



## SPECIALISATION OR DIVERSIFICATION?

Divergent perspectives on rice  
farming in three large dam-  
irrigated areas in the Sahel

Bara Guèye

**Global Water Initiative (GWI)** – The Global Water Initiative in West Africa is part of a global action-research and advocacy programme funded by the Howard G. Buffett Foundation. It is implemented by the International Institute for Environment and Development (IIED) and the International Union for Conservation of Nature (IUCN) in Mali, Guinea, Niger, Burkina Faso and Senegal. We focus on agricultural production linked to large scale irrigation schemes and dams, from local to regional level. Our multi-stakeholder approach seeks to empower smallholder farmers – both men and women – to put them at the centre of policies for efficient water management, food security and secure livelihoods.

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*The views expressed in this report are those of the authors and do not necessarily represent those of the organisations participating in the Global Water Initiative at a national, regional or global level, or those of the Howard G. Buffett Foundation.*

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## ABBREVIATIONS AND ACRONYMS

ANID	National Association for Irrigation and Drainage in Niger ( <i>Association Nigérienne pour l'Irrigation et le Drainage</i> )
ARID	Regional Association for Irrigation and Drainage in West and Central Africa ( <i>Association Régionale pour l'Irrigation et le Drainage en Afrique de l'Ouest et du Centre</i> )
CNCAS	Caisse Nationale de Crédit Agricole du Sénégal
FCFA	CFA (African Financial Community) Franc ( <i>Franc de la Communauté Financière Africaine</i> )
FONGS	Federation of Non-Governmental Organisations of Senegal ( <i>Fédération des Organisations Non Gouvernementales du Sénégal</i> )
GWJ	Global Water Initiative
IED Afrique	Innovation, Environnement, Développement Afrique
IIED	International Institute for Environment and Development
MFI	Microfinance institution
MOB	Bagré Project Management ( <i>Maîtrise d'ouvrage de Bagré</i> )
ODRS	Sélingué Rural Development Office ( <i>Office de développement rural de Sélingué</i> )
WFP	World Food Programme
GDP	Gross Domestic Product
SODAGRI	Senegal Agricultural and Development Agency ( <i>Société de Développement Agricole et Industriel du Sénégal</i> )
IUCN	International Union for Conservation of Nature

Throughout this report the term 'irrigated perimeter(s)' is used to describe the agricultural area adjacent to a dam which is irrigated with water from the dam either through gravitational or pumped irrigation channels.

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## SUMMARY

This report gives the conclusions of case studies examining the strategies, aspirations and constraints of the various types of farmers living round the dams of Bagré (Burkina Faso), Sélingué (Mali) and Niandouba/Confluent (Senegal). This research was initiated by the Global Water Initiative (GWI) and funded by the Howard G. Buffett Foundation. It aimed to contribute to regional discussion of practical policies and programmes that can improve rice cultivation in irrigated areas and strengthen farmers' livelihoods.

Irrigated agriculture is important because of the central role rice farming plays in West African agro-food policies. In addition to the negative impact it has on the balance of payments, the acute dependence on rice imports (which make up 45 per cent of all cereal imports) poses a structural threat to food security. Finding a solution to this situation is all the more urgent as it coincides with rising demand due to population growth (about 3 per cent per year), especially in urban areas, and an increase in cereal consumption per inhabitant (by about 4 to 6 per cent per year). The challenge therefore is to address the increased demand for rice in the short and medium term while dealing structurally with the whole issue of food policy, including prioritising traditional cereals, such as millet and sorghum, which have a higher nutritional value.

The study areas offer significant potential in terms of water and land. However, our research suggests that harnessing this effectively would mean tackling some crucial issues, chief of which are:

1. Selecting approaches for public investment that guarantee high returns at reduced cost while securing access to land for smallholders.
2. Building up farmers' social capital to empower them to play a key part in the governance of irrigated perimeters.<sup>1</sup>
3. Taking into account family farms' many roles when designing and supplying agricultural services.

The best investment choices will be those that support food supply and autonomy, that use natural resources sustainably, that improve family farms' livelihoods, and that ensure agricultural investments – especially those supporting irrigated agriculture – are both profitable and sustainable.

Fortunately, now is the time. Since the 2007-2008 food crisis, agriculture has re-emerged as a central priority for governments and their international partners. But to make the most of this new situation, strategies to develop irrigated agriculture must recognise the realities and challenges that our research reveals.

Current outline plans to develop the irrigated perimeters around the three dams embody a conflict. On one hand the government favours 'modern' agriculture, based on technological intensification, specialisation of production and the promotion of agribusiness. On the other hand, family farms maintain their resilience through their multiple roles and diverse strategies. These strategies depend on each farm's composition, size, available capital and the farmers' aims and aspirations. Keeping this variability in mind will help interventions in these irrigated perimeters increase production and build up the livelihoods of poor smallholders.

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1. Throughout this report the term 'irrigated perimeter(s)' is used to describe the agricultural area adjacent to a dam which is irrigated with water from the dam either through gravitational or pumped irrigation channels.



The current discrepancy between the two approaches leads to several institutional and technical inefficiencies. Projects can become costly and ineffective. Those with useful 'social capital' end up with only a weak role and are sidelined in decision-making on sustainable management of the irrigated perimeters. Smallholders with the least resources are in increasingly precarious positions. And the system of agricultural services and advice is fragmented and does not cover the many needs of family farms.

Yet rice remains a strategic cereal, central to the visions and aspirations of most family farms. Big farms seek to consolidate their strategic market position by taking advantage of the incentives offered to private actors, while smaller scale farms simply aim to meet basic livelihood needs or secure sustainable access to land.

A major challenge will be to create institutional and technical conditions that allow those farmers who have the ambition and capacity to 'scale up', to produce more and better. Such conditions must help groups such as young people and women who still struggle to secure access to land and so cannot yet take advantage of irrigated farming.

The political target of food security should, therefore, take into account the multi-functional nature of farms, as well as the priority they accord rice cultivation in their aspirations and visions for the future. New rules and mechanisms should be established for governing the irrigated perimeters which should be built on: inclusive and transparent procedures to create a shared vision between the state and farmers, new governance mechanisms and tools that farmers themselves can use, and a favourable national and regional institutional framework that lays down and guarantees the new rules.

With this in mind, a number of technical support measures should be taken, particularly to map how land use is changing so as to make it easier to redefine the rules and conditions of land allocation and guarantee access for the most vulnerable groups. The next priority is to start improving the system of agricultural and rural support services, so that it accommodates the multifunctional nature of family farms and is also able to help strengthen and consolidate social capital. In addition, an alternative way of funding the value chain is urgently needed to take full account of farmers' diverse needs.

## INTRODUCTION

This summary report is based on the main lessons and recommendations of three case studies analysing the strategies, aspirations and constraints of the various categories of farmers living around the dams of Bagré (Burkina Faso), Sélingué (Mali) and Niandouba/Confluent (Senegal).<sup>2</sup> The research was initiated by the Global Water Initiative (GWI), and funded by the Howard G. Buffett Foundation. GWI promotes a vision in which water is used efficiently and equitably, enabling farmers to improve food security and become more resilient to change through sustainable agricultural production for themselves, their communities and the world. The study hopes to contribute to ongoing national and regional discussions of the policies and programmes which are needed to improve rice cultivation in irrigated perimeters and to support farmers' livelihoods.

This initiative is particularly opportune given that national food security policies in West Africa focus on rice cultivation and take a technological approach that revolves around constructing large dams, designed to provide irrigation as well as generate electricity.

Today, over 90 dams have been built in West Africa to improve irrigation, and another 40 are at the planning stage. As a result GWI is taking an interest in rice cultivation, which is a priority option for West African governments in terms of achieving food security, with the aim of guaranteeing smallholders' livelihoods. But it is not yet clear to GWI whether this option really allows for better use of available resources and supports farming that is suited to smallholders' needs.

