



# Financing Small-Scale Irrigation in Sub-Saharan Africa

Part 3: Overall Summary of Study Results  
and Extension Concept

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for Economic Cooperation  
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THE WORLD BANK

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## Acronyms

ADB	Asian Development Bank
AfDB	African Development Bank
AFRACA	African Rural and Agricultural Credit Association
AMFI	Association of Microfinance Institutions
ANED	Asociación Nacional Ecuménica de Desarrollo
ASAL	Arid and Semi-Arid Land
BAAC	Bank for Agriculture and Agricultural Cooperatives
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung
CBCP	Commodity Based Credit Provider
CBFO	Community-based Financial Organization
CECAM	Caisses d'Epargne et de Crédit Agricoles
CGAP	Consultative Group to Assist the Poor
CLA	Caja Los Andes
DFID	Department for International Development
DFS	Decentralized Financial System
ERS	Economic Recovery Strategy
EurepGAP	European Retailer Produce Working Group on Good Agricultural Practises
FAO	Food and Agricultural Organization
FC	Financial Cooperation
GOK	Government of Kenya
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IFAD	International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
KARI	Kenya Agricultural Research Institute
KfW	Kreditanstalt für Wiederaufbau
KSH	Kenya Shilling
MDG	Millennium Development Goals
MFI	Micro-finance Institution
MSE	Micro and Small Enterprises
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organizations
OBA	Output-Based Approach
OECD	Organization for Economic Cooperation and Development
O&M Cost	Operation & Maintenance Cost
PPP	Private-Public-Partnership
SACCO	Savings and Credit Cooperative Society
SIPMK	Smallholder Irrigation Program Mount Kenya
SMEP	Small and Micro Enterprise Program
SSA	Sub-Saharan Africa
SSI	Small-Scale Irrigation
TC	Technical Cooperation
UNDP	United Nations Development Program
WUA	Water Users Association

## Exchange Rate

1.00 US\$ = KSHs 75.00

## Executive Summary

Throughout the world 1.2 billion people have to survive on income levels of less than 1 US\$ per day; 75% of them live in rural areas sustaining their livelihoods largely with agricultural activities on small holdings. Locked into a scenario where spatial expansion of a household's agricultural production area, due to dense population patterns, is not possible any more, a more intensive use of their assets i.e. land and labor through irrigation might therefore be a way forward.

It is estimated that Africa alone has a potential of about 700,000 ha which could be utilized by using small-scale irrigation (SSI) technologies to exploit water resources that would otherwise not be developed, thus allowing up to 4 million low income households to intensify their agricultural production.

The insufficient access to financial services is an important development constraint for the establishment and operation of SSI. This problem is particularly prevalent in Sub-Saharan Africa (SSA), where less than 10% of the population has access to financial services.

To address this problem World Bank has commissioned GTZ to carry out this study on current practices and experiences in 'financing small-scale irrigation in Sub-Saharan Africa'. The study has been implemented in three consecutive steps: (i) conduct of a literature review, (ii) preparation of a case study<sup>1</sup> documenting experiences in Kenya and finally (iii) this summary report with the formulation of concepts and strategies for strengthening financial services supporting SSI in countries of SSA.

This summary report draws heavily on the results of the Kenyan case study but also reflects the gained experiences against the documented practices from other countries. The broad definition of SSI<sup>2</sup> should assure that the relevance of the findings will apply to a wide range of circumstances in different countries of SSA.

Irrigation development was in the past in many countries the sole responsibility of government who developed suitable areas usually on a larger scale. The staggering cost has slowed down irrigation development in many parts of Africa. However, the availability of low-cost SSI technologies developed during the last decades tailored to the needs and conditions of individual households offers new opportunities and opens a huge potential to rural entrepreneurs to utilize water sources that were previously not accessible to them.

Small scale irrigation is of increasing importance for smallholder farming systems in SSA and contributes especially in areas with lower and erratic rainfall conditions substantially to the increase of agricultural incomes, employment and reduction of poverty and malnutrition. In comparison to other agricultural activities, irrigation offers a number of advantages: (i) farmers are less vulnerable to weather conditions which reduces agricultural production risks considerably; (ii) irrigation supports the intensification and diversification of the farming system and improves significantly agricultural productivity also by reducing the effects of seasonality; (iii) it allows farmers to cultivate crops with diverse vegetation periods not only during the conventional rainy season but also in the off-season. Such staggered planting is

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<sup>1</sup> A summary of the two studies is provided in chapters 2.2 and 2.3.

<sup>2</sup> In the context of this study the term 'Small-Scale Irrigation' has been applied in a wider context including all irrigation activities that involve 'small farmers who own and manage an individual plot or are part of a community-managed scheme'.

especially important for the production of high value vegetable crops, it allows a longer and stronger presence in the market with positive effects on prices and incomes and a more even cash-flow thus contributing to a reduction of credit risks.

SSI development from a technical point of view can be distinguished into three categories or technology levels:

- *Technology level 1* includes low-cost irrigation ‘manually operated’ technologies (e.g. bucket and drum kits, treadle pumps) that allow SSI-farmers with a relatively modest investment (up to about US\$ 200) to develop small areas (typically between 50 m<sup>2</sup> up to about 0.6 ha) under irrigation and hence to increase production and productivity. Low-cost irrigation technologies are private investments of individual farm households.
- *Technology level 2* is comprised of medium-cost ‘motorized’ irrigation technologies that require a more substantial investment in pumps and water distribution equipment costing about US\$ 600 to 800 for a typical irrigation unit of 1 ha. Thus, such an investment allows farmers to develop a larger area under irrigation and to increase production and productivity more substantially. The technology requires not only technical know-how to operate and maintain the equipment but also to use more advanced production techniques. To a great extent, such technologies are explored by advanced individual farmers or micro-entrepreneurs who operate under commercial terms and conditions.
- *Technology level 3* are community-owned schemes serving on average 150 – 250 farmers involving relatively high initial investment costs on main infrastructure and infield distribution systems amounting for a typical irrigation area of a smallholder in such schemes of 0.4 ha to about US\$ 1.700. While maintaining the access to and the supply of water as a joint initiative, usually managed by a WUA, production on the irrigated plots remains the responsibility of the respective individual small-scale farmers.

It is particularly through the use of individually owned SSI technology that SSI farmers or agricultural entrepreneurs become important players in the value chain.

In the absence of financial services, SSI farmers frequently have a limited capacity for investment into SSI technologies and / or rely on informal sources that are often highly expensive. A reliable access to financial services has shown to boost the ability of entrepreneurial SSI farmers to undertake investments that enhance productivity and scale of farming operations and to exploit new market opportunities.

Small scale irrigation development and expansion does not depend on special financial products for the dissemination of the technology. Irrigated agriculture is basically an entrepreneurial activity that requires the facilities and products the rural financial market is supposed to provide on a sustainable base:

- *short term working capital loans* for financing farm inputs. Such loans may be required by SSI farmers several times a year, depending on the cropping pattern. Timely availability and flexible financing mechanism are essential;
- *short term investment loans* are required for investing into low-cost irrigation technologies and related equipment (technology level 1), but also into more advanced technologies (technology level 2);
- *medium term investment loans*<sup>3</sup> / *leasing* are required for investments into more advanced technologies (technology level 2) as well as in communal schemes with

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<sup>3</sup> Short term or medium term investment loans are adequate to satisfy the financial requirements associated with the establishment of SSI technologies. Long term loans with maturities of more than five years are not required.

co-financing arrangements for the share of farmers in scheme investment cost. Leasing is another valuable option for financing more expensive equipment;

- *secure savings facilities* that are an integral part of financing mechanisms.

The focus for improving the access to financial services to SSI farmers is on commercially viable institutions that reach large numbers of clients on a sustained base. SSI farmers need financial institutions that are in reach and that offer the whole range of financial services to fully exploit their potential. Ideally, they receive such services from one institution in order to develop a valuable relationship as well as to avoid inefficiencies on their part and to overcome the problem of information asymmetry on the part of financial institutions.

There is general consensus that the agricultural produce market is the most effective driver for success in irrigation development. Market opportunities attract the private sector all along the value chain and also into financing of irrigation equipment and infrastructure. However the utilization of such opportunities must be embedded in respective policies<sup>4</sup> and implementation strategies that enhance the efforts of the private sector.

**The overall concept** for the introduction, strengthening and scaling-up of financial services to the SSI sector focuses on an interdisciplinary concept. This is primarily the development of rural financial markets and the support on commercially viable institutions that are operating in rural areas. It focuses on institutions that are committed to serve the low-income population to which SSI farmers belong and that are most likely to reach large numbers of SSI farmers but also other clients. Depending on the institutional variety in the respective countries SSI farmers will select institutions that meet best their financial requirements. Any strategy will therefore not concentrate on specific types of rural lenders but on the respective ability of institutions to provide viable financial services to the SSI sector.

The overall concept recognizes in an interdisciplinary approach the importance also of complementary services as well as the irrigation farmer being part of the value chain. It promotes linkages between SSI farmers, traders, processors, input suppliers, exporters, service providers and financial intermediaries.

The concept promotes commercial approaches for individually owned low and medium cost irrigation technologies that build on the dynamics of agricultural markets and the financial sector. The focus is on demand-driven irrigation development without direct subsidies, which implies that farmers have to take full responsibility for their investment and operating cost. Likewise, the creation or provision of financial services for seasonal farm inputs and irrigation operation and maintenance (O&M) cost to beneficiaries of community irrigation systems should always follow commercial principles. However, it is recognized that there is generally a need for a deviation from this principle in the case of the relatively high initial infrastructure cost of communal irrigation schemes exceeding the financing capacities of most low income small scale farmers. . More advanced approaches promote a mix of grant funding and commercial term finance.

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<sup>4</sup> SSI development is affected by four different policy areas: macroeconomic policy, financial sector policy, agricultural sector policy and water/irrigation policies. The essence of a successful rural and agricultural policy framework is the skilful integration of these different policy areas and to avoid inconsistencies.

Limitations of the financial sector and risks in serving the SSI sector include:

- serving low potential areas without markets, economic potential and high poverty levels. It is also recognized that micro credit is not the appropriate instrument to assist very poor populations who lack access to economic opportunities and are too vulnerable to take risk;
- financing of the entire development cost of community irrigation schemes. The quasi non-availability of medium term finance in countries of SSA in general and the high initial investment cost in combination with weak financial and technical capacities of smallholders in particular, represent the major constraints for access to commercial finance in this type of SSI development;
- political interference especially in view of subsidized interest rates, directed credit, 'mass forgiveness' and subsidies.

**Key strategies of the concept for financing SSI focus on three different areas:**

Closing the Information Gap and Improving the Commitment of Financial Service Providers to Serve SSI Farmers: The necessary reduction of the large information gap between financial service providers and rural smallholders can be addressed through a number of measures that will ultimately result in better financing options for SSI farmers.

First, financial institutions have to be convinced that financing SSI is an interesting business venture. The emergence for low and medium cost irrigation technologies has created a high demand for financial services among economically active smallholders. Therefore, commercial banks, rural financial intermediaries, equipment or input suppliers as well as marketing organisations and processors can significantly increase their business activities if the high potential of SSI are understood and a strategic choice is made to engage into smallholder lending. The driving force for such expansion is *competition*.

Second, rural smallholders need to be better informed about available financial services. This will ultimately lead to more informed choices and better use of financial resources in general. The information status of farmers can be improved by agricultural extension staff and should also be supported by financial institutions that find their entry point through better marketing and simple, customer-friendly procedures and financial products. A key strategy to address this issue is to support rural financial intermediaries in product development and marketing.

Financial Broadening by Widening the Range of Financial Products to the SSI Sector: SSI farmers need a permanent access to financial services to finance investment and production cost of SSI systems. Ideally, they would develop durable relationships with their financing institution to better manage the heterogeneity of lending needs. These requirements must be balanced with the overall objective of institutions to operate viably. Client orientation and knowledge of the irrigation sub-sector are pre-conditions for the successful entry into the market. Although SSI farmers do not require a special product range delivery channels and lending methodologies must be adopted, especially with regard to collateral requirements and repayment schedules.

A valuable alternative to standard financial products in reaching large numbers of smallholders is the introduction of microleasing. Leveraged leasing is especially relevant to SSI farmers that market their production on a regular and predictable base to capable marketing organizations. Wholesale lending to the private sector and community-based financial intermediaries is another option to reach a large number of SSI farmers in a cost effective way. Further, risk reducing measures such as

tripartite arrangements and / or the use of insurance need to be explored. A value chain approach is an important element of the overall strategy, by linking different actors at all levels.

Financial Deepening by Increasing the Outreach of Financial Institutions to SSI Farmers: the challenge is to take into account the special characteristics of financing SSI development and to attend to a larger number of SSI households without impairing the sustainability of rural financial intermediaries. Agricultural potential and the resulting economic activities vary significantly among different countries/regions in SSA. Rural outreach of financial institutions is highly skewed towards the more productive agro-ecological zones. The coverage strongly decreases with the economic potential of different zones.

Agricultural potential, access to water sources, connectivity to road and communication infrastructure, and security of tenure are, in addition to an established market demand, crucial elements for successful financial intermediation that can be found mainly in areas with higher agricultural potential. In such areas, it is recommended for increasing the outreach of financial services to concentrate on 'upgrading' or 'downscaling' promising institutions but also through 'greenfielding' if no institutions with potential are present. Instruments will vary according to different institutional solutions that can be found in different country contexts. Potential partners for SSI farmers are (i) commercial banks with focus on the lower income market; (ii) financial cooperatives; (iii) experienced deposit-taking NGO-MFIs; and (iv) community-based financial intermediaries. Low potential areas with high poverty levels and lack of access to markets and basic infrastructure often face serious limitations for effective and sustainable financial service provisions. Approaches to alter the situation are strengthening community-based financial intermediaries and the linkage approach.

Communal irrigation schemes continue to be an important instrument for poverty reduction, notably in low potential areas with high poverty levels where due to physical conditions an existing irrigation potential can economically not be utilized through individual farmers. A purely market-driven approach to irrigation development in such schemes would politically be hardly enforceable. The initial investment cost into communal infrastructure will continue to contain a grant element as long as more affordable technical solutions are not available. In cases where a purely commercial approach is not feasible and government funds are involved it is important to clearly separate the grant element from financing. A possible loan to SSI farmers for the share of initial investment must, however, always follow commercial principles and the provision of permanent access to financial services for O&M cost as well as for farm inputs must be ensured. Therefore, the inclusion of financial sector expertise in the design of irrigation projects is required.

To conclude, the aim should be the availability of a range of viable financial institutions that serve SSI farmers with a variety of financial services on a permanent base. However, sustainable irrigation development is only possible if farmers see economic incentives for intensifying their production. In this context, the Kenya case has revealed that the boom in SSI development was mainly underpinned by the opportunities of a liberalized horticultural market. SSI development offers a wide range of interfaces where the mechanism of public-private-partnerships (PPP) can be usefully applied and can contribute to effective produce marketing, to SSI technology development and distribution as well as to value chain development. In such a conducive environment the sustainable access to financial services will boost the abilities of rural smallholders to invest into promising technologies, to increase incomes - and overall to escape poverty.

# 1 Introduction

Approximately 70% of the world's poor live in rural areas faced with limited opportunities outside agriculture. Dependent on rainfed production in an unreliable natural environment communities are faced with regular drought and yield losses. Agricultural land resource potentials are in many countries already fully utilized.

Figures (for 1997-99) show that some 200 million people - or 28% of Africa's population - are chronically hungry, compared to 173 million in 1990-92. Whilst the proportion of the population affected by hunger is dropping slightly, the absolute numbers are rising relentlessly. The underlying cause is the low farm productivity: in 2001 cereal yield in Africa averaged 1,230 kg/ha compared to 3,090 kg/ha for Asia, 3,040 kg/ha for Latin America and 5,470 kg/ha for the European Union. The result is a growing dependency on food imports. The last years of the 20th century have seen a growth in food imports with Africa spending an estimated US\$ 18.7 billion in 2000 alone (110).

The New Partnership for Africa's Development (NEPAD) sees support focusing on sustainable land management and water utilization through small-scale irrigation (SSI) as an important element of a broader development strategy for the continent. The provision of access to suitable financial services is identified as one of the main drivers to revive the continent's rural economies. This analysis is widely shared by the international donor community.

Currently there is still far less than 10% of the continent's irrigation potential developed. Expanding SSI and water harvesting systems could provide a sizeable segment of rural farming households with an opportunity to move beyond subsistence farming (107). Key to develop a substantial part of these resources for SSI is broad access of the population to adequate financial services for investments into new SSI technologies.

The last two decades have seen the development of new SSI technologies and their refinement to suit different socio-economic conditions. In several countries the utilization of these technologies has provided large numbers of smallholders with the opportunity for intensified and expanded agricultural production, resulting in improved incomes and household food security.

Despite this positive development, analytical literature on the use of private sector finance for investments in SSI technologies is still very limited. It would suggest that the topic of so-called 'intermediate technologies' has not been perceived as 'big enough' to attract the full attention of the major donor organizations. NGOs have been and still are in the forefront of SSI technology development and dissemination.

Ambiguity may also stem from the way the terminology is being used, where SSI technology is widely associated with a specific set of devices such as treadle pumps. However in the context of this study the term '**Small-Scale Irrigation**' has been applied in a wider context including all irrigation activities that involve '*small farmers who own and manage an individual plot or are part of a community-managed scheme*'.

Such an interpretation includes a much wider range of irrigation technologies, and in combination with the provision of financial services, opens a new broad field for development initiatives. The influx of private capital in an area formerly exclusively dominated by government grant funding adds a new dynamic to irrigation development. These new approaches should help to overcome the stalemate of the

last two decades when international finance for irrigation development dropped sharply.

In order to establish an overview on current efforts and existing strategies on financing irrigation development in smallholder environments World Bank has commissioned GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) to carry out this study. This investigation on 'financing small-scale irrigation in Sub-Saharan Africa (SSA)' is being implemented in a process consisting of three different studies:

- step 1: initial desk study with literature review and summarization of information on the existing situation and experiences in the provision of financial services to the small-scale irrigation sector;
- step 2: conduct of a case study in Kenya (during July / August 2006) to compare results from the literature review to actual development trends in the field;
- **step 3: summary of results from steps 1 and 2 and preparation of concepts and strategies for strengthening financial services for promoting SSI through the local private sector in countries of SSA.**

This report represents step 3 and provides a summary of the overall findings.

The study is part of a broader cooperation between the World Bank and the German Federal Ministry for Economic Cooperation and Development (BMZ) aiming at the development and dissemination of extension concepts for strengthening the delivery of financial services in the water and basic sanitation sectors of countries of SSA. As part of this cooperation BMZ has commissioned GTZ to carry out studies with a focus on financing drinking water and basic sanitation through the private sector in countries of SSA. In this context, a desk study, two country case studies and a summarizing concept study will be conducted later in 2006 and in 2007.

The following are the major issues to be analysed in the overall summary and concept study:

- preparation of a summary / synthesis of key findings, conclusions and recommendations of the studies carried out including a summary and assessment of already existing experiences in the provision of financial services to water user groups and small-scale irrigation farmers. General experiences, with relevance for the SSI sector are also to be included in the summary;
- based on major study findings, concepts with key strategies are to be prepared for the introduction, strengthening and scaling-up in a financial system development approach of financial services in the SSI sector. The proposals are to be specifically geared towards the conditions, demand and financing needs of water user groups and small-scale farmers in countries of SSA;
- identification of complementary services such as training and other supporting measures on the side of the enabling environment in the water and financial sectors;
- preparation of recommendations on the potential roles of national stakeholders and donor organizations in development concepts.

