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Decentralized Management of Irrigation Areas in the Sahel : Water User Associations in the Senegal River Valley

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In this decade irrigation has been the central focus of programmes seeking to reduce food shortages. In the Sahel, a victim of long cycles of drought, this interest in irrigation has been rekindled by the increased scarcity of the rainfall that underpins agricultural production. Population growth has also exerted pressure on water resources because of greater human needs for drinking water and water for production (Niasse, 2004). All the Sahel countries now agree on the need to develop irrigated farming in order to reduce dependence on irregular rainfall and improve food production (*Le Monde*, August 2005).

Given the precarious nature of rain-fed agriculture, the will to develop irrigated farming within the countries of the Sahel has led to many institutional innovations. Several policies and programmes have been formulated in search of a framework capable of fostering the development of agriculture in general and irrigated production in particular (Ostrom, 1992).

The structural adjustment programmes begun in the 1980s in most Sahel countries represent the starting point for a new perspective on agriculture (Le Roy, 1998). These programmes advocated a withdrawal by the State from the production sector to give producers greater responsibility. The State abandoned the production process and confined itself to a supervisory or advisory role, which in Senegal and other Sahel countries has given rise to new agricultural policies.

This process of State withdrawal upstream of the production sector was subsequently to be manifested in an innovative institutional framework with the adoption of decentralization policies in the Sahel. Decentralization, the objective of which is to foster genuine community participation in managing local affairs, was reflected in the transfer of a range of responsibilities previously exercised by the central government to democratically elected bodies (Blundo, Mongbo, 1999). In terms of natural resources management, decentralization entailed devolving the management of local resources (forestry, land, water) to local user communities. These policies as a whole, however, were to mould the organization of irrigation areas. The State is gradually giving way in irrigated production to producer groups coming together in user groups (Mali, Senegal, Burkina Faso, Niger).

Senegal experienced a watershed in making producers responsible for managing irrigation areas in 1987. The *Société d'Aménagement des Espaces du Delta et de la Falémé* (SAED), the State framework structure, has always adopted a particularly prescriptive approach that leaves little room for participation by farmers, if not depriving them of responsibility entirely (Dahou, 2004). In response to the many conflicts between this framework and a farmers' movement demanding greater autonomy¹, the Senegalese State resolved to transfer the management of agricultural water schemes to producers coming together in Water User Associations that already existed, but which had no autonomy (Seck, 2001). Water User Associations in the form of Economic Interest Groups (EIG) are federative organizations that bring together several village bodies within the same irrigation area, and which have substantial responsibilities in operating and managing agricultural water infrastructure.

Giving the Water User Associations greater responsibility was a first step in breaking away from the technocratic approach that prevailed for many years in the management of agricultural water schemes in favour of a more participatory approach (Ostrom, 1992). These associations have become important stakeholders in water and land governance, despite the many difficulties they have faced, particularly those arising due to the insufficient technical

¹ A movement demanding independence and emancipation for farmers emerged during the 1980s in the Senegal River Valley on the initiative of an association of young producers, the *Amicale Socio-économique Sportive et Culturelle des Agriculteurs du Walo* (ASESCAW) [Walo Farmers Socio-Economic, Sports and Cultural Association], who felt that the SAED framework was too heavy and treated them like children.

and organizational training that should have preceded the transfer of responsibilities (Lavigne Delville, 1997).

The situation now prevailing in the Senegal River Valley is characterized by strong competition for access to irrigated land. Irrigation has become an important production tool and a factor for regional integration and decentralization, and is coveted nationally and internationally. Water User Associations are no longer the only stakeholders where irrigation is concerned (Cotula et al, 2005). The liberalization of agriculture in line with State policy of withdrawal and the shifting of responsibility to the Rural Communities, the basic step of the Senegalese decentralization model² in terms of the allocation and de-allocation of land in the irrigated zone, has attracted other categories of stakeholder who sometimes invest in particularly speculative agriculture (politicians, religious figures, businessmen). Competition for access to irrigation areas in the Senegal River Valley brings several protagonists from different origins face-to-face. Arbitration is required between a native community demanding a legitimate right of access to water and land on the one hand, and a non-native class on the other, supported by State policies that encourage large-scale agro-industrial production. Questions must therefore now be raised on the future of producer organizations in agricultural water schemes in light of the development of agro-industrial irrigated farming and increasing State withdrawal (Sylla, 2004).

The objectives of this case study on Water User Associations in the Senegal River Valley are:

- To measure the development of the responsibilities devolved to the Water User Associations in managing agricultural water schemes;
- To highlight the constraints on the democratic and egalitarian functioning of Water User Associations;
- To assess the role of NGOs in reinforcing the autonomy and capacities of producers' groups. Following the State's example, NGOs have always invested in irrigated farming in the Senegal River Valley;
- To highlight the paradoxes in Senegalese State policies in terms of promoting irrigated farming, torn between a desire to maintain the family smallholdings characterizing the Water User Associations and a clear intention to promote agribusiness, which is not inconsequential for the former.

This study draws substantially on the author's field work in Senegal carried out in July 2005 in connection with the International Institute for Environment and Development (IIED) and FAO joint project on links between rights of access to water and land in the Sahel countries. It has also been very much enriched by the grey literature on current trends in irrigated farming in the Sahel.

² By Decree No 87-720 of 4 June 1987 on revitalizing certain undeveloped zones in the arable area, the Government of Senegal transferred the management of significant irrigable land that had previously been administered by the SAED to the Rural Communities, which are decentralized structures responsible for allocating land in parallel to the Water User Associations, which have the same responsibilities in public water schemes. Land management is the most important responsibility of Rural Communities in Senegal (Act 64-46 of 19 June 1964 on the creation of a national domain).

THE DYNAMISM OF WATER USER ASSOCIATIONS IN AGRICULTURAL WATER SCHEMES

Water User Associations (WUA) are federative organizations encompassing a group of villages broken down into the basic unit of Village Sections, led by different democratically elected bodies (Annex 1). WUAs have the status of Economic Interest Groups (EIG) governed since 1993 by the *Actes Uniformes de l'Organization pour l'Harmonization du Droit des Affaires en Afrique* (OHADA) [Uniform Acts of the Organization for the Harmonization of Business Law in Africa], which allows them to liaise with financial institutions and perform management acts on behalf of their members. In response to the SAED's new policy, which increasingly encourages decentralization, their responsibilities are expanding continuously. They are gradually gaining the experience and skills to manage the water schemes. Professionalization has become a priority both for the State and for the Associations themselves, though not without serious constraints.

The transfer of agricultural water schemes by contract

Agricultural water schemes are set up with public funds. They are subject to a particular legal system, and their transfer is governed by special rules.

They are transferred on the basis of a concession contract between the framework structure on the one hand, the SAED, a public institution representing the State and which is the instigator of the venture, and the WUAs on the other, representing all the producers in an irrigated area. The concession contract as the foundation of user group responsibilities defines the obligations and duties of the WUA and the SAED in relation to the rational exploitation of production infrastructure and its maintenance in good working condition.

The WUA undertakes to repair and maintain irrigation and drainage networks and hydromechanical and electromechanical equipment. At the beginning of each season it must also draw up a plan to develop and ensure compliance with crop intensity standards set by the SAED. The WUA's obligations as a whole are recorded in a written document called a *Note d'Entretien et de Gestion* (NEG) [Maintenance and Management Memorandum], which is the summary charter of the WUA's responsibilities as regards maintaining agricultural water works and irrigated areas in general.