Such questions are particularly relevant as existing irrigation systems have low productivity, chiefly because their capacity is under-used, crop yields are low, and uncertain and inefficient use of irrigation water brings high risks. Yet despite these constraints, the region has good potential for irrigation, thanks to the presence of several rivers. In the three countries in the study, irrigated cultivation only accounts for a small proportion of cultivated areas and exists alongside rain-fed cereal farming, producing millet, maize and sorghum. There is also a considerable amount of rain-fed rice cultivation in the valleys, often without much government support or investment. These farming activities are part of a system of diversified livelihood strategies, which also includes cattle rearing, small scale trade, seasonal or long term migration and employment.

The three dams studied each have individual features reflecting conditions at the time they were built as well as their specific strategic objectives (see box 1). However, the dynamics this study observed correspond closely to current issues and challenges linked to the construction and operation of dams in West Africa.

The development strategies being applied at the three dams pay insufficient attention to how family farms maintain resilient livelihoods. Neither the criteria for allocating land nor the options put forward for increasing agricultural productivity seem to take account of the individual characteristics of the different types of family farm. Yet despite these constraints, the region has good potential for irrigation, thanks to the presence of several rivers.

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2. Ouédraogo et Sedogo (2014), for Bagré, de Hathie *et al.* (2013), for Niandouba, et de Kergna *et al.* (2013), for Sélingué. These documents are available (in French) online: <http://www.gwiwestafrica.org/library>

## BOX 1

### Brief description of the study sites

#### a. Bagré Dam (Burkina Faso)

The Bagré dam, which has a capacity of 1.7million m<sup>3</sup>, was built between 1989 and 1993. The amount of land it could potentially irrigate is estimated at 29,900 ha and the rainfed land is estimated at 25,000 ha. At the end of 2013, 2,447 ha of land was opened up and allocated to smallholders. A total of 1,673 families, settled in 16 farmers' villages, cultivate the irrigated land. Traditional agriculture is the mainstay of the zone and is chiefly used to help meet the subsistence needs of local people. The main crops are cereals, groundnut, cotton, black-eyed pea, soya bean, sesame and voandzou or bambara groundnuts (*Vigna subterranea*). Cattle rearing is a major activity and is concentrated in three main pastoral zones. Bagrépôle took over the project management of Bagré (*Maitrise d'ouvrage de Bagré – MOB*) in 2011, when the Bagrépôle project (funded by the World Bank) was launched.

#### b. Niandouba/Confluent Dams (Senegal)

The Niandouba/Confluent dams were built in the Anambé basin, situated in Haute-Casamance, in the Kolda region of Senegal. The basin covers an area of 1,100 km<sup>2</sup> and includes seven rural communities. An estimated 112,000 people live here, with a relatively low density of 34 inhabitants/km<sup>2</sup>. Traditional extensive agro-pastoral farming is practised, raising cereal crops (sorghum, maize, rice and fonio), and cash crops (cotton and groundnuts). The introduction of irrigated agriculture has brought changes in these production systems (some more important than others) and growing emphasis on irrigated cultivation.

The Senegal Agricultural and Industrial Development Company (*La Société de Développement Agricole et Industriel du Sénégal – SODAGRI*) was set up in 1974 to develop rice cultivation in order to reduce the country's cereal deficit. The Niandouba dam was built during the period 1996-1999, and has a water storage capacity of 90 million m<sup>3</sup>. Today, with the new land development, SODAGRI has been able to meet the target of 5,000 ha of developed irrigated land although only around 3,000 ha is being cultivated.

#### c. Sélingué Dam (Mali)

The Sélingué dam was built at the end of the 1970s. The objectives were to generate electricity (which, at the beginning of the 1980s provided more than 75 per cent of the electricity supply of the country, as compared to about 15 per cent now), develop agriculture by opening over 20,000 ha of land for irrigation (only 2,294 ha of which have been developed) and help make the River Niger more navigable from Koulikoro, downstream from Bamako. The two irrigated perimeters covered by the study are Sélingué (gravitational) and Maninkoura (pumped), of 1,030 and 1,094 ha respectively. These are farmed for rice and bananas and also used for market gardening. In Sélingué 1,943 people hold land plots and in Maninkoura the number is 1,168 (of whom 231 and 69 respectively are women).

The Sélingué Rural Development Office (*L'Office de développement rural de Sélingué – ODRS*) is responsible for managing the dam.

Source: Adapted from Ouédraogo and Sedogo (2014) for Bagré, Hathie *et al.* (2013) for Niandouba, and Kergna *et al.* (2013) for Sélingué.

So the challenge is to rethink the approach taken to irrigated farming, tackling the following questions:

- a. How can government investment be channelled more effectively into irrigated agriculture to promote the best technical options – ones that are accessible to smallholders and guarantee high yields at lower cost on a sustainable basis?
- b. Given that governments are clearly disengaging from smallholder farmers, how can local social capital be enhanced so farmers' organisations can play a key role in decision-making and in governing the irrigated perimeters, particularly in managing land rights, infrastructure and agricultural services?
- c. How can we rethink the current model of state intervention and tailor it more effectively to the multiple roles performed by family farms, which are far more than just economic units of rice production and have social, cultural and environmental roles with a direct impact on the entire production system?

This document takes these questions as a starting point and is structured around a number of conclusions addressed to the different stakeholders involved in designing and implementing food security policies and programmes centred on irrigated agriculture. It suggests paths for action and reflection, proposing new institutional options and techniques to improve the livelihoods of family farms.<sup>3</sup>

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3. Ouédraogo et Sedogo (2014), for Bagré, de Hathie *et al.* (2013), for Niandouba, et de Kergna *et al.* (2013), for Sélingué. These documents are available (in French) online: <http://www.gwiwestafrica.org/library>



## IRRIGATED FARMING AND CEREAL DEMAND IN WEST AFRICA

Agriculture remains a highly strategic sector for the global economy because demand for agricultural products is constantly diversifying and growing in response to the combined effect of population growth and increasing per capita consumption – itself triggered by increasing personal incomes in emerging economies. This situation brings much tension to markets and great volatility in the prices of agricultural products. Growing demand for agricultural land also exerts acute pressure on natural resources (soil, water and energy). In the long run, the answer must be to boost productivity rather than continually increase the area under cultivation.

Because Africa today has such vast agricultural reserves it is seen as the last untapped resource. Although agriculture's share of Africa's gross domestic product (GDP) has shrunk over recent decades, there is an expectation that agriculture will now grow, all the more so because the rural population, which depends on this sector for its survival, remains significant in numbers. Sixty-five per cent of the continent's active labour force are employed in agriculture. (CTA, 2012).

### 1.1 DEPENDENCE ON INTERNATIONAL MARKETS

Family farms are central to agricultural and food production in West Africa. For example, according to the Federation of Non-Governmental Organisations of Senegal (*Fédération des Organisations Non Gouvernementales du Sénégal – FONGS*), family farms represent 95 per cent of farms and meet 60 per cent of national demand for food (FONGS, 2010). Cereals are dietary staples, especially millet, sorghum, rice and maize. Practically all African countries depend on imports to meet part of their cereal needs. This situation is largely a product of the central place occupied by rice in consumption.

Today, the continent only meets 60 per cent of its rice needs and has to import the remainder. In West Africa, rice represented 45 per cent of cereal imports between 2008-2010 (valued at US\$2,250 million in 2008) and although this dropped after



A farmer with combine harvester in his field in the irrigated perimeter of the Niandouba dam in Senegal.

2009, the value of these imports is still over 50 per cent higher than the value of imports before the 2007-2008 food crisis. (WFP/CILSS/FAO/CIRAD/FEWS NET, 2011). In addition, urban consumption of rice accounts for 63 per cent of the rice available in West Africa (Bricas *et al.*, 2009). Some countries, such as Senegal, have long been importing low price rice (at the expense of rural farmers) to satisfy urban populations who wield strong political influence. The 2007-2008 food crisis might even have had a silver lining because it revealed how this dependence made for a precarious situation and helped put agriculture back at the centre of development priorities.