## **2 Significant Key Findings and Conclusions from the Already Completed Studies with Relevance for the Financing of SSI Development in Countries of SSA**

### **2.1 General Experiences with Relevance for Financing SSI**

The findings from the desk study and the country case study have revealed a number of issues that are important to highlight. Although they are not directly related to SSI development but rather general experiences of agricultural finance or financial sector development they are of high relevance for the findings and conclusions of this study.

#### **2.1.1 Financing SSI in the Context of Agricultural Finance**

Financing SSI is a sub-set of *agricultural finance* dedicated to financing mainly investments into SSI technologies and farm inputs. In this respect, SSI farmers face the same constraints than other farmers when it comes to financial services. General lessons of agricultural finance and rural finance do therefore fully apply to the specific topic of financing irrigation.

In consequence, the study follows the principles of the financial systems development approach and traces the evolution of 'best practice' in the field of rural finance. It underlines the importance for the creation of an infrastructure for the provision of effective financial intermediation services and the need for creating efficient and viable financial institutions. The role of government is to create an enabling environment for the promotion of rural financial services, such as the provision of public goods, regulation and supervision and support to innovation that are likely to enhance outreach to rural entrepreneurs and increase the efficiency of financial intermediation. In many countries of SSA donor interventions are required at all three levels (micro, meso and macro) in order to enhance the growth of the sector. In this context, it should be underlined that efforts to develop SSI should not be limited to the question of *financing* but to the provision of *financial services in general*, including savings and payment services. The international debate has come a long way in recognizing the important role of savings in any financing strategy. This is of special relevance for SSI farmers who operate in a risk prone environment and for a distinct approach in supporting rural financial intermediaries.

#### **2.1.2 Failure of Directed Credit for Agriculture**

During the three decades prior to the 1990s, supply-led and directed credit programmes<sup>5</sup> were an important tool to spur agricultural development in many countries. It was argued that enhanced access to credit would accelerate technical change, stimulate agricultural production and improve rural income. However, this approach failed to produce the desired results. In fact, directed agricultural credit programmes proved to be subsidy-dependent, and ineffective in achieving their objectives. Instead of building a sustainable financial infrastructure, many of the

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<sup>5</sup> Such government or donor programmes had targeted the agricultural sector and supported loan programmes often for specific 'beneficiaries' who benefited from 'soft' loan conditions, including subsidized interest rates and/or high tolerance to loan defaults. The assumptions behind these efforts were that (i) farmers face liquidity constraints; (ii) farmers are too poor to save; and that (iii) financial institutions are too conservative to lend to the agricultural sector. Directed credit programmes focused on overcoming these constraints.

directed credit programmes undermined the development of a viable financial market with the result that as of today the rural population has even less access to financial services than before.

The lessons from past experience of directed credit are that subsidized interest rates and ‘soft loan conditions’ have the opposite effects of those intended and local financial markets cannot develop under such distortions. Such conditions have most often resulted in (i) low loan collection rates because clients consider cheap loans as grants that do not have to be repaid; (ii) limited number of borrowers served due to high default rates with shrinking loan capital; (iii) rationing of loans, which typically favours more wealthy and politically connected rent-seekers; (iv) institutional corruption and fraud because staff may try to capture the difference in the interest rate by eliciting side payments from clients; (v) continued reliance of financial institutions on subsidies, because they are unable to reach financial self-sufficiency given that their interest rate margin does not cover their administrative and financial costs over the long term.

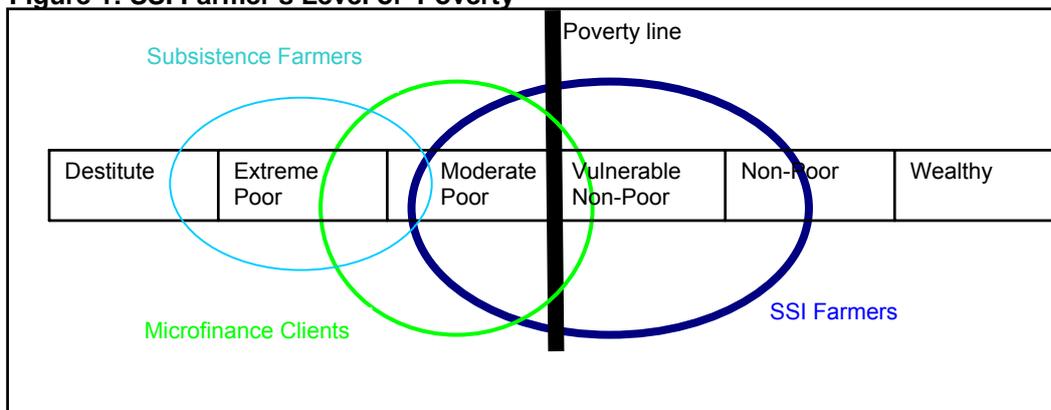
The flaws of directed credit led to the formation of the financial systems development approach which focuses on the primary goals of rural development: increase of incomes and poverty reduction. It is based on the assumption that a *commercial approach* is much more likely to reach large numbers of clients on a sustained basis.

The present study takes into account these learning’s. In cases where a purely commercial approach is not feasible and government funds are involved – especially in the installation of community-irrigation schemes – it is important to clearly separate the grant element from financing. A possible loan to SSI farmers must still follow commercial principles.

### 2.1.3 Financing SSI in the Context of Financial Sector Development

SSI farmers as defined for the purpose of this study, irrigate areas up to five hectares but typically less than one hectare. Often, they are relatively resource-poor, rely heavily on family labor and are weak in bargaining power. Regarding their poverty level, SSI farmers can be situated as follows:

Figure 1: SSI Farmer’s Level of Poverty



Source: Adapted from Helms (2006)

(1) Figure 1 shows only a very small intersection between SSI and farmers with subsistence oriented production systems. The agricultural produce market is the key driving force and of significant importance for the expansion into private sector irrigation development. Many subsistence farmers are located in remote, resource poor areas and the lack of market access is the major constraint for investments in

SSI development. As the Kenyan case has shown, SSI development takes mainly place in higher potential areas with well developed markets.

(2) Figure 1 also shows quite a large intersection between SSI farmers and typical microfinance clients with regard to poverty levels. This may imply that the microfinance industry<sup>6</sup> is in the position to serve the lower segment of SSI farmers. However, it has to be recognized that MFIs do traditionally not focus on rural areas and that they have little or no experience with agricultural lending. Unfortunately, agricultural lending is still perceived as the most risky business and associated with high transaction costs. Products and methodologies do most often not correspond to the specific requirements of SSI farmers. For example, typical microfinance loans are characterized by weekly or regular repayment schedules, are mainly short term and focus on micro and small enterprises (MSE) that have a fast turn-over of funds. On the other side, useful practices that can be also applied for SSI farmers are (i) the graduation approach; (ii) collateral substitutes such as group lending; (iii) supplementary collateral such as blocked savings.

It can be concluded that MFIs can be an interesting partner for SSI farmers in many respects. The driving force for the microfinance industry to enter into SSI business is competition. If new market segments need to be developed SSI farmers can be an interesting choice.

The focus for improving the access to financial services to SSI farmers should be on institutions that are able to provide at least savings and credit services (versus credit-only MFIs that have serious limitations). The most appropriate institutional form appears to be commercial banks focussing on the lower income market because first, they offer a full range of banking services to their clientele, second, they are regulated and supervised by Central Bank; third, they have the largest outreach; and fourth, they have most probably the necessary institutional strength and financial resources for expansion into agricultural lending. Finally, these institutions are in the position to retain customers with growing business. Accepted approaches for fostering such developments are 'green fielding' or 'upgrading'. Prominent examples are Pro-Credit Bank in the Balkans and K-Rep Bank in Kenya.

(3) Figure 1 shows also that the upper segments of SSI farmers are not necessarily covered by the microfinance industry. However, with the existence of promising institutions that enter into commercial banking it is expected that also the upper SSI segment can be tapped. Not only because such institutions want to retain their best clients but also because expansion into the upper client segment is a useful strategy for diversification and therefore to spread risks.

Larger and highly commercialised operating SSI farmers will most probably approach other institutions of the rural financial market such as commercial or cooperative banks. These institutions face other problems including: (i) products and methodologies are often very inflexible; (ii) other than traditional collaterals (usually land titles) are rarely accepted; and (iii) client-orientation and customer-friendly procedures are rather an exception. However, 'downgrading' of these banks has resulted in better client-orientation and is an accepted approach for increasing the outreach of financial institutions to the lower client segment.

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<sup>6</sup> Included are all financial institutions that focus on the lower income market such as commercial banks, financial cooperatives, NGO-MFIs and community based financial organisations (CBFO).

In conclusion, a clear attribution of SSI farmers to the microfinance industry does not sufficiently take into account different development scenarios in the financial and non-financial sector of different countries. In the absence of viable financial intermediaries SSI farmers may rely entirely on non-financial service providers such as suppliers, traders and processors; in the absence of viable institutions focussing on the lower income market (financial cooperatives, banks, NGOs or community-based financial organisations) smallholders may rely on the formal banking sector. Therefore, the focus is on commercially viable institutions that reach large numbers of clients on a sustained base. Depending on the institutional variety in the respective countries SSI farmers will select institutions that meet soonest their financial requirements.

## **2.2 Key Findings of the Desk Study**

### **2.2.1 General Remarks**

The literature review has only partly provided the desired results. The experiences reflected in the literature mirror the intervention approaches for irrigation development from a technical point of view. The prominent statement is that the availability of *finance* is the main bottleneck for the development of SSI because farmers are resource poor and have not the necessary financial capacity for investments into SSI technologies. A more detailed demand analysis for financial services is rarely provided, given the wide range of technical solutions and different development scenarios in view of economic and geographical potentials.

On the other side, literature regarding agricultural finance underlines the sector principles and advocates a commercial approach. The challenge for agricultural finance in agricultural development lies in the support for solving the real sector challenge by creating rural financial markets that provide the economic actors with sustainable financial services. References to irrigation are rarely provided.

Hence, literature covers both topics comprehensively in isolation, but does in most cases not link the two areas. There are references about the importance of better integrating those areas in general but the lack of detailed analysis of existing practices and experiences suggest that the topic has not been given the attention it deserves.

The authors depended entirely on literature available through the internet, but had no access to evaluation reports of irrigation projects and related access to lesson's learned.

### **2.2.2 Irrigation Development**

There is agreement in the literature about the crucial relevance of irrigation development in achieving some of the Millennium Development Goals (MDG) especially with regard to direct effects on food security, improved incomes with contributions to *poverty alleviation*. Land resource potentials are already limited and yield levels in Africa trail the rest of the world by a significant margin. Irrigation compensates for irregular rainfall, which plagues yield levels in most SSA regions. According to estimates more than 90% of Africa's irrigation potential remains unused so far.

The reviewed literature is largely dominated by appropriate *irrigation design* and review of development concepts. This dialogue is based on the experiences of practitioners from developing countries and major donor organizations. Researchers and practitioners are united in their analysis of the 'mega-scheme' era. The limited success of these large-scale projects was responsible for the review in strategy and has resulted in a sharp decline in the allocation of financial resources, thus halting the pace of expansion of large perimeter developments.

Mainstream thinking mirrored in the literature is strong on policy and conceptual aspects and their operationalization in an institutional environment. It deals, however, only briefly with the translation of the proposed concepts and strategies into designs and the role and suitability of different technologies. Questions as to which potential requires which design or irrigation technology remain largely unanswered.

The literature identifies the *role of the market* as a crucial factor in guiding investments in the agriculture sector in general. Venturing into some of the irrigation technologies represents major investments for small farmers. A realistic market analysis is therefore suggested before investments are undertaken. It is the local dynamic in a country that will guide investment decisions.

*SSI technology development* and dissemination are still very much spearheaded by non-governmental organizations (NGO). The international literature acknowledges the existence of these low-cost devices, but their potential in irrigation development remains so far undervalued on policy and strategy level. SSI technologies such as treadle pumps and small motor pumps are designed to economically empower individuals specifically and to utilize specific small water resources (e.g. small wells, tube-wells, dambos) which would not be developed otherwise.

It was the prevailing conditions in large parts of the Indian subcontinent (high groundwater tables, small farm environment, suitable topography, etc.) that led to the development of the treadle pumps and their fast adoption in the region. The development of drip irrigation technology designed for larger commercialized farmers has found its technical adaptation to small rural and peri-urban households in connection with bucket and drum technologies.

The broad-scaled adoption of these technologies in many African countries is however hampered by several factors. These include especially:

- lack of access to appropriate financial services by individual agricultural entrepreneurs (especially savings as well as seasonal and term finance);
- availability of SSI technology in a country / region. In many countries in SSA SSI technologies and related equipment must still be imported. This increases costs considerably, especially when import duties are charged as well;
- lack of market opportunities to sell produce.

### **2.2.3 Financing Small-Scale Irrigation Development**

The effective provision and outreach of financial services to the economy and the population in countries of SSA is inadequate and generally lagging strongly behind most parts of the world. Less than 10% of the population has access to financial services. In rural areas the situation is even worse.

The financial systems development approach is largely accepted by the international community which is reflected in most of the literature reviewed. However, the switch from directed credit to financial market development is often only partial. In many

countries of SSA, directed credit and subsidized schemes do still exist and hamper the development of rural financial markets. In this respect, literature on financial sector development is far ahead of the realities in the field, especially regarding interdisciplinary concepts that involve agriculture. The difficulty is clearly to close the large gap between development perceptions and successful implementation of concepts.

The availability of low-cost irrigation technologies and related equipment has started to unlock large human and natural resources through individually owned and operated SSI systems. The available literature suggests that operators realize attractive returns on their investments from such systems. The overall importance of SSI technologies, remains, however, generally underestimated or not sufficiently highlighted. On the other hand, a critical debate on the shortcomings of heavily subsidized, supply-driven, 'one size fits all' irrigation development programs is only slowly taking place. It would be very helpful if past experiences are analyzed and important lessons would be drawn.

The development of SSI technologies has a significant impact on the demand of *financing* because it shifts the focus from supply-driven approaches to demand-driven private sector initiatives that need not only *financing* but a whole range of *financial services* on a permanent base. This shift has not sufficiently being considered in literature because the importance of new SSI technologies has only recently been acknowledged and a financial systems development 'lens' has not yet been integrated into SSI development concepts.

Literature identifies the quasi non-availability of finance to the agricultural sector as the major bottleneck for the development of SSI. Without question, it has to be recognized that *there is a supply – demand gap* for financing SSI, especially when it comes to term-finance<sup>7</sup>. Further, in a market-driven environment not only financial services are a bottleneck for the development of SSI, but also all issues that are related to the *marketing* of agricultural production.

In fact, the commitment to commercial approaches and the introduction of low-cost irrigation technologies would reduce - as compared to the standard situation in the past<sup>8</sup> - the demand for financing immensely. On the demand-side, it has to be distinguished between the demand for irrigation equipment and facilities and the respective demand for financing. *If funding is provided* SSI farmers are likely to demand large, expensive irrigation schemes; but farmers do not demand financing in form of a loan because they are risk averse<sup>9</sup>. Private investments must be *affordable* and an established market demand is a pre-condition for sound investment decisions. The recognition that the presence of subsidies in the sector has created a hyper-demand for more expensive technical solutions that is in contrast to economically sound and feasible investment decisions of individual SSI farmers is not sufficiently analyzed in literature and leads to the incomplete assumption that only the absence of financing hampers SSI development.

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<sup>7</sup> See chapter 3.2 and desk study (chapter 5.4) where worldwide experiences of financing medium term investments are analyzed. Noteworthy is that these experiences are not specifically geared towards financing irrigation.

<sup>8</sup> This refers to more expensive larger community irrigation schemes based on imported equipment.

<sup>9</sup> Poor farmers are risk averse and don't like to break from tradition when they are confronted by uncertainty. In other words, with their limited ability to absorb risks (mainly related to price and yield of crops produced), poor and low-income farmers opt for low-risk / low yield patterns of production.

In a risk prone environment a much larger emphasis must be given to the self-financing capacity of SSI farmers and therefore to the crucial importance of deposit facilities. Encouragement of savings and building-up financial reserves of SSI farmers will strengthen their financial management capacities and their ability to access financing.

Low-cost solutions do not work in all circumstances. In a purely market-driven approach, irrigation schemes that involve more capital-intensive investment cost for infrastructure (headwork, major distribution network) would likely to be discontinued. The question to be resolved is therefore if such systems targeting SSI farmers who are due to their geographical location excluded from access to water should generally disappear or if the infrastructure measure should still be provided with the full or partial support of subsidies by donors or governments. Literature does not treat these essential questions in detail. Common practice shows that the promotion of grant supported irrigation schemes is still a very accepted development approach to irrigation development that will not disappear in the near future. The challenge is to critically deal with the subject and to find consensus on a design that will not undermine current development trends and that is in line with the financial systems development approach.

## **2.3 Key Findings of the Case Study – Kenya**

### **2.3.1 General Remarks**

The country can look back on an impressive record with regard to SSI development and the production and dissemination of low-cost irrigation technologies. Kenya therefore provides a perfect example for the case study. Important lessons can be drawn in translating the situation to less advanced countries.

The financial sector in Kenya exhibits greater financial depth and more institutional variety than most other SSA countries. The financial services industry focusing on the lower income market has achieved considerable growth rates. A number of dynamic institutions are committed to 'best practices' and even rural outreach has been improved in recent years. The emergence of commercial banks focusing on the lower income market and other financial intermediaries such as Savings and Credit Cooperative Societies (SACCO) or community-based financial organizations (CBFO) has led to increased competition in the market and to a moderately better service for the rural population in terms of accessibility and availability of rural financial services. Rural outreach remains, however, highly skewed towards the more productive agro-ecological zones. The coverage decreases with the descending economic potential of different regions.

The impetus for the success of the current expansion in irrigation development in Kenya originates from the national and international horticultural produce market. The most important driving force of the massive development in the SSI sector has been the fast expanding export market. The dynamic growth in Kenya's irrigation development stems from the close interaction of the agro-processing and exporting sector with small-scale horticultural producers. This 'pull effect' of the market has been able to mobilize private capital and is purely market-driven. SSI systems meanwhile account for an impressive percentage of the country's irrigation area. The adoption of SSI technologies is based on individual entrepreneurship seeing the activity as an opportunity for economic advancement and finding the resources to act on it.

## **2.3.2 Irrigation Development in Kenya**

### **2.3.2.1 Relevant Policy Framework**

The country's development vision is articulated in several central policies and strategies, all underlining the importance of agriculture in general and irrigation in particular for the national economy. A special irrigation policy exists only in a draft format. An important milestone for the improvement of the legal and regulatory framework conditions in the financial sector is the '*Savings and Credit Co-operative Societies Bill* (SACCO Bill) which is now being considered by Parliament as well as the '*Deposit-Taking Microfinance Bill*' that is expected to be passed by Parliament soon.

