

PROSPECT FOR RICE CONSUMPTION AND PRODUCTION IN BURKINA FASO: POLICY IMPLICATIONS

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Abstract

The Burkinabè agriculture is struggling to respond to the increasing demand for rice from its urban population, triggering increasing imports from Asia and America. Though the potential for rice production is important, increasing rice production will require a more targeted policy intervention and above all technological improvement in its rice fields. While bound by SAP and UEMOA, the Burkinabè government has to find a difficult trade-off between conflicting objectives such as self-sufficiency, cheap food for the poor, high return to investments and environmental protection. If the momentum seems right to reinitiate large irrigation infrastructures, it risks generating new debts rather than achieving both higher efficiency and food security. While the rice import tariffs should be increased to protect rice production, under the concept of infant industry, the whole policy of common tariffs within UEMOA needs to be revisited because some of its members such as Senegal or Mauritania cannot afford such tariff increase while others should. Above all the key to higher rice production lies in the technical improvement of rice production. The current productivity is still too low and rice production is not competitive against cotton and maize productions whose returns attract the farmers of the high potential areas. Rice production is too labor intensive, and if irrigated requires too much water, compared to other crops such as fruits, vegetables and maize. Water will be increasingly diverted towards hydroelectricity and domestic consumption. Overall rice production policies in Burkina Faso should be thought through regional cooperation rather than through strict national self sufficiency.

Keywords: Rice production, trade, trade policy, irrigation

Introduction

Should Burkina Faso pursue rice production, be it rainfed or irrigated, or should the government allow more cheap imports? The question has been debated over the last few decades with on one side international financial institutions usually in favor of short term cost effectiveness (promoting imports if comparative advantages are low) and on the other side national institutions and NGOs worried about self sufficiency and employment and in favor of protection. One of the few remaining policy instrument available under WTO rules to protect local production is tariff. Increased tariffs will elevate the price of imports and should boost the local supply of rice and other substitutable staples. The question is whether local producers can respond quickly enough to higher prices. If not higher rice price will hurt urban consumers and will not necessarily improve the consumption of local products.

A related question is whether Burkina Faso should pursue irrigated, lowland or rainfed rice production, a question that goes beyond simple per hectare economic calculation as it implies water and land availability, opportunity cost of labor, as well as environmental concerns. In this paper we discuss these questions, bringing new highlights from recent numbers and future trends. First we show that the evolution of the world rice market is too uncertain to count exclusively on imports. Second we show how the evolution of urban consumption is changing. Third we try to estimate the potential of the local production to respond to the changing demand. Fourth we investigate in more detail the difficulties of irrigation. Fifth we discuss some environmental issues related with the alternative policies.

Uncertain world rice market

World stocks of rice have reached a 20-year low in 2005 while rice prices have increased steadily for the last few years. At the same time world demand for rice will continue to grow fast in the next few decades because the Asian population and economy, are growing fast. Only among the richer Asian countries are the richest groups reducing their per capita consumption of rice (Huang and Bouis 1996). Also the booming demand for grain by the poultry and pork industries is putting pressure on the supply of rice (Delgado, Rosegrant et al. 1999).

Several studies even question the ability of Asian producers to respond to the increasing demand for rice. While some are optimistic thinking that research and proper investments will be enough (Kumar and Rosegrant 1994; Bhalla 1999; Delgado, Rosegrant et al. 1999; Rosegrant, Paisner et al. 2001) others are more worried (Bhalla 1999). Only a small number of countries, mostly located in South and South-East Asia, exports rice. Among them Thailand, Vietnam and India show little interest in exporting more rice since a small increase of rice exports directly depresses world prices. These countries are trying to diversify their crop production towards higher value crops such as fruit and vegetables (Joshi, Gulati et al. 2003). Also Thailand, India and above all the United States are subsidizing their rice producers and will sooner or later have to reduce these subsidies under WTO rules. All Asian countries have reduced their investments in irrigated rice production because they consider that the battle for food self sufficiency is now secondary and that the world market has become a convenient place to buy relatively cheap food.

Asian rice production is becoming uncertain because urban expansion is reducing arable land. Also because the emerging Asian middle class will demand more fruit, vegetables and meat, farmers will shift from rice to higher value crops and to poultry production. Also fresh water is increasingly diverted towards urban consumption and hydroelectricity. If Asian farmers are not willing to respond to the rice demand, world rice price will continue to increase. African countries should avoid counting on Asia to provide what is becoming its basic food.

A last factor of changes in the world market for rice is the progressive phasing out of subsidies by rich countries. World prices of grains such as wheat and rice are artificially depressed by the rich countries' subsidies to their own farmers and their exports. When these countries will phase out these subsidies, as they are supposed to do under WTO agreement, world prices of grains are supposed to rise thus making urban's life more miserable but improving the competitiveness of local African grain productions.