It must be stressed that Africa's strong dependence on the external market comes more from making poor political choices and from lacking a clear vision than from poor agricultural potential. This is particularly true of decisions on agricultural investment, which is often ill suited to multifunctional family farms and brings little benefit to those smallholders who lack resources. It is also true of decisions in some countries that have introduced new land tenure policies which undermine small family farms while benefitting the private sector. The current context calls for new options and strategies to make the most of Africa's agricultural potential.

Regional demand is expected to grow because of the combined effect of continuing population growth and rapid urbanisation. Between the periods of 1995-1999 and 2005-2008, cereal consumption per inhabitant went up by 20 per cent in Senegal, 18.6

per cent in Mali and 11.6 per cent in Burkina Faso (MSU/Syngenta, 2011). In addition, recurring food crises in the Sahel, largely due to extreme weather events such as droughts and floods, call for an increase in cereal production capacity in order to build up reserves for future food security. At the same time, the trend of rising prices on the international market means local rice could become more competitive.

## 1.2 MAKING THE RIGHT POLICY CHOICES

Irrigated rice has already been made a central part of agricultural policy. So any new strategies to tackle the current challenge of food security must answer an essential question. How can we meet increasing short and medium term demand for rice while simultaneously redirecting food policy so it also promotes consumption of more nutritious cereals, such as millet and sorghum? This raises a number of issues linked to the availability and accessibility of agricultural inputs and equipment, access to markets and the existence of transport, storage and processing facilities for cereal products. In addition, promoting traditional cereals requires an integrated approach that links cereal policy with other sectoral policies, such as education and health. This type of approach has already produced innovative initiatives, such as the programmes for school meals introduced in various countries by bodies such as the World Food Programme (WFP). As well as helping boost pupils' nutrition, these initiatives have improved smallholders' livelihoods.

It is clear that unpredictable rainfall makes guaranteeing stable supplies very difficult. In the context of climate change and increasing variability, the issue of water management becomes particularly important, and goes hand in hand with the growing focus on irrigated agriculture. However, policies based on building major dams raise questions, given these dams' weak economic performance. If irrigated agriculture is to constitute the basis for food security policy, governments will need to rethink current investment decisions and seek alternative technical models that are economically viable and accessible to smallholders.

The potential for increasing supply is high both because the percentage of irrigable land actually irrigated is still very low in the three sites studied and because potential productivity gains remain high since existing irrigation systems are under-performing. By way of illustration, yields for irrigated rice remain very low, at about 1.6 tonne/hectare (t/ha), even though in some countries, such as Mali and Senegal, average yields are higher, reaching 3.6 t/ha and 3.09 t/ha respectively (WFP/CILSS/FAO/CIRAD/FEWS NET, 2011). The increases in rice production recorded to date are at least 80 per cent due to an expansion of areas rather than a real increase in productivity. At current productivity levels, the area under cultivation would need to be at least doubled to meet demand by 2025 (Bricas *et al.*, 2009). This raises the fundamental question of which technological approach to agricultural development to promote: will expanding irrigated areas or enhancing productivity maximise food-growing potential?

The three governments have shown their commitment to agriculture with a noticeable increase in public investment over the past five years. These three states have all reached or exceeded the aim set by the African Union in Maputo in 2003 to devote at least 10 per cent of national budgets to the agricultural sector (Summit of the Heads of State of the African Union, 2003).

However, most of this investment has been directed towards irrigated rice cultivation. Whether or not this makes the most of the agricultural potential and potential gains in productivity will depend on accompanying institutional and technical choices, chiefly relating to the type of agricultural development to be promoted and the institutional context (such as access to land, credit, and agricultural inputs, equipment and advice). The best choices will be those that combine the needs for food security and food sovereignty, sustainable use of natural resources, strengthened livelihoods for family farms, and profitability and sustainability of agricultural investments (particularly those made to support irrigated farming).





## STAKEHOLDERS' PERSPECTIVES AND THE CHALLENGES OF STRENGTHENING FARMERS' LIVELIHOODS

The case studies carried out in the vicinity of the three dams enable us to draw out the challenges and opportunities to consider in order to improve performance in the irrigated perimeters.

First of all, there is an obvious clash between two perspectives. On the one hand, the government has a vision of agricultural modernisation essentially featuring technological intensification and monoculture of rice, and which promotes agribusiness as the engine of this modernisation. On the other hand, there are the family farms which fulfil a range of different functions and rely on diversification of livelihoods.

Secondly, the discrepancy between the two approaches produces several challenges: institutional and technical inefficiencies which result in expensive land development that is not as effective as it could be; weakening of social capital; and provision of agricultural advisory services that does not suit farmers' diverse needs.

Thirdly, it is apparent that these inefficiencies do not undermine the central role rice cultivation plays in people's visions, aspirations and livelihood strategies. There is therefore a need to devise future responses that are tailored to the different types of farm.

Fourthly, the relevance and sustainability of these responses will require the immediate implementation of a better system of governance in the irrigated perimeters, based in part on building farmers' social capital so their organisations have the capacity to influence the decision-making processes.

These conclusions, which underpin this report, are addressed to the main stakeholders: farmers' organisations; members of parliament; agriculture ministries; donors; the private agricultural sector; agencies responsible for managing large irrigated perimeters

in the region; agricultural research and advisory organisations and civil society. And they are designed to help those formulating future measures to improve the adaptability and performance of irrigated systems, both within the three study sites and beyond.

## 2.1 A CLASH OF PERSPECTIVES

To produce responses that are tailored to the challenge of food security it is essential that key actors – governments and farmers’ organisations in particular – share a joint vision on aims, objectives and strategies for agricultural policy. Unfortunately, the reality ‘on the ground’ showed a confrontation between government and family farm approaches.

### CONCLUSION 1

The official approach, which underpins choices on agricultural investment in the irrigated perimeters, is structured round a vision of ‘agricultural modernisation’. The main components of this are a high degree of technological intensification, crop specialisation and strong promotion of agribusiness. Family farms are seen as elements of the system, but the government approach is not designed in such a way as to really encompass family farmers’ multiple roles or their own vision of development.

### Government perspective

Food self-sufficiency, in other words limiting dependence on imported agricultural products, is central to agricultural development strategies in the three countries. Governments have made considerable efforts to achieve this over the past four years through a major increase in agricultural investment. The objectives spelled out in the three countries’ long term plans and strategic sectoral documents all give priority to agricultural modernisation as the main driver for increasing agricultural productivity (the *Stratégie de croissance accélérée et de développement durable, 2011-2015*, in Burkina Faso; the *Loi d’orientation agricole, 2006*, in

Mali; and the *Plan Sénégal émergent, 2013*, in Senegal). Irrigated rice farming is central to this strategy and accounts for most investment in this sector. It attracts 63 per cent of investment in Burkina Faso and 65 per cent in Senegal, even though irrigated areas represent less than 10 per cent of cultivated land (Ouédraogo and Sedogo, 2014; Hathie *et al.*, 2013). This imbalance in the distribution of investment between the different cereal crops suggests that food self sufficiency comes down to rice self sufficiency.

The four pillars of this modernisation strategy are:

- a. technological uniformity, through a more or less standardised system of farming
- b. agricultural specialisation in rice
- c. a belief that only large irrigation developments can meet the production objectives set
- d. promotion of private investment: this clearly conflicts with the systems of production adopted by family farms, based on complexity and diversification.

This government approach flows from the belief that traditionally diverse systems of production – the strategic choice usually made by farmers – are not suited to ensuring food security because yields remain too low to make high investments profitable. As a result, the state tries to push smallholders to adopt a technological model that, instead of developing complementarity with the traditional system, simply seeks to replace it. In the process of trying to adapt to this new model, the traditional farming systems have become destabilised and have lost some of their resilience.