The country looks back on a long history in smallholder irrigation development. The government in its efforts to address landlessness and poverty saw irrigation development as an effective measure to support the rural poor. Large perimeters and community schemes designed as settlement projects were to address these challenges. All developments were based on social objectives and therefore entirely financed by grants. Institutionally the implementation units for the two different approaches were separated. There was no uniform policy guiding development and operation of these projects.

After critical reviews especially also of the public irrigation sector the Government of Kenya (GOK) in the early 1990s reduced its budget for irrigation and on the side of large settlement schemes no further perimeters were supported. On the side of community managed irrigation schemes the 100% financing policy by the state had turned out not to be sustainable also in view of the high costs for the government. It had especially also negative effects on the development of ownership by farmers and resulted often in weak Water Users Associations (WUA) with unsatisfactory performances in scheme management and operations as well as on-farm level. The new policy aimed at full cost recovery for irrigation development on titled smallholder land. However, even the economic incentives from a deregulated and fast expanding horticultural market could not overcome the communities' scare of the huge initial investments in such schemes. As a result no community scheme development took place for nearly a decade under the new policy.

In the late 1990s the government adopted a new approach with an adapted financing mechanism of the overall scheme development cost based on a loan to grant ratio of 20% to 80% in gravity-fed sprinkler irrigation systems installed on 0.2 ha irrigation area on the farm of each participating farmer. Encouraged by the response the government has of late introduced a 50 : 50 grant to loan ratio, but providing water for an irrigation area of 0.4 ha per farm. These policy developments represent a landmark and also attracted private sector capital to finance irrigation infrastructure.

### **2.3.2.2 Existing Irrigation Potential and Current Development Trends**

Kenya has so far developed about 106,000 ha (1985 = 52,000 ha) for irrigation out of its total estimated potential of 539,000 ha. It is crudely estimated that about 15% of this resource lies within areas of high agricultural potential, 50% in the areas with a lower potential, and the remaining 35% in the Arid and Semi Arid Lands (ASAL) region of the country.

The fast growth in Kenya's irrigated area stems from the close interaction of the agro-processing and horticultural export industry with commercial and smallholder farmers,

who account for 48,000 and 50,000 ha of irrigated land respectively. About one third of the smallholder irrigation area has been developed using individual SSI systems, the other two thirds represent community-managed schemes.

Specifically commercial and individual smallholders invested in a variety of technologies suitable to their respective farming situations. The bulk of this development took place in the high potential areas. Major enhancing factors include:

- *socio-economic parameters*: (i) farmers hold titles to their land, (ii) have already a commercial orientation through the cultivation of cash crops (anchor crops) such as coffee and tea and (iii) are members of respective marketing cooperatives providing access to credit;
- *natural conditions*: the areas have high agricultural development potential with (i) relatively good rainfall conditions; (ii) many perennial streams providing a large number of farmers with direct access to water; (iii) fertile soils;
- *communication and marketing infrastructure*: (i) the areas are densely populated and therefore there is an easy access to market centers; (ii) good road and communication infrastructure with traders able to buy produce at or near farm gate; (iii) good access to a major consumer market (up to four hours drive to the market of the capital) as well as to an international airport; (iv) contract farming arrangements provide producers with a secure market.

It is a strength of SSI technologies that they can use small water and land resources that would otherwise not be utilized. Even for the design of community schemes the government has adopted smaller design units.

*Environmental aspects*: currently Kenya has developed about 20% of its identified irrigation potential. There are already signs that the abstraction capacity of several major catchments is being exceeded upstream, threatening not only irrigation water use but even domestic water supplies downstream. In several regions in the high potential areas the Ministry of Water and Irrigation has halted issuing new water permits to community schemes and individual SSI farmers alike. Along some streams water rationing has already been introduced where farmers and schemes are only allowed to irrigate on special days. In order to utilize the irrigable land potential the country needs massive efforts to increase its dam capacity.

### **2.3.2.3 Adoption of Relevant SSI Technologies in Kenya**

The fast expansion in the use of low and medium-cost irrigation technologies went largely uncoordinated and technically and financially unassisted by the public sector. The development was purely driven by market forces with a high concentration in the high potential areas where a combination of favorable framework conditions exist (see chapter 2.3.2.2). Depending on the size of their land and the physical conditions on the farm (water source, topography) individual farmers invest in a range of technologies to irrigate their land:

*Low-cost technologies* such as rope-and-washer pumps and especially different types of treadle pressure pumps account meanwhile for more than 13,000 ha of irrigated land benefiting about 35,000 rural households. To put this into context, the large public schemes operated under the National Irrigation Board developed over several decades cover only 12,000 ha benefiting about 5,800 settler families. In addition small systems such as bucket and drum drip irrigation systems have been sold by the Kenya Agriculture Research Institute (KARI) to about 17,000 households. Though the number of reached households looks impressive, these units may

altogether irrigate only about 180 ha due to the relatively small areas being irrigated per unit.

For *medium-cost technologies* such as motorized pumps purchased by smallholders no detailed information is available. It is nevertheless estimated by the Ministry of Agriculture that also the use of this system perceived by smallholders often as an upgrade of the labor intensive treadle pumping systems is with the availability of lower-cost motorized pumping units strongly on the increase in more commercial oriented farms.

*Community irrigation schemes* cover about 37,000 ha and are mostly based on gravity-fed water supply systems which are in smallholder schemes due to frequent mechanical problems with engines and pumps and difficulties in maintenance and repairs in many circumstances the preferred option. The smallholder schemes are owned, operated and managed by the farmers' through their respective WUAs. They are being developed in different land tenure systems. In most cases the development takes place on private land where farmers hold individual titles to the land. The size of the schemes varies in terms of irrigated area from 20 to 200 ha and the irrigated area developed per farmer is often ranging between 0.2 ha and 0.4 ha. To fit the prevailing physical and socio-economic conditions on-farm water distribution is either by sprinkler or by furrow irrigation. The design for example of a gravity-fed sprinkler irrigation scheme includes bulk infrastructure such as intake weir, sediment settling tanks, main supply pipelines, and pressure control devices. Installations on farm level include a farm hydrant and movable equipment such as piping and sprinklers. This scheme type is more costly because the infrastructure layout for a 40 - 100 ha irrigation area may be embedded into a farming area of 200 - 500 ha of land with each of the 100 - 300 farmers receiving water for a plot of 0.2 - 0.4 ha. Such schemes incur high initial investment costs of between US\$ 4,000 to 5,500 per ha irrigated area. Though, technologically in a different category, by their 'modus operandi', farmers in such schemes are individual and independent operators. They face the same challenges regarding access to finance as users of other SSI technologies do.

The development potential for the different SSI systems is strongly linked to the different land potentials and availability of water resources:

*Bucket and drum drip irrigation kits* can fit many rural and peri-urban household settings throughout the country, provided there are water sources available to recharge the respective containers. Drum systems (containing 80 to 500 liter of water) are therefore more limited in their use than buckets (10 liter).

*Rope-and-washer pumps* and the various *treadle pumps* depend on a water source on the farm and have specific requirements for the topography on the farm. These conditions prevail mostly in the high potential area where numerous little streams converge into the major rivers. There groundwater tables are often within reach and can be accessed by digging wells. In the areas with a lower agricultural potential there are fewer but larger streams providing only a small number of farmers with direct access to a water source. In addition suitable arable land is scarcer and therefore the opportunities for the use of manually operated pumps are more limited. The treadle pump distributor Kickstart estimates that the technology could nevertheless be applicable to over 350,000 households in Kenya.

Small *motorized pumps* are being used across the different land potentials, but they also depend on a water source on or close to the farm.

*Community managed irrigation schemes* account for most of government supported irrigation development. Such schemes will continue to play an important role as an instrument of assistance for impoverished communities with no direct access to water nearby. Designs vary considerably depending on the topographic conditions and the water source. Future developments require owner operated irrigation farmers participating in such schemes to co-finance scheme development cost. The communal schemes in ASAL regions are in most cases operated by tenants. In these cases the government as the owner of the land is expected to continue to provide 100% of the investment costs.

### **2.3.3 Financing Small-Scale Irrigation Development**

#### **2.3.3.1 Financial Requirements of SSI Farmers**

The SSI development potential depends largely on the natural and economic conditions with high potential areas having a relatively high degree of economic potential and development options also for SSI farmers. Low potential areas are limited through their restricted economic potential and unfavorable natural conditions also in SSI development. The same applies for the access to financial services: while in the high potential areas the access to financial services is meanwhile often improving, the low potential areas suffer from lack of institutions and private sector players that can provide financial services in a sustainable way.

Low-cost irrigation technologies have the advantage in comparison to irrigation schemes that farmers can start with affordable small SSI systems requiring small investments which can later be upgraded stepwise with increasing technical know-how and access to markets.

SSI development and expansion does not depend on special financial products for the dissemination of the technology. Irrigated agriculture is basically an entrepreneurial activity that requires the facilities and products the rural financial market is supposed to provide on a sustainable base:

- *secure savings facilities*: savings are an integral part of financing mechanisms. Not only for seasonal input loans but also for short- and medium term investments a substantial amount of own resources is required;
- *short term working capital loans*: seasonal or working capital loans may be required by SSI farmers more than once a year, depending on the cropping pattern. Timely availability and flexible financing mechanism are essential;
- *short term investment loans*: short term investment loans are required for investing into low-cost irrigation technologies (technology level 1), but also into more advanced technologies (technology level 2);
- *medium term investment loans / leasing*: medium term investment loans are required for investments into more advanced technologies (technology level 2) as well as in communal schemes with co-financing arrangements for the share of farmers in the scheme investment cost. Leasing is another valuable option for financing more expensive equipment.

In summary, SSI farmers do need a whole range of financial services, especially a combination of savings and financing not only on a timely but also on a permanent basis. They need institutions that have enough capacity and flexibility to adopt terms and conditions as well as lending methodologies of existing and innovative products to the specific needs of agricultural production.

### 2.3.3.2 Financing Mechanisms that Work

According to several studies the agricultural credit market in Kenya is at present dominated by commodity based credit providers (CBCP) such as exporters, input suppliers and marketing cooperative societies, especially for tea, sugarcane and French beans, whose provision of credit for farm inputs represents almost two thirds of agricultural credit provided in the country. Therefore, the main share of agricultural credit is at present provided by private sector players who are involved in the value chain. Other financial intermediaries play only a secondary role at present.

The product range offered to the rural population through financial intermediaries for agricultural production is at present rather narrow and limited mainly to short term financing and simple savings accounts. Although medium term loans are offered by a number of institutions, their share in agricultural lending is minimal at present<sup>10</sup>.

Nevertheless, the country has seen a dynamic growth of SSI development. This has taken place mainly in the high potential areas with its relatively good infrastructure and stems from the close interaction of the agro-processing and exporting sector with small-scale horticultural producers. In these areas anchor crops like tea and coffee are produced and many SSI farmers have the financial capacity and technical know-how to invest into new technologies and to expand their production through irrigation. In the absence of term finance, SSI farmers in these regions are likely to be able to finance the equipment with short term loans in combination with own resources. This is not an optimal solution and it is assumed that a multiple of investments could take place if medium term finance is available. In medium potential areas, observations in the field revealed a low use of low-cost irrigation equipment. The main reason appears to be lack of financial resources as well as lack of access to financial services but at the same time an unreliable horticultural produce market.

The range of *financing* provided by CBCPs is very narrow and limited to seasonal credit and short term advances. These arrangements are not designed for term-investments in equipment or facilities to expand or start new operations. But given their large volume and success some lessons could be drawn:

- the arrangements work because there is a clear link to the marketing of agricultural produce;
- both parties profit from the arrangement: SSI farmers are able to finance their agricultural inputs timely and have already an established market demand and the buyer can count on the quality and quantity produced (win-win situation).

Savings and Credit Cooperative Societies are the second important provider of financial services to the agricultural sector. Access to loans is restricted to clients with multiple number of savings, typically three times. The loan term is negotiable but exceeds rarely 12 months. The outcome is often significant credit rationing and terms that do not fully correspond to members financial requirements. Nevertheless, the SACCOs are very accepted from the population and have a significant rural outreach.

Examples from commercial banks focusing on the lower income market in financing agricultural activities are available on a limited scale only. These examples, however, show that customized financial services from the mainstream financial service providers are in principle available for agricultural production purposes and therefore also for SSI farmers. Loan contracts are either secured by agribusiness contracts or through solidarity group mechanisms.

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<sup>10</sup> The issue of financing medium term investments is further elaborated in chapter 3.2 and 4.3.2.4 (2)

Without question, outreach and financial depth need to be improved but the following lessons can be drawn: irrigation does not require a special product range but flexibility within the product range and adopted methodologies. Farmer's entrepreneurial activities are diversified and different activities can be hardly separated from each other. What is important on access to financial services for SSI farmers is:

- timely availability, fast processing and customer-friendly procedures;
- flexibility within the product range, especially regarding repayment modes and collateral requirement;
- the combination of loan products and savings;
- proximity of financial institutions or delivery mechanisms that allow easy access to financial services.

In Kenya SSI development has taken place mainly in the high potential areas. This underlines the assumption that increased investment takes place when financial capacity and technical know-how has reached a certain level. Further, established marketing channels and good infrastructure are important factors for the successful expansion into SSI development. A close interaction with CBCPs is desirable, where ever possible.

#### **2.3.4 Proposed Approach**

The variety of financial services that SSI farmers demand can be met by institutions that (i) operate in rural areas, (ii) offer a whole range of financial services, notably deposits and financing but also other financial services, and (iii) are committed to serve the low-income, economically active population on a large scale. In Kenya, the financial service industry, notably the commercial banks focusing on the lower income market, the SACCOs as well as those institutions that will be registered under the future 'Deposit-Taking Microfinance Bill' are best suited to provide such a range of financial services on a sustainable base to SSI farmers.

Competition in the Kenyan financial market had already positive effects that are important for the expansion into agricultural lending such as:

- increased efficiency;
- decreasing interest rates;
- new delivery methods such as joint liability groups;
- new delivery channels such as mobile banking units, phone banking.

Further, the emergence and success of low-cost irrigation technologies provides a sound base entering into SSI financing. Cost and risks of on-farm investments are substantially reduced.

The financial sector in Kenya has its own dynamics. What is important at this stage is not to disturb positive developments and to apply a market-driven approach. Directed credit and subsidized interest rates should be phased out where they still exist. 'Burning' issues such as the improvement of the regulatory and legal framework conditions of the SACCO sector and the enactment of the Microfinance Bill should be solved.

The rural financial market will not work in isolation. Traders, processors, input suppliers and exporters, insurance companies play a critical role for inter-linking arrangements to reduce the risk associated with agricultural lending. Chapter 2.3.3.2

has already outlined the opportunities of interlinked credit arrangements. The potential of enhancing public-private partnerships by creating commercially viable business for both parties (win-win situation) is immense<sup>11</sup>. PPP interventions are particularly useful in supporting the establishment of new commercial ventures e.g. agro-processing in the medium and low potential area, technology development, etc.

Limitations of the financial sector and risks to provide financing to the SSI sector include:

- serving low potential areas without markets, economic potential and high poverty levels;
- financing of the development cost of community irrigation schemes exceeds the financial capabilities and ability of most smallholders and requires support by government. For the financing share of farmers the availability of medium term loans must be negotiated with financial institutions which relies on guarantees or credit lines provided by donors or government;
- political interference especially in view of subsidized interest rates, directed credit, 'mass forgiveness' and subsidies.

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<sup>11</sup> See also chapter 4.6.

## 3 Major Conclusions and Assessment of the Relevance of the Findings under Consideration of Already Existing Experiences

### 3.1 Synthesis

Based on the literature and the in depth analysis of the country specific situation in Kenya in this chapter major conclusions are synthesised taking into account the already existing experiences for the situation of financing SSI in SSA.

#### 3.1.1 Irrigation Development

SSI technologies deserve a lot more attention in the international discussion. Their scope and potential for impact makes them an important factor in the design and implementation of a country's irrigation strategy and can contribute substantially to the growth of the agricultural sector directly, but also give important incentives to the agro-processing industry. Kenya is an excellent example of this, where private sector capital was used to develop a large segment of the country's irrigation potential.

Based on the results of the literature review and the insights gained in the Kenya case study several points become apparent regarding irrigation development:

- *project type*: in implementation practice donors and implementing governments alike, concentrate their irrigation development efforts to a large extent on community-managed irrigation schemes and the respective support mechanisms for them;
- *private sector*: though the role and the importance of the private sector are reflected upon positively in many studies, there are rarely strategies discussed on how to co-opt the sector into a planning and implementation framework;
- *policy aspects*: irrigation is still treated as an isolated technical development program. The fact that substantial irrigation development in a region changes the economic development much beyond the boundaries of the irrigated plots is not being adequately considered;
- *role of the market*: there is general consensus that the agricultural produce market is the most effective driver for success in irrigation development. Market opportunities attract the private sector all along the value chain and also into financing of irrigation equipment and infrastructure. However the utilization of such opportunities must be embedded in the respective policies and implementation strategies that enhance rather than hamper the efforts of the private sector.

The Kenya case is a very good example of the impacts of the market on irrigation development. The tremendous expansion of private irrigation, commercial and smallholders farmers alike, is basically the result of a dynamic market that involves all players of the value chain. Based on a deregulated horticultural market, entrepreneurial acumen expanded on the opportunities of the international and national markets resulting in a broad-based development, funded entirely by private

capital. Most of this development is confined to the regions where the most favorable conditions prevail.

Considering the involvement and performance of the private sector in translating market opportunities into implementation strategies Kenya is far ahead of the theoretical concepts reflected in the literature. It is particularly through the use of individually owned SSI technology that these agricultural entrepreneurs become important players in the value chain. The immense potential in private sector SSI development can significantly contribute to reduce poverty of the rural population and to boost agricultural sector growth. Not only that many households can be reached with this approach it will also limit the use of scarce government resources to areas that need further support.

### **3.1.2 SSI Technologies and Respective Financial Requirements**

The development and availability of SSI technologies has opened a new era of irrigation development that is able with a significant outreach to contribute to poverty reduction. The focus on market-driven SSI development has significant impact on questions of financing of SSI.

In Table 2 SSI systems with their different investment requirements have been categorized into three technology levels: low-cost technologies, medium cost technologies and communal irrigation schemes which have relatively high investment costs.

