in some parts of West Africa as a response to market demand).

Reviews by Brown and Nooter (1992), Kennedy and Hobohm (1999), Green (2003), Edwards et al (1997), and FAO-World Bank-IPTRID (1997) provide useful insights about characteristics of successful small-scale irrigation technologies and desirable attributes of the enabling environment for MSME involvement. They include: (a) cost and affordability of the technology; (b) potential for high and timely cash returns to the farmer; (c) possibility of private and individual operation of the system; (d) sufficient infrastructure support to permit access to inputs and to markets for the sale of surplus production; (e) creation of appropriate motivation (e.g., potential markets), incentives (e.g., access to required capital), stable and conducive policy environment, and strong and supportive public and private institutions.

Major constraints to fostering growth of MSMEs in many SSA countries have been identified by several authors (Kandiah 1997, FAO and World Bank-IPTRID 1997, World Bank-Africa Region 1995, Muthee and Ndiritu 2003, Agodzo and Gyiele 2003, van Koppen 2004, Edwards et al. 1997):

- Difficult access to affordable credit and high interest rates on lending – e.g., 40 and 60% in Tanzania, Malawi and Zambia and 32% in Zimbabwe;

- High cost of skilled labor, entrepreneurial and managerial skills – it is sometimes cheaper to import than produce locally, especially if there is low demand for locally manufactured equipment;

- Development and promotion of technologies without taking into account actual conditions on the ground – e.g., poor electrical power handicaps adoption of electric pumps (e.g., rural electrification in Tanzania is only enjoyed by 5% the of rural population and 10% in Malawi);

- Non-conducive policy and institutional environment — for example, high import duty for raw materials and unfinished products: 45% in Tanzania, 20% (surtax on irrigation equipment) in Malawi, 15% import duty and 25% VAT in Zambia;

- Poor local demand due to lack of knowledge about the products and their uses and due to relatively high prices;

- Ineffective linkages between technology development and distribution and the other factors required to achieve higher productivity such as access to markets (input and output), credit, training, and information.

Summing Up: Determinants for Success of MSMEs

Among the key challenges facing SME and MSME participation in agricultural water is the lack of coherent governmental, policy resulting in wasteful public support programs. The World Bank Group together with other multilateral and bilateral donors as well as development institutions such as USAID and UNIDO have been supporting various aspects of MSME development in Africa for over 2 decades. Often one observes that relatively little success is sustained beyond the lifetime of these programs and projects; however, there are examples of some 'bright spots', analysis of which should provide useful lessons for the future. This is partly because past approaches tended not to be comprehensive and were implemented in investment climates that were not conducive to long-term sustainability of the MSMEs. Macroeconomic distortions, poor policy environments, high costs of doing business due to inadequate or expensive physical infrastructure, unfriendly legal and judicial systems, and burdensome administrative and regulatory requirements are some of the key constraints that need to be eased to allow growth and development of MSMEs.

Among the key factors for ensuring the success of MSMEs are:

Management and human resources development.

Strengthening the technical, managerial and financial skills of MSMEs to improve their productivity and ability to access markets (domestic, regional and export) is critical. The experience of the owner and management team, their organizational skills, and their ability to build good relationships with customers and clients, backed up by the quality of the product and service on offer, underpin the growth and development of the MSME. The main management issues revolve around finance, making and collecting payments, coping with government regulations, finding skilled manpower, and upgrading worker skills.

Finance and access to credit.

Most MSMEs are created by entrepreneurs with their own savings or borrowed money from family or other members of the team. In general, MSMEs' lack of assets to present as collateral coupled with the restrictive rules of commercial banks, and high lending and borrowing costs hamper access to credit. Finding innovative ways to ease these barriers to access to credit (e.g., credit guarantee facilities, venture capital funds for equity participation) as well as the mobilization of savings to complement profits, hitherto the major source of development funding, can have a huge positive impact on the promotion of MSMEs.

Markets.

Most MSMEs are focused on local and informal markets, while SMEs cater, to some degree, to domestic and international markets. Stimulating domestic demand is an area where assistance of NGOs and the public sector is critical. Strategic alliances with appropriate (overseas) partners can open up access to international export markets.

Networking and information exchange.

Assisting MSMEs to access information on technology, production processes, and quality standards, master technical change, and then apply the knowledge to improve production and productivity can pay high dividends in terms of enhancing their social and human capital. It creates a proactive entrepreneurship culture and enhances capacity through continuous learning. Note that 'technology' is not limited to hardware or equipment but also includes (land and water) management practices, information and advice.

Regulations and the climate for business.

Taxes and duties in many SSA countries are high and not an incentive for the growth of private enterprises. In (the former) socialist countries, profit making and private business were not looked upon favorably. But the regime, regulatory and attitudinal changes that have occurred in the past decade have led to a veritable economic boom in some areas, largely driven by the private sector. Governments and donors should actively pursue initiatives to improve the regulatory environment with respect to MSME participation in agricultural water.

Government support services.

A well-defined policy for support should include the provision of information, training and services to small businesses to assist their start-up, growth, and development. Enterprises should have knowledge of where to go and which government agencies can provide what services (e.g., tax incentives, loan guarantees, market information).

Associations and communication with government.

Membership in both formal and informal entrepreneur associations (e.g., small business entrepreneurs associations, trade and industry associations) can yield benefits such as information on markets, technology, laws, and advisory services, opportunities for networking, and the strengthening political lobbying. Setting up effective channels of communication between MSMEs and government is critical to improving mutual understanding.