In terms of implementing this future vision, it appears that emphasis is being given to functional, economic and technological considerations at the expense of an integrated, institutional perspective which would prioritise strong social capital as a lever for local agricultural development. Yet the growing priority given to the agribusiness model does not seem to have any solid basis: there is no reliable proof that agribusiness is more efficient than family farming. Indeed, some data suggests the opposite. Numbers provided by the Senegalese farmers themselves indicate that family farms in the delta are amongst the most efficient in the world, with yields of 6 to 7 t/ha, although the challenge of reducing production costs remains to be tackled (Diop, 2008). Farmers achieved these results using a well organised agricultural credit system in a trial approach that made farmers themselves responsible for managing the irrigated perimeters. Infrastructure along the whole value chain also helped farmers acquire agricultural inputs and get their products processed. It is also worth noting that many agribusiness-type projects have a significant environmental and social cost because of excessive use of chemicals and agricultural techniques that tend to harm the land.

One direct consequence of the focus on 'modernisation' is that the drive for self sufficiency in rice becomes disconnected from local development strategies that *are* taking into account the diversity and complementarity of family farms' economic and social roles. For example, in Burkina Faso the new Bagrèpôle strategy is overtly oriented towards promoting agribusiness (despite a lack of any in depth analysis of its capacity to improve performance), often with a strong tendency towards specialisation, and to the detriment of smallholder farming which is based on diversification. And in Senegal, although support for decentralised rural development is one of the aims of SODAGRI (African Development Fund – *Fonds africain de développement*, 2001), this dimension is not properly accounted for in the company's performance indicators.

Such approaches have led to a 'vertical' system of governance in the irrigated perimeters, which gives the planning and management agencies (Bagrèpôle, SODAGRI, ODRS) the main decision-making powers, including the power to choose the technical production approach to be applied. This arrangement stifles any potential for innovation on the part of farmers, who are forced to conform to the norms and rules drawn up by the companies, particularly those affecting how land is allocated and the specifications for managing land development and infrastructure. This 'vertical' structure is characteristic of support services based more on supply than demand. The farmers' organisations have weak control over decisions, and the chain of responsibility now tends to be one way (from farmer to authorities in the irrigated perimeters). In other words, the authorities responsible for managing the irrigated perimeters feel little accountability towards the farmers for the decisions they take. The weakness of social capital, which is shown in the limited functionality of farmers' unions and federations in the three sites, means farmers are not in a position to develop tools and mechanisms to stimulate reciprocal (and fairer) accountability. Another consequence of this system of governance is lack of transparency in land management, which makes it hard to decipher land use (users, size of plots and tenure) and the mechanisms and results of water management.

A further result of this system is the increasing role played by new private sector stakeholders. Their rising prominence corresponds perfectly to the policy choices underpinning the government perspective, in which agribusiness serves as the main lever for achieving quantitative development objectives in the irrigated perimeters.

This perspective is reflected in various land allocation decisions and the reform of allocation measures in favour of private investors. The institutional transition of MOB to Bagrèpôle was accompanied by an urgent appeal to private investors, with attractive incentives (guarantees of land rights). In Mali, the allocation of several hundreds of thousands of hectares in the Office du Niger zone is a clear indicator of current political choices. In Senegal, large areas (over 100ha) have been granted to private operators in the Anambé zone.

## BOX 2

### A 'first hand' view from an Anambé smallholder

"All the difficulties we had in 2005-2006 were caused by the suggestion spread by certain people that indigenous inhabitants would not be able to farm the irrigated land profitably and that it would be necessary to bring in outsiders. This is what led to the idea of bringing in private companies."

Source: Hathie *et al.* (2013)

Opportunities exist to build up sustainable, mutually beneficial and complementary links between smallholders and private investors. A partnership model could guarantee smallholders' land rights and strengthen their role in transforming the agricultural sector, while allowing private companies to play an active part in the value chain. Farmers wanting to improve their production system face difficulties getting access to agricultural inputs, processing, storage and training. In the absence of a state-run finance system and effective agricultural advisory services, the private sector could help to fill the gap. Initiatives are under way in Bagré, Burkina Faso, experimenting with public/private partnerships. However, this kind of partnership needs to be overseen by the government through a legal framework which compels private investors to respect their obligations, for example in terms of farming, marketing or employment contracts. It will also be essential to make sure the farmers' land rights are safeguarded.

## CONCLUSION 2

In contrast to the single focus of the governmental approach, family farms see their multiple roles as a fundamental characteristic and key determinant of their resilience. If the models for interventions in the irrigated perimeters take this reality into account they will be able to act as levers to increase production and build up the livelihoods of poor smallholders.

### Family farmers' perspective

When confronted with the system of specialisation and intensification advocated by the government in the irrigated perimeters, family farms still put forward an approach based on diversification. This is more than a strategy to manage risk: diversification is part of the make-up of the family farm, which combines economic, social, cultural and environmental roles. However much capital they have at their disposal, most family farms put diversification at the centre of their strategy.

Against this background, specialisation is always seen as a last resort for farms low in capital (land, labour and financial resources) or part of a system which excludes recourse to any other activities. This is the case for migrants who have no access to other resources or activities; however, their constraints can push them to intensify production to enable them to make more profit from their only source of income.

The situation facing family farms leads them to a different view on the right place for rice in the production system to that of the government. For most farms, rice cultivation is

not the main element of their livelihood strategy although it may be a catalyst for integrating and linking together different forms of capital. Self-sufficiency in rice is definitely an important objective for most family farms growing rice but they are also involved in all sorts of other activities, such as cattle rearing, seasonal employment and migration. There is a close relationship between these activities and rice growing. As it stands today, with its institutional shortcomings (absent or inadequate support services) rice cultivation would only just survive without these activities. For example, in Niandouba selling cattle pays for agricultural inputs; in Bagré cattle rearing provides animals to work the land; in Sélingué gold washing lets farmers repay loans.

Whatever the criteria used to categorise farms<sup>4</sup> a certain number of crosscutting characteristics stand out as the basic livelihood strategy of family farms. First and foremost this includes the association between irrigated crops and dryland farming, cattle rearing and non agricultural seasonal activities (such as artisanal gold mining, migration and small scale trading).

Cattle rearing and remittances are central to diversification strategies. As shown in Figure 1, they constitute the main sources of funding for irrigated farming, which is very expensive in terms of agricultural inputs. They therefore represent essential palliatives in tackling the sometimes difficult access to official financial services (banks and microfinance institutions) or to unofficial sources (traders). In this context, the capacity to self-finance becomes an important socioeconomic distinction between farms. Farmers who do not have these opportunities find themselves in a precarious and vulnerable situation.

The way in which diversification strategies are implemented depends on the type of family farm, which differ in size, social composition, capital, aims, aspirations and constraints. This diversification can be between different agricultural sectors (intra-sectoral), or can combine agricultural and non agricultural activities (intersectoral). The types of farms identified around the three dams show a number of different agricultural models ranging from complete specialisation to varying degrees of diversification:

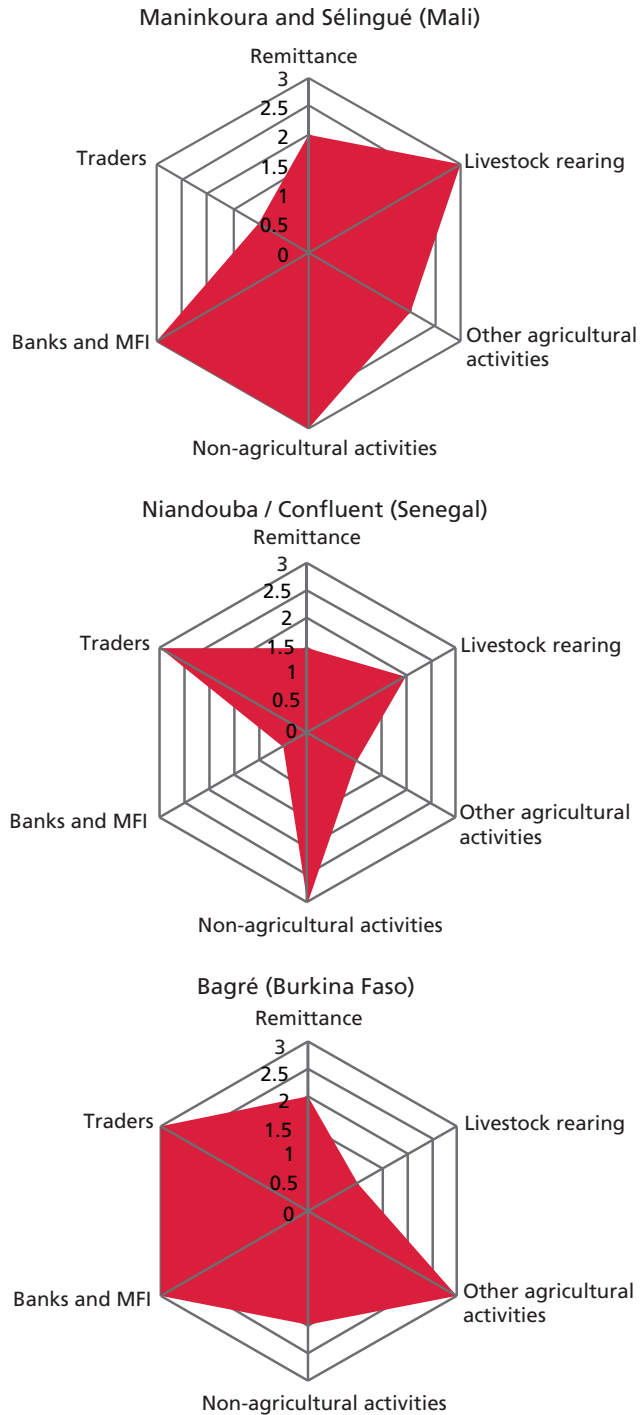
- a. **Voluntary agricultural specialisation:** This usually involves large scale farmers with considerable financial means and the capacity to farm large areas (from 20 ha to over 100 ha). These farmers can be found across all three sites. They hold guarantees which open the way to bank loans or have other reliable and regular sources of income (for example as manufacturers, retailers or religious leaders). In some cases, the government or the development companies make arrangements to grant them the land needed. This happened in Niandouba, for example, when religious leaders were earmarked large tracts to develop and occupy in the irrigated perimeters. Rice is viewed as a cash crop and food security is not the primary aim of big farmers, even when they consume part of what they produce. Generally speaking, all they expect from the authorities in charge of development is the right standard of equipment and supply of water. They have little social link to the site and tend to build their own networks. They are not representative of family farms, which have different motivations. Their link to the land is essentially economic and only lasts as long as it offers economic opportunities.

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4. Farms in the three sites were put into categories in a participatory process involving different groups of stakeholders (farmers, elected representatives and technical staff). Each site suggested a specific system of categorisation which served as a basis to analyse the strategies and livelihoods of family farms. The degree of diversification was used as a crosscutting criterion in choosing farms in the three sites.

**FIGURE 1**

**Main sources of funding for farms**



Source: Ouédraogo and Sedogo (2014) for Bagré; Hathie *et al.* (2013) for Niandouba; Kergna *et al.* (2013) for Maninkoura

b. **Forced agricultural specialisation (monoculture):** Several farms have opted for specialisation (rice monoculture) because of lack of capital. Most such farms devote very small areas to rice (between 0.25 and 0.5 ha, with a few rare farms of 1 to 1.5 ha) and carry out no dryland farming. These farms, which are often run by migrants or vulnerable groups, have no other source of revenue and are often involved in outside, non agricultural activities, which prevent them from freeing up enough resources to improve their system of farming. They do not have the necessary guarantees to obtain credit from banks or MFIs. It is difficult for them to access equipment for ploughing or harvesting. Yields are generally low. Although self sufficiency in rice is their priority, this is not usually achieved. The farmer, therefore, has to turn to non agricultural activities, such as seasonal work or small scale trade to meet household needs. These farms are extremely vulnerable and need close monitoring and access to support services such as finance, agricultural advice and social networks as well as supply of stock (animals and poultry). Sometimes they are forced to resort to 'contracts' with local salesmen for agricultural inputs at exorbitant rates.

### BOX 3

#### **Monoculture (specialisation) in Niandouba, Senegal**

This farm has 1.35 ha under rice cultivation and a labour force of two. The last farming season made a net loss, of 8,000 FCFA. It illustrates the precarious situation of these farms which are forced to specialise because they have no other complementary resources. The family will have to rely on non agricultural activities to meet their needs.

Source: Hathie *et al.* (2013)

- c. **Voluntary diversification (agricultural and non agricultural) with substantial resources:** These are farms with a relatively large rain-fed area (between 5 ha and 10 or more ha), in addition to irrigated plots. They also have other significant sources of revenue such as cattle rearing, artisanal gold mining and remittances. The irrigated plots usually produce the same yields as farms which have chosen to specialise because they have the financial resources to pay for agricultural inputs and have access to agricultural equipment in the irrigated perimeters. Cattle rearing plays a central role in financing production activities (seeds, fertilisers and hiring of harvesting and hulling equipment). Most farms finance themselves. These farms are self sufficient in rice and other cereals and produce surpluses for sale. Like the farms which specialise by choice, they want well developed irrigated land. They also need a more integrated support service, which covers their economic activities outside the irrigated perimeters and meets the agronomic and investment needs of the farm as a whole, rather than only the rice growing part (particularly access to markets for other cereal products and cattle, and access to agricultural inputs).
- d. **Voluntary diversification with limited resources:** This is practised by farms where land resources, both for irrigated rice cultivation and in the rain-fed areas, are limited. The farm's other sources of revenue do not allow for substantial investment in the rice growing plots. Livestock usually consists of small ruminants. Income from those who have emigrated, from seasonal work or small scale trade is limited or nonexistent. The main aim of these farms is to become self sufficient in rice, but they need more diversified support, such as credit and social networks, to make up for their lack of resources.

## BOX 4

### Farming budget of a diversified household in Maninkoura, Mali

This farm is made up 21 people, of whom nine are actively involved in farming. It has 10 ha of land cultivated as follows: sorghum (3 ha), millet (1 ha), maize (3.5 ha), groundnuts (1 ha), rice (1 ha) and market gardening (0.5 ha). The gross value of production came to about 1,700,000 FCFA in 2012. In addition to agricultural revenue, the household makes 250,000 FCFA from artisanal gold mining. The household easily meets its needs in terms of cereal consumption, estimated at about 7,500 kg. According to the household head, income covers about 80 per cent of the overall needs of the family (such as food, health, education and social events such as ceremonies). This is made possible through diversified agricultural and economic activities. Although it plays a key role in ensuring food security on the farm, rice cultivation is not the most important element in this.

Source: Kergna *et al.* (2013)

One of the lessons to be drawn from this categorisation is that small plot size is not a fixed feature of family farms. Several family farms cover over 20ha and combine irrigated and rain-fed crops. In addition, most of them are ready to invest in improving the performance of their production system, particularly when there are incentives such as guaranteed access to land and markets. Analysis of the different types of farm has shown that under certain conditions, family farms have the capacity to launch a process of institutional and technological innovation, which enables them to achieve a high level of economic performance (as compared to the relatively low yields generally achieved in these irrigated perimeters). This can make them interesting alternative models, given that the prevailing discourse favours agribusiness (family farms can offer the necessary economic stability while ensuring smallholders' control of the land). The experience of seed producing smallholders in Burkina Faso (see box 5.) illustrates the importance of social capital for improving family farms. There is no doubt that being part of formal and informal networks increases the resilience of family farms because it brings access to various forms of group solidarity and mutual help, as well as other types of services such as credit, capacity building and access to information.

There are a range of different ways in which farms have been able to improve their economic viability.

The first is by securing access to (alternative) forms of finance for their farming businesses by diversifying their other sources of income. In most farms, cattle rearing enables this basic accumulation of funds, but it is sometimes combined with other sources of income, such as remittances from migrant family members or (in Mali) artisanal gold mining.

