

# Land tenure conditions and the viability of irrigated rice farming



## KEY POINTS

- Producers who do not have access to land outside of the irrigation scheme should receive larger plots than those who also have access to rain-fed land.
- Plots allocated by the State must be large enough to provide producers and their families with an adequate income.
- Plots of one hectare or less do not enable an average family to meet its needs if it is solely dependent on income from this land.
- A land distribution policy based on “meeting demand” leads to allocation of plots which are too small and may create more poverty.

Analysis of land allocation strategies in irrigated agriculture schemes in West Africa yields lessons which can guide the design and implementation of current and forthcoming projects. Allocation of insufficient land makes the main purposes of large dam projects – to combat poverty and to increase national cereal production – more difficult to achieve. Research by the Global Water Initiative (GWI) at three dam project sites in West Africa shows that the area of land allocated per family is usually about 1 hectare (ha). This surface area is not large enough by itself to enable an average sized family to meet its needs, still less to invest in improvements to its economic and technical performance. As sale or rent of rice fields is not allowed, the initial allocations made are important as land holdings are then fixed and inflexible in the long term.

Large dam projects are among the leading measures adopted by governments and aid donors to respond to food security and climate change challenges. The 2013 Dakar Declaration,<sup>1</sup> signed by the governments of Burkina Faso, Mali, Mauritania, Niger, Senegal and Chad, envisages an increase in irrigated land in the region from 400,000 hectares to 1,000,000 hectares by 2020.

However, significant numbers of people often have to move to make way for these dams, both at the construction sites and in the areas to be flooded (for example, 48,000 people displaced at Fomi in Guinea, 38,000 at Kandadji in Niger, 55,000 at Taoussa in Mali). Deprived of their means of livelihood, these families usually receive compensation in the form of land allocations in the newly created state irrigation scheme. Migrants looking to escape difficult conditions and climatic hazards in their regions of origin are also attracted by these agricultural irrigation schemes. The question is, what area should be allocated to each family to enable them to make a living and invest in the future of their smallholding? Ongoing research by GWI at three dam sites where growing irrigated rice

is the main agricultural activity, at Sélingué in Mali, Bagré in Burkina Faso and Niandouba in Senegal, sheds some light on this issue.<sup>2</sup>

## What is the minimum area needed to make irrigated rice cultivation viable for family farms?

A simple graphic model allows us to determine the surface area necessary for one family, according to the revenue generated per hectare of irrigated rice (see Box 1).

Average families have 9 or 10 members, of whom 4 or 5 are active workers. In Niandouba, a family of 9 people would need 6 hectares of land if rice farming is its only source of income. At Bagré, where rice farmers produce two harvests per year, the minimum required area is approximately 2.5 ha (see Box 2).

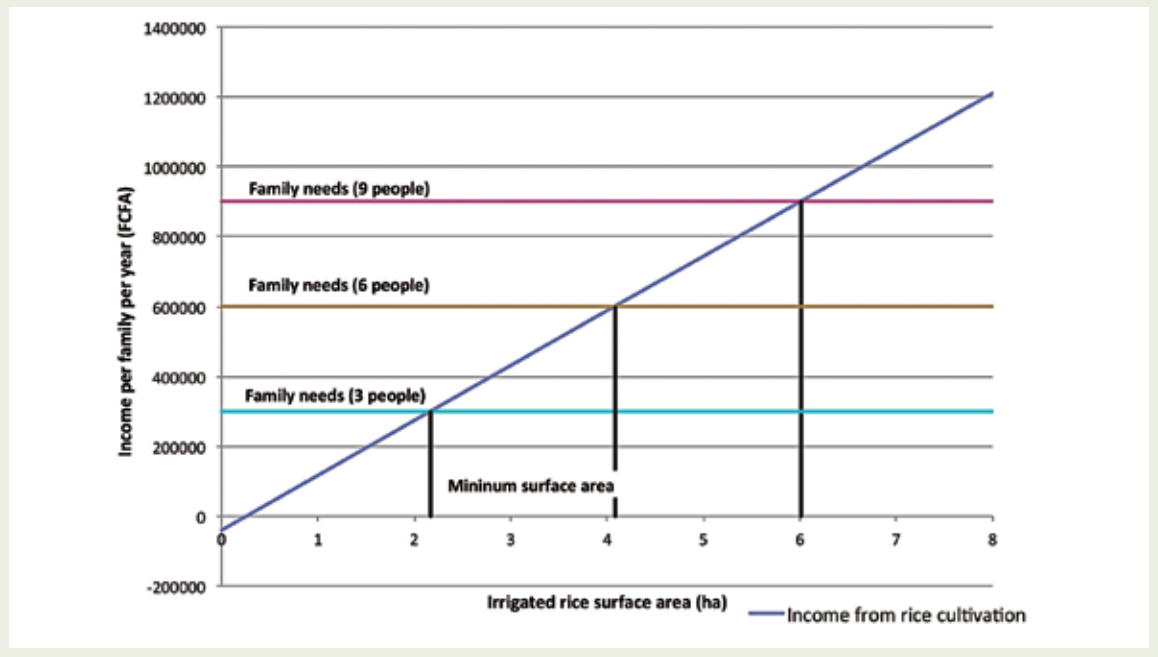
## Are the plots allocated to family farms in irrigation schemes sufficiently large?