PRIVATE SECTOR PARTICIPATION: ROLE OF GOVERNMENTS

The public sector, particularly government agencies and donors, will continue to play a role in promoting private sector participation, from both smallholder farmers and MSMEs. These roles generally pertain to the establishment of rules, regulations and a supportive policy environment, developing basic infrastructure, and provision of support services.

Conducive Policy Environment

The overall thrust of government policy should be to facilitate private sector participation through appropriate policy and legislation to create a level playing field, commercial discipline, and clear accountability. Government should not be directly involved in constructing and managing the commercial operations (Langford 1999) but could rather focus on technology development and adaptive research, perhaps in close collaboration with research institutions, and on promoting the uptake of promising technologies. On the other hand, governments may need to retain some 'residual' presence in irrigation projects, post-IMT, and provide support in various ways (e.g. see Sally and Abernethy 2002).

Governments can eliminate or streamline the distorting regulations and public interventions that constrain the irrigated agriculture sub-sector such as high taxes, and both tariff and non-tariff regulations. For instance, governments can develop policies and regulations to support irrigation equipment manufacture, importation, promotion and servicing (Purcell 1997), such as encouraging lower priced imports and joint manufacturing arrangements. There is also a clear need to develop mechanisms that will facilitate small farmers' access to affordable credit.

Other regulatory aspects: standardization of products (e.g., in pipe sizes, pump specifications, among others); setting up systems of quality control, certification (of product quality) and product labeling (especially to assist exporters); and setting up of monitoring systems in order to better perform these roles. To ensure that the manufacturing sub-sector is producing quality technologies, the South African, Indian and Chinese governments have established state technology inspection centers (Koegelenberg 1997; Weiping 1997; Sundaram 1997). This helps to ensure that only standard equipment is released to the market; with some safeguards in place to make sure that this does not become overly restrictive. In addition, governments should do environmental monitoring, auditing, and regulation of land and water markets where they exist. This may require appropriate policy changes and incentives (for example, taxes, subsidies, water rights).

Investments in Basic Physical Infrastructure

The availability of good infrastructure is one of the main factors that can reduce transaction costs and induce private sector participation. The key infrastructure investments are: construction of access roads to ease transport of inputs and farm produce, and accessible market facilities (Abubakar 2002; Abernethy 2002); rural electrification, which is a major constraint to the implementation of productivity enhancing inputs and technologies in many crop-growing rural areas; and a good communication system to facilitate the transition from subsistence to commercial operations. The introduction of mobile telephone and SMS-services in rural areas has been shown to strongly stimulate the connection of smallholder farmers to markets in countries such as Kenya, Senegal, India and the Philippines and much reduce the role of middle man. The MSMEs can play a key role once the government has set the rules. This is a particularly interesting area for further commercial and technical development.

Support Services Provision

Governments can also play both a direct and indirect role in extension, service training and provision of other technical support services. Among the support services cited in the literature as key to the success of MSMEs are: (a) facilitating access to information and advisory assistance; (b) promoting establishment of private support organizations (chamber of commerce type or industry specific); (c) training and extension in partnership with NGOs, research institutions or universities; (d) linking MSMEs with traders or product buyers and input suppliers; (e) facilitating provision of training and advice or even assisting in linking with market both local market and international contacts for export crops; (f) assistance to ensure compliance with international market standards and requirements; (g) help and advice with establishment of delivery chains and storage facilities.

Readiness of the Public Sector

While there is general agreement that greater private sector participation is the way forward, public sector agencies are not always prepared or they lack the capacity and incentives to intervene effectively to promote the private sector. Government officials may perceive the private sector as a threat to their existence, job security etc. The role of government is shifting from one of a direct participant in the production and marketing processes towards one of formulation and enforcement of the rules by which private sector (and other) participants interact within the agricultural water sector. This change requires considerable capacity to formulate, respond, and implement policies to promote market development and coordination.

Current development strategies call for increased private sector leadership and a declining direct role for the public sector, requiring important changes in the public sector institutions and policies. At the national level, the major priorities are to: (a) implement unfinished reforms, such as reducing public sector bureaucracies, privatizing state corporations, and devolving programs to lower levels of government for more efficient implementation; (b) formulate coherent national agricultural development strategies and innovative sector development programs; (c) develop mechanisms for producers and the private sector to participate in policy and program formulation and implementation through public-private partnerships; and (d) develop capacities and institutions for government to carry out regulatory, information, policy, and negotiation functions to promote efficient markets and respond to international agreements and standards.

Summing Up: Role of Government

There is a shift in the role of governments from one of a provider of goods and services to one of facilitator, enabler, regulator and investor in infrastructure. There are specific functions that are required to respond to specific needs of the MSMEs and smallholder farm households. To perform these roles, the public sector needs to be equipped and trained. Greater partnerships with NGOs, donors, and research and academic institutions may offer a better chance of performing those roles effectively and efficiently. Learning Alliances** are an effective instrument to do this, but there is still very little practical experience n how to initiate and operate these. The merits of private sector participation in agriculture water development and management are recognized, and the need to encourage wider and stronger public and private sector interfaces is becoming apparent. Both sectors have common or overlapping interests and will get into this relationship with hope as well as caution.

This study highlights the factors constraining the private sector to invest and actively participate in irrigation development or provision of irrigation-related services. As these constraints are better understood, governments and donors can take steps to turn them into opportunities. In the overall context of providing a conducive enabling environment, relevant policies that will promote greater private sector participation in irrigation investments include: (a) facilitating financial access; (b) improving support (physical and social) for infrastructure; (c) reducing risk through access to information and better equipped MSMEs; and (d) facilitating demand creation through promotion of products produced by the private sector and facilitation of market linkages.