**Table 1: Financial Service Requirements for Different SSI Technology Levels**

<b>Technology level</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
<b>Classification</b>	<b>LOW-COST</b>	<b>MEDIUM-COST</b>	<b>SCHEMES</b>
<b>Example</b>	Bucket kit, drum kit, rope-and-washer-pump, different types of treadle pumps, hip pump	Motorized pump unit (4 hp)	Gravity-fed sprinkler irrigation scheme for 200 farmers with 80 ha irrigation area
<b>Investment cost/unit (typical examples)</b>	bucket kit (for about 50 m <sup>2</sup> irrigation area) US\$15; drum kit (500 m <sup>2</sup> ) US\$ 110; treadle pumps (4000 to 6000 m <sup>2</sup> ) US\$ 112 to 185; rope-and-washer-pump (2000 m <sup>2</sup> ) US\$ 40; hip pump (2000 m <sup>2</sup> ) US\$ 73	US\$ 550 to 800 for a unit irrigating 1 ha	Scheme development cost per 0.4 ha irrigated area/farmer = US\$ 1,665 (in-field equipment cost = US\$ 330) or >US\$ 4,100 per ha; total investment cost of the scheme = US\$ 0.34 million; under 50:50 cost sharing arrangements the farmer is required to finance US\$ 833
<b>Description</b>	Low-cost irrigation technologies allow SSI farmers with a relatively modest investment to irrigate areas between 50 m <sup>2</sup> (bucket kit) to 0.6 ha (pressure treadle pump) and hence to increase production and incomes and become less vulnerable to weather conditions. Such investments are often the first attempt to change traditional production systems and provide an ideal ground for knowledge generation and building-up of experiences. Low-cost SSI systems are private investments of individual farm households.	Medium-cost SSI systems require higher investments and allow SSI farmers to develop the area on a larger scale and to increase production and incomes more substantially. The technology requires not only technical know-how to operate and maintain the equipment but also the use of advanced production technologies. To a considerable extent, such technologies are used by expanding SSI micro-entrepreneurs operating under commercial conditions.	High cost irrigation technologies depend on the establishment of capital intensive scheme infrastructure. They are constructed for a number of farm households often ranging between 150 to 250 farmers who are organized into WUAs to manage, operate and maintain the system. While the access to water is a joint initiative, production on individual farm plots is an individual entrepreneurial activity, just the same as for technology levels 1 and 2.
<b>Financial service requirements</b>	(1) Savings; (2) Short term working capital; (3) Short term investment loans.	(1) Savings; (2) Short term working capital; (3) Short term investment loans or medium term investment loans or leasing.	(1) Savings; (2) Short term working capital loans; (3) Medium term loans for the farmers' contribution to scheme development costs (4) Government grant finance for the scheme development cost not covered by farmers

Source: own compilation.

The adoption of technology level one and two are market-driven and therefore not only a function of natural potentials but basically a function of entrepreneurial initiative and market demand. Irrigation technology is not generating cash income for smallholders unless there are market opportunities to exploit. Therefore, the market driven expansion of SSI technologies has and will primarily occur in areas of the high and medium potential zones where SSI farmers can market their produce in a profitable way. The adoption of technology level three is dependent on substantial

government or donor grant finance and is often based on socio-political considerations.

SSI farmers do need a full range of financial services, not only one-time but on a permanent base. While the demand for savings and working capital loans occurs continuously during the year, investment loans are needed at the time of the installation of the SSI system. Short term or medium term investment loans are adequate to satisfy the financial requirements associated with the establishment of SSI technologies. Long term loans with maturities of more than five years are not required. SSI farmers may also need financial services for their off-farm activities and / or consumption.

At present, the demand for secure deposit facilities is rarely met. A large percentage of the savings potential is not yet tapped by the financial markets. At the same time, the market is at present not able to provide a significant share of medium term finance for agricultural purposes. Seasonal loans are often provided by CBCPs, traders or the informal sector.

To conclude, the access of SSI farmers to financial services is not yet satisfactory and farmers are often confronted with a very fragmented service. SSI farmers need institutions that are in reach and that offer the full range of financial services notably credit and savings but also money transfer and insurance to fully exploit their potential. Ideally, they receive such services from one institution in order to avoid inefficiencies on their part and to overcome the problem of information asymmetry on the part of financial institutions.

### **3.1.3 Supply-Driven Versus Market-Driven Approaches to SSI Development**

Before the introduction of low- and medium cost irrigation technologies, irrigation development in Kenya has concentrated on capital-intensive community irrigation schemes that were mainly financed through grant finance. Experiences have shown that such supply-driven schemes have often not been successful. Main constraints were/are the (i) lack of ownership of farmers and their WUAs; (ii) difficult access to markets; (iii) limited technical know-how of farmers; (iv) unsatisfactory performance of WUAs with problems in management, operation and maintenance of the system, and (v) the lack of access to adequate financial services.

In contrast, the demand-driven approach focuses on individual rural entrepreneurs that take investment decisions according to their preference, individual conditions and opportunities. A demand-driven approach functions clearly without direct subsidies, which implies that individual farmers take the full responsibility for their investment and the resulting operating cost. Thus, the system must be financially attractive, viable and affordable for rural micro-entrepreneurs bearing the full risk for their investment. In this situation it is of special importance that the market demand is well established and that a whole range of financial services is available on a permanent base.

With the rise of promising SSI technologies that work under market conditions the importance of irrigation schemes decreases. From a macro economic view, simple low-cost irrigation technologies have the potential for immense outreach and increasing incomes for many households while capital intensive community irrigation schemes are rather restricted also in view of sparse government resources to a limited number of beneficiaries. However, natural conditions and access to water do not allow the use of low and medium-cost SSI technologies in all circumstances. But

wherever feasible preference should always be given to market-driven initiatives of rural entrepreneurs.

A purely market-driven approach on irrigation would consequently result in the disappearance of community irrigation schemes because a significant share of infrastructure cost has to be provided from outside sources. In contrast to medium- and low cost irrigation technologies where investments can also take place gradually, the high initial up-front investment of irrigation schemes in combination with weak financial and technical capacities of smallholders represent the major constraint for access to commercial finance.

Politically, a purely market-driven approach would be hardly enforceable. Irrigation schemes are the 'darling' of governments and donors and are still an important instrument for poverty reduction, notably in low potential areas with high poverty levels. In this context standardized criteria for the selection of irrigation project areas need to be developed and a uniform approach towards the treatment of grants is to be adopted on a country-wide level and applied also to all donor initiatives in irrigation development.

Further, from a financial sector perspective, the creation or provision of financial services to beneficiaries of irrigation systems should follow commercial principles. Important lessons from past experiences should be taken into consideration in the design of new irrigation projects as outlined in chapter 2.1.2. The risk to return to discredited approaches is high, if the principles outlined in chapter 4.4 are not applied.

### **3.2 Financing Term Investments – Worldwide Experiences Translated into Financing SSI**

Financing agricultural-term investments remains a challenge worldwide. SSI farmers demand medium term loans for the purchase of advanced equipment such as motorised irrigation pumps that can increase productivity significantly. Even in a country like Kenya with one of the most diversified and developed financial sector in SSA term-finance for agricultural purposes is hardly available. The major constraints of term lending in SSA are the limited capacity of designing and managing term loan products and the limited access to refinancing.

The desk study (chapter 5.4) has analysed different case studies on term-lending and provided insights into successful agricultural lending practices around the world that are also relevant for lending to SSI farmers. The following trends can be observed:

- the loan portfolios are mainly financed by concessionary and / or commercial sources;
- loan portfolios are diversified (urban / rural and agricultural / non-agricultural loans);
- some institutions have linked the term loans to the marketing of produce;
- long-standing financial institution - client relationships and / or established track record is required;
- individual lending technology is used, sometimes secured by joint liability groups;
- most institutions lend only to experienced farmers and / or for existing activities.

These experiences should be taken into account when designing term lending products for SSI farmers. Term investments require substantial experience in production, a long-term relationship with financing institutions and previous payment history, and an established market demand for the products to be produced by the client. From the perspective of the financial institution a diversified portfolio and reliable sources of funds for agricultural lending are of special importance. The design of products and the development of financing technologies are other important tasks. Second-tier institutions on the meso level have a significant role to play, notably in refinancing and training.

**Leasing** is an attractive instrument to finance farm equipment and particular attractive for the acquisition of motorized diesel pumps. It is an alternative to standard medium term loans for equipment. Leasing is of interest for SSI farmers because security for the transaction is provided by the leased asset itself. Financial lease arrangements for new equipment are therefore able to remove the collateral constraint. Worldwide experience has shown that the access to lease is often restricted to the upper segment of clients. Leases on *used* equipment are an alternative for low income SSI farmers; they offer the advantage that they are more affordable and are likely to attract more clients

Basic principles in leasing arrangements include that: (i) the financial institution continues to own the equipment until it has been fully paid; (ii) the lessee is monitored through the duration of the lease; (iii) usually 25% down payment is required; (iv) in the event of default, the financing organization can repossess the equipment without any specific litigation. (68)

Poor handling and maintenance of the equipment have been reported as specific problems in leasing arrangements that need to be resolved.

Not only financial institutions but also equipment suppliers can engage into leasing of SSI equipment. Requirements for institutions to engage into leasing are reliable technical structures and solid financial resources. At present, unclear legal frame conditions are an important constraint for the development of leasing in countries of SSA.

### **3.3 Policy Implications**

SSI development is affected by four different policy areas: macroeconomic policy, financial sector policy, agricultural sector policy and water/irrigation policies. The essence of a successful rural and agricultural policy framework is the skilful integration of these different policy areas. Important policy aspects with specific relevance for SSI development are summarized below.

#### **3.3.1 Macroeconomic Policies and Legal Framework**

The macroeconomic policy conditions and legal framework that exist in a developing country can either enhance or hinder the development of agriculture and the financial sector. The so called 'enabling environment' is essential for any private sector development and therefore of high significance for SSI farmers. It encompasses legal aspects of business operation as well as a sound business climate.

Appropriate government policy support measures that facilitate the role of the private sector, and in particular, provide favorable investment opportunities for SSI farmers, should recognize the interdependence of the financial and the non-financial sectors.

Areas of the enabling environment with high importance for SSI development include: (i) effective road access and communication infrastructure to regions with a SSI development potential; (ii) the efficiency of court systems; (iii) land and property registries (iv) contract enforcement; (v) legal frame conditions for leasing, especially a framework for easy and fast repossession of leased assets, and (vi) deregulation of markets and exchange control regulations.

### **3.3.2 Financial Sector Policy**

The challenge is to promote a variety of viable financial institutions that are client oriented, that mobilize deposits efficiently, and that provide access to loans to a broad spectrum of economically active farmers, agribusiness entrepreneurs and other rural clients. An aspect that is of special importance for financing SSI is that policies should facilitate the experimentation and adaptation of new financial technologies and development of attractive financial products.

It has already been outlined that competition in the financial sector is the most important driver for financial institutions to discover new client segments such as SSI farmers. Therefore, policies must support the creation of a conducive environment in which competition can take place.

The development of rural financial markets requires a supportive legal and regulative framework. The formulation of appropriate prudential banking laws and procedures for the effective enforcement are important areas for policy intervention that have a direct impact on the access to financial services for SSI farmers.

### **3.3.3 Agricultural Policy**

Agricultural policies deal with agricultural production aspects, national and international markets and aspects of trade. Given the challenges the continent faces with achieving food security, falling agricultural output, a dwindling resource base, agricultural policies are seen as the vehicle to deliver the programs to address all these challenges.

The Kenyan example shows the importance and resulting impact of agricultural policies. The deregulation of the agricultural produce market has created the space for the private sector to continuously increase the country's share in the horticultural business which has been the basis for the demand-driven SSI development.

Given the potential for expansion of irrigated agriculture the market will not absorb unlimited quantities of horticultural produce. A diversification of the agricultural production under irrigation will need to take place on the continent addressing food security and unemployment. This could require adjustment to the often subsidized staple food items, but also complementary measures to establish agro-processing for a range of other crops.

The critical issue in agricultural sector policy is the profitability of farming. As long as this remains low, lending for agricultural production will be risky. It is essential that the agricultural sector becomes more profitable if it is to attract funds for viable investments.

### **3.3.4 Irrigation Policy**

The technical literature reviews experiences in irrigation development worldwide and in regional contexts identifying best practices and lessons learned, but rarely

recommends policies. It is the responsibility of national governments to adapt the experiences to their respective policies. Key aspects with importance for the design of effective irrigation policies identified in the literature include:

- *Irrigation policy is to be part of the national water policy*: it is important that irrigation policies are derived from the respective water policy of a country. These should outline the regulatory framework how water is used and under which conditions.

At this stage Kenya has a modern water policy which, however, does not deal with irrigation at all. The water policy provides the institutional framework and the procedures of water allocation, which will also be binding for irrigation development. The formulation of the new irrigation policy of the country needs to be aligned on the provisions of the water policy.

- *Irrigation design*: the international trend in irrigation design is to move to smaller scheme units designed in cooperation with the beneficiaries and managed by the respective communities through their WUAs. The use of motorized pumps by individuals finds mention in some strategy reviews, but manually operated pumps are not yet part of mainstream concepts.

Kenya is in line with these international trends in scheme design. In its support to community-managed schemes the country now experiments with some co-financing concepts by beneficiaries. Careful monitoring of this new approach will show where the limits lie with regard to the most suitable loan/grant ratio under different natural and socio-economic conditions.

Individual investments in SSI technology by smallholders are at this stage not even reflected in the draft irrigation policy document. The current magnitude of area coverage and the scope for further expansion makes low and medium-cost technologies a key factor in the country's ambitious irrigation expansion.

- *Economic and financial viability of investments*: the literature upholds the principle that investments in irrigation must be based on a realistic assessment of the investment costs versus the expected income. Examples of analysis in different countries can only be seen as procedural blueprints on how to carry out an analysis. As the cost as well as expected income from irrigation activities often differ widely from country to country<sup>12</sup>, a case by case assessment is always required.

Major international and Kenyan policy papers view irrigation development as the most effective measure to address food security. This has important repercussions for the viability of irrigation schemes, because local food crops return net margins that are far below those obtained from high value horticultural crops seriously affecting the viability of investments in irrigation infrastructure. The situation may be further worsened in countries where markets are distorted and prices for staple crops are controlled by the government and kept on a low.

Meanwhile there is considerable experience available amongst implementing agencies world-wide on the use and the impact of SSI technologies. These experiences with SSI technologies and their respective impact in socio-economic terms as well as on national economic situation deserve systematic analysis and consideration in a country's relevant policy papers.

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<sup>12</sup> For example, in 1992 the sinking of a tube-well cost in Nigeria US\$ 79 and in Ghana US\$ 313 (142).

## **4 Interdisciplinary Concept with Key Strategies for the Introduction, Strengthening and Scaling Up of Financial Services for the Promotion of SSI in Countries of SSA**

### **4.1 Introductory Remarks on the Role of the Financial Sector in SSI Development**

#### **4.1.1 What Can the Financial Sector Achieve?**

Small-scale irrigation is in locations with usable water resources of increasing importance in the smallholder farming systems of many countries of SSA. It contributes especially in areas with lower and erratic rainfall conditions substantially to the increase of agricultural production. Irrigation farmers are less vulnerable to weather conditions which reduces agricultural production risks considerably. Irrigation supports the intensification and diversification of the farming system and improves significantly agricultural productivity also by reducing the effects of seasonality. It allows farmers to cultivate crops with diverse vegetation periods not only during the conventional rainy season but also in the off-season. Such staggered plantings are especially important for the production of high value vegetable crops. They allow a longer and stronger presence in the market with positive effects on prices and incomes and a more even cash-flow thus contributing to a reduction of credit risks.

The overall objective of the proposed activities in the water and financial sectors is to expand the access of financial services to individual farmers and WUAs for improving the financing of SSI development. This is expected to contribute to the increase of agricultural incomes primarily of low-income households, employment and reduction of poverty and malnutrition.

The reliable access to financial services will boost the ability of entrepreneurial SSI farmers to undertake investments that enhance productivity and scale of farming operations and to exploit new market opportunities. It will therefore contribute to agricultural growth and to economic development in general.

Access to financial services is an important ingredient of SSI development. As mentioned before the availability of financial services alone will not enhance the development of the sector. The creation of reliable marketing structures, the availability of affordable SSI technologies and related equipment and the entrepreneurial ability of SSI farmers are other important factors that need to be addressed simultaneously.

#### **4.1.2 Limitations and Risks for the Provision of Viable Financial Services to the SSI Sector**

There are several risks and limitations for the provision of viable financial services to the SSI sector.

##### **4.1.2.1 Political Interference and Influence**

The agricultural sector is in many countries of SSA highly politicised and prone to political interference. Subsidized lending rates and directed credit do still prevail in

the sector and have the effect that commercial financial institutions will limit their operations in the rural sector in view of the 'unfair' competition. If directed credit and subsidized interest rates are channelled to rural areas, the development of the financial sector is hampered.

SSI development in the past was often dominated by supply-driven approaches and relied heavily on grant funding. Due to the fact that vast amounts of government credit schemes had weak repayment enforcements, the local credit culture is a challenge in itself. The impact of directed public credit programs varies across different countries in SSA but can seriously affect the provision of financial services to the sector.

Further, effective financial intermediation is closely related to the profitability of promoted investments. If returns are low because of adverse macroeconomic and sectoral conditions it will be impossible to develop strong rural financial markets and thus to support a sustainable rural development.

#### **4.1.2.2 Low Potential Areas**

The provision of financial services in low potential areas with low population density and limited economic potential remains a challenge worldwide. Financial intermediaries can hardly operate on a cost-covering base and can therefore often not meet the aim of sustainability. Promising approaches include the emergence of community-based financial intermediaries such as village banks, but their impact for SSI development remains very limited. Not only the rudimentary product range but also the lack of other preconditions (e.g. markets, services) will make it very difficult to enhance SSI development in these regions especially for individual small-scale farmers. Another option is the linkage approach where informal or semi-formal self-help groups are linked to the formal banking sector.

In general, the provision of credit is not the appropriate instrument to assist very poor populations who lack access to economic opportunities and are too vulnerable to take risk.

#### **4.1.2.3 Community Irrigation Schemes**

Capital-intensive community irrigation schemes have mainly for socio-political reasons always been subsidised in the past. The high initial up-front investment of such irrigation schemes in combination with weak financial and technical capacities of smallholders represent the major constraints for access to commercial finance. At the same time, the financial sector in most countries of SSA is at present not able and / or willing to extend term lending to agriculture with large grace periods. First attempts to alter this situation are recent donor interventions and government policies as also documented in the Kenyan case study that require smallholders to contribute meanwhile up to 50% of the investment costs with the support of a loan. A guarantee fund is provided to the bank by the donors to cover parts of the credit risk.

The emergence of more cost-effective technical solutions and the development of markets can positively influence decisions of financial institutions to provide the required financing on a commercial base.

The question of financing capital intensive community irrigation schemes through commercial sources is a step forward regarding irrigation development but bears the high risk of non-conformity with the financial systems development approach. First, the construction of irrigation schemes is rather a political decision as compared to

purely market-driven and private investment decisions. Financial institutions may be pushed into lending to the beneficiaries of the scheme although their systems or strategy may not be compatible with it. Second, beneficiaries within a scheme vary considerably in entrepreneurial ability and financial strength. The risk of overstraining the capacities of single smallholders within the scheme is high, because the contribution is determined on a pre-determined ratio but not adapted to the individual household situation. Third, the absence of financial sector expertise in the planning process of irrigation schemes may lead to unsolicited terms and conditions such as subsidized interest rates or the like.

## **4.2 Overall Concept under Consideration of the Financial Systems Approach**

In view of the large differences in physical, socio-economic, institutional and policy conditions prevailing in the different countries of SSA a concept with key strategies for improving the financial services for SSI development in SSA can only serve for general orientation and guidance and needs to be adapted to specific country situations.

The overall concept for the introduction, strengthening and scaling-up of financial services to the SSI sector focuses in an interdisciplinary approach primarily on the development of rural financial markets and the support of commercially viable institutions that are operating in rural areas and that are able to offer a full range of financial services, notably deposit services and financing on a sustainable basis. It focuses on institutions that are committed to serve the low-income population to which SSI farmers belong and that are most likely to reach large numbers of SSI farmers but also other clients. Depending on the institutional variety SSI farmers find in their respective countries they will select institutions that meet soonest their financial requirements. Any strategy will therefore not concentrate on specific types of rural lenders but on the respective ability of institutions to provide viable financial services to the SSI sector. In the absence of institutions that provide a full range of financial services a more fragmented approach may be necessary.