Family farms in the schemes at Sélingué, Niandouba and Bagré are rarely larger than 1 ha per family. At Bagré, producers were allocated between 0.74 and 1 ha of irrigated land. At Sélingué, the state allocated plots

### Box 1. How to determine the surface area of rice necessary according to family size

The bigger the family, the more hectares are needed to feed it. The estimated minimum income necessary to meet a person's basic needs is estimated to be around 100,000 FCFA per year.<sup>3</sup> Analysis of production systems in the irrigation schemes around the three dams which GWI focuses on, provides realistic models of annual income per hectare of irrigated rice at current yields and prices. The surface area of rice cultivation necessary according to family size can then be determined graphically. In the example below, an average family of 9 people will thus need an income of 900,000 FCFA per year and will need to have 6 ha of land if rice cultivation is their only source of income. A family of 6 people would be able to live off about 4 ha.

#### Graphic representation of minimum surface area necessary according to family size



according to the number of active family members and their available equipment. Some families thus received several hectares of irrigated land. However, after transplanting was introduced in the 1990s, which was more demanding in terms of labour but enabled increases in yield, the dam management agency carried out a re-allocation and a reduction in plot sizes to 0.25 ha per recipient. At Niandouba, two types of allocation were initially planned: i) small irrigation plots as a complement for farmers with rain-fed land; ii) larger plots for farmers exclusively dependent on rice. In the event, the irrigated plots allocated to family producers did not vary much in size, between 1.25 and 1.35 ha.

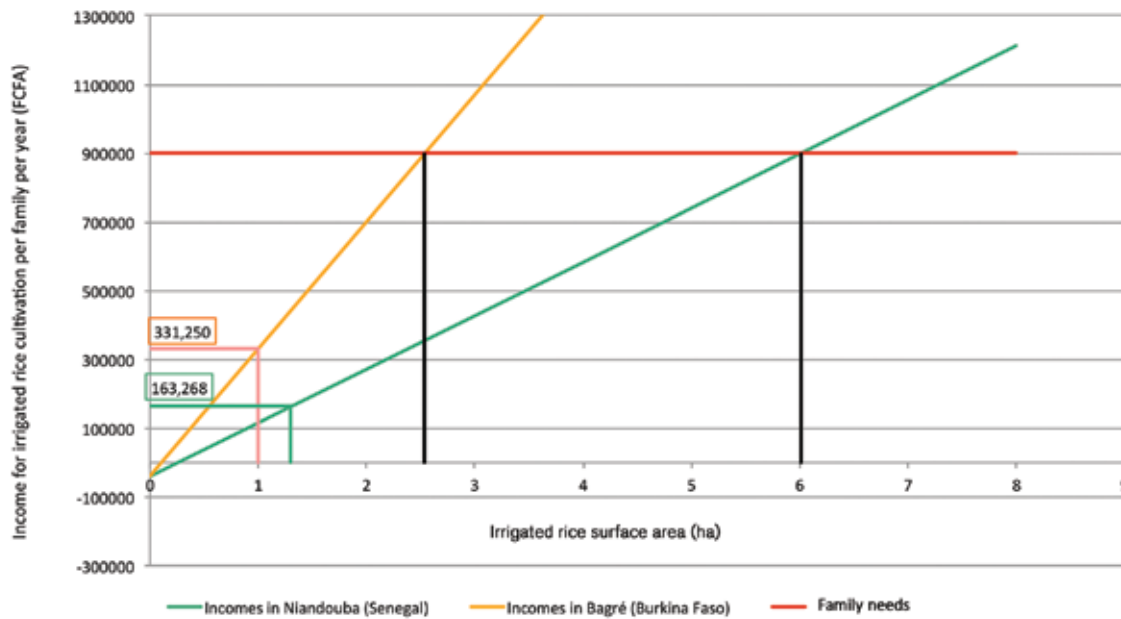
As shown in the graph in Box 2, the annual income from rice farming on these small areas is around 160,000 FCFA in Senegal and 330,000 FCFA in Burkina Faso, which is below the minimum needed for one family. Many producers have little or no agricultural income outside rice farming because they do not have access to land outside the irrigation scheme. Many of these are migrants, but some are displaced people who lost all their fields to the building of the dam, or who can no longer farm them because they were

displaced too far away from them. At Sélingué, 25% of producers are estimated to be migrants who have little access to non-irrigated land. At Bagré, around one third of producers depend exclusively on irrigated rice farming.