FINANCING MECHANISMS

Overview

This overview deals with instruments for providing funding to the private sector. It does not elaborate on the many other ways in which the private sector can get access to financial capital: use private funds, group savings and borrowing from rotational funds, remittances, pensions, and other off-farm income. A particularly interesting topic is how public funds can leverage use of private funds, and vice versa. This is important in respect of formal and informal public private partnerships. We have, however, too little hard evidence to elaborate on this issue.

The search for appropriate financing instruments and mechanisms for investments by private decision makers is an integral part of encouraging private sector participation and investments in agricultural water development and management. International experiences in agricultural investments are analyzed and key factors associated with successful approaches, including external factors that support or hinder their introduction, are identified. A range of financial products and services suitable for supporting (high-risk and high transaction cost) agricultural investments is explored, bearing in mind that reducing transaction costs while both lender and borrower meet their objectives, is one area where we might realistically be able to assist.

Two characteristics of finance in agriculture and the irrigation sector are high transaction costs and risks. Transaction costs are high both for lenders and borrowers (Aeschliman 2002; Byerlee, et al 2003) because of: (a) long distances to serve dispersed rural clients with small size of individual transactions; (b) poorly developed transportation and communication infrastructure, little knowledge about heterogeneous farm households which means high information costs due to information asymmetries and moral hazard risks; (c) expensive management and supervision of rural bank branch networks; and (d) possibly high additional costs for borrowers in terms of working time lost, high cost or lengthy registration procedures, processing fees, etc.

Among the risks in agricultural lending are (Aeschliman 2002; Byerlee, et al. 2003): (a) high, interrelated covariant risks due to yield uncertainties which can result from pests and diseases, inadequate water, market and price fluctuations, and constrained smallholder access to inputs, advice, and markets; (b) official interference in lending processes and procedures which can lead to lending to "unqualified borrowers", waiving of fines and penalties, or delaying of enforcement of foreclosures, etc.; (c) lack of usable collateral due to ill-defined property and land-use rights and social constraints to foreclosure.

Most smallholders and MSMEs in SSA lack the necessary financial resources to start a business or expand an existing one. It is acknowledged (World Bank-Africa Region 1995) that among the major constraints to growth of MSMEs are access to markets and credit, made worse by the lack of access to relevant information for the first and lack of assets to use as collateral for the second. Indeed, most financial institutions are averse to giving credit to MSMEs due to lack of collateral. Considered as high-risk borrowers, the interest rates applicable on their loans are usually very high (exceeding 30%).

Aeschliman (2002) highlights five sets of problems that often affect the financing of small-scale projects in African irrigation:

- *faulty project design* — lack of beneficiary participation, inappropriate, complex and costly technical choices, absence of a market development approach;

- *the beneficiaries* — farmers' frequent pre-existing indebtedness to formal and informal lenders, depreciation of fixed assets, high proportion of post-harvest losses;

- *the lending institution* — long distances between lending institutions and beneficiaries involving cost of transport and lost time;

- *the government* — inadequate legal and regulatory framework, lower interest rates on agricultural loans compared to other sectors, massive budget deficits that provoke high inflation and interest rates;

- *the donors* — major development banks tend to support centralized, large-scale investments or investments targeted at large institutions while small-scale irrigation has largely depended on NGOs, CBOs, and bilateral donors.

On the last point, shifts in the policy environment favoring private-sector initiatives and greater small-holder participation are leading to removal of barriers to funding small-scale agricultural water initiatives. Governments, as the borrowing agencies, are now more amenable to passing on responsibilities and funding to NGOs or other local organizations to plan and implement development activities, notably those funded by bilateral donors.

Another special challenge is how best to assist the target group of small farmer-investors whose profile (e.g., limited scale of operations and lack of security) does not fit that of the clients of conventional financial institutions and those served by micro–finance, the so-called "neglected middle".

Approaches such as those employed by equipment manufacturers like ApproTEC, IDE, Enterprise Works and others to promote smallholder technologies are based on market-driven supply chains rather than the traditional top-down systems of governments and donors. The technology is often not entirely unfamiliar to the farmers and they are usually able to recover their investment in a relatively short time through improved production and productivity. All members of the market chain derive a reasonable profit, thus ensuring the sustainability of the process.

Experiences with Microfinance

It has been shown (cf. chapter on the Investment Environment) that investments by farmers themselves (via savings, credit and remittances) constitute a substantial share of the 'private sector'. However, there are limits to the self-financing of investments. Farmers, like other prospective investors will, sooner or later, have to resort to supplementary sources of financing and credit to support improvement and expansion of their ventures.

Micro-credit often is an effective response to market weaknesses in developing countries and the high transaction costs of rural credit in the agriculture water sector. Microfinance** refers to the financial sector that responds to demand of low-income households through small and short-term loans predominantly for trading, services and micro-enterprise activities. Providers of micro credit can be classified into four groups: (a) NGOs which operate the majority of micro-credit programs; (b) membership-based financial organizations such as credit unions and cooperatives, savings and credit associations, etc; (c) banks such as agricultural, and postal and savings banks; and (d) informal financial intermediaries such as processors and traders (who provide credit to protect their interests and promote their operations), group-based Rotating Savings and Credit Associations (ROSCAs)[5], money lenders, and retail stores offering goods on credit.

