Pathways towards agricultural intensification

Case study: The delta of the Senegal River (Senegal)

Synthesis report
(English version)

September 2016

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I. The choice of the delta of the Senegal river

1. Context of the study

Against an African background of strong demographic growth, agricultural intensification is a key challenge. We should produce more to feed more consumers. But the needs will also be to produce better, in particular to preserve the environment and foster social peace (resource sharing, land and water, work and income). Consequently, there is a pressing need to raise questions about the pathways towards agricultural intensification to focus on during the coming years. ProIntensAfrica has been elaborated accordingly (http://intensafrica.org). Different fields were selected to address this issue. Among them, the choice of the Delta of the Senegal River is particularly relevant.

The Delta of the Senegal River covers indeed a wide geographic territory bolstered by the rapid growth of irrigation since the 1960s. Located in the northern part of Senegal (map 1), this area is home to different agricultural commodity chains (rice, sugar cane, milk, tomatoes, vegetables, livestock breeding), different production systems and a wide range of stakeholders (from pastoralism to intensive irrigated agriculture). This area has a long experience in intensification programs (irrigation, mechanization, roads, electricity, agricultural and banking services, etc...). More recently, there is a growing interest in these high potential lands among private investors. Therefore, agribusiness projects are now supported by the government programs. The motto is the private sector will strengthen the virtuous circles towards food sovereignty (Emerging Senegal Plan, 2014) and support family farming (PRACAS, 2014). If access to land and water is an important challenge for the Delta of the Senegalese River area, the Senegalese Government is currently experiencing new ways for land governance and management.
Main objective:
The purpose of the study is to identify the future research questions on the pathways towards sustainable intensification within the area of the Delta of the Senegal River.

Involved commodity chains:
Rice, sugar cane, tomatoes, vegetables, milk.

Consortium members and partners
Involved consortium members: Pastoralism and Dry Zones Pole (Pôle Pastoralisme et Zones Sèches) (CIRAD, ISRA, CSE, UCAD) – www.ppzs.org
Other partners: NGOs, Université Gaston Berger, IRD, private sector, SAED, producer organizations.

2. Work plan and agenda
The case study is structured around four activities:

The purpose of the study, carried out between September 2015 and March 2016, is to draw up a description of the agricultural context of the Senegal River Valley and, more particularly, the intensification processes observed over the last decades, their achievements and difficulties encountered. In order to achieve this, the work survey targets
the transformations that took place over the past 50 years in the areas of the Senegal River and the Lac de Guiers. The study identifies the main drivers of changes and intensification processes within the region, whether they are exogenous or endogenous. The results of the literature review were discussed in Activity 4.

**Activity 2. Territorial diagnosis and description of current production systems**

With a view to achieve synergies between agribusiness and family farming, the efficiency of irrigated systems, in their diversity, should be compared to that of the other activity systems, often extensive, that promote special available lands, while fostering the development of local product markets. This analysis will enable the identification of priority areas as part of territorial investment plans and highlight the synergies to be built between the different production systems. Bearing this perspective in mind, we offer to link-up different survey levels to:

i) Assess the different production systems (types of production systems), and identify the stakeholders and the rules governing the management systems, formal and informal, of land and water resources within the valley (stakeholders: actors, rules, spaces)

ii) Analyze the diversity of stakeholders’ logics, with a special focus on family farming, and, more broadly the positioning of farmers towards the forms of agriculture. How are dynamics of change initiated and accompanied?

iii) Analyze ongoing investment dynamics in the Delta of the Senegal River valley and around the Lac de Guiers and more specifically inform processes related to the establishment of new stakeholders in the territory (access to land and water resources, project effectiveness), analyze the impact of the new development projects on resource management in the valley.

Carried out from September 2015 to April 2016, this section also highlights the interactions (analyze land features, more broadly, access and resource management) between production system and the study of arrangements between the stakeholders.

**Activity 3. Participatory prospective workshops on agricultural intensification at local level**

This will involve organizing a participatory workshop (St. Louis, 16-17 May 2016) to reflect on stakeholders’ practices and therefore i) identify their effective roles in resource management; ii) contribute to the reflections on the relevance of new land registry rules promoting intensification and their applicability; iii) explore possible future for a sustainable and inclusive intensification from local stakeholders perspective and project their potential impacts. The participatory modeling approach’s purpose is to test/play the different scenarios developed. It may be organized in two articulated phases: a playing board, allowing to simulate a space, its resources and its actors, then in the second stage, a theater-forum to create a space for public debate allowing to present, discuss and spur exchanges during group session games. This workshop was also an opportunity to think aloud about the
possible transitions that traditional production systems should manage in the near future. Specifically, this work will put an emphasis on the support needs of some production systems.

The workshop gave special focus to the negotiation of compromises, viewed as articulation points for possible synergies. Therefore, the theater-forum addressed precisely this point. It allowed to discuss with the different stakeholders on negotiating modalities. It was suggested as a platform for discussion, but also for collective experimentation of such negotiations.

**Activity 4.** Multi-stakeholder workshop on inclusive and sustainable intensification

The final activity consisted of organizing a brainstorming workshop on the agricultural intensification issue within the study area. This meeting took place on 23 June 2016 in Dakar. The overall aim of the meeting was to provide a forum for dialogue among all stakeholders of the pathways towards intensification, its contents, its prospects, its long-term effects in a variety of fields (equity, economy, environment, food security, social peace etc.)

The work completed as part of the first three activities were presented and discussed by a set of participants including policy makers, researchers, farmers and farmers’ organizations, private sector, NGOs, other stakeholders contributing to the Delta of the Senegal River’s development. Based on the analysis presented, the participants were invited to reflect on issues regarding pathways towards intensification and its dynamics within this special area of Senegal.

In practice, group works addressed a number of broader issues related to intensification (relationship between governance and sustainable intensification, specific needs and investment in value chains, etc.) as well as the local realities of the study area (relationship between intensification pathways and local development dynamics, role of the private sector in sustainable intensification pathways, complementary beyond the competition for access to land and water resources, place of extensive systems, etc.).

Specifically, the future research questions on the pathways to sustainable intensification are identified.
II. Bibliographic synthesis

Synthesis prepared based on:


1. The Delta of the valley: building a model of productive agriculture

The Delta region covers some 500 km2, from Saint-Louis to Dagana (Dia. I., LE Gal. P.Y, 1991). For being the application site of hydro-agricultural policies, this part of the country has attracted Senegalese authorities’ attention. This has been the case since independence. The creation of the SAED, in 1965, demonstrates the strong commitment of the government to support economic and social development in general and hydro-agricultural development in particular within the Delta.

The Delta is home to different types of hydro-agricultural developments, including: (i) large transferred developments, large non-transferred developments, small transferred perimeters and intermediate transferred development financed by public funds and implemented by the SAED; (ii) village level irrigated perimeters (PIV), (iii) private irrigated perimeters (PIP), and (iv) agribusiness (Compagnie Sucrière Sénégalaise – CSS - , Société de Conserves Alimentaires au Sénégal – SOCAS -, les Grands Domaines du Sénégal – GDS - , etc.) located outside the SAED areas. Most of large developments are located in the Delta. Almost 85% of these types of perimeters are identified in the valley of the Senegal River. In terms of investment, they are relatively expensive and the price per hectare varies between 5 and 6.5 million CFA (Wade. M et al. 1996).