For West Africa this situation should ring a bell. The food bill is already increasing fast, and higher rice price easily trigger urban unrest. During the 2005 food crisis due to a poor 2004 production, grain prices have reached prices never seen before. However the 2004 rainy season was not that deficitary and locusts damage was not very important. Statistically speaking there

will be worse rainy seasons in the future. As humanitarian crisis have multiplied in the past few years (South-Asia, Darfour, Southern Africa, Niger, Pakistan and now the horn of Africa), the international community capacity to deal with such crisis has shown its limits. Food security issues require strong and proactive public policies. However one key issue in Burkina Faso as in Africa is that urban population is shifting from traditional African staples towards rice. Why is this situation occurring and what can policy makers do about that?

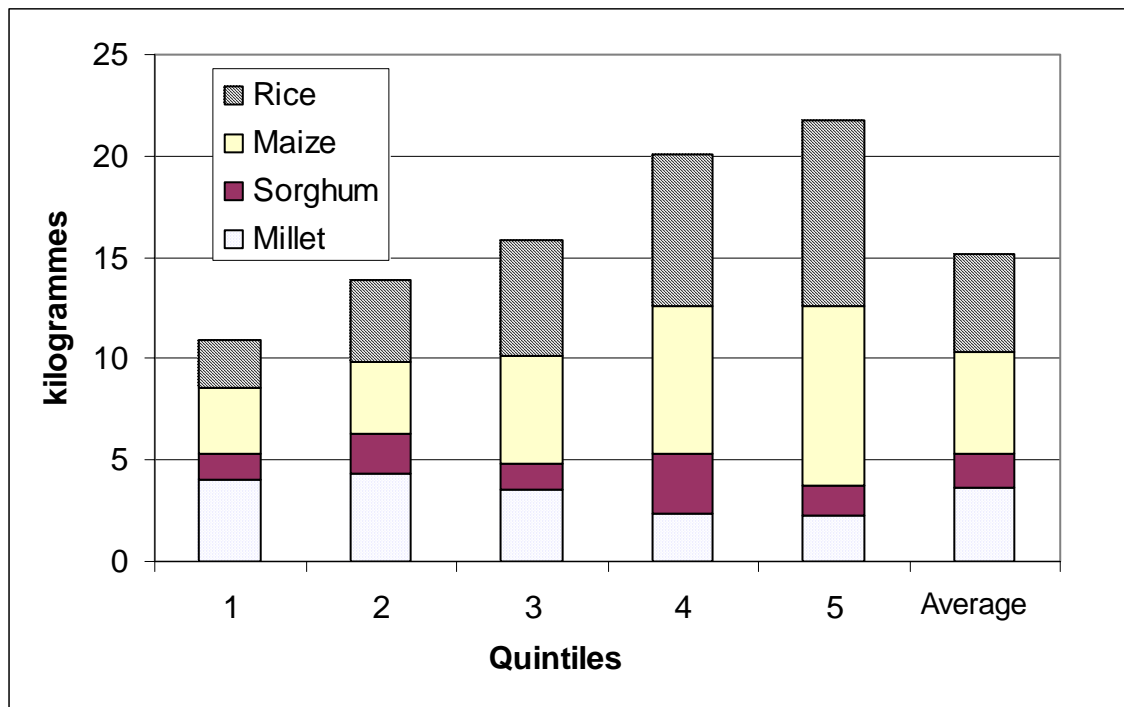
Urban consumption pattern is changing fast

African countries are becoming major consumers and importers of rice because urban consumers are shifting from traditional staples to rice. Even the rural population has started to following the urban fashion. While coastal consumers are shifting from tubercules to rice, sahelian consumers are shifting from millet and sorghum to rice and at a lesser extend to maize and wheat. Low relative prices of imported versus local food, coupled with convenience and taste makes imported foods more attractive to consumers. It takes much less time and energy to cook rice, and time is becoming a scarce resource for working woman (Yaméogo, Karmou et al. 2002) and energy is increasingly expensive, in particular in Sahelian countries (Minvielle 1999).

Rice consumption is also increasing with household incomes. In Burkina Faso rice represents 21% of grain consumption among the poorest quintile and 42 % for the richest which means that income growth is linked to higher per capita consumption (figure 1).