The SAED undertakes in return to help the Association to develop, equip and rehabilitate the area either by means of a contract for services, or by helping it to contact and secure financing from development partners. The SAED should also ensure the technical supervision and training of farmers in the new techniques, and provide information and continuing training for WUA leaders in technical, financial and accounting management and environmental protection.

To date, the SAED has transferred the management of 25 irrigated areas to 22 WUAs. These areas represent a total investment of some CFAF 68 billion, involving an overall area of 16 000 hectares (SAED, 2004).

The allocation and de-allocation of irrigated plots

The allocation and de-allocation process

The power to allocate and de-allocate plots in agricultural water schemes has always been a SAED prerogative that farmers have bemoaned for many years (Dahou, 2004). Since 1987 the transfer of their management to WUAs has given the latter this responsibility. Once the SAED has ensured the technical development of the irrigation area, the WUA divides it up on the basis of a list of names. The operation is always preceded by a census of families in the various villages covered by the irrigation area. The family is the unit of allocation of plots in

public irrigation areas. The operation is overseen by the SAED, which must ensure that plots are shared out on a transparent and equitable basis.

Physical participation in the work of developing the irrigation area can often be required when laying claim to a plot. This is the case in the Village Irrigation Areas (VIA) (Annex 2), which are more developed in the Middle Senegal River Valley³. Human investment in providing irrigation areas with water is a form of non-monetary participation that allows the most socially and economically disadvantaged to aspire to the allocation of a plot (see below).

The WUA on the other hand also has the power to de-allocate land, which is the punishment for failing to comply with the rules governing the use of irrigation areas. De-allocation may be applied in the event of failure to reimburse seasonal loans, breaches of water use rules, or infringement of the internal regulations of the group. The community spirit prevailing in WUAs, however, generally militates against eviction from a plot⁴. The Association and the member in breach often come to an arrangement. In the event of failure to reimburse a seasonal loan, for example, some Associations prefer to dip into their financial reserves until a compromise is reached with the defaulter. The president of the Grand Digue WUA in Ross Béthio Rural Community in the Delta suggests that eviction will always be the last resort, since removal from a plot is not advisable for someone who only has the land on which to survive (Sylla, 2005).

The primacy of the principle of equality in rules of allocation

The transfer of water schemes represented a watershed for equal access to irrigation areas. Following the example of the large schemes, the VIA played an important role in balancing rights of access to irrigation areas (Lavigne Delville, 1994).

Their democratic nature is apparent not only in the rules governing the operation of Associations with elected members, but most importantly in the fact that they allow equal access for all social classes. In the Middle Valley, where traditional land rights still prevail, the schemes have allowed people who did not originally have any rights over the land to benefit from a plot in the same way as the owners of the land. In order to achieve this, transfers are often preceded by hard bargaining to persuade the landowning aristocracy to waive their right for the benefit of the community. The suppression of traditional land rights over the irrigation area to be developed is a prerequisite for the principle of equal access when facing customary landowners steeped in their rights over the land. In view of the economic interest irrigated farming increasingly represents, they usually accept the decision to develop schemes (Lavigne Delville, 1994).

The irrigation areas developed have become places where all social and ethnic classes cohabit. Several villages of different ethnic origins or even belonging to different territorial entities jointly participate in the functioning of the same WUA. In the Middle Valley the Ndouloumadji scheme in Matam is shared between two Rural Communities with different ethnic elements: the majority hal pular Nabaji Rural Community that originally had a traditional right over the irrigation area developed, and two Wolof villages in Bokidiawé Rural Community (Sodé Sobe, Thiarène)⁵. Also in Bokidiawé Rural Community, by means of Decision No 02 of 13 June 2001, the Rural Council allocated an area of 16 hectares of land to a Soninké ethnic group. The plot is on a large site developed by the SAED and originally belonging to traditional hal pular landowners.

³ The Senegal River Valley is divided into three major sections: the Delta, the Middle Valley and the Upper Valley.

⁴ In 2004 the Government of Mali withdrew over 5 000 hectares of land via its Niger Office from national farmers considered to be bad payers in relation to water charges.

⁵ The Wolofs have always been seen as foreigners in the Middle Valley, which has a large hal pular population.

The sharing of water and contribution to charges

Water management is the WUAs' most important attribute, and their responsibilities are expanding continuously in this area. They range from organizing distribution to maintaining infrastructure by way of collecting the charges owed by their various members.

The distribution of water

Access to water for WUA members is ensured on an egalitarian basis. At the start of each season a special committee draws up a management plan that makes an approximate estimate of users' water needs and the means of sharing water out.

Since the method used is surface irrigation from the pumping station, a water tower system is used to irrigate plots. Water tower use is based on an order of access established at the beginning of each season. Its advantage is that it avoids pressure on water resources due to simultaneous use by all farmers. Users can also make additional demands during the season outside the order of access laid down in the management plan, which attests to its flexibility.

Water tower use is strictly controlled so that users respect the time allotted to them. Conflicts may often arise when water towers are used (breaking the order of access, using irrigation channels without WUA authorization) (Ostrom, 1992).

Collecting water charges

The WUA is responsible for collecting water charges. Any beneficiary of a plot must pay the charge. It is paid collectively by each area under the responsibility of the WUA, which collects it and pays it back to the supervisory funding body⁶, the *Banque Nationale de Crédit Agricole du Sénégal*.

The amount of the charge established on a lump-sum basis is proportional to the surface area farmed, the unit being the hectare (Le Gal et al, 2001). The charge varies between CFAF 60 000 and 65 000 per hectare per season. The charge must include the right to draw water, personnel operating costs, and the costs of maintaining and renewing agricultural water infrastructure (Fall, 1999).

Breakdown of water charges in the Boundoum irrigation area in the Delta (cost/ha in 2001)

Nature	Lump sum price (CFAF)
Depreciation and major repairs	20 000
Repairs to paths and channels	10 000
Operation (electricity, wages, compensation)	20 000
Repairs to plots	10 000
Total per hectare	60 000

Contribution to the maintenance of agricultural water infrastructure

WUAs have always contributed to the costs of servicing agricultural water infrastructure. Servicing nevertheless remains a major problem area because there is no appropriate maintenance policy (very high cost, technical problems).

In 2003 the SAED adopted a new agricultural water infrastructure maintenance policy. Its objective is to ensure effective servicing and to create an innovative participatory framework for perpetuating the schemes encompassing all stakeholders in the Senegal River Valley, including the local authorities, which have to date played a minor role in managing public

⁶ In irrigation systems managed by the Niger Office in Mali, water charges are individualized, which is to say that each operator must pay them directly to the Niger Office without going through the group. This is a way of individualizing responsibilities in the event of failure to reimburse credit (Le Gal et al, 2001).

irrigation areas. After wide-ranging consultations with the various users and local authorities, four maintenance funds were set up. The WUAs are directly involved in managing two of these funds.

The *Fonds de Maintenance des Adducteurs et Emissaires de Drainage* (FOMAED) [Maintenance Fund for Feeder and Drainage Channels] is maintained by the SAED and users. It is controlled by a committee consisting of agricultural users, businesses and rural communities. The *Fonds Mutuel de Renouvellement des Stations de Pompage et des Equipements Hydromécaniques* (FOMUR) [Mutual Fund for the Renewal of Pumping Stations and Hydromechanical Equipment] is the second fund whose management has been transferred to users. It is run by representatives of users and a SAED representative. The aim of this fund is to regulate the mobilization and use of supplies for the major servicing and renewal of equipment used in public agricultural water schemes.