The organization, management and maintenance of hydro-agricultural developments vary based on the evolution of state policies in terms of development. In fact, depending on the approach taken by public authorities, two main periods mark the Delta of the Senegal River’s development.

- For the period from the independences (1960) to 1980s, it was up to the government, through the OAD and later the SAED, to cover the expenses arising from organization, management and maintenance works. Through its interventions from the study of developments to possible own management operation, its pervasive presence was visible in all aspects (Maïga M, 1995). However, in the late 1980s, the state management, which was dominant, faced costs and expenses issues: poor performance of the irrigated system due in large to insufficient maintenance.

- The second period is characterized by state disengagement regarding the management of the development implemented or rehabilitated through public funding: this is the era of the transfer of hydro-agricultural development and responsibilities to producer organizations.
2. The Lac de Guiers: between pluriactivity and agricultural intensification dynamics

The Lac de Guiers is the internal extension of the Delta of the valley of the Senegal River. The lac de Guiers is a distributary channel of the Senegal River, fed by the channel of Taouey whose junction point is located in the city of Richard-Toll (108 km from the city of Saint-Louis). The lake constitutes the largest body of surface fresh water of Senegal and provides mainly the city of Dakar with drinking water.

The implementation of the Diama (1985) and the Manantali (1987) dams have profoundly changed the hydrological functioning of the lake and the quality of its waters. The potential of irrigable land around the lake is very huge. Within a 5km radius, the potential available for development is estimated by the SAED at more than 47,000 hectares, and at 10 km, it is estimated at more than 90,000 hectares.

It is an area with hydro-agricultural potential, characterized by increasing pressure and competition stemming from the exploitation of its resources. This area is also targeted to be home to large agricultural projects designed by the government aiming at turning the region into a development pole for horticultural agribusiness. Different group of actors (family farming, agribusiness, etc.) operate on the lake and immediate influence area. They include
Sénégalaise des Eaux (SDE), Compagnie Sucrière Sénégalaise (CSS), private agribusiness operators, pastoralists and agropastoralists (SREC, 2014). Through its strategic nature, the lake area is a space of high pressure due to its natural resources, especially land resources. Based on the various forecasts, (Mar et Magrin, 2006), this pressure is expected to increase driven by several factors, including: (i) change in water supply needs for activities related to agriculture and livestock, in particular around the highly coveted arable lands bordering the lake; (ii) increase in water supply needs for Dakar and its suburbs; and (iii) depression of Ndiael refilling project (for environmental, ecologic and tourist needs).

The acceleration of agricultural development process on the lake shores is driven by the development of private agricultural investment. Despite the existence of an Agricultural Development Master Plan for the Lac de Guiers, many agribusiness projects are implemented in the area over the past years. This implementation of agricultural private entrepreneurs, with modality for access to land resources (location, affectation, attribution, etc.) affecting local communities (farmers and pastoralists), is often a major source of tensions and conflicts among the different actors. These conflicts are in addition to those already existing among local communities (mainly among herders and farmers, fishermen and pastoralists, etc.) around the exploitation of natural resources. Due the lack of rigorous planning or control, we are moving toward a saturation of the areas surrounding the lake. As public authorities have not the means to enforce laws and charters (land-use and development plans, charter of the irrigated domain, law on state public property, etc.), competition for access to water and land resources is getting tougher.

3. Policy evolution

3.1. Settlement policies

For physical reasons, the Delta was originally very sparsely populated. Indeed, upwelling of salt water and flooding of agricultural lands during flood events in Senegal reduced the availability of fresh water, and consequently the settlement of farming populations. Traditionally, for these reasons, the Delta was largely a pastoral transhumance region during dry season and deflooding.

The economic and social environment of the Delta bear the imprint of the natural conditions and the important historical events that happened over the last century. In the Delta, the development dynamic of hydraulic infrastructures was accompanied by immigration waves organized and supervised by central authorities (forced migrations during the colonial era and free migration after independence) to provide the necessary workforce for the exploitation of the irrigated perimeters. The creation and establishment of the SAED from 1965 for the development of 30 000 hectares of rice fields has disrupted the social structures of the Delta (Seck, 1986). In fact, the SAED settled agricultural populations in the villages created for this purpose by providing them with new conditions for rice cultivation. Nowadays, next to the "modern" villages of the SAED, we have "traditional" who use to live from cattle-rearing, fisheries and composite agriculture (rain-fed and recession) but
subjected to climatic vagaries (Maïga, 1995). Thus, between 1965 and 1975, the SAED favoured the implantation of some 900 settler families and the creation of new villages in the Delta.

Throughout the Delta, in 2013 the population was approximately 597,849 (Source ANSD 2013: General Population and Housing, Agriculture and Livestock Census (RGPHAE)). It is noted that from 1988 to 2013, the population of the land zones of the Delta (8 municipalities) has more than doubled, increasing from 85,572 to 202,662 (fig 1).

![Figure 1: Evolution of the population of the land zones within the 8 municipalities of the Delta (ANSD, 2013)](image)

3.2. Agricultural policies

Guided by public policies, the Delta of the Senegal River is a territorial area whose name is inextricably related to the structures governing the development policies within this area. «The SAED the most well-known, as a result, the Delta is inseparable from this governing body. In practice, the SAED inherited from longstanding public policies implemented by former structures: (Development Mission of Senegal (Mission d'Aménagement du Sénégal-MAS), post-war period; the Autonomous Organization of the Delta (Organisation Autonome du Delta- O.A.D.), in 1960; the SAED since 1965) » (Dia, 2012: 4). Cutting across these public policies is a food security issue: reduction in large-scale rice imports by increased irrigated area. This had a ripple effect on the other crops.

Generally, from 1960 to 1980, policies and programs set out for agriculture targeted producer’s price protection, provision of credits and agricultural inputs, control of product market. Throughout this process, the State will be involved in every segment of agriculture.
However, in 1984, the Senegalese government designed the New Agricultural Policy (Nouvelle Politique Agricole (NPA)) aiming at the liberalization of the conditions of production, through reduced state involvement. This disengagement of the State precipitated by the financial situation of the rice sector in the early 80’s supplemented by the State's budgetary constraints. Moreover, the cumbersome structure of the SAED and the importance of subsidies, the rapid deterioration of the facilities, the premature wear of pumping equipment and bad debt loans have exacerbated this situation.

While remaining resolutely productionist, the strategy opens horizons for a participatory approach. Over this period, the intervention of the SAED in productive or commercial functions is considerably reduced to be restricted solely to the management of major hydraulic facilities. A financial institution, Caisse Nationale de Crédit Agricole (CNCAS), issues agricultural credit. The major public perimeters and water resource management are progressively transferred to producers. In addition, the State of Senegal faced the devaluation of the CFA franc in 1994. Such a devaluation, deemed to contribute to the revitalization of agricultural production, has rather led to an increase of local prices and prices of imported products, as well as a reduced profitability of agricultural activities and a decrease in households’ cash incomes (Bélières and Touré, 1999).