While most studies suggest that substitution of imported food for local cereals is an almost irreversible trend, others argue that higher taxes or currency devaluation will trigger a shift back to local productions. The analysis of the 1994 CFA franc devaluation can bring some insights. The 50% devaluation has induced a 47% increase in the price of imported rice, from CFA F 170 per kg in 1993 to CFA F 250 in 1996 (Savadogo and Kazianga 1999) which was more than the price of local coarse grains (maize, millet, and sorghum). But the result was somehow disappointing because urban households adjusted by eating less of everything (12% in average and by 28% for the poorer quintile) instead of shifting back to local cereals. Share of rice in the diet decreased only slightly, from 35% to 32 %. It declined strongly among the poor but increased among the rich. The devaluation produced a shift in breakfast towards millet and at noon towards traditional meals but did little changes in the evening's meal. Overall it did hurt consumption of the poor.

Figure 1. Grain consumption in three burkinabè cities in 1997



Source: Savadogo and Kazianga 1999

To assess future trends one can look at elasticities by income groups. According to the Savadogo and Kazianga (1999) study the elasticity of rice in 1997 was 0.8 and slightly lower than for maize while millet and sorghum have low elasticities declining sharply with income, even becoming negative in the richer group. This suggests that millet and sorghum are likely to continue their decline at the benefit of rice and maize. The ongoing appreciation of the CFA franc in regards to the dollar is making rice and wheat import even more attractive relative to local grains today. Talks have been held about a new CFA franc devaluation.

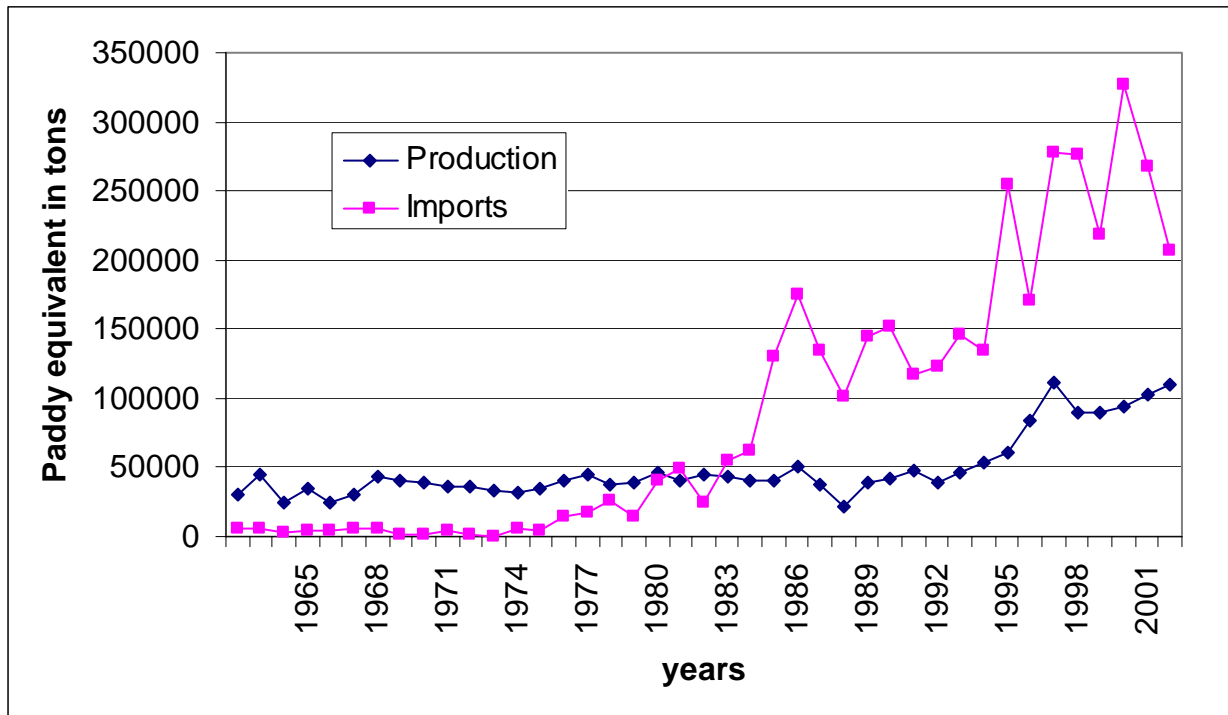
Also according to the same study, wheat will increasingly compete with the other grains as consumers' incomes will grow. According to Savadogo and Kazianga wheat consumption has an elasticity of 1.9 and even 2.3 for the poorer while it is only 0.8 for rice and maize. It means that from its low base of less than 1% of the household expenses wheat consumption will increase much faster than the other cereals. The complete opening of less advanced countries to the European commodities by 2008 might have a strong impact on wheat consumption. It is currently taxed only 5% against 10% for rice (Value Added Tax). Wheat is becoming a major food in West Africa and imports are growing fast. If wheat is imported tax free, the youth will turn towards bread, sandwiches, pizzas, pastas and hamburgers. Even the poorer might shift from millet to bread for breakfast. Overall urban consumers are changing their diet and the question is whether farmers will be able to satisfy this shift.