The adoption of the new maintenance policy has led to greater involvement of users and local authorities in managing structural and collective schemes and schemes of general interest. Their management is based on transparency and democracy (the amount is decided in agreement with the groups after protracted consultations).

The new maintenance policy requires users to be more disciplined in their financial participation. While payment of the water charge is justified by being able to farm the plot, the new policy establishes that contributing to the maintenance fund is mandatory for anyone who has been allocated a plot, even if it is not actually farmed. The mandatory nature of such contributions can be seen as a means of compelling the beneficiary to cultivate their plot so as to maximise crop intensity.

Constraints on the egalitarian and autonomous functioning of Water User Associations

Party-political political membership, a bias against equitable access to irrigation areas

The WUAs have always been paralysed by political tendencies. The history of farmers' organizations in Senegal in general is characterized by the strong influence of political struggles (Dahou, 2004; Blundo, 1994). The Senegal River Valley is no exception.

The WUAs were very quickly coveted by political parties, this was no more than a transposition of existing party-political tendencies the Rural Councils on to irrigation areas, since elected rural leaders are also leaders in the farmers' associations. Many WUAs were divided between the two majority parties at the turn of the 1990s (the Socialist Party, in power until 2000, and the Senegalese Democratic Party, the main opposition party that came to power in 2000). The decision-making process as regards irrigation areas is often paralysed by party-political tendencies, as well as favouritism and clientelism (Dahou, 2004). Certain political leaders who are also Association leaders still find arrangements to obtain the best land and the largest areas to farm, abusing their position of leader and principal representative of a political party (Box 1).

Since 2000, the date of the change in political power in Senegal, WUA authorities have tended to become increasingly depoliticized. Political trends in the irrigation areas are at the very least less apparent. This may be a result of the political changes in Senegal, which have disrupted the political majority in the WUAs, the originally majority Socialist Party now being a minority. Young people are increasingly advocating the depoliticization of groups in the irrigation schemes to avoid falling into factionalism again.

The persistence of traditional rights in rules of access to and management of irrigation areas

Customary and modern institutions continue to co-exist in the Senegal River Valley, particularly in the Middle Valley, where tradition has a great influence on the management of local affairs. In this zone a transposition is taking place in the traditional hierarchy within

farmers' associations. Under the guise of modernity, the institutions that usually manage land and water legally vest their authority in the governing bodies of producer organizations. In the Middle and Upper Valley three-quarters of farmers' associations are run by old social classes that had total control over the land and water (Traoré, 2005).

The reproduction of the social structure within certain Associations compromises their democratic functioning. The lower, according to tradition, social classes are often relegated to subordinate positions in representative bodies, and are rarely promoted to management posts. The decision-making process is often biased because the minority classes rarely if ever challenge the veto of leaders from the upper social hierarchy. This conservatism hinders the democratic functioning of user associations (Box1).

Box 1: How customs interfere in political practice in the Middle Valley of the Senegal River

Land accumulation

In Bokidiawé Rural Community, M. K., the holder of 16 ha of land inherited from his grandparents and a member of the nobility, also has sizeable plots in the major public agricultural water schemes. A senior leader in the Socialist Party and a descendant of landowners, he has twice been president of Bokidiawé Rural Council and is now vice-president. His position as a traditional political leader has always given him great sway over decisions to allocate land in the community and the Associations. Given his inability to cultivate this huge land potential, M.K uses sharecropping with neighbouring villagers, who often do not have land.

Influence on the decision-making process

Vieux D. is a well-known descendant of landowners who founded the large village of Ndouloumadji Dembé in Nabadji Rural Community. A former village chief, V.D also set up the first farmers' association in the village as a pioneer of rice-growing. A member of the Socialist Party, he has also been a rural councillor several times. All these functions now give him a certain respect. Even in retirement V. D. continues to wield a great influence over the management of irrigation systems in his Rural Community. His opinion is required for all agricultural water scheme projects, even by State structures.

Lack of training of Water User Associations and measures for professionalization

After over 20 years of decentralized management of irrigation areas, many technical deficiencies are evident. Transferring schemes without previously putting the necessary monitoring measures in place at logistical, training and institutional level will give rise before long to many shortcomings that will affect the efficiency of farmers' organizations. Producers are facing management and organizational problems that they were not prepared for (Legoupil et al, 2001).

In terms of water management and from an accounting point of view, current capabilities within farmers' organizations are not sufficient to be able to assess the real cost of irrigation (Fall, 1998). Water charges are established on approximate bases which are often challenged by farmers who are seeking to cut costs. The WUAs have to use private service providers to manage their accounts, which increases costs.

All stakeholders agree that the complexity of the technical and financial management of major schemes and the social and cultural complexity of farmers' organizations are constraints that can only be overcome gradually by training those in positions of responsibility in techniques for managing irrigation areas and farming methods, and by providing regular, transparent information to all stakeholders. The SAED's new strategies include the need to make the WUAs more professional.

Capacity building for Water User Associations

With funding from the *Agence Française pour le Développement* (AFD) [French Development Agency] and in partnership with the SAED, in 2003 a professional organization support project set up two *Centres de Gestion et d'Economie Rurale* (CGER) [Management

and Rural Economy Centres] in the *départements* of Dagana and Podor. The purpose of these Centres, created by and for producer organizations, is to improve the management of the latter and other economic agents in the Senegal River Valley. By means of their action the CGER help to stabilize credit, perpetuate agricultural water investments and improve their members' economic performance (profitability). CGER funding is provided by members' contributions on the one hand (payment for the provision of services by beneficiaries), and by a project subsidy on the other.

Tools to facilitate decision-making are gradually put in place in agricultural water schemes. *Plans d'Occupation et d' Affectation des Sols* (POAS) [Land Use and Allocation Plans] drafted jointly by the SAED and local people in the Valley make it possible to rationalize the use of natural resources and the management of space on the one hand, and to foresee conflicts and regulate access to resources on the other.

At subregional level, under the aegis of the *Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles* (CORAF/WECARD) [West and Central African Agricultural Research and Development Board], the *Pôle régional de Recherche sur les Systèmes Irrigués Soudano-sahéliens* (PSI) [Regional Centre for Research into Sudanese-Sahel Irrigation Systems] has designed tools to facilitate decision-making which are currently being piloted. These tools are primarily aids for discussion and dialogue between farmers and the people responsible for managing the area and the space. They ensure that information is transparent, and make it possible to visualize proposals (on maps or by means of other aids) and estimate the technical, economic, social or environmental impact of the different scenarios proposed and discussed among the various stakeholders concerned (Legoupil et al, 2001).

Box 2: Adoption of the drip irrigation system by Thilène Coordinating Committee

The village of Thilène is located in the district of Dagana in Diéry, an area with insufficient rain and water courses. Since 2004 Thilène Coordinating Committee, an association of water users, has adopted the overhead drip irrigation system as a method of rational irrigation water management. This initiative supports an overall strategy of a gradual reduction in problems of access to water faced by producers in Diéry.

This irrigation system involves the use of a motor pump connected to PVC pipes with holes that dispense water by dripping directly onto the crops. A three kilometre canal distributing water over a surface area of four hectares was built from the river with the consent of the SAED. The canal has an irrigation capacity of 300 hectares.

The Coordinating Committee is convinced of the advantage of the drip irrigation system. It allows water to be saved and facilitates the treatment of fertilizer. In terms of productivity, harvests have been speeded up, with the possibility of carrying out four during the year rather than two, with several crop varieties.

The method also has the merit of allowing savings in energy and human resources. One person is responsible for the irrigation, while it would have required at least four to irrigate 300 hectares of land with the traditional system, and it requires less labour and working time.