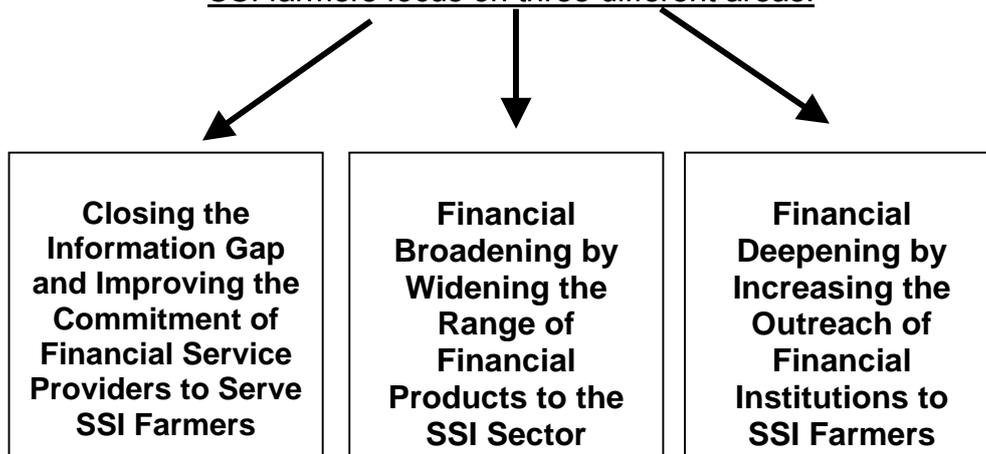
The overall concept recognizes in an interdisciplinary approach also the importance of complementary services as well as the players being part of the value chain. It promotes linkages between SSI farmers, traders, processors, input suppliers, exporters, service providers and financial intermediaries.

The concept promotes market-driven approaches that build on the dynamics of the financial sector and agricultural markets. The focus is on demand-driven irrigation development without direct subsidies, which implies that farmers have to take the full responsibility for their investment and operating cost.

## **4.3 Key Strategies that Enhance the Provision of Financial Services to the SSI Sector**

The following chapters will outline concept elements and key strategies for expanding the provision of financial services to SSI farmers that operate under market-conditions. It focuses basically on the financing of low- and medium cost irrigation technologies and the provision of access to financial services for O&M cost and farm inputs to beneficiaries of community irrigation schemes. The financing of investments into capital intensive community irrigation schemes is addressed in chapter 4.4.

The recommended key strategies for expanding the provision of financial services to SSI farmers focus on three different areas:



#### **4.3.1 Closing the Information Gap and Improving the Commitment of Financial Service Providers to Serve SSI Farmers**

The degree to which financial service providers are able to serve the SSI sector is dependent on a strategic choice of institutions or companies to enter into agricultural smallholder lending:

- Traditional microfinance is mainly urban centered and has made substantial progress in providing finance to rural off-farm micro-enterprises and for the so called 'consumption needs' (health care, school fees, emergencies). An expansion to rural smallholders implies greater flexibility within the product range and adaptation of lending methodologies. It requires also a good knowledge about rural livelihoods and agricultural features.
- Commercial banks serve traditionally the upper segment of the population and have concentrated on financing larger enterprises. Increasingly, commercial banks are - attracted by profitable growth opportunities - entering the lower income market. Commercial banks can enter the market directly by expanding their operations to the 'micro-level' or they can take an indirect approach by providing wholesale lending to existing rural financial intermediaries. The extent to which commercial banks enter into the *agricultural* market depends largely on the economic attractiveness of the sector and its activities.
- Equipment or input suppliers can increase turn-over significantly if they provide financing to SSI farmers who want to invest into SSI equipment and facilities and / or farm inputs. Know – how of financing technologies and refinancing are important pre-conditions.
- CBCPs such as marketing organisations and processors can promote the reliable and timely production in the right quality and quantity of horticultural produce by smallholders by entering into contract farming arrangements with them that may also include other service provisions such as technical advice, input supply and financial advances for investments into SSI technology.

For all potential providers of SSI finance, the driving force for expansion into SSI lending is competition. If market niches have to be identified and new client segments need to be discovered, financing SSI development can be good strategic choice.

#### **Why should institutions provide financing to SSI farmers?**

- Irrigation improves substantially agricultural productivity, provides reliable income and thus increases the borrowing capacity of smallholders.
- SSI farmers belong to the economically active poor. They are an interesting clientele if new market segments need to be identified.
- SSI reduces agricultural risks. SSI farmers are less vulnerable to weather conditions, which reduces the climatic production risk substantially.
- Irrigation reduces the effects of seasonality, provides a more even cash-flow and allows a stronger presence at markets.
- The emergence of low- and medium cost irrigation technologies has opened a whole range of new investment opportunities for SSI farmers. The demand for financial services is high.

At the same time, a whole range of mind-set of rural smallholders has to be changed. Bias against financial institutions, unawareness of financial services or of the conditions under which they are available and financial illiteracy have to be overcome. Therefore, it is necessary that rural financial service providers (i) present themselves in different ways; (ii) that procedures and financial products are simple and demand-driven; and (iii) that fundamental financial information is provided.

Improving smallholder's bankability and financial management skills will benefit both parties and help to close the gap between financial and non-financial institutions and the rural poor. Beside the institutions themselves, agricultural extension staff should also play an important role in the provision of information especially on the financial service options available to SSI farmers. Basic financial education should be included into curriculum of schools.

#### **4.3.2 Financial Broadening by Widening the Range of Financial Products to the SSI sector**

As already outlined SSI farmers need continuous access to savings, working capital loans and short to medium investment loans to finance production costs and investments into low and medium cost SSI systems (Table 2). Their requirements to financial services can be summarized as follows:

- timely availability, fast processing and customer-friendly procedures;
- flexibility within the product range especially with regard to repayment mode and collateral requirements;
- proximity of financial institutions or delivery mechanisms that allow easy access to financial services.

These requirements must be balanced with the overall requirement of institutions to operate viably. Transaction costs in serving SSI farmers are high compared to urban

areas mainly due to the dispersion of farmers and the generally relatively small amounts involved in the transactions.

SSI farmers need not only one-time financing. Ideally, they would develop durable relationships with their financial intermediary to better manage the heterogeneity of lending needs and to smoothen irregular income streams through savings.

In the absence of financial intermediaries that provide both, savings and credit services a combination of different actors is possible. A crucial role in such arrangements could be played by an institution such as the Post Bank in Kenya with its country-wide service outlets but also by CBCPs, traders and input or equipment suppliers.

#### **4.3.2.1 Client-Orientation and Knowledge of the Irrigation Sub-Sector**

Expanding into new markets requires employing new methodologies or modifying existing ones. An essential requirement is to know what SSI clients require/want. It is also essential for financing institutions to gain sufficient knowledge about the characteristics of the farming and production system such as regional/local development potential, production potential, intensity and returns on production, cropping patterns and notably markets and market channels. This allows to assess the production and market risks and opens possibilities for inter-linked credit arrangements. Product research and development are required to adopt or design products<sup>13</sup> that best fit the requirements of SSI farmers and at the same time protect the integrity and viability of the institution.

#### **4.3.2.2 Delivery Channels and Lending Methodologies**

A lending methodology is the way in which a lending institution structures relationships with its clients.

Financial intermediation services must reach smallholders in their dispersed locations. The use of new technologies such as mobile van banking, palm pilots, phone banking, and smart cards needs to be explored. These technologies open a whole range of possibilities to reach SSI farmers in their locations and at the same time contribute to the reduction of transaction cost.

An important feature in dealing with SSI farmers is the adaptation or introduction of financial products that fit the income and investment cycles of SSI farmers. Loan products need different repayment options that fit the income flow of SSI farmers. This requires a large amount of flexibility within the system and at the same time qualified bank staff that can handle such loan products. In fact, individual repayment schedules have to be developed taking into account the household income and cropping patterns.

'Graduation' is a concept that takes into account increasing management capabilities. For SSI farmers that start with irrigation and that have never dealt with financial

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<sup>13</sup> Loan products for SSI farmers are basically short or medium term loans that the rural financial market is supposed to provide. Therefore, it has been stated before that SSI development and expansion does not depend on special financial products for the dissemination of the technology. However, lending methodologies, delivery channels as well as collateral requirements may significantly vary compared to other loan products. If institutions just enter the rural markets they may decide to design new loan products and/or introduce term lending. For the purpose of better marketing it may also be an option to provide very specific products such as 'treadle pump loan' or 'money maker loan'.

institutions this is a very adapted approach. Especially low-cost irrigation systems allow farmers to start small and to expand to larger units with higher income potential gradually. This practice is not only useful for SSI farmers to build-up a track record with financial intermediaries but also to better manage the risks associated with agricultural production.

There have been many discussions internationally about individual lending versus group lending methodologies. Without doubt, SSI farmers need both:

- for SSI farmers who just start with low-cost irrigation systems, a group scheme may in most cases be the most appropriate methodology. Amounts required for financing are small and farmers may not have any other form of collateral. This approach also reduces the transaction cost of micro lending and provides a guarantee mechanism;
- for other micro-entrepreneurs, notably those with growing business and especially those with interest in investing in medium-cost irrigation systems the group approach may not fit. Financial service providers that work exclusively with the group lending methodology should introduce individual loan products to retain their best clients that have 'graduated' and to attract new ones.

#### **4.3.2.3 Loan Collateral**

With regard to loan collateral, rural financial institutions that deal with SSI farmers should explore all kinds of supplementary collaterals such as blocked savings or third party guarantees as well as inter-linked (tripartite) loan arrangements with exporters, agri-business firms or contractors. Under contractual arrangements with marketing organizations the buyer of the produce will pay directly to the financial institution that will deduct the loan amount.

Collateral substitutes such as reputation, savings track record and group lending should also be enhanced not only for access to financing but also to build-up savings.

In countries where farmers own titles of their land, individual lending to SSI farmers can become a very important line of business mainly for advanced or growing SSI farmers. The fast and cost-efficient processing of registries is an important pre-condition to fully exploit the potential.

#### **4.3.2.4 Standard Financial Products**

Below an overview is provided of financial products that are relevant and needed to support SSI expansion and outlines specific features applicable for SSI farmers:

**(1) Flexible short term working capital and investment loans for low and medium-cost irrigation systems:** the availability of low-cost irrigation technologies and related equipment is increasing the demand for financing significantly. Short term loans are the most important source of finance for SSI farmers. SSI farmers have different investment needs and may require seasonal and / or investment loans or a combination of both.

SSI farmers may apply for seasonal production credit several times a year, depending on their cropping pattern. Irrigation allows farmers to cultivate different crops with diverse vegetation periods not only at the traditional planting season but also in the off-season. Timely availability and flexible financing mechanism are

essential. Ideally, a special credit line or an *overdraft* would be provided not only to reduce transaction cost but also to serve SSI farmers in the most efficient way.

Short- and medium term investment loans for irrigation equipment need an assessment of economic feasibility and market demand. Therefore, the financial institution needs to be familiar with the local economy to be in a position to carry out an appraisal. Ideally, the 'household approach' is applied where not only the income from the investment is considered but all diverse income sources of the farm household. If the group-lending methodology is applied, the financing institution may be satisfied with the guarantee mechanism within the group and can forgo an individual appraisal.

**(2) Medium term investment loans for more advanced irrigation systems:** investments into more costly irrigation equipment such as motorized pumps require on the side of the producer appropriate know-how and experience in more advanced levels of farming, familiarity with financial institutions and a well established market demand for the products to be produced. The loan size must be considered as affordable under the real socio-economic situation of a micro entrepreneur. It also requires a long-standing relationship or track-record with the financial institution.

Risks are related to the duration of loans since the uncertainty of farm incomes and the probability of losses increases over longer time horizons. An established track record results in better information about the SSI farmer and increases confidence in the farmer's management capabilities.

Term finance is rarely available in countries of SSA (see also chapter 2.3.3). Non - deposit taking MFIs, cooperatives, CBFOs and also non-financial companies have not enough stable funds to engage into term lending and often lack the required know-how. Formal banks do offer medium term loans but are reluctant to extend them to the agricultural sector.

To overcome these constraints it is necessary to provide long term refinancing to the sector. Further, institutions need to be encouraged to get licensed with the Central Bank of a respective country in order to be able to engage into savings mobilisation.

The other important constraint is lack of knowledge of the irrigation sector and the perceived risks with term lending to SSI farmers. This can be overcome by:

- adopting a *relationship approach* where SSI farmers establish a 'social capital' with rural financial intermediaries. A positive history and savings track record will provide information to the lender on the character, cash flow and management skills of the client;
- the use of substitute collateral, supplementary collateral but also conventional collateral such as land titles, where applicable.

An ideal combination for SSI farmers seems to be the relationship approach together with savings and interlinked contract arrangements with a buyer/marketing organisation. International experiences as summarized in chapter 2.3.3 have systematically to be taken into account in the design of medium term loan products.

**(3) Deposit facilities:** deposit facilities are of crucial importance for SSI development and are usually available only from banks and member based institutions. Options of NGO-MFIs that are not registered under the banking act to engage into savings mobilisation vary greatly among different countries.

Especially where well performing rural financial intermediaries are absent, institutions with a widely established service network like the Post Bank in Kenya are a valuable option for savings mobilization.

A substantial amount of investments for low-cost irrigation systems can be financed by farmers themselves out of savings. Further, savings track record can ease the access to finance.

From an institutional perspective, savings improve sustainability by developing relatively stable means to finance the portfolio and may contribute to an expansion into term lending.

#### **4.3.2.5 Innovative / Other Products for Financing SSI Development**

**(1) Microleasing:** the specific features of leasing have been outlined already in chapter 3.2. Microleasing is a valuable alternative for SSI farmers to standard medium term loans for the acquisition of new or used motorized pumps or other advanced equipment.

The main difference as compared to a standard loan product is that (i) the investment risk for financing institutions is reduced because the lessor retains full ownership of the equipment; (ii) the ability to make repayments is assumed to be derived from the productive use of equipment. Viable leasing depends therefore even more than standard medium term loans on accurate appraisal of the produce markets.

The administration and monitoring of large numbers of small value lease contracts will generate high transaction cost. Equipment suppliers are in a good position to provide technical training and after-sales services. Linkages can be created to reduce overheads and to alter the risk of break-down of machinery.

Microleasing institutions should seek linkages with buyers of agricultural produce (leveraged leasing). Leveraged leasing is especially relevant to SSI farmers that produce on a regular and predictable basis for larger companies within the value chain where both parties have incentives to increase investment in productive capital.

**(2) Wholesale lending:** financial institutions can provide indirect lending to the SSI sector by financing the private sector within the value chain or smaller community-based financial intermediaries that use the loan for financing their clients:

- equipment suppliers are of increasing importance in the provision of credit to SSI farmers. They use deferred payments or leasing to promote the sale of equipment. In addition, they are in a good position to provide technical training and after-sales services;
- processors or marketing cooperatives might be interested in financing farm level investments to ensure reliable quality and quantity of horticultural produce. They secure the marketing outlet and can additionally provide support services such as input and extension to the farmer;
- input suppliers provide short term advances to farmers in kind;
- community-based financial intermediaries such as village banks, financial service associations or self-help groups provide financing to members that are not in reach of financial institutions.

All of the above institutions need to finance their activities. Wholesale lending to private sector players and community-based financial intermediaries reduces

significantly transaction costs for financial institutions and benefits SSI farmers directly.

**(3) Non-credit financial services:** non-credit financial services include domestic and international money transfers such as remittances. They can play an important role for smoothening seasonal income flows of SSI farmers and also for investments into SSI equipment and facilities.

#### **4.3.2.6 Financing Mechanisms to Reduce Risk and / or Transaction Cost**

**(1) Combination of financing and insurance:** the linkage of insurances and loans are instruments to reduce production risk. Well designed insurance products can substitute traditional collateral and allow farmers to access loans. Insurances can be quite costly and the feasibility of the different schemes require careful analysis based on a specific crop in a given region during a certain season.

**(2) Tripartite arrangements:** for SSI farmers and financial institutions, tripartite or inter-linked arrangements with exporters, agribusiness firms or other contractors are an interesting choice. The provision of loans is to be closely related to the marketing of agricultural produce. The advantage of such arrangements is two-fold: SSI farmers need to establish market demand before they start production and financial institutions can substantially reduce risks, especially if the produce buyer pays directly to the loan account. Such arrangements do exist at present mainly for seasonal loans but could also be extended for investment loans if trustful relationships are established.

**(3) Warehouse receipts:** the concept of warehouse receipt refers to the practice of depositing agricultural produce in a warehouse and receiving a certificate. This receipt can be used as collateral for availing a loan. The interesting concept allows farmers to reduce the effect of price fluctuations and to increase profits on the sale of agricultural produce. For investments into SSI equipment the warehouse receipt has only limited impact because (i) horticultural produce is difficult to store (exemption: onions, potatoes) and (ii) it serves only to overcome a short period until the prices go up. Nevertheless, increased profits can be used by interested farmers in self-financing irrigation equipment.

#### **4.3.3 Financial Deepening by Increasing the Outreach of Financial Institutions to SSI Farmers**

The challenge is to take into account the special characteristics of financing SSI development and to attend to a larger number of SSI households without impairing the sustainability of rural financial intermediaries.

Agricultural potential and economic activities vary significantly among different countries and regions in SSA. SSI farmers find different conditions that need to be considered for the introduction, strengthening and scaling-up of the provision of financial services to the small-scale irrigation sector.

Different zones and related promotional strategies for the improved provision of financial services can broadly be classified as follows:

*High potential* areas are characterized by fertile soils, comparatively good road and communication infrastructure, access to local and / or export markets and numerous non-agricultural economic activities. These zones have the best potential to develop

sustainable financial institutions because the pre-conditions for an effective financial intermediation are mainly existent. The strategy will be to focus on existing rural financial intermediaries and strengthen their capacity for better outreach through scaling-up their product range specifically geared to the demand of SSI farmers as described above, increasing efficiency and transparency as well as human resource development. The aim must be sustainability and growth. This can be reached through 'upgrading'<sup>14</sup> or 'downscaling'<sup>15</sup> promising institutions but also through 'greenfielding'<sup>16</sup> if no institutions with potential are present. Instruments will vary according to different institutional solutions that can be found in different country contexts.

*Medium potential* areas have less favourable conditions than above. These zones often have a considerable potential for SSI development; its utilization require, however, the simultaneous development of a favorable market environment. Once rural financial intermediaries are well established in the high potential areas and have reached satisfactory financing technology and operational performances such institutions will in search of new markets gradually expand into less developed regions and the above strategies are then also to be applied. The development of community-based financial intermediaries, the extension of branch networks and new technologies in areas with lower development potential may justify initial support measures/subsidies for institutions that are interested to penetrate into such areas.

*Low potential areas* have the least potential for the development of sustainable financial intermediation. The limitations of the financial sector to provide financial services sustainably have been mentioned already. The problem may be not only the absence of financial services but also the absence of markets for agricultural production and basic infrastructure. Although some promising examples from Mongolia exist, where formal financial institutions are providing financial services to low population density areas profitably, the challenge remains to serve such areas on a viable base. In the absence of formal financial institutions the support and creation of community-based financial intermediaries (village banks, financial service associations) and the linkage approach<sup>17</sup> is an interesting option.