Secondly, human capital has turned out to be a determining factor and, in this context, larger size farms with several economically active adults appear to have a significant advantage because they can manage and consolidate their diverse activities.

Thirdly, secure land rights represent another essential condition, particularly in irrigated perimeters. This security can serve as an incentive to invest, especially when acquiring stock, such as draft animals or livestock for breeding, which can both contribute to fertilising the soil and help farmers pay for agricultural inputs and hire services and equipment when needed.



## BOX 5

### The case of the Bagré seed producers, an institutional innovation which builds social capital

The seed producers, set up in 2003, are a group of 32 people who received training and technical support from MOB and the Burkina Faso *Maison de l'Entreprise*, with Bagrépôle providing technical and commercial oversight. Seed production did not take off until 2008, because before that seeds were sold for the same price as rice for consumption, namely 75 FCFA per kilo, which meant almost 80 per cent of the seed producers abandoned the project. In 2008, subsidies were introduced for agricultural inputs and seed production resumed, and now sells to the government at 500 FCFA/kg.

At the beginning, each producer was allocated a plot of between 0.74 and 1 ha. However, seed producers could also rent land for 100,000 FCFA per hectare from other farmers, which enabled them to farm between 5 and 20 ha. All seed producers have oxen-drawn farm equipment with harrows and carts, and three of them have even set up rice processing equipment.

The seed producers are organised into a farmers' group and because of this, they have been able to develop a 'warrantage' scheme in collaboration with the network of *caisses populaires*, which means members can secure seasonal loans when they need them, for example while they are waiting to market their output. They have also developed supply networks for agricultural inputs.

To increase their lobbying power, the seed producers have recently established a union bringing together the four groups of seed producers (maize, beans, groundnuts and rice). This union managed to negotiate a loan of 100 million FCFA from Coris Bank in May 2013, on the basis of a stock guarantee of 900 tonnes. This credit enabled the union not only to finance the growing season, but also to buy up other members' output. Today, 60 per cent of seed producers have yields ranging from 4 to 4.5 tonnes. They have all diversified and have cattle, small ruminants and poultry rearing facilities. Some have started processing rice and others have begun selling rice and agricultural inputs wholesale.

Source: Adapted from Ouédraogo and Sedogo (2014)

Unfortunately, the size of the irrigated crop areas remains very small for most farmers. In Niandouba, in Senegal, plots vary in size between 1.25 and 1.35 ha, whereas in Burkina Faso, 73 per cent of farmers interviewed have plots of between 0.7 and 1 ha for rice, and at least 1 ha for rain-fed crops. In Mali, many farms are about 0.5 ha in size, although some farmers have bigger areas. In most cases, the areas allocated cannot yield enough rice to feed a family of eight to ten people. Paradoxically, instead of helping indigenous smallholders to expand their areas, government strategy encourages the involvement of new stakeholders, who are allocated very large areas of land.

The size of a family no longer seems to determine land allocations, even if this was initially the case. Those farms that have managed to expand their area have done so through land transaction mechanisms, often informal in nature, such as loans or sales. Although this land market is not formally recognised (it is in fact formally prohibited), it does exist *de facto* in the various irrigated perimeters and the absence of an effective monitoring system makes it hard to establish the scale of the areas involved.

Overall, this flexibility in the land market presents some advantages. It allows smallholders who are not able to develop their plots to rent them out, and so bring in money. And this flexibility also lets farmers with the means to acquire land to produce more. This seems to meet the two government objectives of increasing production and reducing poverty – provided it does not lead to a complete loss of land for smallholders, forced by individual circumstances to permanently sell their plots.

Given the scarcity of irrigated crop areas, access to rain-fed land becomes an important aspect of the farmers' strategies; letting them redeploy surplus labour, enhance food security and rear cattle (sources of both income and organic fertiliser). So rice cultivation in the irrigated perimeters is closely linked to rain-fed farming. In contrast to land in the irrigated perimeters, land in rain-fed farming areas follows a system of tenure ruled by custom, particularly in the sites in Mali and Senegal.

All this goes to show that the specialisation model promoted by the government for the irrigated perimeters does not suit the reality of family farms. The system of institutional and investment support should reflect the multifunctional nature of family farms.

## BOX 6

### Example of a well-resourced diversified farm in Niandouba, Senegal

The farm covers an area of 10.5 ha, of which 5 ha are devoted to irrigated rice, 2 ha to maize, 3 ha to cotton and 0.5 ha to groundnuts. With a labour force of three economically active people, this farm brought in an agricultural income of 983,000 FCFA per person during the 2011 to 2012 season. Although the rice plot produced a gross loss of 92,000 FCFA, the income from other crops enabled the farm to make a substantial income per person.

This example illustrates the perspective of family farms, whose main preoccupation is the balance and performance of the system as a whole, even if some elements perform less well than others, either as a result of reasoned choices or constraints. For many farms, the primary objective of rice cultivation is to help feed the family. The profit motive may not always be a priority as long as they can make an income from other activities which permit them to meet family expenses.

Source: Adapted from Hathie *et al.* (2013)

## 2.2 CONSEQUENCES OF THE DISCREPANCY BETWEEN THE TWO PERSPECTIVES

### a. The poor development quality of the irrigation systems is one factor explaining the low yields obtained by most farmers

This is a result of the focus on large scale projects which are extremely expensive to construct. The upkeep and maintenance of irrigation infrastructure is influenced by several factors that keep costs very high. The shortage of financial resources is exacerbated by inefficient systems for collecting usage fees and the low level of participation by farmers' organisations in managing the irrigated perimeters, which opens the way to practices such as diverting water and to a lack of transparency in maintenance programming. All of this degrades the irrigated area and its infrastructure. As a result, yields per plot remain relatively low in comparison with their potential. Although average yields of rice in the Senegal delta reach over 6t/ha (Diop, 2008), in Anambé they are between 1.3t/ha and 4.75t/ha. Low yields are also found in Sélingué and Bagré (Kergna *et al.*, 2013; Ouédraogo

and Sedogo, 2014). However, we must also bear in mind other factors, such as the absence of an effective system of agricultural credit to facilitate access to agricultural inputs and equipment for the majority of smallholders.

### **b. Social capital is weakened in the irrigated perimeters**

An effect of dismantling the traditional system, in favour of agricultural specialisation, is to introduce a 'vertical' model of governance that marginalises traditional institutions and organisations so they no longer have a voice within the irrigated perimeters. The gradual disappearance or weakening of traditional organisations only adds to the vulnerability of the poorest farms. These miss out on group solidarity, which can be particularly important in periods of crisis or stress. As this process is taking place while the government is disengaging, the vacuum left by the state is taken over by new arrangements for support and service provision, which lack a firm social or local basis and are often unmonitored and without clear specifications on how and when services should be provided. This is illustrated by the numerous cases of abuse observed by the three case studies (such as supply of poor quality inputs, non compliance with delivery dates and lack of after sales service).

### **c. Resource-poor smallholders are excluded from the system**

The current thinking behind schemes to develop irrigated perimeters is at odds with the fight against rural poverty, set out in various strategic documents as a major objective of agricultural development programmes in the three countries. The reformulation of criteria for access to plots, which now stress the capacity to develop their potential, by definition excludes most farmers who lack spare human, physical or financial resources. Paradoxically, the system of agricultural development benefits the already-better-off farmers. Given that traditional support services for access to credit are breaking down, smallholders cannot acquire the resources needed to meet the access conditions for irrigated plots. The formal institutional framework set up to empower them (helping, for example, with credit, advice and marketing) does not work. At best, these farmers are offered very small areas of land which do not permit them to produce enough food to feed their families, let alone produce a surplus to sell.