THE ROLE OF NON-GOVERNMENTAL ORGANIZATIONS (NGOs) IN CONSOLIDATING PARTICIPATORY MANAGEMENT OF IRRIGATION AREAS

The involvement of NGOs in irrigated farming has a long history. In the Upper Valley of the Senegal River, NGOs actually preceded the State in supporting organizations that used water from the River (Lavigne Delville, 1997). Village Irrigation Areas were introduced here towards the 1970s by a farmers' organization funded by a former emigrant and supported by an NGO. Nowadays NGOs are present throughout the Senegal River Valley. Their actions form part of a global anti-poverty strategy. In addition to their involvement in irrigated farming, they initiate action relating to environmental protection and the improvement of rural infrastructure.

With regard to access to water and land, particularly in the irrigation areas, NGOs have made the most important contribution in the struggle for gender equality. They have also been involved in managing the consequences of the political crisis opposing Senegal and Mauritania since 1989 (Niasse, 2004; Trémolières et al, 2004), which has had many repercussions on the rules of access to irrigation areas in the Senegal River Valley. Their policy involves creating user organizations in the irrigation areas that they have developed with their own funds, following the example of the SAED.

Action for equal access to irrigated land

Women are not very well integrated into irrigated farming (Diagne, 2005). They have always occupied the poorest quality land or land with the fewest plots (Bop, 1998). Their access to land is still problematic, despite the egalitarian provisions of land regulations. The SAED is now set on correcting this by seeking to reserve larger areas for women in all future schemes. When the Kobilé area (Bokidiawé RC) was being developed in 2004, the SAED required the WUA to allocate 40 ha out of the 700 hectares making up the area to the women's group. NGOs, however, were the first to address the problem (Box 3). Several of their projects sought to reduce inequality between men and women in access to natural resources. The NGOs Plan International, the *Association Sénégalaise de Recherche et d'Appui pour le Développement Communautaire* (ASRADEC) [Senegalese Association for Community Development Research and Support], RODALE International, the *Association pour la Solidarité et l'Entreaide* (USE) [Association for Solidarity and Mutual Assistance] among others, have tried to eradicate discrimination in access to water resources and land in the Senegal River Valley (Box 3).

Box 3: Objective of the *Projet Intégré de Podor* (PIP) [Podor Integrated Project]: the involvement of women in irrigated farming

The PIP was set up in 1989 by the NGO *Union pour la Solidarité et l'Entreaide* (USE), based in the districts of Podor and Matam.

Several Village Irrigation Areas (VIA) were set up as part of the PIP and then transferred back to the SAED after user groups, mostly female, had been set up. They continue to help women's groups to obtain the motor pumps required for irrigation and to get seasonal credit. A total of 64 motor pumps were made available to them by 2005.

In 2004 the PIP set up another five-year programme that provides for support for eight irrigation areas (motor pumps, access to inputs, farming techniques and crop protection), with contributions from beneficiaries. This support is reserved exclusively for women's groups.

The policy strategy is to make the provision of support conditional on the existence of an allocation of land to encourage men, particularly traditional owners, to make land available to women. Another strategy involves exerting pressure on rural councillors, who are legally responsible for allocating land.

PIP action in the area of irrigation has been beneficial. VIA have allowed their beneficiaries, especially women, to overcome the difficulties linked to the transition from the previous year with the plague of locusts, facilitate access to land for certain social strata (women, descendants of detainees), prevent malnutrition and provide fodder for livestock. (PIP, 2005)

Reconciling humanitarian issues with irrigated production: NGOs and the integration of returnees from Mauritania into irrigated farming

The tragic conflict between Senegal and Mauritania in 1989 caused significant involuntary migration on both sides of the Senegal River (Trémolières et al, 2004). Displaced people from the Mauritanian side found themselves without production tools because of expropriation. This originally humanitarian crisis was to take on an economic turn. The need to include all working people in the production process was particularly acute. Thanks to the action of NGOs, the idea of creating production circuits on the very banks of the Senegal River to avoid an exodus seemed to be the most relevant approach.

The possibilities offered by water from the Senegal River will be exploited with the development of several hectares of land for the benefit of deportees. The latter are organized into groups following the example of the WUAs in the irrigation areas developed by the SAED. Plots are allocated to them with the support of the High Commission for Refugees (HCR) and the Red Cross, which played an exemplary role in the crisis (supply of motor pumps, inputs, seed, working capital)⁷. In the *département* of Podor, one of the most important host areas, land was allocated to the project by the Rural Councils after traditional landowners were made aware of the gravity of the crisis.

This work is to be taken over by the *Office Africaine pour le Développement et la Coopération* (OFADEC) [African Development and Co-operation Office], an originally Senegalese NGO. From 1990 to 1995 OFADEC developed over 200 hectares of land around refugee camps to produce an annual output of 1 200 tonnes of rice per year for an average of 1 100 families. OFADEC still initiates irrigated farming programmes for the benefit of the same target population in order to consolidate knowledge gained from previous actions. Rather than adopting a short-term project strategy, the aim is to work towards sustainable actions that can be repeated.

⁷ The Senegalese State subsequently supported these initiatives by establishing the *Projet de Développement Agricole de Matam* (PRODAM) [Matam Agricultural Development Project]. Financed by the International Fund for Agricultural Development (IFAD), this project is geared towards integrating deportees from Mauritania into irrigated production. It recently began its second phase in 2004.

WATER USER ASSOCIATIONS CHALLENGED BY THE DEVELOPMENT OF PRIVATE IRRIGATION

The “boom” in private agriculture in the Senegal River Valley dates back to the 1990s, which is when the policy to liberalize agriculture was adopted (Dahou, 2004). The Senegal River Valley was the stage for strong competition for access to land and water resources. Nowadays the development of private irrigation areas is taking on another dimension in light of the Senegalese State’s wish to promote agro-industrial farming.

Incentives for the introduction of agro-industrial irrigated farming

Legislative provisions

The future of family farming is at the centre of a debate in the Sahel. For some it is a form of farming paralysed by a lack of productivity. For others it should be supported because it is accessible to all social classes, despite the huge difficulties it faces (drought, financial resources, insufficient public support). The Senegalese public authorities consider this subsector to be characterized by “*archaic and not very productive methods of farming*” (Seck, Touré, 2005). In the OMEGA Plan proposed by the Senegalese Government in 2001, the “*small producers forming the core of the agrarian system are on the whole dominated by rudimentary production methods and low productivity*”.

This contradictory ideology of family farming was systematized in the Act of 25 May 2004, the *Loi d’Orientation Agro-Sylvo-Pastorale* [Agriculture, Forestry and Grazing Guidance Act], which lays down the legislative foundations of the process for modernizing agriculture in Senegal. The Act encourages family holdings to adopt modern forms of production in order to become more competitive. While stressing that family farming must develop, the Senegalese Government also wishes to create an “attractive environment” to foster the emergence of “agricultural entrepreneurship”. There is no doubt that the objective of this Act is to encourage major capital investment in agriculture, something which is clearly manifested in various programmes introduced in the Senegal River Valley (Haramata, 2004).