The transfer of developments managed by the SAED on behalf of the State is now in the hands of a large number of players. Farmers' organizations took up the task through their involvement at different levels. Moreover, before the disengagement of the State, the procedures for access, enhancement and management of developed lands were all defined by the public authority, through SAED according to conditions applicable to farmers who are holders of irrigated lands (Tall and al., 2002). These lands were located in frontier lands. However, in 1988, the transfer of the frontier lands to land zones led to significant problems. The populations who were cultivating these agricultural parcels asserted claims in these lands which they consider as part of their heritage. They took issue with the fact that these lands transferred by the State were managed by rural boards (Fall, 2006). Thanks to the transfer of the frontier lands to land zones, water availability (installation of Diama and Manantalli dams), access to credit facilities (through the CNCAS), private irrigated perimeters have grown at a fast pace in the Delta. Between 1987 and 1991, some 25,000 hectares were developed by private owners. But, these perimeters are usually made in a perfunctory manner, at low cost and often with no guarantee of water supply. In a few years’ time, it has been noted that private irrigated perimeters have deteriorated fast, and led to a progressive, yet marked decrease in yields and the abandonment of these perimeters (Seck, 2009; Quatrida, 2008).

More recently, from the year 2000, in a wide international context of pressure on agricultural land and commoditization of the agricultural space, Senegalese public authorities implemented policy and institutional reforms reflecting a vision of rural development rural targeted towards sectors highly productive and private agricultural entrepreneurship promotion. The valley of the Senegal River has been identified as an agro-industrial production zone aimed at addressing the agricultural challenges set by the government. These agricultural policies steer the development of irrigated lands of the Delta.
and the Valley of the Senegal River towards rice intensification systems. This is made within the framework of the Emerging Senegal Plan (PSE) that promotes commercial farming, modernization of family farming and agri-business sector. This vision is realized as part of the Program for the Relaunch and Acceleration of Senegalese Agriculture (PRACAS). In terms of the agriculture industry, several programs were introduced by the government with the support of technical and financial partners to facilitate partly, the settlement of national and international private investors in areas with significant agricultural potential such as the valley of the Senegal River. The reform of the agricultural sector entails a reorganization of the Senegalese territorial governance. Since 2014, the government initiated a decentralization reform with the aim of revitalizing territorial development and territorializing the ambitions of the PSE and the PRACAS. This phase III of the decentralization legislation proposes to redefine the territorial architecture by promoting the regions to the status of development hubs. New stakeholders appear: often urban people, domestic or foreign, financial and political. They are the basis of a new paradigm of agricultural development based on agri-business through their investment in rural areas. Family farming is also strongly influenced by this guidance for being increasingly integrated in these chains. Added to this is also a land reform coordinated since 2012 par the National Commission for Land Reform (CNRF, Decree 2012-1419 of 6 December 2012).

In the Delta and Lac de Guiers area, a Senegalese government project designed with the support of World Bank is in line with all these reforms. The Inclusive and Sustainable development of agro-business project (PDIDAS) is therefore intended to promote growth and employment by increased productive private investments in agricultural commodity chains (especially horticultural) in the region of Louga and Saint-Louis. With a view to further integrating agribusiness in the management of land in the national domain, the PDIDAS tries and experiments the granting of a property right to investors (sublease granted by the local community which received a leasing from the State). However, many questions remain unanswered, interrogations (public authorities, civil society, etc.) about the effective capacity of the project to promote inclusive and sustainable intensification. Within the same territory, situated between dewatered and irrigated areas, innovative new experimentations of intensification have also been introduced for extensive transhuman livestock system. These production method and way of life are facing rapid change (population growth, climate change, internationalization of markets, decentralization, etc.) and are the focus of many discussions, at international level, on agricultural policies and production models to promote. The experience of Laiterie du Berger (LDB) implemented in Richard-Toll (in the Valley of the Senegal River) sets out a model of the dairy sector’s intensification. The company proposes to enhance mobility and ensure long-term viability of pastoralism by collecting milk in a Sahelian context while building upon fodder resources of the irrigated area. Within this framework, a contract is signed with the Compagnie Sucrière du Sénégal (CSS) to ensure the supply of roughage (sugarcane straw) during the dry season to many livestock producers delivering dairy products.

4. Evolution of production systems
Preliminary remark: Stockbreeding activities exist in a variety of forms and intensification levels in the three systems presented above. The intensification is strongest among farmers valorizing agro sub-products for cattle and sheep, then more recently among diaries established since 1990s.

4.1. The flood-recession systems

Flood-recession agriculture was one of the largest potential sources of food crops for farmers living in the Delta area and the lake before the implementation of hydraulics works along the Senegal River. Currently, it is seldom practiced. This decline is associated with the development of irrigated agriculture and the decrease in acreage arising from dams commissioning (quasi permanent presence of water, development of aquatic plants).

4.2. The rain-fed systems

In the Delta, low rainfall results in generally low yield because of poor soil and highest rainfall amounts were in excess of 500 mm per year. The varieties cultivated are essentially subsistence-based (pearl millet, maize, sorghum, watermelon). Around the Lac de Guiers, we have the same system with much higher proportions with diversified agricultural speculations including millet, sorghum, cowpea, watermelons and groundnut crops, in pure culture or associated culture covering 15 to 30% of lands.

However, this system remains very important, particularly in the Delta around the municipalities of Gandon with some 9000 hectares, Syer with a dominant position with some 2,600 hectares in 2011, Mbane, where rain-fed cultivated lands are about 5,000 hectares, Keur Momar Sarr, where it is widely use with some 15,000 hectares of land farmed every year, as well as in the Dieri than the Walo.

4.3. Irrigated systems

The high potential of the irrigated domain of this area has been subjected to significant allocations in a decade against a background of land speculation and race by private investors of all types (national and international agribusiness, local communities, etc.) benefitting from easier access to agricultural credit. «From 1987 to 1998, 30,000 were allocated by the Ross-Béthio rural council, without any information, reference map or specific training» (CONGAD, 2012).

Farmer organizations of the Delta are also involved in this land race through their collective approach based on the creation of the great federative farmer organizations, to increase pressure on rural councils and act as intermediaries with the CNCAS. Thanks to these allocations, private irrigated perimeters ranging from 5 to 100 hectares, have mushroomed in the Delta rapidly exceeding the areas funded by the State. Thus, the surface of private development increased from 10,000 hectares in 1989 to 38,750 hectares in 2005, representing 63% of total development surface of the Delta (SAED, 2006). During this time, some landlords did not hesitate to extol the benefits of liberalization et decommissioning, arguing that within a 15 year period, private investors have developed more than the State in 40 years. This trend has accelerated in recent years in the Delta with the rise of agribusiness requiring large-scale allocation.
This has been particularly encouraged by the regularization of the hydrological regime of the Senegal River, bringing the minimum flow to 300 m3/s in Bakel. Taking into account the possibilities offered by the reservoirs created by the dams of Manantali, Diama, the lakes Lac de Guiers and Rkiz, it is possible to envisage the development and use of some 240 000 ha of potentially irrigable lands in the left bank of the Senegal River basin, as contemplated by the OMVS through its program of integrated development of the Senegal River Basin.