[5] ROSCAs are made up of a small number of friends who contribute periodically (monthly or weekly) a fixed sum. The entire sum collected is given to one member at each meeting or at each period of collection until each member has received the equivalent of his/her total contribution for one cycle. Members can thereafter decide to continue for several rounds.

In Asia, particularly in Bangladesh, important lessons have been learned about the investment behaviors of the poor and the differentiated impact on poverty reduction. The impact of the Grameen Bank savings and micro-loan program offered to small groups of very poor women or men has been very positive because it has been accompanied by a thorough human development and women empowerment program.

The short term micro-loans have been primarily used for productive investments resulting in income improvements (Hossain, 1988). Repayment rates have been very high, especially in the case of women (95%) and the systematic savings considerable. Sustainable poverty reduction, however, has been possible only through repeated and gradually larger loans; although persisting gender stereotypes were responsible for women receiving smaller loans than men (Safilios-Rothschild and Mahmud, 1989). Experience from Tamil Nadu, India, shows that the poorest and most disadvantaged women did not perform in a significantly different way than less poor women with respect to savings, loan repayment and ability to productively utilize loans, but they do need more flexibility in repayment (IFAD, 1995).

While the impact of the Grameen Bank has been outstanding for poverty reduction, the record of other NGO's in Bangladesh has been mixed. Some of them, although reaching poor men and women with loans for the purchase of irrigation technology, did not take into consideration the social and economic dangers that can confront indebted beneficiaries and did not make flexible and appropriate provisions to protect them in the event of defaulting on repayment. As a result, instead of reducing poverty, such interventions actually increased it through inability to repay individual loans because the poor lost the money they had already invested in the venture (van Koppen and Mahmud, 1995; van Koppen, 1998). A positive lesson from most of these programs in Bangladesh has been that it is possible to provide poor women with technical irrigation and managerial skills that allow them to function effectively as irrigation managers (van Koppen and Mahmud, 1995). However, it has been observed in rural India that members of some NGOs did not accept that poor people have development potential and therefore excluded them from development programs (IFAD 1995, van Koppen, Parthasarathy and Safiliou 2002).

In SSA, the growth of semi-formal networks of mutual or cooperative financial intermediaries in French-speaking West Africa has been attributed to the efforts of the central bank (BCEAO) to promote and strengthen the decentralized financial systems (DFS). These decentralized financial institutions are characterized (Aeschliman 2002) by: (a) close proximity to member clients; (b) viability in areas with a critical mass of potential members; (c) better opportunity to serve the poorest in the community; (d) freedom to set own interest rates within limits determined by regulations; (e) independent management; (f) high probability to break even within four years; (g) increasingly organized within the relatively flexible framework of regulations appropriate for DFS rather than the formal banking or cooperative regulations; (h) appropriation by the base where the DFSs are owned by the members/ shareholders, and the apex or secondary service organizations such as federations, associations, financial wholesalers, are in turn owned by the DFSs. The government ensures the appropriate legal and regulatory environment, assists with infrastructures, and acts as promoter and motivator.

A major strength of the DFS is that of requiring detailed business plan for each borrowing farmer or group of farmers which is contrary to the "one size fits all" approach where the project decides what each participant needs. Development agencies are beginning to recognize the role that DFSs can play in agricultural projects aimed at increasing productivity and incomes and are supporting local DFSs through provision of the following: (a) technical training; (b) administrative assistance to facilitate project disbursements; (c) office buildings; (d) vehicles to enable operation of "ambulant" DFS offices; (e) capital to increase revolving credit funds through grants or facilitating credit lines with local banks.

Not enough is known to calculate the actual cost of developing micro-credit schemes (often covered by grants and subsidies and whether this distorts market mechanisms), their sustainability (which could directly influence the rates of interest and the nature of activities that must be undertaken to generate sufficient returns), their institutionalization (implying mechanisms for control and supervision and the associated costs and risks), and the real impact of these schemes over time on the incomes, capital accumulation and poverty levels of the target households (AFD 2004).

Equipment Leasing

Leasing is an alternative to outright ownership – use rights to an asset are transferred to a lessee for a period of time. An agreement stipulating responsibilities for the operation, maintenance and return of the asset is usually entered into. The lessee attempts to generate sufficient revenue to pay the lease fees, O&M costs and any other payments he may be responsible for, and also generate a profit.

Micro-leasing has the potential to become a viable option to meet the medium-term investment capital needs of emerging individual farmers who are "too big" for traditional group-based microfinance loans and "too small" for mainstream financial institutions (Hollinger 2002). Some of the advantages include lower transaction costs due to the absence of collateral requirements, zero risk of diversion/misappropriation of funds, good after-sales service of equipment, and easier recovery/repossession of the assets in case of default in payment. It has helped ease the investment constraints of small farmers and rural entrepreneurs in Bolivia, and leasing might also be an option in Africa, where lack of conventional collateral or legal and institutional constraints related to enforcement give rise to a vacuum of investment finance in many rural areas. Collaboration with NGOs and equipment suppliers providing capacity building and technical training are important tools to reduce client-level risk.