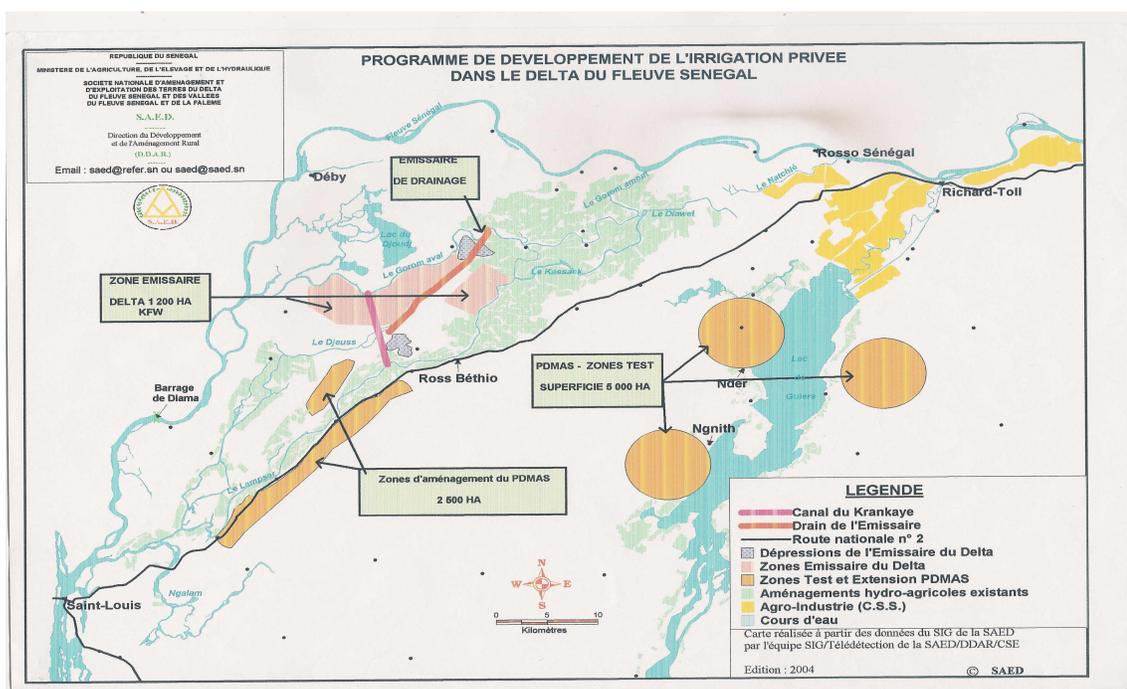
Private entrepreneurship development programmes in the Senegal River Valley

The Senegal River Valley is the focus of several development plans whose aim is to attract private capital. Senegal is currently emulating the Agribusiness Real Estate Investment Trust model (AREIT) that has been tried in other African countries such as Mozambique. This model involves establishing a strategic commercial and technical relationship with an international partner providing capital, know-how and access to the market for a period of at least 15 years, and participation in the capital of a joint venture with producers (or their organizations and/or the Rural Community) by means of developing land and making it available. Providers of land who agree to participate in the capital will receive favourable treatment.

This programme is backed by the *Agence Française de Développement* (AFD), which granted financing to the order of EUR 7 million over four years. This could be used to introduce mechanisms at local authority level seeking to make land secure and to promote economic development so as to create conditions fostering private investment in irrigated farming.

The World Bank-supported *Programme de Développement des Marchés Agricoles au Sénégal* (PDMAS) [Agricultural Markets Development Programme for Senegal] has now been drafted. It is scheduled to begin in the first half of 2006 for an implementation period of ten years, divided into two five-year stages. The PDMAS includes a component entitled “Promotion of private irrigation”. It seeks to consolidate, increase and diversify production by involving private promoters to the full. The establishment of such private promoters in the

Senegal River Valley, however, is becoming increasingly prevalent even before the programme has begun the active stage.



Competition for access to water and land resources between agribusiness and family holdings

The process of developing private agriculture in the Senegal River Valley can be divided into two major periods.

The first, from 1989, the beginning of liberalization of agriculture, was characterized by the development of, in particular, private indigenous holdings. The revitalization of undeveloped zones in agricultural areas and making the rural councils responsible for allocating land in the irrigated area sparked off an unbridled race to occupy irrigable land. With the support of politicians at central level and rural councillors, national citizens and businessmen came to set up in the Senegal River Valley to grow speculative crops, particularly vegetables, while rice-growing for food dominated public schemes. Commercial family holdings⁸ were increasingly developing in public schemes, however. These neo-rural citizens were the first wave of private farmers after the establishment of large businesses such as *Compagnie Sucrière Sénégalaise* (CSS) and *Société de Conserverie Alimentaire du Sénégal* (SOCAS), which were two of the first agro-industrial companies to set up in the Delta.

The second stage was marked by the influx of new businesses using sophisticated high water-consumption irrigation systems involving the introduction of pumping stations with floating tanks from the source. The basic investment for their operation was substantial and not greatly reliant on the aid of local banks. They ranged from CFAF 50 million for 7 ha, including development, equipment and technology, to almost CFAF 6 billion for 40 ha of crops under glass.

⁸ Commercial family holdings only use family labour on areas that may range from 3 to 10 hectares, a very large part of which is in public schemes. The average area per farmer in public schemes is 1 hectare per family.

These are essentially new entrants (very few locals, some Senegalese not residing in the Valley, and an increasing number of expatriates). They set up with a business plan based on a more or less formalized marketing plan and a marked concern for financial profitability. In particular, they generally control their distribution outlets. International markets are also targeted for distributing their produce⁹ (studies carried out by EXA, 2005). Examples of these are the Saudi Arabian company Ferlo Gomme, in Mbane Rural Community, which specializes in the organic farming currently being established, and *Grands Domaines du Sénégal* (GDS), a company of French origin specializing in vegetables for export and located in Gandon Rural Community.

Nowadays competition for access to irrigated land sets this new category of agribusiness against family holdings, whether coming together in Water User Associations or not.

Evolution of areas developed by type of initiator/ha in the Delta (Source: SAED 2005)

Initiators	1999	2000	2001	2004-2005
SAED	22 055	22 447	22 398	22 515
PRIVATE	36 872	36 960	39 188	35 486

Agribusiness access to irrigated land and water

The Rural Council, the new promoter of agribusiness in the Senegal River Valley

Access to land is the primary key factor for those who wish to obtain irrigation in Senegal (Mathieu, 1992). The right of access to water is subordinate to the holding or otherwise of land. The value acquired by land thanks to agricultural water schemes necessarily raises certain issues (Boutiller, 1989; Traoré, 2005).

In the Senegal River Valley the Rural Council as a decentralized structure for allocating land is the organization that now receives applications from private investors wishing to set up. However, cases of agro-industrialists bypassing the Rural Council in order to gain control over irrigated land sometimes come to light (Box 4).

Box 4: Agreements between agribusiness companies in defiance of the law

By Decision No 005 of 16 December 2004, Ross Béthio Rural Council refused to approve an application for land from *Société de Conserverie Alimentaire du Sénégal* (SOCAS), a company that specializes in vegetable production and processing. The reason cited was that not only did SOCAS begin to farm land without a decision from the Rural Council, but it also allowed the company *Grands Domaines du Sénégal* (GDS) to farm in the same irrigation areas under a secret agreement passed without the knowledge of the Rural Council. According to Decree 72-1288 establishing the conditions for allocating and deallocating publicly-owned land, the latter is the only body qualified to allocate and deallocate land (Record of Decisions).

The development of decentralization in Senegal¹⁰, with local authorities having greater responsibility for promoting local development, has given more prerogatives to the Rural Communities in promoting entrepreneurship. At the level of irrigated farming in particular the Rural Councils directly become intermediaries for businesses that would like to set up on their land. Previously the State, which held this monopoly, acted according to a special procedure of downgrading land to grant a right of use to entrepreneurs. Now the Rural Communities in the Senegal River Valley use contractual procedures with foreign companies before endorsing their plan to set up.