With the river regulation, irrigated agricultural systems are the most efficient, even if their performance is related to water management. All perimeters are now pump-based irrigated through four main different patterns following their size, management model and funding. Generally speaking, in the Delta there are especially:

- Large transferred developments (GAT) and non-transferred (GANT) for an average cost of 4 million FCFA/hectares before the devaluation, 5 to 6.5 after, with surfaces ranging from 500 to more than 1,000 hectares stemmed and equipped with large pumping plant visible in the Delta and downstream middle valley (Podor);
- Village level irrigation projects (PIV), covering an area of 20 to 50 hectares (0.6 to 0.9 million FCFA/hectares before the devaluation, 1 to 2 million after), irrigated by motor pump set, development most frequently manually by village groups visible in the middle and high valley following the drought of 1970s;
- Intermediate developments (AI), that emerged at the beginning of the 1980s very close to the model of the first ones but with a smaller size. Moreover the funding granted by the State, the development of large development and intermediate development was facilitated by land control ensured by the SAED on development sites (classification of the Delta as pioneer area with lands manages by the SAED from 1965 to 1987), et;
- Private irrigated perimeters (PIP) carried out by private individuals with a rapid increase from 1988.

5. Intensification drivers

The main driver of agricultural intensification in Senegal, like West Africa, is population growth. It is both a driver of domestic market (strong demand for agricultural products) and provision of manpower. It determines the broad agricultural policy guidelines: irrigation, agribusiness, water access, land governance. Specifically, the best approach for intensification since many decades is the productivism path. However, it could be steeped in environmental concerns in the future (climate change, weight of consumer demand).

The paths of the «bio» or even agro-ecology are so far relatively unexplored or, at least, lightly expressed as such in the Valley of the Senegal River. With environment being a rising concern (see V.), it is likely that these paths will only find their real place if the economic reasons are the greatest (domestic markets or exports, incomes for producers and agribusiness).
III. Analysis of agricultural intensification dynamics

Preamble: territory level vision and less at exploitation level.

1. Technical criteria of intensification: evolution of yields

1.1. Evolution of agricultural yields

Beyond the achievement of hydro-agricultural facilities (see 1.2.), through complete water control, innovations to support and foster agricultural intensification to improve production were focused on:

- Agricultural mechanization,
- Supply of production equipment,
- Improvement of soil fertilization,
- Fertilizer and phyto-sanitary products use,
- Introduction and use of skimmed, improved and certified seeds.

Beyond these technical aspects, economic innovations were introduced in particular access to agricultural credit facilities (seasonal and equipment credit) through creation of the CNCAS. Some dedicated institutions, such as SAED, provide agricultural mentoring and advising. Through this structure, the State of Senegal carried out, in a sparsely populated area, mainly agro-pastoralist without any irrigation tradition, development operations, well administered, committed to foster a large artificialization of the environment and modern techniques, intensive in capital.

However the reality is that, agricultural production has increased considerably since the 1960 (fig 2a). This is particularly the case for rice and onion. The situation is more "biased" for tomatoes that after a sharp increase until 2005 experienced stagnation then a price drop. This situation is the result of the willingness of the SOCAS, main industrial site of the area, to diversify its production in favor of green bean and promote collection in the department of Podor (upstream in the Senegal River). Since the 1990s, the upward trend in production is mainly the result of increased allocated irrigated areas (fig 2b). This applies especially to rice in response to the crisis of 2007-2008 (government policy, agribusiness). It is true that it is hard to intervene on the yields (fig 2c). Nowadays, they are high enough and higher margins are limited. However, it is worth noting that over the last 20 years paddy rice yields jumped from 3-4 tons per hectare to more than 7 t/ha – even if the results are more contrasted according to the types of family farming and agribusiness.
**Figure 2a.** Evolution of the production in tons (according to the SAED 2015, dept. of Dagana)

![Graph showing the evolution of production in tons](image1.png)

**Figure 2b.** Evolution of cultivated areas in hectares (according to the SAED 2015, dept. of Dagana)

![Graph showing the evolution of cultivated areas in hectares](image2.png)
Figure 2c. Evolution of yields in tons per hectare (according to the SAED 2015, dept. of Dagana)

The same is true for sugarcane, exclusively cultivated by the CSS (Compagnie Sucrière du Sénégal). The yields are very high, up to 150 tons of fresh material per hectare. The company’s development is therefore based on the growth of irrigated areas (fig 3).

Figure 3. Annual growth in %: production, yields and cultivated areas of sugarcane from 2003 to 2013 (according to FAO, 2015).

1.2. The specific case of milk

Agricultural intensification is not just limited to irrigated crops. Dairy production is also involved. Initially devoted exclusively to pastoral herding, the Delta and Lac de Guiers area offers large quantities of agri-sub products through dairy farming. The Laiterie Du Berger (LDB) was created in 2006 in Richard-Toll. In order to maximize its profitability, the company has as main target to increase its collected volumes. This objective was first based on the increase in the number of herders supplying the dairy. In 2015, they were estimated at 800
families. However, individual quantities (per cow, per farm) are poor since the production system is still based on extensive pastoral practices. The LDB willingness is now to foster the production by settling an intensified dairy base (feeding and genetics) and by promoting specialized small dairy-farming and dairy farms (fig 4). Finally, intensification calls for drawing up contracts with a powerful neighbor, the CSS. Since 2015, the LDB has access to some parcels of the CSS to bunch sugarcane straw, intended for herders supplying dairy during the dry season. Through this agreement between agribusiness stakeholders, it is possible to support the development of the dairy activity among several hundreds of small producers.

**Figure 4.** Projected evolution of the collection by the *Laiterie du Berger* by 2025 (according to LDB, 2015)

The productionist vision of intensification is strongly put forward in the case of the Delta of the Senegal River and the Lac de Guiers. Nevertheless, even if the potential for improvement is important for the dairy sector, it is smaller for irrigated crops. The increase in production shines through increase in cultivated areas.
2. Land tenure criteria of intensification: development of irrigated crops

A major transformation in the Delta of the Senegal River is visible through the development of irrigated crops.

Maps 3 and 4 outline this evolution. Restricted for a long time to Richard-Toll and CSS, irrigated crops cover now the majority of flood-prone areas. The Djoudj national bird sanctuary remains consequently an exception (see map XX). The region around the Lac de Guiers is today almost fully cultivated. The dewatered areas (diéri) are also concerned, at the east of the Lac de Guiers, in the area of Trois Marigots (at the east of St Louis) and even in the reserve of NDiael (at the west of the Lac de Guiers).

Map 4. Irrigated land property dynamics from 1960 to 2015

The increase in irrigated areas allowed a strong agricultural production growth, especially for rice and sugarcane. However, this intensification adversely affects pastoral spaces or nature reserves, which appears particularly problematic within a context where livestock is still a major activity. Furthermore, if the new spaces were initially designed for family farming, they should be shared with agribusiness (extension or creation of business).