#### How can irrigated rice farming be made viable?

To earn an adequate income from irrigated rice farming, producers will therefore have to increase the area they farm or increase yields. This is theoretically possible because a family of 9 people has 4 to 5 workers, and is therefore capable of farming up to 5 ha of irrigated rice. But in reality it is hard for a producer to obtain more irrigated land. On the one hand, land transactions such as purchase or rent are not permitted by the agencies who manage the irrigation schemes. On the other hand, governments do not usually have the means to convert large areas of land to irrigation, and are mostly nowadays moving towards allocating land suitable for irrigation to 'agro-investors' rather than to family farms. Some limited illegal, but tolerated, land transactions do take place, between farmers who want to enlarge their holdings and others who do not have the

**Box 2. In Niandouba and Bagré, the size of irrigated land allocated is insufficient to meet a family's basic needs**



means to exploit theirs. It is mainly farmers with the most equipment who seek to enlarge the size of their plots, in order to get the best return on their investment in machinery. For example at Bagré, half of all farmers with animal traction equipment are farming over 2 hectares, compared with only 5% of those who work the land by hand (see Box 3).

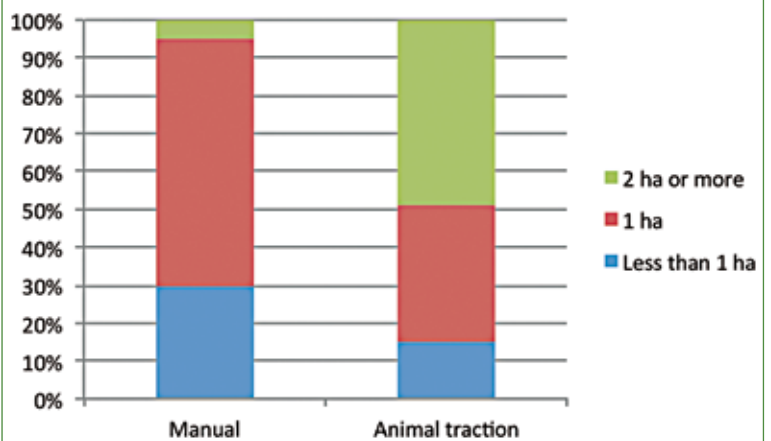
Animal traction is not only a means of enlarging the area cultivated, it is also a means of improving yields. Use of draught animals is essential for timely performance of farming operations, and reduces the costs of production. Box 4 shows that in Bagré a family of 9 people without animal traction needs 3.3 ha to meet its annual needs, whereas a family with animal traction can manage with 2.2 ha. There are no reliable data on the number of producers with a full set of animal traction equipment, but a rough estimate is that less than half of all family farms are in this category.

Given the shortage of land at their disposal, irrigation scheme management authorities often turn a blind eye to unofficial land tenure re-arrangements, and instead stress the importance of improved yields and cultivation rates to increase the income per hectare of rice.

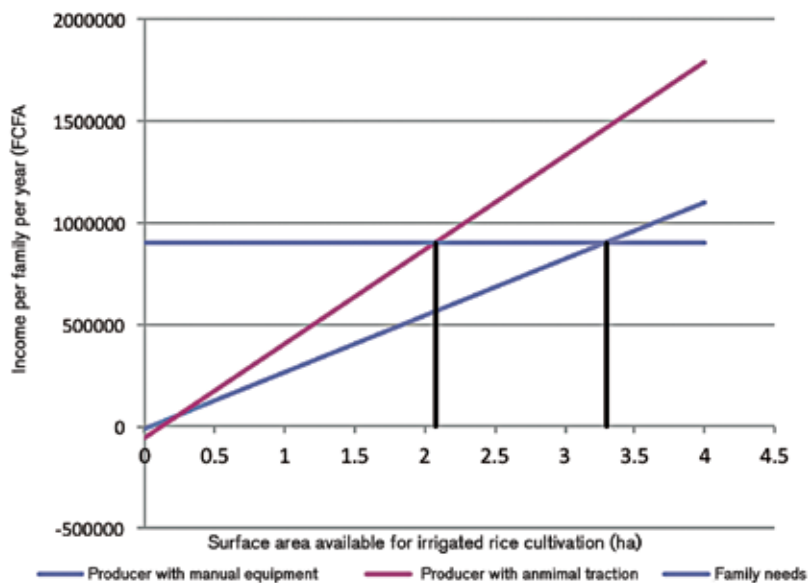
There are suggestions that yields of six tonnes per hectare may be possible, and of three rotations per year (two of rice and one of vegetables). But these figures appear unrealistic in view of