The authorities' efforts to attract outsiders and private investors into the irrigated perimeters, and the incentives offered to these interests, bolster indigenous smallholders' arguments that the government is seeking to exclude them from the system. Smallholders' numbers are dwindling, in terms of both individuals and amount of land cultivated. In the zone of Niandouba, 34 per cent of plots allocated in 2005 went to groups of outsiders. Indigenous smallholders, who received only 20 per cent of allocations, held only 17 per cent of the allocated areas. Secure land tenure is an important way of mitigating risk for smallholders because when farmers do not have the means to develop their plot they can rent it out and make the money they require for their basic needs. As has been mentioned above, this practice which is clearly illegal, seems to be tolerated.

### **CONCLUSION 3**

The discrepancy between the government's and the family farmers' perspectives leads to several institutional and technical inefficiencies. These are reflected in costly and ineffective projects, and the weakening and sidelining of local social capital in decision-making for sustainable management of irrigated perimeters. Smallholders with the least resources find themselves in increasingly precarious positions; and the system of advisory services has become fragmented and does not meet the inherent needs of family farms, given their multiple roles.

#### **d. Agricultural advisory services are weak and fragmented**

Where there is a high degree of agricultural specialisation, rice cultivation is only loosely integrated into the local development strategy. The main support services (finance, processing, training, advice and marketing) are directly linked to rice and not to the local economy as a whole. To respond to farmers' diverse support needs, governments are forced to draw up a number of advisory arrangements through different bodies, which are not always run very effectively. The different arrangements are very poorly coordinated and can lead to duplication or conflicting messages, as happened in Mali, where researchers observed friction between the agents responsible for agricultural guidance in the ODRS and those playing a role in the traditional rain-fed crops. In addition, the current system of agricultural advisory services being applied in the irrigated perimeters tends to offer a uniform service, whereas different types of farms may have very different needs.

As the state is disengaging from its traditional role of supporting marketing and supplying agricultural inputs and equipment, there must also be changes in the way agricultural advisory services are provided. The new role must be to act as an intermediary, bringing farmers and service providers together. Unfortunately, this role has been neglected because of the poor methodological, technical and material capacity of agricultural advisory services, not to mention understaffing, lack of motivation and high staff turnover.

The people who suffer most from this situation are those farmers who are most short of resources and who are unable to appeal to other service providers. These farmers have a greater range of support needs in terms of access to credit, equipment or marketing than the better-off farmers, whose resources open up the services they need. This situation results from the absence of a good strategy for agricultural advisory services, particularly in terms of the institutional links between such services and agricultural research.

### **2.3 FUTURE VISIONS AND ASPIRATIONS OF FARMERS**

All farms, whatever their individual characteristics, highlight the important role that rice plays in their livelihood strategies. They all aspire to keep a foothold in irrigated rice cultivation. For the great majority of farms (small and medium sized) if they are self sufficient in rice they can substantially reduce food purchases and thereby become more resilient. In the case of big farms this aspiration reflects their search for a strategic position in the market, given the new trends in agricultural policy and the various incentives being offered to the private sector (particularly, easier access to land tenure).

#### **CONCLUSION 4**

In spite of the institutional and technical constraints which hamper the performance of irrigated rice cultivation systems in the various zones studied, rice remains a strategic cereal, central to the visions and aspirations for the future held by most family farms. However, any measures introduced to help realise these aspirations must reflect the contrasting underlying motivations of the different types of farms. One of the major challenges will be to create the institutional and technical conditions which would allow those farmers who have the necessary ambition and capacity to scale up, by producing more and better. This will naturally involve the removal of constraints relating to land tenure.



Young villagers in the Sélingué irrigated perimeter in Mali.

Farmers also refer to other important motivating factors, such as sustainable access to land holdings which are becoming increasingly sought after. Many farmers want to hang on to their irrigated plots to maintain a permanent presence in the irrigated perimeter and benefit from a resource which, apart from the opportunities it offers in terms of agricultural production, can temporarily generate income through activities such as renting or sharecropping. These practices are observed most frequently on the poorest farms which, lacking the means to farm their plots, sometimes rent them out.

This general overview of the future visions and aspirations of farmers would not be complete without considering individual features of the different groups:

### **a. Young people**

Most young people are increasingly pessimistic about participating in the agricultural system. Although there are quotas for new allocations of land in some of the perimeter zones such as Bagré, most young people are generally excluded from accessing land in these zones. Failing to find paid seasonal or permanent employment (artisanal gold mining or working as a farm labourer) or emigrate, they see their future in terms of income generating activities such as market gardening or intensive cattle rearing. The issue of food self sufficiency is not a central preoccupation for them. This is partly because some young people do not take on family responsibilities. In addition,

they prefer a more commercial economy. This raises doubt as to whether the local socio-economic system will last and at the same time challenges decision makers to think through the implications of this situation and how they might integrate more young people in the system of irrigated agriculture. Young people should no longer be viewed as simply a family labour force but as stakeholders to be made part of development strategies for the irrigated perimeters. The starting point is to take them into account in allocating plots but also in providing access to support services. However, this will require young people to organise themselves so they can negotiate and exert pressure to obtain the changes desired.

### **b. Women**

Women, like young people, are very poorly represented amongst the landholders in the irrigated perimeters. In Niandouba they represent 12 per cent of the population, with relatively small plots averaging 0.27 ha. The situation is similar in Mali, where female plot holders represent about 16 per cent of the population in Maninkoura, and 12 per cent in Sélingué, with plots under 0.3 ha (Kergna *et al.*, 2013). In some cases, the women who have been allocated plots do not farm them directly but prefer to rent them out.

Women aspire to receive a larger share of the plots allocated in the irrigated perimeters and elsewhere, and this reflects a need for more economic and social autonomy, which they hope to achieve by diversifying their sources of income and acquiring more responsibility in the decision-making process of local organisations. They will have to do this by building up their economic and social assets (such as cattle rearing, credit, networks and training). However, the current approach of specialising support, directed mainly towards activities in irrigated perimeters, does not take account of these specific needs.

## GUIDELINES FOR MORE EFFECTIVE FUTURE INTERVENTIONS

### CONCLUSION 5

The political objective of food security must take into account both the many roles performed by farms and the varying emphasis they give to rice cultivation in their future visions and aspirations. However, before any new interventions can be made, a system of governance for the irrigated perimeters must be drawn up, based on new rules and mechanisms for accountability as well as a stronger role for farmers' organisations in the decision-making process.

The three main pillars of this system of governance should be:

- a. Establish a system to take inclusive and transparent decisions in support of a vision shared by governments and farmers alike
- b. Introduce control mechanisms and tools that farmers can use
- c. Establish a national and regional institutional framework that lays down and guarantees new rules of governance in irrigated perimeters.

Introducing this kind of governance would make it possible to place the different categories of farmers at the heart of the arrangement. It is essential to rethink the chain of responsibility and make the bodies in charge of providing services in the irrigated perimeters feel responsible to the farmers for the quality of these services. These bodies must then introduce decision-making processes and mechanisms which meet these requirements. In the same vein, farmers must have the necessary social and human capital not only to be aware of their rights but also to be able to exercise the required control over decision-making systems. This process of institutional transformation must be supported by the government, which will have to adapt the previous rules of the game and redefine the roles and responsibilities of the different stakeholders. It must also be based on clear principles, jointly identified and accepted by the different

stakeholders. These principles will cover clearly defined rights of access and use of water and equipment, equitable sharing of costs and benefits, respect for rules accepted by all and the introduction of mechanisms for conflict resolution.

## BOX 7

### Opinion

“Farmers are perfectly capable of managing the perimeter zones, but applying their own approach. This is why they think that a system of hybrid governance which reconciles the policies of the government with the approach of farmers should be found and applied to produce a more viable system of governance for the irrigated perimeters.”