A significant supply response

Burkinabè farmers and the government have shown that are able to respond to price signals, even if the response was insufficient so far. The 1994 CFA Franc devaluation is a good

illustration. Figure 2 show how national rice production started an upward trend after 1994. The national rice production is now rising steadily exceeding 100,000 ton of paddy in 2000 from 50,000 in the mid-nineties.

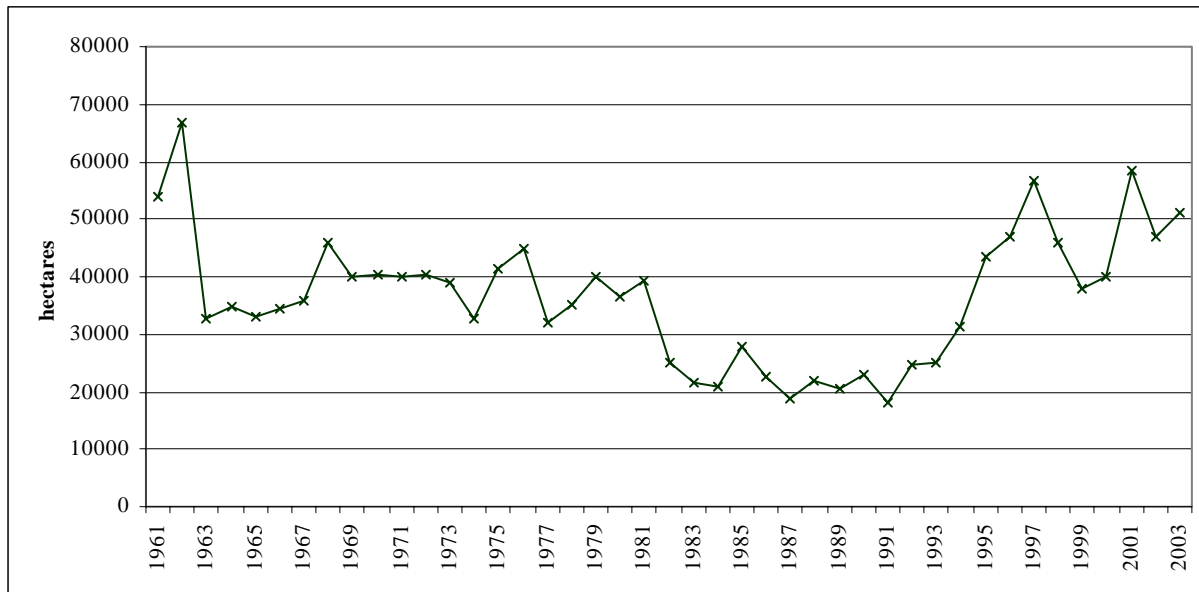
Figure 2. Rice production and imports in Burkina Faso



Source FAOSTAT 2005

Before the devaluation the area planted in rice was decreasing steadily because of droughts, competition of cotton and maize, cheap rice imports, over-evaluation of the FCFA. Only after the currency devaluation, the trend reversed. The government has invested in irrigated rice schemes and farmers have expanded lowland rice production. Ongoing migrations towards these regions have benefited to rice production. The rice area has reached 50,000 hectares today from 20000 in the nineties.

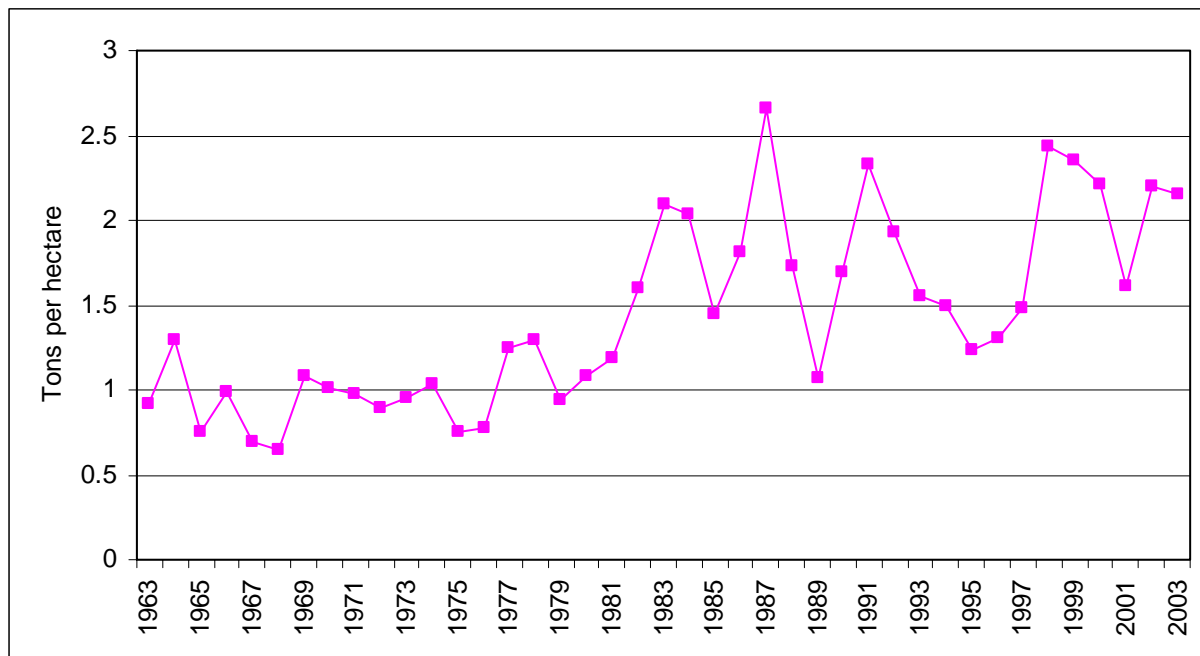
Figure 3. Evolution of rice area in Burkina Faso