the current conditions in rice farming, in terms of equipment, organisation of producers and of available services (water distribution, access to inputs and credit, mechanised services etc.). In particular the low level of farm equipment, reflecting both the low investment capacity of producers, and, especially, the absence of sufficient land to make it profitable, represents a major obstacle to reaching the targets set by management and, by extension, by donor agencies. This makes it all the more important to carry out a proper analysis of the land tenure issues at the time when schemes are inaugurated, because these arrangements are difficult to change afterwards, given the generally prevailing prohibition on the rent and sale of land.

**Box 3. Animal traction allows producers in Bagré to cultivate a greater surface area of irrigated rice**



#### Box 4. In Bagré, access to animal traction leads to greater production of irrigated rice



## CONCLUSIONS

Initial decisions on land allocation constitute a critical point in determining the productivity and profitability of an irrigation scheme in the long term, and also affect poverty levels.

When governments allocate (too) small plots to a (too) large number of families, in order to meet social demand or to reserve land for “investors”, they run the risk of creating sub-optimal technical and economic conditions which will prevent the best exploitation of irrigation projects, and may ultimately increase poverty rather than reduce it. The size of farms allocated by the state within irrigated farming schemes should be based on realistic technical criteria, so as to guarantee: 1) that producers can earn an adequate income to meet their needs and to be able to invest in their farms, and 2) that total production of the irrigated zone is sufficient to release significant

marketable surpluses and contribute to national food security.

These technical criteria should be defined on the basis of local production conditions, or existing conditions in similar irrigation schemes in new developments, and should take into account the diversity of producers. In particular, allocation of land must differentiate between producers who will depend exclusively on their irrigated plot for their livelihood, and those who also have rain-fed land for farming and for livestock.

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#### Notes

The Global Water Initiative in West Africa is currently developing this analysis further through a series of complementary, in-depth studies. The results of these studies will help ensure policy-making that is based on a better comprehension of farmers' production systems.

1. Building resilience and accelerating growth in the Sahel and West Africa by boosting irrigated agriculture

[http://www.icid.org/decl\\_dakar.html](http://www.icid.org/decl_dakar.html)

2. Hathie, I., Diouf, L., Diouf, M., Kama, M. (2013). *The challenges for small producers in the areas irrigated by large dams – the case of the Niandouba and Confluent dams in Senegal (Anambé)*. GWI (West Africa).

Kergna, O.A., Cissé, I., Meïté, F. (2013). *The challenges for small producers in the areas irrigated by large dams – the case of the Sélingué dam in Mali*. GWI (West Africa).

Ouédraogo, O., Sedogo, S.A. (2014). *The challenges for small producers in the areas irrigated by large dams – the case of the Bagré dam in Burkina Faso*. GWI (West Africa).

3. This figure comes from the feasibility study proposed by the Office du Niger Farmers' Union (SEXAGON – farmer investors).

*Première partie: La faisabilité économique de la proposition du Sexagon. Rapport final*. Université Libre de Bruxelles – Centre d'Études de la Coopération Internationale et du développement, Bamako, April 2012. This is a minimum amount, since it remains below the poverty line in the different countries, which are: 165 431 FCFA in Mali; 108 374 FCFA in Burkina Faso and 200 574 FCFA in Senegal (BCEAO report on the situation of poverty in the UEMOA countries, 2012).

## GW WEST AFRICA

The Global Water Initiative in West Africa is an action-research and advocacy project. We work with family farmers and governments to shape policies and practices that support livelihoods and food security in the context of large multi-purpose dams. The project is funded by the Howard G. Buffett Foundation and implemented by IIED and IUCN.

[www.gwiwestafrica.org](http://www.gwiwestafrica.org)

## IUCN

The International Union for Conservation of Nature helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN's work focuses on valuing and conserving nature, ensuring effective and equitable governance of its use, and deploying nature-based solutions to global challenges in climate, food and development.

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