With the considerable share of poor rural households with unsatisfactory access to financial services in SSA, existing institutions have a great growth potential. In this situation it is important to support the *sustainable growth* of promising institutions. Institutional capacity building efforts, improving management information systems, support to the introduction of new technologies are proven strategy elements to support gradual extension in a sound manner.

Different institutional models offer different opportunities for outreach and scaling up financial services to SSI farmers. Depending on the institutional variety that can be found in various countries of SSA the following institutional options may be of relevance and need to be supported with appropriate interventions on the micro, meso and macro levels:

- commercial banks;
- financial cooperatives;
- experienced deposit-taking NGO-MFIs;
- community-based financial intermediaries.

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<sup>14</sup> 'Upgrading' refers to the transformation of NGOs into regulated financial institutions.

<sup>15</sup> 'Downscaling' refers to commercial banks that want to enter new client segments on the lower end.

<sup>16</sup> 'Greenfielding' refers to the establishment of new financial institutions.

<sup>17</sup> 'Linkage' approach refers to the linkage of self-help groups to financial institutions.

Non-financial service providers such as suppliers, traders and processors may also require support in the design of suitable lending methodologies and procedures as well as reliable sources of financing.

#### 4.4 Financing of Capital Intensive Community Irrigation Schemes

Experiences have shown that supply-driven and capital intensive community irrigation schemes had often only limited success in the past (see chapter 3.1.3). With the availability of a range of promising lower-cost SSI technologies that are suitable for individual farmers and work under market conditions the importance of communal schemes is expected to decrease in irrigation development. Wherever technically feasible, preference should always be given to such market-driven individual initiatives.

However, such lower cost solutions suitable for individual farmers do not work in conditions where the water source is not bordering the agricultural area to be developed and the cost advantages of gravity systems are to be utilized. In such cases there is the need for capital intensive infrastructure investments which are under conditions of small-scale farming only economical if a minimum number of farmers participate in such schemes.

The implementation of community irrigation schemes should primarily be supported in suitable locations of regions with a lower development potential and high level of poverty. Beneficiaries are mostly rural communities living in fragile agricultural production environments who are often also regular recipients of famine relief support.

The design of community irrigation systems is far beyond solving technical solutions only and demands an integrated approach. Taken into account the past experiences there are some key aspects which need to be taken into account in the design of communal schemes (see also checklist below):

- the access to markets has to be ensured;
- the demand for financial services needs to be addressed. The availability of financial services is a condition to enable SSI farmers to finance seasonal loans and their share in investment costs, if any. This includes also the appropriate integration of savings into the system. The creation of community-based financial intermediaries, the linkage approach or the initial support of existing institutions to expand their branch network to a scheme area are valuable options if increased economic development is expected;
- furthermore, technical know-how and management skills of SSI farmers need continuous improvement. Irrigation systems need strong and viable WUAs that are able to manage, operate and maintain the system. To advise and support farmers and the WUAs a competent and well performing extension service is required. The access to specialized services like repair services has also to be ensured. Interesting in this context are the so-called output-based approaches (OBA)<sup>18</sup> that link the grant element to the performance of the system.

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<sup>18</sup> OBA is a mechanism for providing subsidies to support the delivery of basic services in different sectors (water and sanitation, electricity, telecommunications, transportation, health and education) where policy concerns – such as limited affordability for some customers, the desire to capture

### **Checklist of key aspects to be reviewed in the design of communal irrigation schemes:**

- √ Feasibility of use of low-and medium cost SSI systems? – If yes, reject the proposal.
- √ Can access to markets be ensured in a viable way?
- √ Can competent extension services for technical and institutional advice to farmers and WUA be developed?
- √ Are financial services available or can they be established in a viable way?
- √ Can technical back-up services for equipment and facilities be ensured?
- √ Can a strong and viable WUA be developed?

For the financing of communal irrigation schemes it has to be taken into account that the high initial investment clearly exceeds the financing capacities of potential beneficiaries who are often living in poverty. Nevertheless, farmers should for the maximum creation of ownership participate substantially to scheme development at least in labor and kind (e.g. locally available building materials) but also in financial contribution. The financial contribution should be based on the expected financial performance and viability of the respective perimeter and the socio-economic situation of the beneficiaries. The financing of operational production costs as well as repair, maintenance and replacement costs should always be the responsibility of farmers for which they need access mainly to short term loans and savings. It is important that the setting of criteria for farmers' contributions are uniform and transparent throughout the different development zones of a country.

Government policies may already envisage co-financing arrangements of investment costs by farmers. Such arrangements are to be encouraged if the farmers own the land and if their financial capacity allows such important investments; it should generally not be below 20% to 50% of the scheme development cost taking into account the capacity of the weakest participants.

Scheme development in areas, where beneficiaries are *tenants*, may need - also considering the socio-economic conditions and the scheme financial viability to be expected - a special approach based on full grant funding of investment cost. Under this condition even more emphasis has to be put on labor and in kind contributions by farmers in order to support participation and the development of ownership.

From a financial sector perspective, the creation or provision of financial services to beneficiaries of communal irrigation systems is not unproblematic and have already been outlined in chapters 2.1.2 and 4.1.2.3 While the demand for savings and seasonal short term loans is just the same than for SSI farmers that invest into lower cost technologies, the difference is the high contribution to the costs of scheme development. Medium term loans on a commercial base are not available in the market and massive donor support is necessary to create them. While the reasons for failure of directed credit have been widely analyzed<sup>19</sup>, important lessons need to be considered. Designer's of irrigation systems are often not familiar with the financial systems approach and are only interested to ensure one-time financing and do not take into account the need for financial viability of financial institutions and the need

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positive externalities, or the infeasibility of imposing direct user fees – justify public funding to complement or replace user fees.

<sup>19</sup> See chapter 2.1.2 and Agricultural Finance Revised: Why? Page 1-6 (35)

for a permanent access to financial services of SSI farmers to finance farm inputs and O&M costs of the scheme. The risk to return to discredited approaches is high, if the guiding principles summarized in the box below are not strictly applied.

#### **Guiding principles for the implementation of new irrigation schemes:**

- √ Strict separation of grant element and commercial financing<sup>20</sup>
- √ Don't subsidize interest rates to end-clients
- √ Ensure maximum contribution by farmers in labor, and kind to promote ownership
- √ Base financial contribution of farmers to investment costs on expected repayment capacity and socio-economic situation of beneficiaries. Use very conservative projections<sup>21</sup> for expected performance of the irrigation perimeters
- √ Ensure that financial institutions involved are not violating their business strategy and that institutional capacities exist to manage administration and follow-up
- √ Operational production costs and scheme maintenance, repair and replacement costs are always the responsibility of farmers
- √ Enhance entrepreneurial skills
- √ Ensure arrangements for repair and maintenance
- √ Include financial sector expertise in the design of irrigation projects
- √ Consistent policies on national level for the use of subsidies
- √ Promote donor harmonization

### **4.5 Environmental Aspects of SSI Development**

In concept and strategy development for SSI development and its financing environmental aspects need appropriately to be taken into account and negative effects have to be avoided.

Irrigation is seen as being an important factor in transforming the continent's rural economies. Currently the continent utilizes only a small fraction of its irrigable potential, but there are already signs in several countries that extended water use impacts severely on regional water balances.

Upper river catchments often endowed with a better agricultural potential are usually densely populated. In search for good agricultural land the natural vegetation is cleared away and cultivated with arable crops. The expansion of agriculture results in seasonal exposure of the soil, after harvest and before planting, reduced water retention capacity of the soils and thus higher rates of runoff at the time of precipitation.

The degradation of the catchments result in faster peak runoff changing the hydraulic characteristics of river systems which subsequently contribute to higher floods and

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<sup>20</sup> See chapter 2.1.2

<sup>21</sup> In such assessments it has to be taken into account that: (i) a 100% achievement of the planned or potential productivity increases is generally not realized in the first years; (ii) the profitability of agricultural crop enterprises varies considerably due to various farm endogenous (e.g. the skills of the farmer) and exogenous factors (e.g. markets and prices); and (iii) the production and marketing risks may influence the success or failure of the activity. Therefore, for a loan decision, a very conservative appraisal needs to be done.

longer periods of low flow. The problem is compounded by increased irrigation activities in the upper catchments reducing the runoff considerably. This limits the expansion of irrigation development in downstream regions, but more importantly threatens the availability of water for public water supplies. Reduced river flow levels reduce also their recharge capacity of aquifers which are the main source of water for public water supplies. A shortage of storage capacity for surface runoff in the rural areas and along river systems limits in many countries the agricultural production cycle considerably and threatens domestic water supplies. Increased dam capacity provides a more even supply of water to all its users; it especially enhances water security for the broader community in a given catchment.

Reports from West-Africa (38) indicate increased levels of salinity in areas with a high concentration of SSI. A similar threat exists around the Dambos in Southern Africa, which are mainly recharged through surface runoff from the surrounding areas. In addition environmental threats stem also from the contamination of groundwater and surface resources through the inappropriate use of agro-chemicals and fertilizers. However, carefully planned crop rotation and good irrigation and crop husbandry practices can contain the problem.

Health hazards such as malaria, bilharzias and other water borne disease may also occur even in small water storage and conveyance systems. Small irrigation developments in remote areas provide 'crystallization points' for increased human settlement with all its positive and negative side effects. The development of social infrastructure e.g. schools, health facilities, water supplies must therefore keep pace with agricultural development activities.

## **4.6 Support to the Promotion of Private Sector Partnerships in SSI Development**

Irrigation development always aims at an increased production on farm level and faces therefore the challenge of effective produce marketing. The development of effective well functioning value chains for the wide range of agricultural and horticultural produce grown under irrigation provides often a considerable challenge that can not be met by the conventional partners 'farmer-trader-financier' in the chain.

SSI development offers a wide range of interfaces where the mechanism of private-public-partnerships (PPP) can be usefully applied. It is an important role of the public sector to facilitate the cooperation of the private sector with agricultural entrepreneurs (farmers). Furthermore it is the role of governments and donor agencies in such partnerships that they provide loan or grant finance to strengthen certain links in a value chain.

### **4.6.1 Role of the Market and Potential Areas for PPP in SSI Development**

There are the challenges of increasing poverty levels especially in Africa on one hand, and a vast untapped potential for irrigation on the other. This contrast is even further accentuated by the decline in public funding for irrigation development. Irrigation development has nearly always the objective to propel the respective users of the more productive irrigation technologies, from subsistence cultivation centered on household needs into a market-oriented production of cash crops.

Irrigation development and irrigated agriculture are complex undertakings and depend in their success on a range of public and private sector role-players. Some of

the necessary interactions just happen, but often fruitful PPPs in irrigation development need to be pursued in a more systematic manner, also in order to attract private capital into a sector desperately short of investment finance.

It is crucial in the design of PPP support that it is used to facilitate development processes and that it should not jeopardize the use of commercial finance.

Some of the most likely areas for PPPs in SSI development and its financing are outlined below in the next chapters.

#### **4.6.1.1 PPP in Financing Irrigation Infrastructure and Equipment**

Irrigation design has shifted in many SSA countries from large-scale public-sector-managed developments to small community-managed schemes. Similarly there is also a change in the perception of the respective beneficiaries. In large schemes settlers/tenants previously had to adhere to a pre-designed cropping pattern, whereas in the new generation of schemes farmers are seen as entrepreneurs.

This change in focus with regard to irrigation design opens up new opportunities with regard to the participatory financing of such projects where small farmers require access to a range of financial services. Farmers and their WUAs are seen as economic partners in such developments, and detailed financial analysis is therefore required to estimate the expected benefits of the proposed development for individual scheme members, but also a careful assessment of their ability for financial contributions towards infrastructure investments. Projects receive therefore a mix of grant finance from the state (public partner) and term finance through commercial bank (private partner) to finance the respective investments.

#### **4.6.1.2 PPP in Small-Scale Irrigation Technology Development and Distribution**

Currently most countries in SSA have to import SSI technologies and related equipment. Transport and taxes add additional costs to the price tags of these devices and make them relatively expensive.

*Technology development and production in countries of SSA:* the basic SSI technology concepts have been developed and are meanwhile already successfully used in local manufacturing of relevant equipment in a few countries of SSA (e.g. Kenya). Countries with high SSI potential should aim at the manufacturing of relevant equipment in their own country. Potential manufacturers are to be identified who can produce or assemble the respective treadle and motorized pumps or other equipment. During establishment a manufacturer will face several challenges: (i) local manufacturing will require some costly precision tools to produce the pump elements, (ii) the adaptation of equipment to local conditions, (iii) stocking-up on materials without a developed market, (iv) marketing of technologies. The new business venture also faces the risk of a slow uptake. Initial public/donor financial support is a useful approach to cushion the manufacturer against undue business risks especially during the product development phase and the first few years of serial production.

*Technology distribution:* many countries in SSA lack an established dealership network for agricultural inputs. Depending on the scope and distribution of the actual irrigation potential, suitable distribution channels need to be identified for SSI equipment. PPP mechanisms could be useful to support the establishment and strengthening of an appropriate distribution system.

#### **4.6.1.3 PPP in Produce Marketing**

Irrigation opens up new opportunities for the cultivation of higher value crops which could otherwise not be cultivated, but producers are then also confronted with a number of new challenges. Support to marketing is a common PPP approach as it can focus on a number of aspects in production and marketing:

*Product development / refinement:* the introduction or promotion of the increased cultivation of higher value crops (e.g. horticultural crops, crops produced under organic farming) for the national and overseas market require market research, training and in some cases investments in processing and packaging facilities. Such activities can be organized as joint ventures between communities and local as well as international investors. PPP finance can be used to cover the costs of capacity building on the level of the farmers and their WUA as well as some of the initial investment costs of an investor also for compensating his / her higher transaction costs when dealing with a community respectively a large number of smallholders rather than a large-scale commercial producer.

*Export standards:* Production for the overseas market requires the conformity of the produce to the standards prevailing in the importing country. Accreditation procedures for organic and EurepGAP labels are lengthy and expensive. PPP finance is often used to facilitate the training of exporters and producers alike.

#### **4.6.1.4 PPP in Agro-Processing - Value Chain Development**

Most irrigation systems aim to cultivate higher-value fresh produce also to recover the costs of the investment. It can, however, not be assumed that all farmers involved in irrigated agriculture would secure a slot in the lucrative fresh horticultural national or export market. Distance to the market centers will be one of many criteria determining what can be sold and where.

The cultivation of agricultural products with a longer shelf life or agro-processing potential might be an alternative. Planners should pursue an approach aiming at PPP-based solutions. An analysis would reveal which steps of the value chain can be performed in the rural areas. Value addition in the area of production will create additional employment and cheaper labor in the remote locations might compensate a private investor for higher transport costs.

#### **4.6.1.5 PPP in Government : Commercial Farmer : Smallholder Cooperation**

Outgrower schemes where small producers link up with large-scale producers can be an effective approach to access a market that demands larger quantities of a standardized product. PPP finance can be used for technical training to ensure that quality and production standards are being met. The box gives an example of a PPP approach in Namibia:

#### Namibia's 'Green Schemes':

The 'Green Scheme' is an initiative of the Ministry of Agriculture, Water and Rural Development to develop irrigation-based agronomic production within the agro-industry in Namibia. It aims at various economic and socio-economic objectives. Under the Green Scheme, irrigation projects aiming at the development of more than 30,000 ha in the next two decades along the perennial rivers of Namibia are being set up. The Government of Namibia provides the bulk infrastructure up to the project boundary.

Half of the scheme area is settled with landless farmers on three ha plots on the basis of bankable leaseholds. The settlers have to repay the in-field equipment. The other 50% of the scheme area is given on a time-based lease to a commercial operator who is responsible to develop his farm irrigation system, provide technical advice during the planting season and marketing support to the smallholders to sell their crops. He also has to finance the required buildings (stores, offices). Leasehold duration and financial contribution of the commercial operator and small-scale farmers are being reviewed regularly and the experience are applied to new projects under construction.

The objective is that newly established irrigation farmers in cooperation with the commercial enterprise embark on a diversified production of high value horticultural crops. Tying it to commercial operators is to ensure high quality; in addition it brings a substantial private capital in order to co-finance national development objectives. (57)

#### **4.6.1.6 Research in SSI Technology Use**

Currently there is little research focusing on the use and impact of low- and medium-cost SSI technologies on farm level. Given the economic importance of this technology segment for the economy in a substantial number of SSA countries it warrants systematic research to provide an improved decision making platform especially also for further sectoral expansion. A cooperation between state, universities and private research capacities supported by PPP arrangements should ensure solutions that will continue to further increase the private sector's share in irrigation development.

#### **4.6.2 Support to the Strengthening of the Cooperation between Marketing Organizations, SSI Farmers and Financial Institutions**

The array of manually-operated and motorized pumps has led in several countries of SSA to an influx in privately developed irrigation area. The pace of this trend will continue provided farmers have access to financial services enabling them to make the necessary investments. The financial service provision to a farmer can be strengthened and supplemented by the cooperation between SSI farmers, marketing organizations and financial institutions:

**'Anchor' crop collateral:** the cultivation of a major cash (anchor) crop in an area such as coffee, tea, sugar, etc have normally their own 'monopolistic' marketing structure, where the crop is being marketed through a specific channel. In such cases farmers can in tripartite agreements with the marketing agent use future crop sales as collaterals for loans from financial institutions.

**Contract farming:** contract farming arrangements can be applied to a wide range of crops provided there is a buyer. The concept is often applied in connection with horticultural production for the export market, where high quality produce is required to fulfill the quality standards of importing countries. Companies engaged in the export market often enter supply contracts with their producers specifying type,

quality, and time of purchase and provide besides the inputs also technical advice through their own field services with the objective to ensure high quality. Farmers can use such contracts as collaterals and access credits individually from financial institutions for SSI system development or other financing needs. It requires the consent of the farmer and purchaser of the produce to make such arrangements work. Outgrower agreements fall into the same category.

In the absence of anchor crops or other major cash crops potential SSI farmers are limited to use the group-credit facility of financial institutions. In Kenya there is a concept about to be tested where rural agricultural input suppliers extend loans to SSI equipment purchasers.

**Facilitative support:** 'third parties' such as government, development organizations, and NGOs can play a vital role in market analysis, product refinement, and most importantly technical training of SSI farmers. But most importantly these organizations can often play a much stronger facilitative role in strengthening the linkages between farmers and traders as well as with financial intermediaries.

## 4.7 Important Complementary Support Measures

### 4.7.1 Extension Services

The provision of irrigation water to farmers represents a major technology step in crop production. It adds a new complexity to crop husbandry and it can not be assumed that farmers will transform to irrigated production techniques unassisted.

Especially if farmers aim to produce horticultural crops for the international markets the need for support will be very high. 'Contract farming' arrangements with exporter or agro-processing companies also often include the provision of the required inputs and technical advice to the producers in order to ensure uniform quality at the required quantity.