Source FAOSTAT 2005

The impact of the devaluation on yields is not as clear (figure 4). The evolution of rice yields shows an increase over time but with irregularities difficult to explain for a crop supposed to be grown under more secure conditions (irrigation and lowland). From less than one ton in the sixties, yields have increased to more than 2 tons in the late nineties. The main reason of this growth is a relatively faster increase in the irrigated areas compared to the lowland and rainfed areas which have much lower yields. At the same time yields have increased in the irrigated areas thanks to progressive improvement in the irrigation techniques, the adoption of improved seeds and better water management. There are no signs of a direct relation between the devaluation of 1994 and rice yields, but supply response of rice yields is always slower. The yield increase since 1998 is probably partially explained by the FCFA devaluation.

Figure 4. Evolution of rice yields in Burkina Faso



Source : FAOSTAT 2005

To sustain the upward of rice production, the government has to intensify its support to technological improvement, institutional organisation, marketing and prices. Currently the FCFA is again overevaluated to the dollar putting pressure on local rice price by favouring imports. A new devaluation is discussed within UEMAO but West African governments are also discussing the increase of the common tariffs on rice.

However such increase will not necessarily trigger a quick response. Rice short term supply response to prices is considered to be comparatively lower to other crops because it takes time to expand irrigation infrastructure and to bring new farmers into rice production (Ruthenberg 1980). Rice yields cannot be boosted just by adding fertilizers or by buying new seeds. The major limiting factors such as water and weed managements, take more time to improve. The short term supply response is usually short and long term response is the one policy makers should expect.

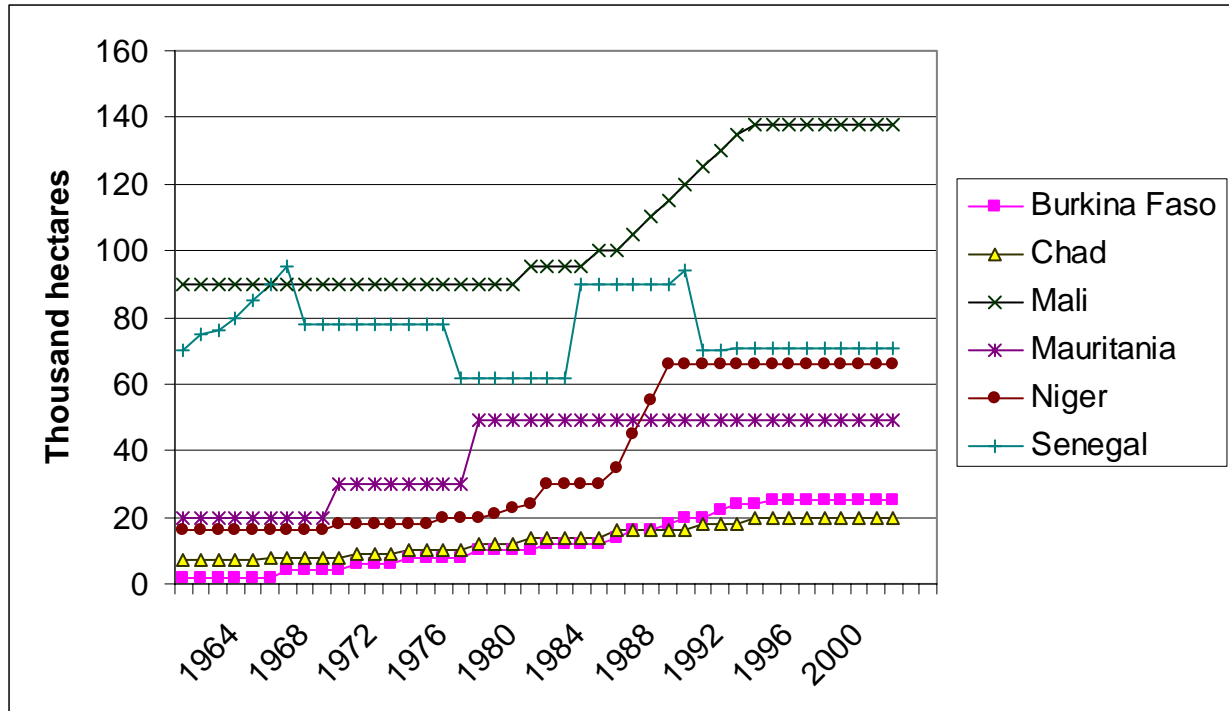
Should rice be irrigated ?