3. Social criteria of intensification: evolution of relationships between agribusiness and family farming

The purpose of a field survey conducted early 2016 was i) to develop a better understanding of the production systems of the Delta of the Senegal River and ii) to understand the nature of their interactions. This task was also designed to address two major debates in Senegal
(and more broadly in developing countries). The first one is related to the confusion/controversy between land acquisition and land grabbing. Whereas some promoters highlight the social and economic opportunities that these agricultural investments could create, some authors and NGOs warn about the risks of corruption and other threats for the livelihoods of poor rural populations, including loss of land and progressive marginalization. The second debate, that we would like to nuance, is the recurring question of positive or negatives interactions between family farming and agribusiness.

### 3.1. Agribusiness inventory

<table>
<thead>
<tr>
<th>Municipalities</th>
<th>Project name</th>
<th>Investor’s origin</th>
<th>Targeted production</th>
<th>Land access mode</th>
<th>Area allocated or leasing in hectares</th>
<th>Allocation date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gnith et Ronkh</td>
<td>Sen huile</td>
<td>Senegalese, Italian</td>
<td>Oilseed</td>
<td>leasing</td>
<td>20 000 hectares</td>
<td>2012</td>
</tr>
<tr>
<td>Gnith</td>
<td>West African Farm WAF</td>
<td>South African, English</td>
<td>Horticulture</td>
<td>allocation</td>
<td>500</td>
<td>2008</td>
</tr>
<tr>
<td>Diama &amp; Ross Bethio</td>
<td>Société de Cultures Légumières SCL</td>
<td>French</td>
<td>Horticulture</td>
<td>allocation</td>
<td>937</td>
<td>2004</td>
</tr>
<tr>
<td>Diama</td>
<td>Société de Tomates Séchées STS</td>
<td>Italian</td>
<td>Horticulture</td>
<td>allocation</td>
<td>200</td>
<td>2007</td>
</tr>
<tr>
<td>Gandon Ross Bethio</td>
<td>Grands Domaines du Sénégal GDS</td>
<td>French</td>
<td>Horticulture</td>
<td>allocation</td>
<td>400</td>
<td>2002</td>
</tr>
<tr>
<td>Keur Momar Sarr</td>
<td>SEPAM</td>
<td>Senegalese</td>
<td>horticulture and oilseed</td>
<td>allocation</td>
<td>1250</td>
<td><em>2005</em> and <em>2012</em></td>
</tr>
<tr>
<td>Mbane</td>
<td>TEMEYE Agro</td>
<td>Senegalese</td>
<td>Horticulture</td>
<td>sub lease</td>
<td>1350</td>
<td>2007</td>
</tr>
<tr>
<td>Mbane</td>
<td>SANOSSI</td>
<td>Italian</td>
<td>Horticulture</td>
<td>allocation</td>
<td>1 500</td>
<td>2007</td>
</tr>
<tr>
<td>Mbane</td>
<td>FERLO GOMME</td>
<td>Senegalese (taken over because formerly Saudi)</td>
<td>Horticulture</td>
<td>allocation</td>
<td>150</td>
<td>2008</td>
</tr>
<tr>
<td>Mbane</td>
<td>TOLL DIOM</td>
<td>Senegalese (formerly consortium)</td>
<td>Horticulture</td>
<td>allocation</td>
<td>NA</td>
<td>2008</td>
</tr>
<tr>
<td>Mbane</td>
<td>SENEG INDIA</td>
<td>Indian</td>
<td>Horticulture</td>
<td>allocation</td>
<td>5000</td>
<td>2008</td>
</tr>
<tr>
<td>Mbane</td>
<td>VITAL SA</td>
<td>Senegalese</td>
<td>Rice cultivation</td>
<td>sub lease</td>
<td>6000</td>
<td>2008</td>
</tr>
<tr>
<td>Syer</td>
<td>AGRINA SENEGAL</td>
<td>Senegalese</td>
<td>Horticulture</td>
<td>title</td>
<td>5000</td>
<td>1996</td>
</tr>
<tr>
<td>Syer</td>
<td>Rovick</td>
<td>Senegalese</td>
<td>Oilseed</td>
<td>Allocation underway</td>
<td>NA</td>
<td>2013</td>
</tr>
<tr>
<td>Diama</td>
<td>CASL</td>
<td>French</td>
<td>Rice cultivation</td>
<td>allocation</td>
<td>2000</td>
<td>2013</td>
</tr>
<tr>
<td>Diama</td>
<td>Soldive</td>
<td>French</td>
<td>Watermelon</td>
<td>allocation</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>
Table 1: Key features of farm business settled in the Delta and the Lac de Guiers area (Source: Cirad, Etudes sur les conditions acceptables d’allocation de terre dans le cadre du PDIDAS, 2013 et auteurs).

Table 1 outlines the number and diversity of agribusiness in the Delta of the Senegal River. Map 5 allows their localization.

Map 5. Location of agribusiness in the Delta of the Senegal River

Figure 4: Evolution of the number of companies and their surface in the Delta of the Senegal River.

Whereas agribusiness raises many unresolved questions and issues, its presence in the Delta area goes back to 1970s (fig 4). This reflects a willingness to intensify agricultural production, initiated since the Independence in 1960, as a result of major hydraulic development.
including the development of irrigated rice areas thank stop a secure water resource. In sum, for more than four decades the number of companies has increased tremendously and their profile has diversified.

In terms of space occupancy compared to other countries, France is well in the lead regarding fenced areas. Indeed, out of the 21948 hectares identified as areas fenced areas by agribusiness companies, six French companies cover about 70,09% of surface (representing 16,921 hectares). Followed by Italian companies with almost 14, 8% of fenced areas (representing some 3259 hectares). Figure 5 outlines the origin diversity of the companies.

![Graph: Fenced areas based on the origin of companies capital in the Delta of the Senegal River.](image)

**Figure 5:** Fenced areas based on the origin of companies capital in the Delta of the Senegal River.

### 3.2. Interactions between agribusiness and small producers

**Employment opportunity through agribusiness**

There clearly is a strong argument that agribusiness allows for the creation of jobs for local communities. However, this is offset by the productionist objectives of the company. A specific assumption might be made: with lower investments, companies should rely less on mechanization and consequently should recruit more waged workforce. But, on the facts, this is not such a case (Figure 6). For instance, the CSS, even with a high mechanization level, chose to keep the sugarcane cutters which make up the main part of its seasonal workers, even though the company possesses machines dedicated to this task and could make more profit by increasing its mechanical asset. On the contrary, some companies chose to invest heavily on mechanical production and employ very few workers (see STS). Therefore, the
employment rate is dependent on the choices made by the company and it is worth noting that if in 2014, surveyed companies hired over 12,000 workers, only 28% were permanent jobs.

Figure 6: Employment in some agribusiness and their investment level per unit area in 2014.

Compliance with local conventions

One of the most controversial issues created by agribusiness within the Delta of the Senegal River is related to its settlement on land «naturally» allocated to sylvo-pastoral activities. Considering the land use plan of all the municipalities concerned by observed companies, it turns out that over the total acreage currently occupied and effectively developed by agricultural companies, 93% are located in the ZAPAs (agro-pastoral areas dedicated to agriculture), 6 % are located in ZAPE and 1 % of the reserves dedicated to housing (ZH) (Table 2).