This transfer of prerogatives to the Rural Communities involves risks, however. The latter do not have the expertise or technical resources required to study highly technical set-up projects

⁹ This classification of agribusiness is the result of a study carried out by EXA *Etudes* for the SAED in 2005, on making water engineering schemes legally secure.

¹⁰ Act 96-06 of 22 March 1996 on the Local Authority Code.

formulated by agro-industrial companies. The Rural Communities often overlook their impact on the land and people when they are set up.

Mbane Rural Community is the most sought-after at present because of major irrigated farming development projects underway in the Lake Guiers district and because of the land it has available. With its 10 000 hectares of land, only 5 200 of which are actually farmed, it has become an area of attraction for agro-industrial companies. In 2005 Mbane Rural Council had to approve an application from four large foreign companies. Several applications are still pending at Rural Council level.

Gandon Rural Community has also allocated land to agro-industrial enterprises, the most important of which at the moment is GDS, which is currently expanding in terms of real estate occupation. Initially with only 200 hectares of land allocated, i.e. in 2002, this company specializing in vegetables intended in principle for export actually had 570 hectares of land in 2005, while the process is far from being concluded.

The country's authorities often support the establishment of these agro-industrial companies. In May 2005 Ross Béthio Rural Community received an application for land from a Spanish firm accompanied by a letter from the Prime Minister of Senegal.

Presentation of some agribusiness companies and their activity

(Source: Record of Decisions of the RC)

Rural Community	Name of Company	Activities
MBANE	- FAKI BIO AGROPOLIS	Organic farming
	- FERLO GOMME	Organic farming
	- AZILAL GOMME	Organic farming
	- VEGETAUX D'AILLEURS	Exotic plant production
GANDON	- GDS	Vegetables
	- BELLE RIVE	Vegetables
ROSS BÉTHIO	- SOPROCER	Vegetables
	- CABELLO	Vegetables
	- SOCAS	Industrial tomatoes
	- YVES CAPITAINE	Vegetables
	- SAFINA FILFILI	Vegetables
	- GAFFARI	Vegetables

Pressure on water resources

Agro-industrialists' water needs are in keeping with the scale of their activities, which are not negligible. These require significant amounts of water, which means that a high water consumption irrigation system must be set up. They mostly use the overhead or stationary irrigation system with pumping stations or floating tanks from the source.

Certain firms actually exercise control over water resources (Box 5). This is the case of *Compagnie Sucrière du Sénégal (CSS)*¹¹, a firm that specializes in sugar cane production. Its site and position in relation to the water courses running into Lake Guiers and its strong presence in the area give it a privileged place in the system for regulating water upstream and downstream of the dam, which it has the power to open and close to supply neighbouring producers. This position is much criticised by the people and their representatives in the WUAs, producer federations and local authorities. It has been cited as a source of tension. People consider the position taken by CSS to be unacceptable. They believe that the power to open and close the dam granted to this structure close to the town of Richard

¹¹ CSS is one of the leading agro-industrial companies established in the Senegal River Valley. It is linked to the State by means of a lease in rem contract valid for 99 years. It currently controls over 11 000 hectares of land in the Senegal River Valley. Its considerable responsibilities and powers over water and land resources in the River Valley often give rise to many (particularly environmentally-related) disputes.

Toll should be put back in the hands of the State departments responsible for water engineering issues. According to certain producers, CSS only carries out work expected of it in terms of water management according to its own needs, to the detriment of other producers, who are sometimes exposed to water shortages because of the discretionary power CSS has over the regulation of water in the lake (UICN, 2001).

Box 5: When an agribusiness claims exclusive use of water!

In 1999 a dispute brought a French agribusiness concern, Yves Capitaine, into conflict with the inhabitants of the village of Maraye in Ross Béthio Rural Community.

Mr Capitaine had over 100 hectares that had been allocated by the Rural Council, on which the company grew vegetables. The water needs involved led the company to construct a canal one kilometre in length from the river, and which went through a large number of plots. This could not prevent people from using the canal to water the land and their livestock. Mr Capitaine, however, did not agree with the principle of collective use of the canal, and stubbornly insisted on prohibiting villagers from drawing water from it. This marked the beginning of the confrontation, since local people felt that they were under attack on their own land by an outsider who sought to perpetuate a “colonial” tradition by wanting to reserve exclusive rights over resources intended for collective use.

Mr Capitaine’s intransigence actually caused the then French Consul in Senegal to visit the site, thus adding a diplomatic dimension to the dispute (Sylla, 2005).

Farmers’ strategies for controlling water and land

In response to pressure from agro-industrialist companies, local people have also developed strategies for laying claim to as much irrigable land as possible.

Individualization of holdings at family level

The individualization of holdings is not a new development. It has always been used to achieve a certain land security at family level faced with strong demand from outsiders. The phenomenon of the double plot is developing in public schemes. At the same time as they benefit from an allocation of land in Water User Associations, farmers also work an individual plot that has been awarded by the Rural Council.

This phenomenon of the double plot has given rise to fraudulent practices in terms of water use. The plots awarded by the Rural Council, generally developed alongside the public schemes, use the irrigation network set up by the SAED without Water User Association authorization. They are commonly known as “pirate plots” because of the unorthodox practices adopted and the unstable nature of such land development. They often generate conflict with the other members of the Water User Association, particularly during farming seasons, when the demand for water rises substantially.

The desire to make possession of land more secure entails consequences in terms of the social organization of production (Toulmin, Gueye, 2003). Several families in the Valley have split up into small farming units. Members of the family who have the physical and financial capacity to promote themselves do not hesitate to submit an application for land to the Rural Council. Sometimes they do not even have the financial resources, but thanks to family and even village solidarity they always manage to develop the plots. This means that the splitting up of the family unit does not necessarily undermine the spirit of solidarity that has always prevailed in family holdings. The case of Mr Diop, an inhabitant of the village of Ndiakhaye in Mbane Rural Community, is a perfect illustration of the extensive fragmentation of production.

Until 2002 Mr Diop shared a holding with two of his elder brothers on the banks of Lake Guiers. In response to the strong demand for land from outside the village and the major State projects for developing irrigated farming in Mbane Rural Community (PDMAS), with the aid of his brothers Mr Diop developed an individual two-hectare plot allocated to him by Mbane Rural Council. Since he did not have the financial resources to develop this land, his family lent him a sum of FCFA 150 000, with which he paid for a tractor to plough his field and to

dig a rudimentary drainage system from the water network. Following the example of other family farmers, Mr Diop diversified his crops to get better value out of the land, part of the production of which is intended for sale.

These large projects that now attract major foreign investors also encouraged young people who had left the rural areas to go to towns in the interior of the country to return to the village before “the good land was taken by foreigners”. This return of young people to the village also bears witness to the rekindling of hope in family farming (Box 6).

Box 6: The return of young people to the Village

Ady, an inhabitant of Mbane Rural Community, is a higher education graduate from the University of Cheikh Anta Diop in Dakar. He decided to leave university to farm the land. He was able to obtain an 11 ha plot with the help of his uncle, on which he grows potatoes, black-eyed peas and groundnuts. Since he did not initially have the resources to buy a motor pump, Ady used a sharecropping contract to irrigate his plot. He agreed to share the plot equally with someone who had a motor pump, and in return was able to use the pump to water his plot. After two years of farming in 2003, Ady managed to buy his own motor pump with the profit he had made and became independent once more in terms of irrigation.