In Burkina Faso half of the rice production is irrigated, a very small fraction is rainfed and the rest is produced in improved lowland with small infrastructure. Since all irrigation techniques are expensive, many argue that rice should be produced in lowland or even under rainfed conditions where production costs per kilos are supposed to be lower when all the costs are counted. We first look at the problems of irrigated rice production and then discuss the problem of increasing water scarcity.

The trouble with irrigation

Since independence Sahelian governments have been investing steadily in irrigation schemes to improve food security, promote exports and boost employment (figure 5).

Figure 5. Irrigated area in six Sahelian countries



Source FAOSTAT 2005

The total amount of irrigable area in Burkina Faso is estimated between 160 000 ha (Sally, 1997) and 233000 hectares which represents only 3 % of the arable land in Burkina Faso (Ministère de l'Agriculture 2003). From this potential only 23000 hectares (lowland included) are irrigated which represents barely 10%.

An expensive solution

The results of the investment in irrigation schemes have been disappointing. Farmers have shown mitigated interest in the new irrigated techniques. Cropping calendars are not respected. Water distribution remains disorganized. Infrastructures are not maintained and canals are often damaged by farmers to increase their own share of water. Rehabilitation is usually required a few years after reception. Overall yields of irrigated rice have remained low, between 3 and 5 tons per hectares which is insufficient to cover the full cost of irrigation (Berthome, Goueffon et al. 1986; Sally 1997; GIRE 2000; Bethemont, Faggi et al. 2003).

Economic return to irrigated rice production is usually less than 150 000 FCFA per hectare. Return from irrigated grain production is less than the urban minimum wage. Vegetable production is more risky but shows much higher returns (see Table 1). It brings returns close to medium level administration employees.

Table 1 : Yields and returns of a few irrigated activities.

Crop	Yield /ha'	Return	Annual income	Monthly income
Rice	5 tonnes	150 000	300 000	25 000
Green beans	7 tonnes	630 000	1 260 000	105 000
Potatoes	25 tonnes	1 175 000	1 175 000	97 900
Tomatoes	20 tonnes	300 000	600 000	50 000
Onions	40 tonnes	800 000	800 000	66 000
Guinea	15 tonnes	600 000	600 000	50 000

Source: (Ministère de l'environnement et de l'eau 2001)

The major handicap of irrigation is its investment cost (Ministère de l'environnement et de l'eau 2001). The difference between the costs of fully irrigated schemes compared to improved lowland is striking:

Pumping :	10	millions de FCFA
Riverside (fil de l'eau) :	8	millions de FCFA
Dams and schemes :	15	millions de FCFA
Schemes alone :	7	millions de FCFA
Improved lowland (bas-fonds amélioré) :	1,4	millions de FCFA

New investment in irrigation might become even costlier since the best potential sites for dams are already taken. Most Sahelian rivers (Niger, Senegal, Volta) are now close to saturation in terms of dams and schemes. Irrigated schemes have proved fragile because of poor drainage and insufficient protections against flood. The new perimeters are now better protected but at a higher cost.

International financial institutions have turned reluctant to finance new reservoirs for irrigation because economic estimates, especially when the applied discount rates reflect the opportunity costs of capital, show that reservoirs are not always cost effective. Also the argument goes that reservoirs include hidden costs such as the ones related to displaced population (usually not well compensated), loss of biodiversity, local climate changes or salinisation and even sometimes new health problems.

The competitiveness of Sahelian rice production is considered weak relative to Asian rice production where manpower is more experienced, cheaper and where irrigated fields carry several productions per year. African rice production is also not really competitive in regards to some local rainfed productions such as cotton and maize. Even a small farmer can obtain easily several tons of maize per hectare, at a low cost and with much labor. For some analysts, Sahelian countries have little comparative advantages producing irrigated rice (or wheat) for their urban consumers but should concentrate on improving traditional rainfed crops among which lowland and rainfed production are becoming popular options.