Nevertheless, behind these figures, it is important to make a clear distinction between agribusiness profile and the importance of the CSS Company that may distort the analysis. Indeed, without the CSS, it is noticeable that the areas occupied by other agribusiness encroach at 49% on the ZAPEs, 43% are located in the ZAPAs and 9% in the ZH (fig 7).
Table 2: Positioning of agribusiness on land tenure defined by land use plans (2016).

Further analysis indicates that two major companies are exclusively present in the ZAPEs: West Africa Farms (Ngnith municipality) and Société de Cultures Légumières (Diama municipality). Both companies are very close to the sylvo-pastoral reserve of Ndiael and the Senegal River, and especially to the cattle corridors as defined by land use plans.
Counterparts

Interactions between agribusiness and local communities are also made in the form of negotiations during installation or during the production activities of the company. Below are summarized some counterparts found:

**Counterparts for herders** In regard to that point, it should be noted that on all the agribusiness considered, only two conducted negotiations (informal) with herding communities.

Overall, the majority of agricultural businesses support specific actions for herders to offset the occupancy of grazing lands (tab 3). This primarily includes the distribution of crops residues, building a watering trough for the cattle and designing animal trails.

<table>
<thead>
<tr>
<th>Type</th>
<th>Date of installation</th>
<th>Types of counterparts</th>
<th>Specific negotiations with herders</th>
<th>Formalization / contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS</td>
<td>2002</td>
<td>Distribution of fodder</td>
<td>No</td>
<td>N/E</td>
</tr>
<tr>
<td>CASL</td>
<td>2013</td>
<td>Access to parcels after the harvest, Creation of ponds (currently 1 over 6 planned), Distribution of straw to herders</td>
<td>Yes</td>
<td>Informal</td>
</tr>
<tr>
<td>Ferlo Gomme</td>
<td>2005</td>
<td>Achievement of watering trough for the cattle</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WAF</td>
<td>2011</td>
<td>Cattle corridor, water point</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Temey Agro</td>
<td>2007</td>
<td>Fodder (potato straw), Design of cattle corridor</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SCL</td>
<td>2006</td>
<td>Provision of hay after the harvest especially during lean period, Achievement of watering trough accessible to the cattle</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSS</td>
<td>1970</td>
<td>Cattle corridor, Creation of water points, Provision of crops residues</td>
<td>Yes</td>
<td>Informal</td>
</tr>
<tr>
<td>STS</td>
<td>2007</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SOCAS</td>
<td>1972</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Table 3: Agribusiness and counterparts for herders**
However, it is worth noting that, two companies don’t support directly pastoral communities, including STS that reuses crops residues as natural fertilizers.

**Achievements for the locality**

Several companies have agreed to build facilities or equipment for the localities impacted by their projects. For some of them, it was a requirement of the populations following formal negotiations or not and for other, these works were made without any negotiations.

Among companies considered, three of them conducted negotiations with the populations to implement community facilities and equipment (tab 4). These are mainly WAF, GDS and CSS. Regarding WAF, a contract involving several requirements was signed, including the building of an irrigation channel and the construction of a clinic for the communities of Yamane municipality and surrounding villages. This is also the case with the new extensions of GDS in Gandon municipality where communities (including the youth hostel) accepted their lands to be allocated to the company with counterparts related to the rehabilitation of the mosque, cemetery walls, support for religious events and use of local manpower. For CSS, the strategy developed was to discuss with the communities occupying the land allocated (lease) before development operations. In most cases, the company does not displace the villages impacted and it merely circumvents them. Based on prior negotiations, several social achievements were made, including construction of school, mosque, drinking-water supply network (AEP) for Peul villages, etc.

It should be noted that three agribusinesses (CASL, STS, SOCAS) do not consent any counterpart in terms of achievement for the locality where they are settled. In the main, they assert that they don’t want to take any risk by making promises and commitments they cannot keep without a visibility on their production results (CASL and STS).

According to the referents met during the interviews, the profits generated will determine the need to make achievements for the community and above all if populations claim it. Moreover, the CASL is settled in barely coveted with limited water supply. This has undoubtedly facilitated his settlement without any prior negotiation compelling the company to make commitments. Nevertheless, other companies (Ferlo-Gomme, Temey-Agro and SCL) agree to carry out achievements for the communities without any negotiation or formal commitment. For the SCL, populations made some specific requirements during the land allocation process for agribusiness. The CEO of the company was clear enough: «We don’t make any commitment. We are not going to replace the State. But, we will naturally pay all taxes related to the production of our activities. However, depending on the results, we can meet the populations’ needs en terms of drinking water supply, rehabilitation of schools, construction of paths, etc. ». According to the CEO, this strategy prevents from any potential uprising due to a lack of compliance with the contractual commitments and helps to meet populations’ needs in relation to the company’s background.
<table>
<thead>
<tr>
<th>Type</th>
<th>Date of installation</th>
<th>Types of counterparts</th>
<th>Negotiation with the populations</th>
<th>Formalization / contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS</td>
<td>2002</td>
<td>Mosque, School supplies, Cemetery walls</td>
<td>Yes</td>
<td>Contract with the Gandon and Fass municipalities; Contract with some villages such as Lampsar</td>
</tr>
<tr>
<td>CASL</td>
<td>2013</td>
<td>None</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Ferlo Gomme</td>
<td>2005</td>
<td>School supplies, Realization of water basins</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WAF</td>
<td>2011</td>
<td>Clinic, Irrigation channel</td>
<td>Yes</td>
<td>Contract with the municipality</td>
</tr>
<tr>
<td>Temey Agro</td>
<td>2007</td>
<td>Irrigation channel</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SCL</td>
<td>2006</td>
<td>Rehabilitation of cemetery and mosque, Watering trough for the cattle.</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSS</td>
<td>1970</td>
<td>Path, school, health care centre, drinking water supply, school supply, Etc.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>STS</td>
<td>2007</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SOCAS</td>
<td>1972</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Table 4: Agribusiness and support to communities.**

**Counterpart based on production support**

The agricultural companies considered by this study provide also support services for production to producers (Table 5). These services target support activities for producers, including: provision of inputs at cost, training for agribusiness workers in irrigation techniques, monitoring for producers, support to the development of parcels and soil preparation, building channel and maintenance of the primary network, cultivation contract signing, etc.