The majority of farmers produce for the local and national market, where quality standards are somewhat less specified. These farmers are rarely supported by extension services of marketing companies. It therefore falls upon government supported extension services to provide advice to the majority of producers mainly in the following areas:

- provision of market information on annual and seasonal price trends at relevant market centers; this assists farmers to decide which crops to select and when to plant;
- provision of qualified technical advice on cultivation/husbandry and irrigation techniques and methods. This is crucial to many farmers for successful crop production in a very competitive market.

Extension services should also facilitate access of farmers to traders / exporters prior or during the cultivation period so that the farmer knows the traders and equally important that a trader gets to know the place where the produce comes from.

### 4.7.2 Research

In contrast to India, where university research monitors and supports irrigation management and operation actively, in countries of SSA research appears to be much farther removed from the implementation reality.

In countries with important irrigation sectors it appears to be justified to carry out a systematic research program providing feedback to farmers, extension service, planners and policy makers especially on various economic aspects of the production system and its financing. Areas that should be pursued include:

- *Adoption of SSI technologies:* there is little analytical information available to determine the important factors that enhance or hamper the broad-scaled adoption of SSI technologies.
- *Economic impact* of different irrigation technologies should be measured on household and on regional and national level. This should also allow inferences on the impact of local conditions on technology uptake.
- *Production economics:* questions such as (i) how does the use of SSI technology impact on the farming system and (ii) on household income, (iii) costs of production and gross margins per crop, (iv) amount of water used for different crops per unit area, etc. can inform decision makers on possible support measures for further expansion and intensification of SSI in the region and beyond.

Political and technical decision makers generally see irrigation also as a means to achieve food self-sufficiency on household and national level. It is therefore vital to assess also in this context the performance of SSI technologies and compare these with eventually existing alternatives which may have comparative advantages for the farmers and the economy.

- *Financing SSI development:* SSI technologies fit a wide range of socio-economic circumstances. Insights on how different socio-economic groups finance SSI investments in different production environments (high / low potential areas) could provide useful experiences and lessons learned for system improvements.
- *Technology analysis:* there is little information available on which technology suits best a certain natural or socio-economic condition / situation. Experiences need to be analyzed, documented and disseminated. This activity should be carried out in close cooperation with manufacturers and distributors of these technologies who should play a leading role in the process.
- *Marketing:* information is also often lacking on which crops are being produced for which market and where do farmers sell the different crops and at what prices. Such information is an important ingredient for the formulation of development concepts for a given region, but also for the design of specific irrigation projects.
- *Value chain analysis:* the horticultural production might eventually outpace the absorption capacity of a country's local and export market for fresh produce. It is therefore crucially important to analyze which crops can be further processed in the country and even more importantly in the respective location where they are being produced.
- *Environmental impact:* although, there is only a small fraction of the continent's irrigation potential developed, there are already signs in some regions that the water sources are over-utilized. Research into which technology in combination

with which cropping pattern results in the most efficient use of water would provide useful information for planning.

### 4.7.3 Integrated Regional Planning

Sub-Saharan Africa faces a challenge of unprecedented magnitude: in many countries hunger and poverty have proven resistant to development efforts. At the same time there are still huge untapped resources available to better the lives of millions of people, less than 10% of the continent's irrigation potential has been developed so far.

To address poverty as one of the biggest challenge a country may face, requires a holistic approach to planning across all levels of government as to how the available resources are best used. Irrigation development has been identified as one of the strategies where a large number of people can be reached and considerable impact can be achieved at community level, but also on national level. However, for this to happen it requires a coordinated and systematic approach and the inclusion of a wide spectrum of actors into the planning and implementation process. Major issues that need to be addressed in integrated planning approaches are:

- *Analysis of resource potentials:* planning for irrigation development must take cognizance of the interrelation of water and land. Inventorying a country's water and irrigable land resources will give an indication on the type and magnitude of development needed, but also who the likely beneficiaries of such a development are.
- *Water management:* water management plans identify potential use of a water source and the optimal abstraction rates for different river segments. There is often little planning on how the water source can be most optimally utilized by the different available irrigation options/technologies.
- *Development of water resources:* unfavorable distribution of rainfall resulting in high runoff, results in limited water availability throughout the cropping season. Water storage by increasing dam capacity could therefore be an option.
- *Irrigation design:* what potentials exist in the different locations and how and when are they to be developed? Who are the potential users in a given area? Which technologies are to be used to access the water?
- *Services:* which services exist in a given area and which are required by the farmers, e.g. in terms of agricultural extension, irrigation engineering, financial services, etc.? Especially, irrigation schemes are growth centers and attract many other people including laborers and small business entrepreneurs: which services need to be provided for such communities e.g. schools, health, electricity, water, sanitation, etc.?
- *Cropping pattern:* which crops are likely to be grown and how will this impact on the local and national economy? Are there options for agro-processing?
- *Infrastructure:* which infrastructure is required to access produce markets or is to be accessible? Communication links?

Successful irrigation development, especially on a large scale, depends on the cooperation of a number of different stakeholders. An interdisciplinary and inter-institutional planning approach is required. It is important also to include the private sector and financial institutions into such planning as well as implementation

processes as they know best how to create a conducive environment for the private sector to play its full role.

Such an integrated planning approach should follow the principles of subsidiarity, meaning that the level or institution closest to the 'problem' is also the one who takes the leadership in planning the measures and the implementation of that particular aspect of development.

## **4.8 Potential Roles of National Stakeholders and Donor Organizations in the Development Process**

### **4.8.1 Role of the Government**

The government's role in the financing of SSI development is only indirect. The government should create incentives to support agricultural finance development but should not be involved in the direct provision of loans. Its role is to facilitate and strengthen the workings of the market and to create an enabling environment for rural financial system development, such as the provision of regulation and supervision and support to innovation that are likely to enhance outreach to rural entrepreneurs and increase the efficiency of financial intermediation.

#### **4.8.1.1 Policy Development**

Successful small-scale irrigation development will require on national level in conjunction with the establishment of demand driven financing mechanisms an integrated approach involving a wide spectrum of role-players. This is even more the case if private sector actors are expected to play a significant part in such an endeavour.

To support the development process countries with a development potential in SSI require a complementary set of policies and strategies in different fields. Relevant existing policies and strategies should be systematically reviewed pinpointing strengths and weaknesses and identifying inconsistencies and gaps which need to be addressed to support and facilitate the development process and the demand driven delivery of financial services to the sector. Important is an appropriate integration of the different policy areas. Possible inconsistencies that have negative impact on market-driven SSI development to be avoided are:

- directed lending to the agricultural sector through the government;
- market distortions in form of subsidized interest rates to end-clients;
- interest rate ceilings;
- construction of community irrigation schemes where more simple technology solutions and market driven development are feasible.

Crucial policy and strategy elements which could be of importance for the sectoral situation in individual countries include:

- *Macro-economic policies:*
  - deregulation of domestic financial markets;
  - deregulation of trade and product prices;
  - deregulation of markets: easing export and foreign exchange regulations;
  - creation of an enabling environment by providing the legal framework for effective business operation;

- improving the framework conditions for private sector investment in irrigation by commercial and smallholder farmers.
- *Water, irrigation and agricultural policies:*
  - assure that irrigation policy is derived from the principles of the respective water policy of a country outlining the regulatory framework how water may be used and under which conditions;
  - water management: striking a balance between upstream / downstream and public/private water use (issuing of water permits and monitoring water use);
  - technical analysis of irrigation potentials (water and land) with regard to optimal development options: suitability of different technologies, private versus public investment in different regions;
  - nation-wide policy regarding beneficiaries' contributions in irrigation schemes and adherence to agreed loan/grant ratio(s) by government and donors;
  - strengthening the role of the private sector by asking them to participate in relevant national and regional planning fora;
  - identification and support to the provision of necessary complementary services to irrigation development (e.g. agricultural extension);
  - strengthening of the private sector's role in providing inputs and finance for irrigation but also for agro-processing purposes
  - assure that financial sector expertise is included on any questions of financing SSI development;
- *Financial sector policies:*
  - creation of a favourable policy environment in which private financial institutions are able and willing to service farmers;
  - assurance of a competitive market structure;
  - promotion of a variety of viable financial institutions that are client oriented, that mobilize savings efficiently and provide access to loans to a broad spectrum of clients;
  - promote safety and soundness of the financial system;
  - depositor protection;
  - ensure allocative, operational and dynamic efficiency of financial institutions.
- *Enabling environment:*
  - create an efficient legal and judicial framework governing enforceability of claims and property rights as well as an efficient court system;
  - enhance real estate registration and streamline cost efficient and fast processing of registration;
  - create conducive legal frame conditions for leasing, especially a framework for easy and fast repossession of leased assets, clear definitions and clarity in allocating responsibility.
  - provide where economically justified support to the improvement of road conditions and infrastructure to better reach dispersed living SSI farmers.

#### **4.8.1.2 Donor Coordination**

The magnitude of technical and financial support from donor organisation varies from country to country. These contributions range from support to grass root project implementation level to the formulation of development policies and strategies. Since many of these support programs come with considerable resources it is important that the objectives of donors are aligned with national goals.

The expansion of a country's irrigation area requires interventions in several sectors. Appropriate donor coordination should ensure that resources are put to proper and coordinated use where the country has resource shortages in financial or technical aspects.

#### **4.8.2 Role of the Private Sector**

The important role of the private sector manifests itself in three different areas in connection with irrigation development:

- *private investments*: increased private capital is required from companies and financial institutions for SSI development which is a sector that has a good potential for making considerable contributions to poverty alleviation.
- *marketing of produce*: the adequate and profitable marketing of agricultural produce through the private sector is a pre-condition for successful irrigation development. Ensuring appropriate level of quality and produce diversification are critical areas for the successful expansion of irrigation in general and especially also for SSI development;
- *private-public-partnerships*: in some countries the expansion of irrigation may lead to the saturation of the fresh produce market. In such cases possibilities for the development of new products through agro-processing need to be assessed which would also create opportunities for additional employment and income sources.

#### **4.8.3 Role of Donor Organizations**

The magnitude of the challenge that many countries face with regard to developing their irrigable resources will require concerted efforts by the respective governments but also substantial contributions by the international donor community in the form of technical and financial cooperation. Donor organizations active in SSI development and related fields should systematically harmonize their support programs and actively search for possibilities of sectoral/program networking and cooperation. In view of the situation in many countries of SSA with substantial irrigation potential the following fields of cooperation appear to be especially relevant for donor support:

##### **4.8.3.1 Technical Cooperation (TC)**

Important fields for which TC may be required include:

*Capacity building*: support to capacity building may be required on all three levels of the financial system especially in the following fields:

- policy advise and dialogue, donor harmonisation according to 'Paris Declaration';
- The role of donors is especially important in the support to the creation and strengthening of the meso level infrastructure. On the meso level, viable networks and professional support institutions are needed that promote, support and finance rural financial intermediaries. Important functions include: (i) training to build-up human resource capacities; (ii) refinancing facilities that buffer liquidity shortages and term-mismatch of funds; (iii) control mechanisms to assure financial soundness of business and the security of savings; and (iv) research for product development.

- institutional strengthening on the micro level: rural financial intermediaries should be supported in financial broadening and deepening as described in chapter 4.3. Institutional capacity building efforts should concentrate on 'upgrading', 'downscaling', 'greenfielding' and the 'linkage approach', where applicable. Instruments will vary according to different institutional solutions that can be found in different country contexts. An important role of donors is to promote innovations in the rural financial sector and to provide initial support to their experimentation and implementation.

*Market development:* irrigated production is widely associated with export. This provides many producers in SSA with opportunities but also with great challenges, as they must adhere to stringent quality control standards for the different international markets. The training of local producers, traders and exporters is an important area for TC.

*Policy development:* SSI development requires well coordinated interdisciplinary approaches and a conducive policy framework in several fields. The formulation of new market oriented policies or the adaptation of existing ones may pose a challenge to some governments and is therefore an area for technical support. In the process of policy formulation it is important to create the necessary operational space and incentives for the participation of the private sector in areas such finance, marketing and production.

*Implementation support:* the translation of policies into cohesive interdisciplinary implementation programs, projects and strategies and support to their execution is another important field requiring skilled and experienced personnel which is often not available in countries of SSA.

*Inter-regional cooperation:* most of Africa's major river catchments extend over several countries who have to share the water resources. Planning, the establishment of agreements and their monitoring may require external assistance on the side of professional technical support and facilitation.

#### **4.8.3.2 Financial Cooperation**

Potential areas for financial cooperation in SSI development and related fields include:

*Grants, guarantee funds, credit lines and equity participation:* these are – in combination with technical assistance – valuable instruments to support the financial system in its efforts of financial deepening and broadening and may include:

- the initial support to financial institutions to extend outreach to less developed areas. This has proven to be a successful strategy for the creation of sustainable structures;
- the strengthening of financial institutions and non-financial institutions (such as equipment suppliers) that can provide term lending or leasing to end-clients. The access to long term funds is an important precondition to engage into term lending;
- the strengthening of second-tier institutions that can provide refinancing to institutions on the micro level.

*Start-up financing:* in countries with a high SSI development potential support may be required for the establishment of local equipment manufacturing facilities and of the

required distribution channels. The start-up process can be accelerated and facilitated through support to the initial establishment costs with donor funds using flexible conditions/mechanisms appropriate for the local situation.

*Financing of irrigation development:* certain land and water potentials can only be utilized with investments in bulk infrastructure to be utilized by irrigation communities. The magnitude of investments required to unlock such resources requires in most countries of SSA financial cooperation with the donor community.

Financial cooperation will also be required to assist countries to develop the irrigation infrastructure and in some countries substantial investments in the construction of additional storage capacities are required in order to translate hydrological potential into economic assets.

Besides the actual water infrastructure there is a need to provide for other infrastructure such as roads. Irrigation developments are usually centers of increased economic activities attracting migrants from the hinterland or other parts of the country. The increase in population often requires besides roads and communication, schools, and health centers.

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## References:

1. Abernethy, C., 2002: 'Enabling Environments, Financing Mechanisms and Equitable Access to Irrigation'. Private Irrigation in Sub-Saharan Africa. Colombo Sri Lanka.
2. ADB, 2000: 'Finance for the Poor: Microfinance Development Strategy'. Manila, Philippines.
3. ADB, 2005: 'The Changing Face of the Microfinance Industry'. Manila, Philippines.
4. Aeschliman, C., 2001: 'Reflexions on Irrigation Finance in Africa'. FAO. A Resource Document Presented to an FAO-Sponsored Seminar on Promoting Private Sector Participation in Irrigation. Accra, Ghana.
5. AfDB / OECD, 2004: 'African Economic Outlook – Kenya'. Available at: <http://www.oecd.org/dataoecd/24/27/32429985.pdf>
6. AfDB / OECD, 2005: 'African Economic Outlook – Kenya'. Available at: <http://www.oecd.org/dataoecd/42/57/34871854.pdf>
7. AfDB / OECD, 2006: 'African Economic Outlook – Kenya'. Available at: <http://www.oecd.org/dataoecd/34/31/36740590.pdf>
8. African Rural and Agricultural Credit Association (AFRACA), 2006: Available at: <http://www.gdrc.org/icm/afraca/afraca.html>
9. Agricultural Information Resource Centre, 2006: 'Irrigation Development for Food Security, Wealth and Employment Creation'. Proceedings of the National Irrigation Stakeholders Workshop 28.-29.March 2006, Nairobi, Kenya.
10. Ajalaoye, O., 2005: 'Role of the State in Financial Sector Development in Sub-Saharan Africa'. From: Africa in the World Economy – The National, Regional and International Challenges Fondad. The Hague, Netherlands.
11. Alagh, YK, 2002: 'Agricultural Investment Strategies: Prioritizing Land and Water'. In FAO - Proceedings of Regional Consultations. Bangkok, Thailand.
12. Albu, M., 2004. 'Leveraging Leases for Small Business. A Working Analysis of Opportunities, with Special Reference to the Situation in Kenya'. Nairobi, Kenya.
13. Antholt, C., 1994: 'Getting Ready for the Twenty-First Century: Technical Change and Institutional Modernisation in Agriculture'. World Bank Technical Paper Number 217. The World Bank. Washington, USA.
14. Argwings-Kodhek, G., 2004: 'Feast and Famine: Financial Services for Rural Kenya'. Tegemeo Rural Finance Paper 2004. Egerton University, Tegemeo Institute of Agricultural Policy and Development. Egerton, Kenya
15. Association of Microfinance Institutions (AMFI), 2006: Available at: [http://www.swwb.org/English/1000/address/afmin/add\\_afmin\\_kenya.htm](http://www.swwb.org/English/1000/address/afmin/add_afmin_kenya.htm)
16. Bagwitz, W., 2006: 'Gross Margin Calculations for Selected Horticultural Crops'. Deutscher Entwicklungsdienst / SIPMK. Embu, Kenya.
17. Basu A., Blavy R., Yulek M., 2004: 'Microfinance in Africa: Experiences and Lessons from Selected African Countries'. IMF Working Paper (WP/04/174). Washington, USA
18. BBC, 2005: 'G8 Leaders Agree 2005 \$50 Billion Aid Boost'. BBC-News 8 July, Website.
19. BMZ, 2004: 'Sektorkonzept Finanzsystementwicklung'. BMZ Konzepte. Bonn, Germany.
20. Boserup, E., 1981: 'Population and Technological Change. A Study of Long Term Trends'. Chicago: University of Chicago Press, USA.

21. The Central Bank of Kenya, 2006: 'Monthly Economic Review - July 2006'. Nairobi, Kenya.
22. CGAP, 2003: 'Financial Services for the Rural Poor - Helping to Improve Donor Effectiveness in Microfinance'. Donor Brief N° 15. Washington, USA.
23. CGAP, 2004: 'Building Inclusive Financial Systems: Donor Guidelines on Good Practice in Microfinance'. Washington, USA.
24. CGAP, 2005: 'Managing Risks and Designing Products for Agricultural Microfinance: Features of an Emerging Model'. Washington, USA.
25. CGAP, 2006: 'Graduating the Poorest into Microfinance. Linking Safety Nets and Financial Services'. CGAP Focus Note N° 31. Washington, USA.
26. Coffey, E., 1998: 'Agricultural Finance: Getting the Policies Right'. Agricultural Finance Revised N° 2. FAO, GTZ. Rome, Italy.
27. Cooperative Bank of Kenya, 2005: 'Annual Report and Financial Statements'. Nairobi, Kenya.
28. Cooperative Bank of Kenya, 2006: Available at: <http://www.co-opbank.co.ke/>
29. Cornish, GA, Lawrence, P., 2001. 'Informal Irrigation in Peri-Urban Areas: A Summary of Findings and Recommendations'. Wallingford, UK.
30. De Lange, M., 1997: 'Promotion of Low-Cost and Water-Saving Technologies for Small-scale Irrigation'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
31. Egan, LA, 1997: 'The Experiences of IDE in the Mass Marketing of Small-Scale Affordable Irrigation Devices'. FAO: Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
32. Equity Bank, 2006: 'Listing of Equity Bank Limited at the Nairobi Stock Exchange'. Investor Briefing – The Rise of Equity. Nairobi, Kenya.
33. Equity Bank, 2005: 'Annual Report and Financial Statements 2005'. Nairobi, Kenya.
34. Family Finance Building Society, 2006: Available at: <http://www.familyfinance.co.ke/>
35. FAO / GTZ, 1998: 'Agricultural Finance Revisited: Why?'. In: Agricultural Finance Revisited N° 1. Rome, Italy.
36. FAO, 2002: 'Land and Agriculture. Challenges and Perspectives on the World Summit on Sustainable Development - Johannesburg 2002'. Rome, Italy.
37. FAO, 2000. 'Land Tenure, Governance and Sustainable Irrigation Development'. Rome, Italy.
38. FAO, 1997. 'Irrigation Potential in Africa: A Basin Approach'. Rome, Italy.
39. FAO / IPTRID, 1997: 'Irrigation Technology Transfer in Support of Food Security'. (Water Reports - 14). Proceedings of a Sub-Regional Workshop. Harare, Zimbabwe.
40. FAO / GTZ, 1998: 'Agricultural Finance Revisited: Why?'. In: Agricultural Finance Revisited N° 1. Rome, Italy.
41. FAO / IPTRID, 2002: 'GRID – IPTRID Network Magazine'. Issue 19, 2002, Rome, Italy.
42. Family Finance Building Society, 2006: Available at: <http://www.familyfinance.co.ke/>
43. Fiebig, M., 2001: 'Prudential Regulation and Supervision for Agricultural Finance'. Agricultural Finance Revised N° 5. FAO, GTZ. Rome, Italy.
44. Financial Sector Deepening Trust, 2005: 'Financial Sector Deepening. Strategy Paper (2005 – 2007)'. Nairobi, Kenya.
45. Financial Sector Deepening Trust, 2006: 'Briefing Note: FSD Kenya'. Kenya, Nairobi.