Lowland and rainfed rice production

The difficulties with irrigation have forced the research community to investigate the opportunity of rainfed and lowland rice production. Lowland rice field usually require some

infrastructure such as dikes, small canals or even some concrete infrastructure to control water level during the rainy season. Lowland rice production represents almost half of the total rice area in Burkina Faso. It has gained some popularity among farmers but its expansion is still slow because it usually requires some external interventions for the basic infrastructures.

The future of rice production in lowland is uncertain. It is competing for labor with other rainfed crops, and for land in the lowland. Fruit and vegetable productions are expanding fast. Mango trees and other fruit trees are now covering thousands of hectares. Lowlands are also traditional pastures, especially during the dry season, and herders and farmers are increasingly competing for the control of lowland. The expansion of rice production in the lowland will be not be easy.

Unlike irrigated and lowland rice, rainfed rice is produced without any water control, only depending upon rains. In Burkina Faso rainfed rice production is almost non existent, probably less than 5% of the rice area but its potential in the southern third of Burkina Faso is considered important. Burkinabè soils are not as infertile as usually described. Alfisols, the most widespread soils of Burkina Faso respond correctly to fertilization and proper crop management. Chemical fertilization is considered cost effective, the main constraint being lack of credit and excessive risk. However rice fertilization is becoming a common practice even among poor farmers. However rainfed fertilized rice is handicapped by its low yields but also but its lower quality when a dry spell during the rainy season reduces the grain size.

The problem with rainfed rice is that its profitability is lower than the overall profitability of cotton and maize those yields have been increasing fast since the nineties. Burkina has become a regular exporter of maize and is now the first African cotton producer. Improved techniques are progressively adopted by farmers such as new seeds, fertilization, animal draft, chemical weeding. Yield of cotton reach easily 1.5 tons among seasoned farmers and yields of maize reach easily several tons. While cotton is attractive for its price security and availability of credit, maize is attractive for its high yields and its easy management. Rice is more painful to produce. Transplanting, weeding and harvesting are slow and difficult processes.

The overall insufficient performances of the national rice production, be it rainfed, lowland or irrigated is less due to poor natural resources than to lack of capital and technologies? Both can be improved in the short future helping Burkina Faso to become more competitive. Investment in capital and new technologies might require some protection at least to compensate for the unfair competition by subsidized farmers from developed and emerging countries..

Climate variability and change

Despite all its drawbacks, the case for irrigation is still strong. One major pro- irrigation argument is related to the Sahelian irregular climate and its probable change. The Sahelian climate is erratic making rainfed production a risky enterprise. In 2005, Sahelian countries made the headlines despite claims that major food crisis were stories of the past and that globalization will help poor countries import cheap food from countries with comparative advantages. Though not called technically a famine the food crisis of 1995 was the result of an insufficient rainy season. Sahelian populations remain among the most food insecure in the world and climate change might disrupt further future food production. According to global and regional climate models, the climate of West Africa is likely to become more variable, producing both more droughts and floods. Irrigation is supposed to mitigate these effects and new investments can be justified under the principle of precaution.

Employment

Another major argument in favor of irrigation is that it creates direct and indirectly jobs through rice transformation, agro-industries, and trade of vegetables, mainly by woman. Some estimates suggest that half a million burkinabè do live from irrigation. As such irrigation reduces the need for migration. Migrations towards the south of Burkina, towards costal countries and towards northern countries are creating tensions and political instability. Conflicts between migrants and natives are a constant concern throughout West Africa. These migrations are due to lack of employment and improvement in local farming conditions and many argue that irrigation can become a major source of employment in the region.

Competition for water

Besides its cost the other major handicap for future irrigation expansion is water scarcity. Burkina Faso's economy is increasingly reliant on its rivers for power generation and domestic water consumption.

The urban population will need more water

According to the UN projections, the burkinabè population might reach around 40 millions by 2050 and this under the optimistic hypothesis that woman will then have around 3 children instead of the 7 they have currently (UN 2005). The urban population exceeds already 2 millions (less than 20 % of the total population) and is growing faster than the rural population because of rural to urban migrations. According to the UN projections half of the Burkinabè population might live in cities by 2050. With an estimated daily per capita consumption of 60 liters per day total consumption would be of 438 millions of cubic meter to compare with the current consumption of 37 millions m³. Such increase will require new dams on the Volta River and probably will require to rethink irrigation policies.

Hydroelectricity might get the priority

Demand for electricity is likely to boom in the next few decades throughout West Africa because of population and economic growth, increasing rural electrification, expansion of cold chain and air conditioning by the growing middle class. Currently in Burkina Faso the consumption is still very low. Less than 10% of the burkinabè households use electricity and around 95% is consumed in the three major cities. However the government plans to connect more than 60% of the national households by 2015 thanks mainly to power connections to southern countries.