Each company, based on its means and expertise, or even its production line, offers support activities to producers. Some companies conducted negotiations to define the measurement of the different counterparts offered. For example, the SOCAS draw up contracts with the tomato producers of the Valley of the Senegal River to by their productions. The same goes the WAF, following the construction of a channel, the company has committed in developing 200 hectares for the communities of Yamane. In these three cases, contracts based on formal commitments were signed between the different stakeholders.
<table>
<thead>
<tr>
<th>Type</th>
<th>Date of installation</th>
<th>Types of support offered</th>
<th>Negotiation with populations</th>
<th>Formalization / contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS</td>
<td>2002</td>
<td>➢ Technology transfer to local producers working in GDS, ➢ Support to the development of parcels allocated to Exfam, ➢ Internships for young agricultural entrepreneurs</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CASL</td>
<td>2013</td>
<td>➢ Provision of seeds, on credit (through cultivation contracts, short term), ➢ Cultivation contracts with exploitations up to a 20 km radius (project 2016 – 2017), ➢ Development of the primary network ➢ Internships for young entrepreneurs ➢ Support to intensive livestock production, ➢ Training in hygiene and safety</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ferlo Gomme</td>
<td>2005</td>
<td>➢ Monitoring of producers by the agricultural engineer of the project, ➢ Provision of farming tractors for Exfam needing them, ➢ Support to soil preparation, ➢ Development and maintenance of the primary network of irrigation</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WAF</td>
<td>2011</td>
<td>➢ Development and maintenance of the primary network channel of irrigation, ➢ Development of parcels for Exfam,</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Temey Agro</td>
<td>2007</td>
<td>➢ Support to the development of the lands around the Exfam, ➢ Monitoring of some Exfam, ➢ Maintenance of the channel, ➢ Support for some inputs by the company: for some farms</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SCL</td>
<td>2006</td>
<td>➢ Technology transfer for the workers of SCL, ➢ Development of water troughs for farmers</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSS</td>
<td>1970</td>
<td>➢ Free irrigation for some 4500 hectares owned by family farming, ➢ Agricultural machine loans; ➢ Free offset on demand; ➢ Technology transfer and training for employees in irrigated production</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>STS</td>
<td>2007</td>
<td>➢ Some days of free offset for some producers,</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SOCAS</td>
<td>1972</td>
<td>➢ Training for employees, ➢ Support to tomato producers (cropping calendar, varieties, etc.) ➢ Monitoring for tomato producers of the Valley (over thousands of hectare/year), ➢ Support to the production, ➢ Drawing up contracts and purchasing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Funding for producers for input acquisition through the CNCAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tomato production by tomato producers,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 5:** Agribusiness and counterparts based on production support.

Furthermore, the CSS support the agricultural production of producers in the intervention area. Therefore, beyond soil preparation activities carried out free of charge, the company irrigates for free some 4500 hectares of soil cultivated by the producers between Richard-Toll, Rosso and Ronkh. While these activities were carried out thanks to the negotiations with local communities, these commitments were not formal. For the case of CASL, the company is implementing his project and plans, with the support of the ADB and the EU, activities focused on drawing up contracts with rice producers on a 20 km radius for rice production with the provision of inputs and producers monitoring to supply his new rice mill (located in Ross-Béthio, with a 100 000 T capacity).

It is worth noting that all agribusinesses carry out activities to support producers, but most of the time on demand.

**Counterparts to land access**

Agribusinesses develop several strategies and use different front doors to have access to agricultural land. Whereas land access was relatively easy before 2008, the situation has unfortunately become more complicated since then. The civil society is now aware of the issues created by this dynamic and/or vague dire for land grabbing.

Thus, we note that many companies got their lands from the former rural councils while they should officially deal first with the communities (head of village, local populations, etc.) before any formalization at communal level.

An individual analysis of the company shows that CSS and SOCAS represent special cases. In fact, they have leases granted by the government and pay on a yearly basis for the cultivated lands. It should be recalled, however, that the CSS is financially participating to the budget of Richard-Toll municipality, with some 300 million CFA per year in addition to other informal actions on request (Table6).For the GDS, they benefitted from easy access to the lands in 2002 while settling in Ndjawdoune. At that time, they just paid for boundary determination costs and a very small fee to the domain committee for their settlement in the site allocated. However, when the company wanted to settle in the Lampsar area, the GDS carried out negotiations with populations and signed a contract before the Gandon municipality allocates new lands. Over its 340 hectares, the GDS have paid some 1 700 000 CFA as boundary determination costs in addition to other achievements planned in the contract binding them with the Lampsar village. The same was the case for the SCL, which after having easily received lands in Diama en 2006 had to negotiate with the Fass and Gandon municipalities, to have extensions in the Ndialakhar area.
At the opposite, the WAF has first negotiated with local populations which agreed to leave the lands to the company with some commitments including building an irrigation channel and developing 200 hectares for producers. This was made as part of a formal contract signed by the president of the rural council of that time. Furthermore, the WAF has committed to support the operating budget of the municipality in addition to boundary determination costs paid before the site development began. However, the specified amount and the contract have been classified as confidential.

<table>
<thead>
<tr>
<th>Financial counterparts/Municipality</th>
<th>Type</th>
<th>Year</th>
<th>Surface</th>
<th>Boundary determination costs</th>
<th>Other financial counterpart</th>
<th>Installation costs</th>
<th>Formalization / contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS</td>
<td>2002</td>
<td>340</td>
<td></td>
<td>5000 CFA F/hectares (1.7 million CFA F)</td>
<td>No</td>
<td>Yes (small amount)</td>
<td>Convention with villages (formal)</td>
</tr>
<tr>
<td>CASL</td>
<td>2013</td>
<td>2000</td>
<td></td>
<td>Yes (5000 CFA F/hectares 10 million CFA F)</td>
<td>180 000 FCFA/hectares, to every disused person (360 million CFA F)</td>
<td>Flat rate (travel expense of the domain commission)</td>
<td>Informal</td>
</tr>
<tr>
<td>Ferlo Gomme</td>
<td>2005</td>
<td>200</td>
<td></td>
<td>Yes</td>
<td>Yes (contribution to the operating budget of the municipality)</td>
<td>No</td>
<td>Yes (formal)</td>
</tr>
<tr>
<td>WAF</td>
<td>2011</td>
<td>500</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (formal)</td>
<td></td>
</tr>
<tr>
<td>Teme Agro</td>
<td>2007</td>
<td>1000</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>2006</td>
<td>900</td>
<td></td>
<td>Yes (5 000 f/hectares 4,5 million CFA F)</td>
<td>No</td>
<td>Yes (10,000 CFA F to each member of the domain commission)</td>
<td>No</td>
</tr>
<tr>
<td>CSS</td>
<td>1970</td>
<td>17000</td>
<td></td>
<td>N/E (lease)</td>
<td>Participation to municipality budget (300 million CFA F per year)</td>
<td>N/E</td>
<td>No</td>
</tr>
<tr>
<td>STS</td>
<td>2007</td>
<td>200</td>
<td></td>
<td>Yes (5000 F/hectares 1 million CFA F)</td>
<td>No</td>
<td>Yes</td>
<td>Installation costs (formal)</td>
</tr>
<tr>
<td>SOCAS</td>
<td>1972</td>
<td>250</td>
<td></td>
<td>N/E (lease)</td>
<td>No</td>
<td>N/E</td>
<td>No</td>
</tr>
<tr>
<td>Vital</td>
<td>2011</td>
<td>6000</td>
<td></td>
<td>Yes (5000 F/hectares 30 million CFA F)</td>
<td>No</td>
<td>Yes</td>
<td>Installation costs (formal)</td>
</tr>
</tbody>
</table>

Table 6: Agribusiness and financial counterparts.

Broadly speaking, agribusiness followed a classical pathway to have access to the land, through the rural council and by paying for boundary determination costs and installation costs.

It is important to point out that among all agribusiness observed, only two (CSS and WAF) are directly involved in the budget of their municipalities.