The revitalization of community spirit in access to water

The development of agricultural water schemes set up by private agro-industrial firms has revitalized community spirit at village level outside the public irrigation areas. While the State and sponsors were the principal investors in the water schemes, in Mbane Rural Community the people developed community initiatives for exploiting water from the lake without actually waiting for intervention by the State or any other organization. In response to the development of water engineering works carried out by some agro-industrial companies (drainage canal, pumping station) which risk creating dependency¹², people in some villages also felt that it was important to have their own community-based drainage network. Farmers set up a system of interdependence that brought them together around a principle of collective organization and the sharing of irrigation infrastructure, using their own funds. The Dieler canal in the village of Ndiakhaye in Mbane Rural Community, which currently provides access to water for an entire population, is an example of this.

The one-km long canal, which makes it possible to draw water from the lake, was developed in 2002 on the initiative of four medium-scale farmers who established a contribution system (CFAF 287 000/farmer). The contributions financed construction of the drainage network and pipelines. Other farmers then signed up to this collective initiative. Now a seven-member board is responsible for maintaining and developing the canal. This community initiative is also a symbol of community solidarity, since other farmers whose land adjoins the canal and who do not have the resources to contribute financially are authorized to make use of it. This relates in particular to new farmers who do not yet have the means to purchase a motor pump or to develop a costly drainage network.

Control for rational use of water

An irrigation water management committee was recently created in 2005 in Mbane Rural Community. This committee made up mostly of local farmers, campaigns for rational use of water from the lake by the large private investors, and also plays a leading role in State-initiated private irrigation development projects on their land.

One of the committee's objectives is to encourage agro-industrialists to use irrigation methods that consume less water, such as the drip system. Today people bemoan the use by large agro-

¹² In this Rural Community people often use the canals developed by CSS to water livestock.

industrial businesses of the overhead or stationary irrigation system, which not only exerts pressure on water but also destroys soil texture.

The committee also plays a preventive role by making farmers aware of the need to respect environmental standards in using water. The sometimes polluting activities of agro-industrial businesses require a prevention system to be put in place. CSS causes a great deal of environmental damage to the water in Lake Guiers by means of a system for discharging waste water and pesticides.

The setting up of the management committee is the second initiative in the Rural Community after the initiative seeking to introduce a financial contribution from all lake-water users (family and private holdings). In view of the inadequate control over the use of water in the Valley by the State, which does not levy any charges on farmers working outside the public irrigation areas¹³, the people of Mbane Rural Community proposed that a lump sum should be paid that would not only allow the Rural Council to obtain additional revenue but also to control the various water users. The principle has now been ratified in a Rural Council decision passed in March 2005. The initiative should begin its second phase in 2006 with a survey of all users of the lake in the Rural Community. The contribution may vary according to the degree of use of water and the size of holding.

Detrimental effects of the establishment of agribusinesses on family holdings

The impact of agribusiness on the local standard of living is controversial in the Senegal River Valley, particularly its capacity to reduce poverty. Even if the agro-industrial production system has advantages at macroeconomic level, it must also be acknowledged that it causes a great deal of harm to the people directly affected by its presence.

Expropriations and loss of rights over irrigated land

The introduction of agribusiness is, in every case, accompanied by expropriations and the displacement of people without their prior consent (Toulmin and Gueye, 2003). This always generates many conflicts between indigenous populations and foreign companies. The expansion of GDS in Gandon Rural Community has given rise to expropriations to the detriment of the surrounding populations. In 2003 Gandon Rural Council allocated another 70 hectares of land belonging to the village of Lampsar to GDS. Local people initially put up stiff resistance, but after several rounds of negotiation under the auspices of the Rural Council, an area of agreement was found.

In Mbane Rural Community the Rural Council allocated land reserved for stockbreeders to foreign private investors (Box 7). Because of the uncontrolled occupation of space, the problem of access to water points for the breeders and their livestock is a constant issue in the Valley. Pastoral society is generally penalized by State policies concerning agricultural water schemes. No provision has been made to help this category gain access to irrigated zones in agricultural areas (Cotula et al, 2005).

Expropriations only exacerbate the shortage of irrigated land. In the Delta the areas developed represent 85% of the available land¹⁴. Over the last few years the Delta has become saturated due to the uncontrolled allocation of land by the Rural Councils to satisfy a continually expanding population. Shortage of land has favoured the development of schemes among farmers for access to water and land by means of sharecropping and leasing contracts.

¹³ In the Senegal River Valley only farmers in public irrigation areas are subject to water charges, although water legislation establishes the principle of payment for any form of private use of public water. Consideration is now being given to balancing rights to the charge among all farmers.

¹⁴ The OMVS, a body bringing together the countries bordering the Senegal River, establishes a certain number of quotas of land to be irrigated for each country in order to avoid unequal pressure on water resources from the River. The quota granted to Senegal is 80 000 hectares.

Land expropriations therefore only produce more “landless” people and create the conditions for an agricultural wage-earning class. The employment of young people by GDS was a proposal made to the villagers of Lampsar to encourage them to accept the expropriation declared by Gandon Rural Council.

Box 7: Land expropriation in the village of Singuou Jeeri

The allocation by Mbane Rural Council in the Lake Guiers district of 100 hectares of irrigable land in the stockbreeder village of Singuou Jeeri to the Saudi Arabian company Ferlo Gomme caused a dispute between the stockbreeders and the Rural Council in 2003. The villagers challenged the allocation of their grazing land to the foreign company without their consent. An agreement was finally reached between the two parties under which the foreign company paid compensation to the victims of the expropriation (Sylla, 2005).

Impact on production at the level of Water User Associations

In public schemes in the village of Savoigne, following the example of other family holdings, output in 2005 recorded a decrease of over 30%¹⁵. The reasons cited are primarily a shortage of labour and a concomitant increase in its cost. All family labour that was used in public irrigation areas has now moved to GDS areas¹⁶. Mr I. Diop, a member of the Savoigne Water User Association, points out that during the last farming season in 2005 he had had to look for labour in other more distant villages. Previously, seasonal workers would present themselves. What is more, labour is now more expensive because higher wages have to be paid than those paid by GDS, which offers around CFAF 2 000 per day. According to Mr I. Diop, in the last two years he has spent more on labour, which has increased his operating costs. Labour costs have risen from CFAF 800 to more than CFAF 2 400 per unit per day in the public schemes. Another cause of falling incomes in family holdings in Gandon Rural Community is the drop in crop intensity due to the fact that farmers are an ageing population. Young people have left the holdings, leaving only old people behind. Areas to be cultivated are inevitably shrinking substantially. While GDS provides some people with a wage, a large majority of the population are on the other hand experiencing a drop in income (old people and vulnerable categories of the population). The persistence of the phenomenon could even lead to the collapse on family holdings of this category, which can no longer dedicate itself to farming because of its age.

Despite the many difficulties, therefore, family holdings within or outside public schemes have in recent years allowed farmers to become food self-sufficient throughout the year. Mr I. Diop says that he very much prefers to farm his own plot rather than setting himself up as a day labourer in the fields, where the work is harder and more insecure due to dependence on a wage that is not guaranteed to last. He explains the attraction of agribusiness by the shortage of cultivable land and by the problem of selling the rice produced, which has also contributed to a slump. Mr I. Diop said that they were having difficulty distributing production from the previous season, harvested in late October 2005, and that the rice was being stored in warehouses¹⁷. It is therefore not surprising that producers should seek additional income in GDS areas.