Leasing experiences in SSA include that of CECAM in Madagascar, created in 1991 by a farmer organization with the technical assistance of a French NGO with the objective of providing loan and savings services to agricultural households and farmer organizations. CECAM is a network of over 170 local banks and regional credit unions mainly based in less-favored rural regions, with over 52,000 members (largely farm households). By the end of 2002 it was the largest financial institution in rural Madagascar, providing a range of financial services, including working capital loans, grain storage loans, term loans, and innovative micro-leases for agricultural equipment. Key factors in the success of this project are its project-specific product design, a large capital base, and the involvement of farmers in the management of the institution. For example, the micro-lease is secured by the equipment rental and through a verbal commitment of the member's solidarity group. During the payment term, CECAM retains ownership of the equipment. After the final payment, ownership is legally transferred to the client.

Another SSA irrigation equipment leasing experience is that of the *Groupement d'Intérêt Economique* (GIE) Hari Goumo in Timbuktu, Mali. The program was started with the help of a Belgian NGO, which introduced European motor pumps costing approximately $6,700 each but decided to subsidize 50% of the cost while the rest is to be paid by the GIE Hari Goumo. GIE rents out the pumps at $670 per season. Despite the fact that Timbuktu has a tradition of using power pumps since colonial times, the program encountered many problems, mainly due to its faulty design (e.g., too expensive pumps, unrealistic 10-year lifespan given possible improper use of the pumps, high rate of payment default, and lack of backup equipment). Funds were being sought for a second venture that would ensure correction of past mistakes and failures (Aeschliman 2002).

Agribusiness and Contract Farming

Promotion of agribusiness enables agriculture to respond to new markets and standards, and raise levels of productivity. Agribusiness produces backward linkages relating to support services such as irrigation supply and installation, pesticide application, fertilizer and chemical sale, supply of good seeds, among others. Related to irrigation would be suitable technologies, spare parts and service for maintenance and repairs, manufacturing-dealerships-retailerships of micro technologies such as treadle pumps and motor pumps and similar technologies.

Agribusiness is also an opportunity for private sector investment and participation in water in agriculture through contract farming or the use of outgrowers by big commercial firms/exporters (e.g. Agriflora Ltd. in Zambia, Homegrown in Kenya) and even multinationals (e.g. Cargill, Cairns). There are a number of relatively (or potentially) successful examples which can be cited in Kenya, Zimbabwe, Uganda, Zambia, Malawi, Tanzania, Ghana and some of the Francophone West African countries.[6] One way in which the growth in this venture has been facilitated is for the big commercial firms to enter into contract with small farmers for (export) crop production. The farmer group produces the crops for the firm on agreed quality, quantity and prices. As a way of ensuring delivery on the contract, the commercial firms assist their outgrowers through provision of credit and assured and timely access to inputs, and technical support ranging from land preparation to crop care, up to handling at harvesting. Apart from serving as a ready market for outputs, inputs and at times even irrigation-related technologies are provided through this arrangement. Lower prices for inputs are achieved because of bulk purchases.

Summing Up

Positive impacts on agricultural production and poverty reduction are possible without major public investments** because smallholders, except the very poorest, can mobilize funds. It is possible to provide and promote affordable technologies and connect smallholder farmers to input and output markets, and give the private sector a stake in order to be able to reach great numbers of poor men and women with respect to inputs, outputs, and information exchange.

Even the poorest can be successfully included in micro-financial services with savings and loans when these services are accompanied by human development and empowerment programs and the repayment rules are flexible and adapted to their socio-economic constraints. Furthermore, women must be given opportunities to escape from stereotyped “feminine” non-profitable activities with the assistance of training and larger loans that allow them to undertake more productive activities. However, some NGOs consider the poorest not creditworthy and may tend to exclude them. Donors and the government need to provide all NGO members, who work with the poor, with poverty training and to systematically monitor the selection of beneficiaries in order to ensure that the poorest are also included.

Four broad types of irrigation finance have been discussed: self-financing, micro credit, equipment leasing, and contract farming. Providing credit is not always the most appropriate solution; there maybe instances when cash transactions make more sense. If inexpensive micro-technologies are made available, many farmers can buy them for cash without needing credit. Farmers can be invited to self-fund parts of their agricultural water investments. They should learn how to depreciate their fixed assets and provide for their eventual replacement.

[6] For West African examples, see for instance http://www.sahel-club.org/en/agri/agri_sum_1.htm.

Rather than focusing on the use of irrigation technology to increase production, the whole investment approach needs to be re-oriented towards market creation and institutional development. That is, build in upstream manufacturing and distribution of micro-irrigation equipment, inputs (seeds, seedlings, fertilizers, pesticides, small tools, etc.) supply chain, marketing, as well as the forward linkages (processing, storage and market outlets).

Given all the positive experiences and promising efforts for promoting private sector involvement in agribusiness, it appears that the relevant questions pertain to ensuring sustainability and upscaling — more farmers will be reached, and agriculture development and growth will be facilitated so that in turn poverty will be reduced. In addition, we see that partnerships among donors, NGOs, governments, and smallholder farmers can work and facilitate the achievement of goals.