Thermic plants produce more than two thirds of the national electricity while two recent hydroelectric plants, Bagré and Kompiega, produce the rest. Hydropower is an increasingly attractive option especially under the hypothesis of increasing petroleum costs. The recent cancellation of the debts of least advanced countries is likely to encourage the development of new hydropower plants on the major rivers. The two new hydroelectric dams that are projected on the Mouhoun river can make Burkina self sufficient in electricity.

However hydropower is no panacea. The potential for new dams has been largely exploited and the existing hydroelectric plants are struggling to produce at their optimal level. Though relatively cheaper to produce, the availability of power, from hydroplants depends on the rainfall pattern which is uncertain. Droughts and reservoir mismanagement has already led to

dramatic economic crisis in Côte d'Ivoire and Ghana in 1998 leading to an increasing reliance on thermic power plants. For Burkina Faso buying electricity to its neighboring countries located in the south might make better economic sense than building new hydro-plants or than building new thermic plants that require costly transport of fuel. Constructing dams in the Sahel is also more expensive because Sahelian streams are small, dry seasons are longer, evaporation is more intense and landscape is flat. Hydropower is not the only option. Oil is still the major option with an oleoduc connection currently discussed with Ghana. Also Gas is an interesting option with talks of a project of gazoduc that will route natural gas from Nigeria. Alternative energy sources include solar energy, hydropower, fuel wood and biomass from annual crops. The calculation of energy costs should now include environmental externalities such as greenhouse gas emission. Overall, if investment in hydropower looks like an interesting option it will need to be calculated against the demand in water for the population, livestock and irrigation.

A case for regional integration and protection

Regional integration of West African countries is supposed to improve food security and as such to increase rice production. The integration will create a free market between countries with contrasting climates where each country will develop its comparative advantages. Sub-humid regions will develop their rainfed rice production which should feed the urban population of West Africa. Sudanian and sahelian regions are highly populated while large shunck of the sub humid regions are almost empty because of the wars related to slave trade and because of the prevalence of tropical diseases. With relative peace and better control of tropical diseases, some sub humid regions are now attracting Sahelian migrants. One third of the population of the cotton area in Burkina Faso were migrants in 1990 (Schwartz 1990) and probably more today. These regions can become the grain basket of West Africa if policy makers are able to manage the conflicts between natives and migrants.

However the West African market need to be better protected because open access to Asian rice is not likely to boost local production. Lower barriers will favor import of low cheap low quality rice from Asia and low export tariffs will favor export instead of supplying the local markets. As world rice prices are increasing, little can stop West African traders to export their grain surpluses. In 2005 while the sahelian population was close to starvation burkinabè maize was going to Ghana, to be partly exported to Zimbabwe. Even during the famine of 1973, proteins continued to be exported from the Sahel (green beans to Europe and meat to coastal African countries). One should not be too naïve regarding the movement of grains in a free market. In a globalized world food will go to the people able and willing to pay. The grain might go to animal production while poorer regions and the poorer section of the population remain underfed.

West African policy makers have been discussing intensively the possibility of rising taxes on food import to protect and finance local food production especially rice. In West Africa rice imports are cheap because tariffs are low (The common tariff is 10%). Increasing taxes does not impinge on WTO rules for poor countries. In fact low tariffs have been imposed by the Structural Adjustment Programs of the eighties and now that most reformed countries are back on track, such rules can be revised. Nigeria has introduced a tariff of 110 % on rice imports, lowering imports and boosting local food productions, including rice.

Conclusion

Rice consumption is increasing fast in Burkina Faso because the rapidly rising urban population is shifting from traditional cereals to rice. Local rice production in Burkina Faso has started to increase rapidly after the currency devaluation of 1994 that made local production more competitive. However this increase is insufficient to cover the national demand and imports continue to rise.

Further rice production increase has to come from existing irrigation schemes, from lowland and rainfed rice production. New irrigated schemes in the Sahel are maybe not the best use for water, an increasingly scarce resource. The potential for further reservoirs and irrigation schemes in Burkina Faso is relatively poor compared to coastal countries. Water might be better used for fruit and vegetables, hydroelectricity and potable water.

To achieve food security in West Africa, a complete *laissez-faire* approach is not desirable for both farmers and consumers. The world market is a volatile place and the uncertainty about future rice availability should push West African policy makers towards new proactive policies to boost local grain production. West Africa has all the agroecological potential to become self sufficient in grain and technologies are there to make the rice production more competitive. The sub-humid and humid regions already produce rainfed rice at a low cost, competitive with Asian rice production. A small protection is necessary to compensate for the rich world subsidies and to help farmers and researchers develop new farming systems.

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