Family farmers are sometimes also subject to unfair competition from agribusiness. In 2004 GDS saturated the local market with second-grade tomatoes which are not eligible for export. This violated the rules of competition to the great detriment of producers in the Senegal River

¹⁵ Source: surveys.

¹⁶ Between 700 to 800 young people from the village became agricultural labourers in the GDS areas.

¹⁷ Rice production in the Valley suffers from fierce competition from short grain rice imported from Asia because of a policy of excessive liberalization of the sector. The Senegalese State had promised to take measures to protect rice production, but producers in the Valley are having huge problems distributing their produce.

Valley, who had had huge problems selling their produce. And yet the establishment agreement between the Senegalese State and GDS stipulates that in principle production is intended for the foreign market.

The profitability of Water User Associations in public irrigation areas compared to wage-earning agricultural workers has been demonstrated (see table). Public schemes have made it possible not only to ensure food security¹⁸, but also and more importantly for farmers to take over production tools through the decentralizing system (land, water). Measures must be taken to protect this production sector, which is responsible for the survival of most of the Valley's population, to avoid any loss of national land and water resources. Excess liberalization only works to the advantage of a small group and impoverishes a larger majority in the Sahel, in a context in which land and water are the principal assets in a rural environment.

Estimate of income between a farmer in a public scheme and an agricultural labourer¹⁹

1. Agricultural labourer in GDS irrigation areas

Daily Income	CFAF 2 000
Number of working days/year	208 d (Sept-April)*
Annual Income	CFAF 416 000

* *Labourers work an average of eight hours a day for six days a week between September and April, on a variable basis.*

2. Farmer in public schemes

Number of seasons per year	2
Average farming area	1 hectare
Total amount of charges	CFAF 480 000 to 520 000
Total annual income	CFAF 510 000 to 600 000

Conclusion

The idea of decentralized management of natural resources is a panacea for the sound governance of water and land resources in the Sahel. Giving WUAs in Senegal greater responsibility is part of a process of setting up a viable irrigation system in which the rules are discussed, negotiated, defined and accepted by both users and technicians (Ostrom, 1992). The process is, no doubt, yet to achieve all its basic objectives for reasons attributable to the State and to producer associations themselves. These user associations, however, have proved their capacity to adapt to a changing environment and to move towards professionalization despite the many obstacles. Farming in public schemes is nowadays generating new interest, with constantly expanding output (Seck, Touré, 2005).

Private irrigated farming in Sahel countries should not be developed at the expense of user groups, which have become important pillars in managing water and land resources and also in managing food resources. The uncertainty characterizing private investors in their dynamics of establishment, attracted purely by short-term advantages and who are likely to move from one country to another, should lead the public authorities to design sustainable irrigated agricultural development policies based on local potential.

Research should now focus more on the social, economic, political and environmental impact of the establishment of agro-industrialists or agribusinesses on the life of local people. Attention is focused more on economic repercussions, to the detriment of a holistic view of

¹⁸ Despite the difficulties, farmers in public irrigation areas still manage to cover food needs for a year.

¹⁹ The estimate was based on information obtained from villagers in Lamapsar.

human development, such as the environmental dimension. This is the challenge that must be associated to the battle for equal access to water and land.

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Annex 1

MODEL ORGANIZATION CHART OF WATER USER ASSOCIATIONS IN THE SENEGAL RIVER DELTA

• Supervisory and governing bodies

The Association is endowed with democratic supervisory and governing bodies: the General Meeting and the Board of Directors.

The General Meeting comprises the Executive Board of the Association, the representatives of the EIGs, SV [*Sections Villageoises*], Association villages and the elders in each village. It meets twice per season and is competent to define Association policy, elect the Executive Board and the Board of Directors, adopt the budget, and establish and apply the internal rules of procedure.

The Board of Directors is formed by representatives of Association villages in proportion to the areas they farm. The Board of Directors meets every month. Its role is essentially to coordinate the Association's activity and to ensure that the Executive Board's action is consistent with the choices voted on by the General Meeting.

• The Executive Board of the Association

The Chairman: the Chairman's role is to coordinate the activities of the Association's members as a whole. He is also Chairman of the Board of Directors. His role is honorary. The Association coordinator actually acts as the interface between the various bodies and people responsible.

The Vice-Chairman: his role is to stand in for the Chairman if he is absent or unavailable.

The General Secretary: his role is to ensure the day-to-day management of correspondence, to convene meetings and to draft minutes of meetings.

The Treasurer: he is the custodian of the Association's funds and works with the Association coordinator, in co-operation with the accountant.

The accountant: of the leaders the Association the accountant is the only professional paid by it. This position is a recent innovation and arises from the Association's wish to monitor expenditure, a task that it could not carry out successfully previously.

Leaders of Committees: they are responsible for the Association's areas of activity: exploitation of the scheme, maintenance, sales of rice or seed, the distribution of drinking water, credit and collection of charges and the management of operating equipment.

• Technical Committees

Each Committee is made up of seven members (including leaders). Each member represents an Association village. There are generally six Committees within the Association.

The Credit and Collection Committee: this Committee is responsible for granting loans with the Association's OPBs [*Organisations Paysannes de Base*]. Until 1999 it accepted the reimbursement of credits in kind. Since the 1999 off-season, credits have had to be reimbursed in cash.

The Operating and Irrigation Committees: these are both responsible for operating the scheme: the Operating Committee is responsible for monitoring growing practices and the rules for managing the scheme (water towers in particular), while the Irrigation Committee is responsible for operating the pumping stations.

The Sales Committee: this Committee is responsible for monitoring rice collections and assessments on behalf of the Association. It also manages stocks in the Association's shops (it has a shop in each of the scheme's seven villages).

The Scheme Committee: this Committee is responsible for maintaining the schemes. It diagnoses malfunctions connected to the network and supervises repair work.

The Drinking Water Conveyance Committee: this Committee is responsible for managing and selling drinking water from outlets set up by the Association in each village. The Committee is independent of the rest of the Association: it has separate accounts and pays its expenses from income from the sale of water (invoiced at CFAF 25 per pail).

The Operating Equipment Committee: this Committee is responsible for personnel management (drivers), and the maintenance and use of equipment. It is run by the sole director of the Committee.

Annex 2

TYPOLOGY OF AGRICULTURAL WATER SCHEMES

Large Public Area (LPA): medium to large-scale terminal scheme (generally above 50 ha), requiring significant public investment. It serves several users or groups of users (farmers' organizations). The I.S. (Intermediate Schemes) that will be set up subsequently are smaller variations of the LPS.

Village Irrigation Area (VIA): a small-scale terminal scheme (generally below 50 ha) that does not require significant start-up investment (compared to the large public irrigation areas), financed out of public funds (possibly with a contribution from users). It serves a group of users belonging to the same village. These VIA were set up in the Middle Valley during the 1970s and 1980s using public funds (CFA 300 000/ha at the end of the 1970s to CFA 1 million/ha at the end of the 1980s), with the aim of offsetting the effects of the drought. As soon as they are set up the VIA are transferred to the village organizations (which often contribute to the investment with labour). They are a very heterogeneous group but are very often marked by unreliability and poor functioning; this explains why they are underused and gradually being abandoned. The diesel motor pump unit is the most fragile element of the installation.

Private Irrigation Area (PIA): this is a terminal scheme financed out of private funds. PIA were set up by private initiative and funding between 1989 and 1993. They are essentially located in the Delta (78%) and are characterized by inadequate land development (uneven levelling, lack of drainage), which does not make it possible to ensure that performances are maintained because of high irrigation costs, weed problems and salinization.