46. Faulu Kenya, 2006: Available at: <http://www.faulukenya.com/>
47. Fraenkel, P., 1986: 'Water Pumping Devices: A Handbook for Users and Choosers'. London, Intermediate Technology Publications, UK.
48. Gakundi, MK, 1997: 'Funding Irrigation Development in Kenya with Special Reference to Funding by the Smallholder Irrigation Scheme Development Organization'. FAO: Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
49. Giehler, T., 1999: 'Sources of Funds for Agricultural Lending'. Agricultural Finance Revised N° 4. FAO, GTZ. Rome.
50. Glaeser, A., 2004: 'Microfinance: Financial Services for the Poor'. DED-Kenya Concept Paper. Deutscher Entwicklungsdienst. Nairobi, Kenya.
51. GFA Terra Systems, 2005: 'Mount Kenya Smallholder Irrigation Development Programme'. Consulting Services: Preparatory Banking Study. Final Report to Ministry of Water and Irrigation and KfW. Nairobi, Kenya.
52. Government of Kenya, 2000: 'Interim Poverty Reduction Strategy Paper 2000-2003'. Nairobi, Kenya.
53. Government of Kenya. 2002: 'Water Act 2002.', Nairobi, Kenya
54. Government of Kenya, 2004: 'Investment Programme for the Economic Recovery - Strategy for Wealth and Employment Creation 2003-2007: ERS – Revised.', Nairobi, Kenya
55. Government of Kenya, 2005: 'The Deposit-Taking Microfinance Bill (DRAFT)'. Nairobi, Kenya.
56. Government of Kenya, 2006: 'The Savings and Credit Co-operative Societies Bill (DRAFT)'. Nairobi, Kenya.
57. Government of Namibia, 2004: 'Green Scheme – Development Proposal'. Ministry of Agriculture, Water and Rural Development. Windhoek, Namibia.
58. Gurria, A., 2006: 'Task Force on Financing Water for All' Report 1. Enhancing Access to Finance for Local Governments'. Financing Water for Agriculture. Marseilles, France.
59. Helms, B., 2006: 'Access for All. Building Inclusive Financial Systems'. CGAP. Washington, USA.
60. Heney, J., 2000: 'Enhancing Farmer's Financial Management Skills'. Agricultural Finance Revised N° 6. FAO-GTZ. Rome, Italy.
61. Hirschland, M., 2002: 'Developing Deposit Services for the Poor: Preliminary Guidance for Donors'. Draft. The Savings Experts Working Group.
62. Hollinger, F., 2004: 'Financing Agricultural Term Investments'. Agricultural Finance Revised N° 7. FAO, GTZ. Rome, Italy.
63. Hospes, O., Musinga, M., Ong'ayo, M., 2002: 'An Evaluation of Micro-Finance Programmes in Kenya as Supported Through the Dutch Co-Financing Programme with Focus on KWFT'. Nairobi, Kenya.
64. International Development for Enterprises, 2002: 'Micro Irrigation for Income Generation in Asia'. ADB, Manila, Philippines.
65. IFAD, 2003: 'Agricultural Marketing Companies as Sources of Smallholder Credit in Eastern and Southern Africa. Experiences, Insights and Potential Donor Role'. Rome, Italy.
66. IFAD, 2003: 'Rural Finance Sub-Sector Review: The Republic of Kenya'. Rome, Italy.
67. IFAD, 2004: 'Rural Finance Policy'. Rome, Italy.

68. IFAD, 2006. 'Decision Tools for Rural Finance'. Available at: [www.ifad.org/ruralfinance/dt/full/ap3.htm](http://www.ifad.org/ruralfinance/dt/full/ap3.htm)
69. International Development Enterprise / Winrock International, 2002: 'The Smallholder Irrigation Market Initiative'. Lakewood, USA.
70. International Development Enterprises, 2004: 'A Model for Pro-Poor Wealth Creation through Irrigation and Integrated Service Provision'. Lakewood, USA.
71. International Development Enterprises / Winrock International, 2001: 'Smallholder Irrigation Market Initiative: Study on the Dissemination Potential for Affordable Drip and Other Irrigation Systems and the Concrete Strategies for their Promotion'. Lakewood, USA.
72. Jayne, TS, Yamano, T., Nyoro, J., Awuor, T., 2001: 'Do Farmers Really Benefit from High Food Prices? Balancing Rural Interests in Kenya's Maize Pricing and Marketing Policy'. Working Paper 2 B. Egerton University. Tegemeo Institute of Agricultural Policy and Development. Egerton, Kenya.
73. K-Rep Bank, 2006. Available at: <http://www.k-rep.org/>
74. K-Rep Development Agency, 2006: Available at: <http://www.k-rep.org/devagency.asp>
75. Kamau, K., Kabando, R., Ndrangu, N., Ohno, K., 2003: 'Micro-Credit Survey for Smallholder Irrigation in Kenya'. Nairobi, Kenya.
76. Kamprath, H., 2006: 'Commodity Prices for Selected Crops at Different Markets'. Deutscher Entwicklungsdienst / SIPMK. Embu, Kenya.
77. Kamprath, H., 2006: 'Gross Margin Calculations for Selected Tree Crops'. Deutscher Entwicklungsdienst / SIPMK. Embu, Kenya.
78. Kandiah, A., 1997 : 'Summary of Findings of Missions in Selected Countries in East and Southern Africa'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
79. Kenya Women Finance Trust (KWFT), 2006: Available at: <http://www.kwft.org/>
80. Kenya Post Office Savings Bank, 2006: Available at: <http://www.postbank.co.ke/>
81. Kenya Commercial Bank, 2006. Available at: <http://www.kcb.co.ke/home/index.asp>
82. Kenya Union of Savings and Credit Cooperatives (KUSCCO), 2006. Available at: [http://www.kuscco.com/mission\\_vision.asp](http://www.kuscco.com/mission_vision.asp)
83. The Kenya Rural Savings and Credit Cooperative Societies Union (KERUSSU): Available at: <http://www.kerussu.org/about%20us.html>
84. Keller, J., Keller, A., 2005 : 'Mini-Irrigation Technologies for Smallholders'. Lakewood, USA.
85. Kibaara, B., 2006: 'Rural Financial Services in Kenya: What is Working and Why?'. Draft for Review – Working Paper. Egerton University. Tegemeo Institute of Agricultural Policy and Development. Egerton, Kenya.
86. Klein, B., Meyer, R., Hannig, A., Burnett, J., Fiebig, M., 1999: 'Better Practices in Agricultural Lending. Agricultural Finance Revised N° 3'. FAO - GTZ. Rome.
87. Koegelenberg, H., 1997 : 'Review of the Irrigation Equipment Manufacture and Supply Sector in South Africa'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
88. Koppen, B., 1996: 'Women Owners of Irrigation Pumps in Bangladesh'. New Delhi; India
89. Lafourcade, A., et.al. 2005 : 'Overview of the Outreach and Financial Performance of Microfinance Institutions in Africa'. Washington, USA.

90. Lankford, B., 2005: 'Rural Infrastructure to Contribute to African Agricultural Development: The Case of Irrigation'. Norwich, UK.
91. Ledgerwood, J., 1999: 'Microfinance Handbook: An Institutional and Financial Perspective'. The World Bank. Washington, USA.
92. Legovini, A., 2002: 'Kenya: Macro Economic Evolution since Independence'. UNDP.
93. Market Intelligence, 2006: 'Banking Survey 2006'. Nairobi, Kenya.
94. Meyer, R., Roberts, R., Mugume, A., 2004: 'Agricultural Finance in Uganda. The Way Forward'. Bank of Uganda, Sida, KfW, GTZ. FSD Series N° 13. Kampala, Uganda.
95. Mehta, M., Virjee, K., 2003: 'Financing Small Water Supply and Sanitation Service Providers: Exploring the Microfinance Option in Sub-Saharan Africa'. Nairobi, Kenya.
96. Micro Rate, 2005: 'Equity Bank'. Johannesburg, South Africa.
97. Migot-Adholla, SP, Hazell B, Blore and Place F, 1991: 'Indigenous Land Rights in Sub-Saharan Africa: A Constraint on Productivity'. The World Bank Economic Review, 5.1. pp 155 - 175, Washington, USA.
98. The MIX Market, 2006: Available at: <http://www.mixmarket.org/>
99. Ministry of Agriculture, Irrigation Drainage Branch, 1990: 'Profitability of Smallholder Irrigation in Kenya'. Nairobi, Kenya.
100. Ministry of Agriculture, Livestock Development and Marketing, 1992: 'Loan Scheme for Group-Based Smallholder Irrigated Horticultural Production in Kenya'. Nairobi, Kenya.
101. Ministry of Agriculture, Livestock Development and Marketing, 1993: 'Guidelines on Smallholder Irrigation Projects for Implementing Agencies and Donors'. Nairobi, Kenya.
102. Ministry of Agriculture and Ministry of Livestock and Fisheries Development, 2004: 'Strategy for Revitalizing Agriculture 2004-2014'. Nairobi, Kenya.
103. Ministry of Agriculture and Rural Development, 2003: 'Draft Policy Paper on Irrigation and Drainage Development in Kenya'. Nairobi, Kenya.
104. Ministry of Water Resources Management and Development / Japan International Cooperation Agency, 2003: 'Framework for the Formation and Management of Water Users Associations Towards Sustainable Community-Based Smallholder Irrigation and Drainage Development'. Nairobi, Kenya.
105. Ministry of Water Resources Management and Development / Japan International Cooperation Agency, 2003: 'Guidelines for the Promotion and Development of Smallholder Irrigation and Drainage Projects'. Nairobi, Kenya.
106. Ministry of Water Resources Management and Development / Japan International Cooperation Agency, 2003: 'Micro-Credit Survey for Smallholder Irrigation in Kenya'. Nairobi, Kenya.
107. Molden, D., de Fraiture, C, 2004: Investing in Water for Food, Ecosystems and Livelihoods. Comprehensive Assessment of Water Management in Agriculture: Blue Paper. Stockholm, Sweden.
108. Mutua, J., Oyugi, L., 2006: 'Access to Financial Services and Poverty Reduction in Rural Kenya'. Nepru Working Paper Nr. 108. The Namibian Economic Policy Research Unit. Windhoek, Namibia.
109. Nair, A., Kloeppinger-Todd, R., Mulder, R., 2004. 'Leasing. An underutilized Tool in Rural Finance'. The World Bank. Agriculture and Rural Development. Washington, USA.
110. NEPAD, 2006: 'A Summary of all NEPAD Action Plans'. <http://www.nepad.org/2005/files/documents/41.pdf>

111. Neubert, S., et al. 2006: 'Poverty Reduction Through Irrigation: Sustainable Strategies for Kenya?'. Unpublished Research Paper, German Development Institute, Bonn, Germany.
112. Omino, G., 2005: 'Regulation and Supervision of Microfinance Institutions in Kenya'. Central Bank of Kenya. Nairobi, Kenya.
113. Ondego, K'Aol, G., Ochanda, R., 2002 : 'Factors Influencing the Establishment of Micro-Finance Schemes in Kenya'. Nairobi, Kenya.
114. Ostron, V., Feeny, D., Pichteds, H., 2001: Rethinking Institutional Analysis and Development: Issues Alternatives and Choices. San Francisco, Institute for Contemporary Studies Press. USA.
115. Palanisami, K., 1997: 'Economic of Irrigation Technology Transfer and Adoption.' In: FAO. 1997. Irrigation Potential in Africa: A Basin Approach. Rome, Italy.
116. Perry, E., 1997: 'Low-Cost Irrigation Technologies for Food Security in Sub-Saharan Africa'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe,
117. Perry, E., 1998: 'Low-Cost Irrigation Technologies for Food Security in Sub-Saharan Africa'.
118. Porteous, D., 2006: 'The Enabling Environment for Mobile Banking in Africa'. Bankable Frontier Associates. DFID. Boston, USA.
119. Poulisse, J., 2002: 'Quantifying Investment Needs for Agricultural Development in Asia'. In FAO - Proceedings of Regional Consultations. Bangkok, Thailand.
120. Poulisse, J., Thomas, J., 2002 : 'Investment in Land and Water in the Context of the Special Programme on Food Security'. In FAO - Proceedings of Regional Consultations. Bangkok, Thailand.
121. Purcell, R., 1999: 'Potential for Small-Scale Irrigation in Sub-Saharan Africa: The Kenyan Example'. (FAO / IPTRID)
122. Raju, KV, Gulati, A., Meinzen-Dick, R., 2003: 'Innovations in Irrigation Financing: Tapping Domestic Financial Markets in India'. International Food Policy Research Institute. Washington, USA.
123. RFKM / IFAD, 2005: 'Rural Finance Knowledge Management Newsletter'. Issue 1, October 2005. Nairobi, Kenya.
124. RFKM / IFAD, 2006: 'Rural Finance Knowledge Management Newsletter'. Issue 2, January 2006. Nairobi, Kenya.
125. RFKM / IFAD, 2006: 'Rural Finance Knowledge Management Newsletter'. Issue 3, May 2006. Nairobi, Kenya.
126. Rijsberman, F., 2004: 'The Water Challenge'. International Water Management Institute, Colombo, Sri Lanka.
127. Robinson, M., 2001: 'The Microfinance Revolution: Sustainable Finance for the Poor' The World Bank. Washington, USA.
128. Roe, A., 2004: 'Key Issues in the Future Development of Kenyan Banking'. Paper to Stakeholders' Forum on Financial Sector Reforms. Oxford Policy Management and the University of Warwick, UK.
129. Rosengard, J., Rai, A., Dondo, Aleke, Oketch H., 2000: 'Microfinance Development in Kenya: K-Rep's Transition from NGO to Diversified Holding Company and Commercial Bank'. Development Discussion Papers. Harvard Institute for International Development. Harvard University, USA.

130. Roth, J., Barrows, R., Carter, M., Kanel, D., 1989: 'Land Ownership Security and Farm Investment: Comment'. *American Journal of Agricultural Economics* 71: 211-214.
131. Rukuni, M., 1999: 'Creating an Enabling Environment for the Uptake of Low-Cost Irrigation Equipment by Small-Scale Farmers'. FAO, Rome.
132. Ruotsi, J., 1999: 'Financing Irrigation Development and Private Sector Initiatives with Special Reference to Sub-Saharan Africa'. Rome, Italy.
133. Rutherford, S., 2000. 'The Poor and their Money'. Department for International Development (DFID). New Delhi, India.
134. Sabana, B., 2005: 'Incorporating Microfinance into Kenya's Economic Recovery Strategy'. *Microfinance Matters*. UNDCF.
135. Sacerdoti, E., 2005: 'Access to Bank Credit in Sub-Saharan Africa: Key Issues and Reform Strategies'. IMF Working Paper (WP/05/166). IMF. Washington, USA.
136. Saigal, S., 2002: 'Funding Investment in Land and Water'. In FAO - Proceedings of Regional Consultations. Bangkok, Thailand.
137. School of Monetary Studies, 2006: 'Irrigation Development and Management in Kenya – Achievements and Challenges'. Nairobi, Kenya.
138. Singh, RB, 2002: 'Investing in Land and Water: The Fight Against Hunger and Poverty in the Developing Asia'. In FAO - Proceedings of Regional Consultations. Bangkok, Thailand.
139. SIPMK Loan Agreement, 2005: 'Equity Bank Limited and Government of Kenya'. Nairobi, Kenya.
140. SMEP, 2005: 'SMEP Annual Report for the Year 2005'. Nairobi, Kenya.
141. Sivanappan, RK, 1997: 'Technologies for Water Harvesting and Soil Moisture Conservation in Small Watersheds for Small-Scale Irrigation'. FAO: Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
142. Sonou, M, 1997: 'Low-Cost Shallow Tube Well Construction in West Africa'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
143. Sundaram, CRS, 1997: 'Review of the Irrigation Equipment Manufacture and Supply Sector in India'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.
144. Ubels, J, Horst, I. (eds.) 1993: 'Irrigation Design in Africa - Towards an Interactive Method.' Wageningen Agricultural University, Wageningen, and Technical Centre for Rural and Agricultural Cooperation, Ede, Netherlands.
145. UN, 2000: 'United Nations Millennium Declaration: Resolution Adopted by the General Assembly', 55<sup>th</sup> Session. New York, USA.
146. UN, 2001: 'Road Map Towards the Implementation of the United Nations Millennium Declaration: Report of the Secretary General'. New York, USA.
147. UNDCF, 2004: Building Inclusive Financial Sectors that Serve Poor and Low-Income People'. UNDCF Microfinance Sector Development Approach.
148. Von Pischke, JD, 1996: 'Finance at the Frontier. Debt Capacity and the Role of Credit in the Private Economy'. The International Bank for Reconstruction / The World Bank. Washington, USA.
149. Weiping, Z., 1997 : 'Review of the Irrigation Equipment Manufacture and Supply Sector in China'. FAO : Sub-Regional Workshop on Irrigation Technology Transfer in Support of Food Security. Harare, Zimbabwe.

150. Winpenny, J., 2003: 'Financing Water for All: Report of the World Panel on Financing Water Infrastructure'. Washington, USA.
151. Woomer, PL, Mukhwana, EJ, 2004: 'Working with Smallholder Farmers to Improve Maize Production and Marketing in Western Kenya'. Uganda Journal of Agricultural Sciences, 2004, 9:491-500, Kampala, Uganda.
152. World Bank, 1992: 'Resources and Global Food Prospects - Supply and Demand for Cereals to 2030'. Washington, USA.
153. World Bank, 2004: 'Self Supply: A Fresh Approach to Water for Rural Populations'. Washington, USA.
154. World Bank, 2005: 'Kenya Financial Sector Adjustment Credit'. Program Information Document (PID). Appraisal Stage. Washington, USA.
155. Yaron, J., Mithika, M., 2004: 'KENYA - Strategy for Development Finance and Increasing Access to Rural Financial Services. Rural Finance and Agricultural Credit'. (First Draft Report). Nairobi, Kenya.



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