Source: Illiassou Mossi, ANID/ARID

## TABLE 1

### Eight principles for designing self-managed, sustainable irrigation systems

	Principles	Meaning
1	Clearly defined boundaries	The boundaries of the service area and the individuals or households with rights to use water from an irrigation system are clearly defined.
2	Proportional equivalence between benefits and costs	Rules specifying the amount of water that an irrigator is allocated are related to local conditions and to rules requiring labour, materials, and/or money inputs.
3	Collective choice arrangements	Most individuals affected by operational rules are included in the group who can modify these rules.
4	Monitoring	Monitors, who actively audit physical conditions and irrigator behaviour, are accountable to the users and/or are the users themselves.
5	Graduated sanctions	Irrigators who violate operational rules are likely to suffer graduated sanctions (proportional to the seriousness and context of the offense) from other irrigators, from officials accountable to these irrigators, or from both.
6	Conflict resolution mechanisms	Users and their officials have rapid access to low cost, local arenas to resolve conflicts among users or between users and officials.
7	Minimal recognition of the right to organise	The rights of users to devise their own institutions are not challenged by external governmental authorities.
8	Nested enterprises	Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organised in multiple layers of nested enterprises.

Source: Ostrom and Benjamin (1993)



There is a pressing need to map the dynamics of land tenure in the irrigated perimeters in order to have greater transparency about usage, to identify owners of allocated land and who uses it, size of plots, different forms of transactions and so on. This mapping exercise should lead to a review or redefinition of the rules and conditions of land allocation, in order to guarantee access for the most vulnerable groups, while offering ways forward for efficient farmers who seek to develop. Current conditions do not really allow the poorest farmers, especially women and young people, to extricate themselves from their precarious and vulnerable situation. They find themselves trapped in a vicious circle insofar as their lack or scarcity of capital prevents them from meeting the conditions for acquiring more land, which in turn prevents them from making enough income from their plots to acquire and accumulate new capital.

In this context, the package of services on offer to poor farmers must be re-considered, emphasising support for building up capital to help them overcome funding difficulties, and reducing the vulnerability that stems from these farmers' strong dependence on a single plot in the irrigated perimeters. This can be done through different mechanisms, such as the granting of credit for small scale cattle rearing and cash transfers.

#### **BOX 8**

##### **First hand account by a farmer in Maninkoura, Mali**

"Things are bad in Maninkoura! You lose your harvest and end up in debt. God is great! It might be the rice nursery that dries up through lack of water, or your crop fails through too little or too much water or else it's the need to pay back the agricultural inputs when the plot has not yielded a thing."

Source: Kergna *et al* (2013)

In addition, the mapping of land tenure should serve as a useful tool for the new governance system in the irrigated perimeters. Under this approach, the re-definition of rules for allocating plots will be governed by the same rules that apply to participation and inclusion of farmers, who must have the tools needed to establish a system of audit and of participatory monitoring and evaluation of land use governance.

### **Rethinking the agricultural and rural advice system**

While reconfiguring the management system for the irrigated perimeters through stronger mechanisms for participatory governance and inclusion of family farms' diverse needs, the system of agricultural advisory services will be rethought to enable it to do more to strengthen the economic resilience of farms. Two major challenges stand out in this approach.

The first relates to strengthening and consolidating social capital in the relevant zones. To establish a sustainable system of agricultural advisory services it is vital to involve legitimate and representative local institutions and organisations that have the necessary skills to serve as interlocutors in dealings with the government and other stakeholders. Building up this social capital must take into account associations bringing together women and young people, whose needs are largely ignored in the allocation of plots today.

The second challenge is linked to the need to set up an integrated system of service provision which reflects farming as a whole. It has already been shown that rice is only

one element of farmers' livelihood strategies. Support services should be diversified to take into account farmers' different needs. For some, building up capital may now appear as the top priority, while others who are better-off may just need good quality advice and infrastructure (or facilities) to increase their productivity. Agricultural advisory services could play a more crosscutting role, benefiting all types of farm, by serving as a facilitator that puts farmers in touch with other service providers (such as agricultural input suppliers, purchasers of agricultural products and training services). This new approach to agricultural and rural advisory services requires a shakeup of the current role and capacity of organisations and people.

However, given the increasing political emphasis on privatising agricultural advisory services, there is a serious question mark over how to meet the costs involved in such a service. The withdrawal of the government from the system could easily lead to the exclusion, pure and simple, of poor farmers from agricultural services.

### **Towards an alternative system of financing the value chain**

Access to finance is a weak link in the various irrigated perimeters. The high rates of non-repayment of loans have led several credit institutions to withdraw. This happened in Senegal where, when the Caisse Nationale de Crédit Agricole du Sénégal (CNCAS) withdrew in 2005, only about 19 per cent of loans were being repaid (Hathie *et al.*, 2013).

#### **BOX 9**

##### **Statement by the president of the Federation of Anambé Basin Producers (*Fédération des producteurs du bassin de l'Anambé*)**

"The CNCAS granted credit directly to smallholders without involving the Federation and there was no monitoring by SODAGRI. This is behind all the difficulties that arose."

Source: Hathie *et al.* (2013)

The lack of capital in the microfinance institutions (MFI) is another limiting factor. The cooperative system has declined, while the principle of a third party guarantee has disappeared and this limits the possibility of additional security and increases the risk for financial institutions. The collapse of the official credit system for access to agricultural inputs and equipment opens the door to money lending (generally by traders), to which the weakest farmers are the most vulnerable. Thus the government's withdrawal mainly penalises smallholders and serves to deepen social differentiation.

Given this situation, the government and private institutions must think about an integrated system of finance, which is compatible with the multifunctional nature of farms and the value chain's various economic activities. However, before such a system is introduced, a study should be carried out to understand better the factors underlying non-repayment of loans, to make the system more effective.



## FINAL CONCLUSION

The issues at stake in food security are important enough to justify an intensive effort to improve the institutional framework through appropriate new policies and programmes. The propositions and recommendations made in this report are part of this effort. The three case studies show that governance of irrigated systems around major dams faces a considerable challenge in reconciling the objectives of the government and those of farmers. A large amount of public money has been invested in building these dams and developing large irrigated perimeters. Governments are torn between the need to achieve an (economic) return on investment, and the need to fight rural poverty and food insecurity by facilitating access to land for those smallholders who need it the most. Attempts to reconcile these two sometimes incompatible objectives come up against institutional and technical constraints.

However, current strategic choices do not seem to be following the best route. The conclusions of the different case studies argue strongly for a new perspective which focuses on farmers' own strategies in developing irrigated farming.

The different intervention options set out here adopt this position. However, effective implementation will depend not only on commitment from the different stakeholders and others affected by the problem of developing farming in irrigation systems but also on improving the livelihoods of family farms. Establishing a good strategy for communication and advocacy (with farmers' associations as the main catalyst) will create spaces and channels to reflect together and share knowledge and practice. This is needed to effect the desired changes. Influencing policy is a long and complex process. The challenges for farmers' associations will be to identify other stakeholders with whom they can build this process of change, define the approach to intervention, as well as the strategy and mechanisms needed to ensure effective and sustainable implementation.

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### **Photographs**

Cover photo: Women replanting rice in the irrigated area around the Bagré dam in Burkina Faso.

Credit: Barbara Adolph/IIED.

Introduction: Diversified farm in the irrigated zone around the Sélingué dam in Mali.

Credit: Barbara Adolph/IIED.

Chapter 1: Bagré dam in Burkina Faso. Credit: Jean-Claude Frisque/IUCN.

Chapter 2: A farmer watering her plot next to a rice field in the irrigated perimeter around the Sélingué dam in Mali. Credit: Barbara Adolph/IIED.

Chapter 3: Irrigation channel in Sélingué's irrigated perimeter in Mali. Credit: Barbara Adolph/IIED.

Chapter 4: Cattle belonging to villagers in Sélingué's irrigated perimeter. Credit: Barbara Adolph/IIED.

This report is based on the main lessons and recommendations from three case studies analysing the strategies, aspirations and constraints of the various types of farmers living around the dams of Bagré (Burkina Faso), Sélingué (Mali) and Niandouba/ Confluent (Senegal). The research, initiated by the Global Water Initiative (GWI) and funded by the Howard G. Buffett Foundation, aims to contribute to ongoing national and regional discussions on the policies and programmes needed to improve rice cultivation in dam-irrigated perimeters and to support farmers' livelihoods.

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