PUBLIC-PRIVATE PARTNERSHIPS (PPP)

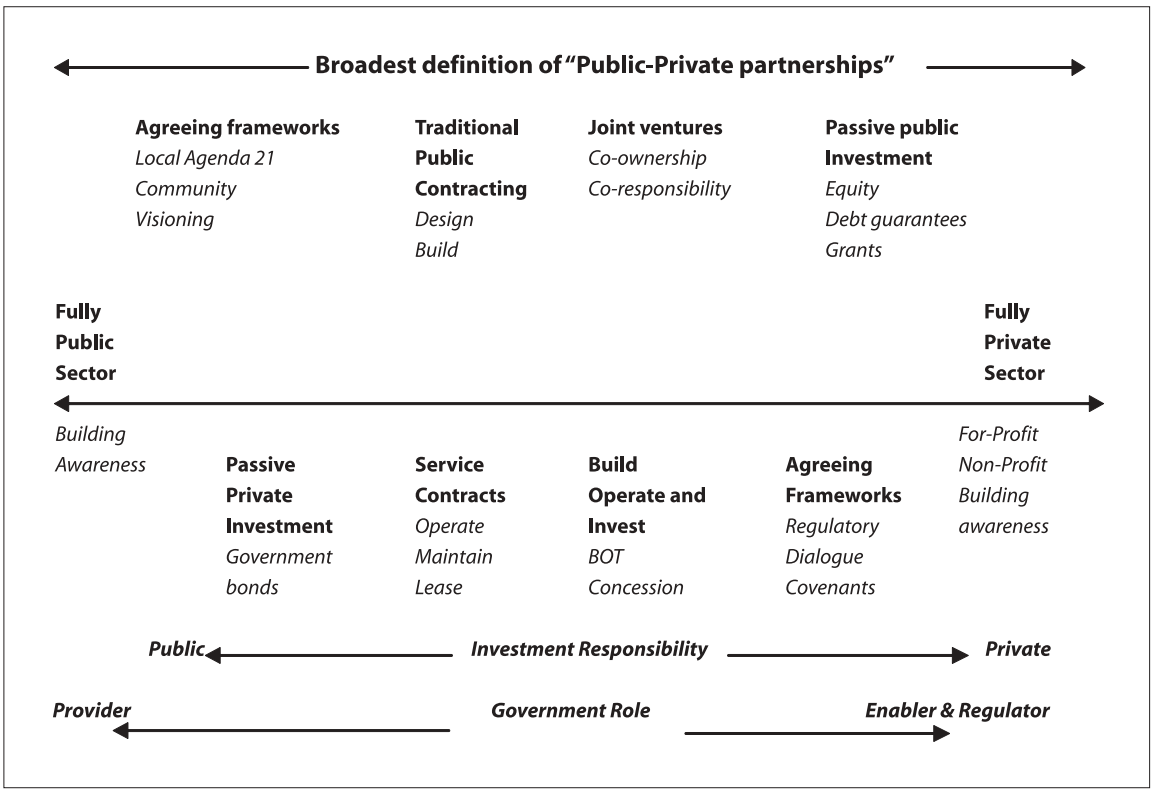
Different Forms of Public-Private Partnerships

Public-private partnerships (PPP) are gaining increasing acceptance and attention as a way of doing things that were once considered the exclusive responsibility of the public sector. In fact, Agenda 21 speaks enthusiastically about public-private partnerships, stating that "the public and private sectors should strengthen partnerships to implement the principles and criteria for sustainable development," and the public sector "should establish procedures" to allow for an "expanded role" for the private sector (United Nations 2003). While there have been many examples of PPP in the water utility and energy sectors in the last two decades, much of the experience in the agricultural water sector has been confined to water user associations taking over management of irrigation schemes (irrigation management transfer or IMT arrangements). However, with the increasing need for financing and improving management efficiency, donors and governments are resorting to greater private sector involvement in the sector. According to the World Bank (2003b), 15 percent of the infrastructure is currently being financed through private funds and this is a growing trend.

Generic analysis and comparison of PPPs is not always easy because each partnership tends to be unique in terms of its objectives and the partners involved. Figure 2 illustrates the range of possible relationships between public and private actors for the co-operative provision of goods and services. It will be observed that where the private sector plays a passive role, government can provide equity, debt guarantees and grants while the private sector can invest in government bonds. At the other end of the scale, in the case of full private provision (e.g. privatization), the public sector role is one of enabler and regulator. In between the two extremes, the options for partnerships range from the traditional public contracting through farming out of design and construction to the private sector, to service contracts, joint ventures, or build-operate-and-invest (e.g., build-operate-transfer, concession). Either the public or private sector can build awareness on opportunities to improve the delivery of services through the spectrum of collaborative approaches. Once awareness has been created, partnerships formed can be guided by frameworks which take into account client needs, a common vision, and clear covenants and regulation.

Selecting the best PPP option depends on a variety of cultural, economic, and social factors. They vary in target, form, process and parties. Flexibility is key and needs to be exercised when choosing parties to play the different roles. The most successful arrangements come from a flexible, opportunistic approach, drawing on past experiences wherever possible.

***Figure 2**. The spectrum of Public-Private Partnerships*



Source: After Bennet et al. 2000

Potential Benefits of Private Sector Participation and PPPs

PPPs can benefit all parties involved. The partnerships can provide the public sector (Bennett *et al*. 2000): (1) access to new, cutting-edge scientific expertise and knowledge, and technologies held by the private sector; (2) mechanisms for developing, marketing and distributing final products or service; (3) financial resources that are otherwise increasingly difficult to obtain; (4) a framework for reconciling economic benefits traditionally associated with pure privatization; (5) an opportunity to dialogue with the private sector regarding social services; (6) potential to leapfrog and acceleration of technology advances; and (7) an opportunity to dialogue with civil society.

Benefits to the private sector include: (1) reduction of project risks (economic, political, regulatory), project development and transaction costs, and institutional red tape due to government's commitment to the project; (2) the advantage of a negotiated contract as opposed to an international competitive bidding; (3) new insights into public sector responsibilities and concerns plus an opportunity to develop innovative, proactive dialogues with the public sector; (4) an opportunity to wield constructive influence on the development of legal and regulatory regimes; (5) access to farmers in emerging markets; (6) greter opportunities to participate and network in important local, regional, and global fora on the service being provided; (7) forging of alliances with international contractors and investors; (8) improved prospects for improving corporate profiles and reputations; and (9) opportunities for profit.

Civil society, farmers and farmers' associations can also benefit from such a partnership: (1) exposure to solutions through greater dialogues in which local knowledge and interests are taken into account; and (2) a mechanism for stimulating pragmatic and replicable solutions to

problems related to the service provided. Collectively, public-private partnerships improve the capacity of each partner or player to address problems in a sector or service that cannot be solved by a single actor.

On the other hand, we must also recognize that there are factors that may inhibit the establishment of PPPs (Spielman and Grebmer 2004) such as:

- Fundamental differences in incentives for the public and private sectors;
- Difficulties in adequately accounting for the direct and hidden costs of a collaborative investment (transactions costs, opportunity costs, and costs of managing risks and uncertainty);
- Persistent negative perceptions of each other;
- Lack of creative organizational mechanisms to reduce intersectoral competition for key assets and resources;
- Limited availability of information on successful working models of partnerships.

Public-Private Partnerships in Agricultural Water

In this report, we have chosen to focus on individual smallholder farmers and farm households as the major representatives of the private sector, including examples of irrigation management transfer. This choice appears to be justified by an analysis (World Bank 1994) showing that the potential for private sector participation in infrastructure delivery in the irrigation and drainage sector (measured by a so-called marketability index) is greatest at the tertiary and on-farm levels, compared to the main (primary and secondary) system. This is illustrated in Table 3 and is consistent with the philosophy of devolving operation (and sometimes ownership) of tertiary systems to water user associations, usually improving maintenance and collection of user fees.

Table 3. *Feasibility of Private Sector Participation in Irrigation Infrastructure*

Criteria	Primary and secondary networks	Tertiary (on-farm)
Potential for Competition	Low	Medium
Potential for Cost recovery	Low	-
Public Service Obligations (equity concerns)	Medium	Medium
Environmental Externalities	High	Medium
Marketability Index	1.4	2.4

Source: Adapted from World Development Report 1994

Besides water user associations that operate portions of irrigation schemes, as already discussed, private sector participation can range from large-scale commercial ventures that invest in infrastructure, to private entrepreneurs that provide services at various stages of the irrigation development process such as planning, design, construction, operation and maintenance. Large-scale PPP experiences in irrigation projects have been reported from France, Mexico, Morocco and Egypt (Grover, 2002). The projects in Morocco and Egypt are largely at pilot stage but should provide a basis for eventually guiding PPP options in sub-Saharan Africa. These pilots are mainly aimed at

"testing the market and identifying suitable models which will be attractive to the big investors." Among options seriously considered in Morocco are the "management or lease contract" in one pilot and a "concession/BOT" in another pilot. But whether there will actually be private sector takers and whether these options will work as envisaged, only time will tell. There are other relatively successful PPP's in Chile and in China, but the pilots in North Africa will be "closer" and make it easier to "sell" this idea to private investors in SSA.

CONCLUSIONS AND RECOMMENDATIONS

On Objective 1:

To show that the private sector is very large and diverse, and that the sector can be a major source of investments

The private sector in relation to agricultural water development and management is very large and diverse, ranging from poor smallholder farmers to micro, small and medium size enterprises, and includes providers, those who set and monitor standards, trainers, and financial institutions.

The private sector has significant untapped investment potential (including savings, remittances, labor, ingenuity, knowledge, assets), and can provide a major stimulus to agricultural investments, and help offset declining public investments.

Neither 'farm households' nor MSMEs are a homogeneous group: the priorities, capacities and asset base for each entity are quite different. This again calls for thinking along lines of a 'For What and For Whom' matrix (Table 1).

Entrepreneurship among women, both on-farm and in micro-enterprises is strong and should be encouraged through supportive policies and institutions.

MSMEs can provide a wide range of goods and services related to agricultural water but their growth and development depends on the creation of a conducive policy and institutional environment.

Collective initiatives and partnerships in agricultural water can be highly effective and should be encouraged by means of training, exposure to real-life examples, and profitable innovations. Collective organizations should be inclusive and not happen at the expense of women, minorities and the poorest.

The key questions and challenges that need addressing are (a) how to release and realize the potential of the private sector; (b) what decisions must be taken (and by whom) to promote private sector participation; (c) what incentives must be put in place to encourage more private sector participation in agricultural water.

On Objective 2:

Identify do's and don'ts on how to facilitate investments by the private sector

Governments, donors and NGOs can all play a role in promoting private sector participation in agricultural water with partnerships among them being especially relevant to improving productivity, reducing poverty and ensuring gender equity.

Investments should be oriented towards market creation and institutional development rather than just technology development for increasing production.

The government role should be one of enabler, facilitator, regulator, and investor in public goods: providing the basic infrastructure (physical, institutional, information), implementing policies and rules (legal frameworks, regulations, standards), and a generally supportive investment climate for prospective micro, small and medium investors and entrepreneurs.

Donors can assist governments to establish basic, large-scale infrastructure such as roads and electrification and thereby help set up the enabling environment to attract small, local private investments.

Governments can also help to promote private sector participation by guaranteeing secure tenure of land and access to water for smallholders, and facilitating access to input and output markets.

Donors can not only work with governments to help the private sector to invest, but also assist the private sector itself to make direct investments (e.g., identify areas requiring priority attention to strengthen investor institutions).

Public-private partnerships and NGOs are well-placed to promote entrepreneurship among smallholder farmers and MSME's by linking the private sector to emerging market farmers, particularly between urban centers and rural areas.

Providing and promoting affordable technologies (including best management practice) and information access can assist smallholder farmers and the private sector in general, to improve skills and awareness, and also reach larger market opportunities.

The top priority issue to avoid is NOT to proceed in a non-participatory, non-inclusive way at any level of intervention.

On Objective 3:

Recommend practical ways for governments and donors to promote investments by the private sector

There are already a large number of recommendations proposed in the literature. A practical overview of recommendations may comprise only generic recommendations that could provide some guidance for concrete action, while a list of detailed recommendations is not only very long but also impractical for anyone to use, not unlike the experience of a newcomer in a big supermarket. Rather then making a shopping list of recommendations, we provide a menu from which one can select according to needs and means. This helps to unpack a large problem into homogeneous items that are more amenable to specific actions. The menu is in the form of a matrix (presented earlier as Table 1). With a view to demonstrating its use, below, we show what types of issues and recommendations can be placed in the cells of the matrix.

Step 1: we propose an analytical framework: 'who decides on what ' to find the effective way forward in options for investments for rural development? (The decision maker - capital matrix: table 4).

Step 2: we populate for the cells of Table 4 and proceed to: (a) determine the base line, (b) identify deficiencies for development, and (c) select guidelines for action.

We provide four examples of application of the 'What and for Whom'-matrix, in different cells (see Table 4) to illustrate this recommendation and to show how interventions tailored to site and situation can be developed. The examples, one at each level of decision making, are aimed to increase the availability of a particular capital, assuming that prior analysis determined that for this target group that particular capital was clearly lacking.

Table 4. *Matrix of Decision-making and Capitals with actions that can be undertaken and recommendations followed*

Investment Decisions: Dimensions (horizontal) and Types (vertical)	Capacity to effectuate investment decisions (types of facilitators)	Capitals in which investments have top priority				
		Human capital (skill, health, knowledge, labor, ambition)	Social capital (organizations, institutions, policies, laws)	Financial capital (income, savings, loans)	Natural capital (water, land, plant and animal genetic resources climate)	Physical capital (purchased inputs, equipment, infrastructure)
Individual farm households	Family, friends, CBO, NGO, RPO, GO				Example 1	
Farmer groups and Communities (RPOs, WUAs, FOs)	CBO, GO, NGO, PPP, RPO, WUA, SME	Example 2				
Enterprises (MSMEs)	Development banks; PPP; industrial partners, GO			Example 3		
Government	International financial and development institutions; international trade and research organizations		Example 4			

Example 1 for action on how to increase/improve the natural capital (soil, water, generic resources) for households, with special attention to women, HIV victims and the underprivileged).

- Identify the target groups and target area;
- Identify key direction for rural development given market, water sources, infrastructure, knowledge base, etc. If ‘agriculture’ is the main development direction then:
- Is there sufficient land and water of fair quality for the target households? Are ownership and access arrangements conducive? Are adequate seeds/planting material available?
- If answers are ‘no’: is there a potential to acquire these, and if so, by investments in legal frameworks, on-farm infrastructure, bringing water from ‘outside’, recycling, rehabilitation of land and riparian zones through biological, physical or landscaping means ?
- If the potential to develop agriculture is low, are there alternative opportunities to generate income with water?

- Is there adequate domestic water of good quality? If not, how to arrange for single-use or multiple use systems to provide it? What methods to improve water quality are appropriate?

- Examples of relevant guidelines include:
  - Guidelines on rainwater harvesting; storage facilities;
  - WOCAT database (www.wocat.com) on soil and water conservation technologies
  - Guidelines on how to create end-user MUS (MUS, 2004)
  - Small water solutions (NWP, 2003)
  - Gender performance indicators (Van Koppen, 2002)

Example 2 for action on how to increase the human capital related to farmer groups and communities:

- Farmer groups can form themselves to exchange 'best practices' among participants and promote the idea that trust and cooperation are more effective then competition in production and markets;

- Organize community and regional competitions to identify and recognize the most productive crops and also raise awareness and ambitions

- Study groups of farmers can set up Farmer Field Schools with little public investment to teach 'best' practices and approaches in the region

- Promote farmer-to-farmer extension

- Guidelines: see Khisa and Heineman (2005), NGO manuals for action (e.g IDE 2005), etc.

Example 3 for action in to raise financial capital at the level of MSMEs

- Identify opportunities for contract farming

- Support development of business plans, explore markets

- Provide initial credit for contract farming

- Provide farm equipment for hire, loan, lease

- Provide small and flexible credit for use of farm inputs (fertilizer seeds, tree seedlings, hatchlings)

- Provide information for use of farm inputs (fertilizer seeds, pesticides, tree seedlings, hatchlings)

- Connect livestock farmer to crop producers through compost production and distribution

- Provide specific guidelines

Example 4 for government action to promote social capital among rural communities:

- Encourage small farmer groups to associate themselves to larger group and become a ‘voice’ in rural discussions and negotiations;
- Provide small grant for mobility of trainers
- Promote learning alliances of stakeholders in larger, integrated development issues and promote use of Learning Wheel. Provide skilled facilitators.
- Train trainers for farmer field schools and respond to farmer groups that invite them
- Guidelines and recommendations: Khisa and Heineman (2005) and FAO website, Learning Wheel methodology (Hagmann, 2004)

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