4. Conclusion

In short, the paths to «productionist» intensification have been and still are put forward in the Delta of the Senegal River. With a fast growing population, there is an urgent need to produce more. In terms of quantity produced, the result was convincing. However, today,
these paths are increasingly narrow. Yields are high and it is both difficult and costly to follow these paths. Developed surfaces for irrigation may be the solution. Still, it is a controversial path for involving the activities of different stakeholders with competing interests (Agriculture/Livestock or National Parks; Family Farming/Agribusiness). Added to this is the limited available space (Map 6). Finally, voices were raised to denounce the environmental risks incurred (water and soil quality especially). This will be our focus on chapter IV.

Map 6. Land use in 2015
IV. Stakeholder perspective

1. Approach

Stakeholder perspective has been collected through field surveys and during the two workshops. The first one took place on 17-18 May 2016 at University Gaston Berger of Saint-Louis. Farmers and herders came from the 2 municipalities Diama (Delta) and Ngnith (Lac de Guiers). Agribusiness managers, researchers and land experts of the area were also invited. The findings of this meeting were presented during a restitution workshop in Dakar on 23 June 2016.

Photo 1. Theater-forum piece facilitated by Kaddu Yaraax (St Louis, 17 May 2016)

The approach chosen for the St Louis workshop is focused on a link between theater-forum and role play. The theater piece was developed by the team of researchers and the professional theatre group Kaddu Yaraax (Photos 1and 3). It outlines an allocation process for an agribusiness and presents to the attendance a contrasted vision of formal and informal negotiations of counterparts that may exist at local level. Following this piece, a forum offered to the participants an opportunity to discuss about the topic and propose changes in situations or stakeholder perspective. The role play (TerriStoriesTM) invited the participants to simulate agribusiness intensification in a village area and planning the different impacts that different investments may have on family farms (Photo 2). During this phase, the participants were divided in 4 board games and each board made of 8 farmers/herders and 1 agribusiness representative. This allowed to participants to deepen their comprehension of compensation mechanism implemented at local level. The workshop was closed with a new theater piece where participants proposed new modifications drawn from their reflections during participatory simulations.
2. Synthesis of interviews and discussions

The challenges, presented during the workshops of St Louis and Dakar, backed by the stakeholders (producers, NGOs, researchers, developers, and policies) are different. It should be specified:

- The quality of the resources and their sustainable management
- Reasoned conditions of development and mechanization
- Health aspects (multi-specific)
- Definition of public-private partnership frameworks
- Multi-scale and multi-factors articulations related to the global context of climate change that requires consideration of systems’ sustainability and adaptability criteria.
The interviews highlighted also the **intensification factors** deemed as fundamental by the stakeholders. The most frequently cited were:

- Water Management
- Sustainable management of lands
- Quality seeds, accessible to farmers
- Quality inputs (organic/mineral) and available
- Suitable, sufficient and reasoned mechanization
- Skilled human resources
- Credit access for all farmers
- Public-private partnership/contractual relationships

Due to their diversity for stakeholders’ perspective following the production systems, chains, markets..., the **paths towards intensification** should be structured around the diversification pillar and multiple logic. **Beyond environmental, agronomic and economic aspects, the social aspects of intensification should be considered for the identification of the possible paths in the Valley of the Senegal River. Equity and social peace arise, for example, as the prerequisites for agricultural intensification.** As mentioned above, the discussions of the Saint Louis workshop (mobilizing the tools for theater-forum and a JDR covering, in particular, the conditions of counterparts’ negotiations between agribusiness and family farming) have underscored the importance of defining the fair paths to intensification based on the frameworks of decisions and shared responsibilities between the different stakeholders involved. The theater-forum helped to conduct a process of discussion on the superposition implications of local authority drivers (customary, administrative, and politic) sometimes contradictory that may restrict the collective involvement of the communities in the negotiations between national and international stakeholders. It has also become clear that agribusiness perceptions within the same rural community were contrasted, revealing the multiplicity of challenges and local interest. All these discussions and proposals emphasize the importance to go beyond the simple agreement «lands»... This specific point revealed a set of needs in terms of support to actors to define the sustainable and fair paths towards intensification in the area. There is a wide range of needs. According to the stakeholders interviewed, there is a real need for capacity building for: (i) farmers (techniques/good practices/negotiation/economic management of their farms based on their profile...); (ii) agricultural advisory agents and research (training/coordination of initiatives/financial) but also (iii) policies (involvement in the fields of collaboration/co-construction of innovations). Therefore, innovative multi-stakeholder «dialogue» processes (public-private/land management/inter-profession grouping) appear essential to the definition of new paths towards intensification of the Delta of the Senegal River.

After the performance of the play, discussion with participants focused on:

- Equity and land grabbing.
- The complexity of actors’ judgment (function and/or ethics) poses the question of responsibilities. How to address these responsibilities without falling in the trap of blaming only those in power! Examining the importance of «awareness», education, and support to
actors to give greater responsibilities. What livers through participative approaches to debate on this issue?
- Implications of the combination/superposition even contradiction of customary/religious/administrative/politic authorities and their role in negotiations and definition of the community choice
- Place of corruption (non-explicit in the play strongly expressed) in negotiation field.
- Contrasted perceptions of agribusiness among local communities and different forms of positioning expression (approve, oppose and leaving, oppose and stay, keep on fighting...). Presenting a play pointing out the need to share the land choices with local communities.
- Discussions to reverse the positioning between local communities and agribusiness. Beyond the simple agreement «lands» against «money » without any involvement of the technical choices and chains to implement, be more constructive for rural communities by offering development options on «their» lands.

Photo 3. Presentation of the play «Win-Win» by Kaddu Yaraax group (Dakar, 23 June 2016)
V. Identification of major research projects on agricultural intensification paths in the Valley of the Senegal River

1. Identification of key constraints

In plenary, each participant proposed des constraints, written on a small paper displayed on the blackboard. Four major topics were chosen:

A. Visions and definitions of intensification paths
- Absence of a territorial vision representative of development
- Employment future based on privileged production systems
- Public policies (arbitrations) or adequacy with the preservation of family farms
- Consideration of sustainability (including environmental)
- Vision for agricultural culture little or badly shared
- Cohabitations and integration of production systems
- Definition of intensification
- Consideration of pastoralism
- Injunction on food self-sufficiency
- Standardization of agricultural choices and practices
- Insufficient training for agro-ecological practices
- Competitiveness and sustainability of production systems

B. Technical constraints
- Poor mechanization
- Small margins on increase in yields for irrigated production
- Poor equipment and lack of facilities’ maintenance
- Expensive inputs
- Reduced access to electricity
- Malfunction in production paths
- Farm size, often too small for mechanization
- Investments in hydro-agricultural developments

C. Markets and competitiveness, distribution networks
- Limited commercialization of products
- Inclusion in distribution network
- Control of sanitary quality of products
- Price guarantee on markets and competitiveness

D. Access and resource management
- Interaction between intensification needs and resource limitation (water, soil) and social peace
- Sustainable management of resources (soil, water ...)
- Access to pastoral resources for herders
- Access to water
- Risk of deterioration in water quality
- Availability and accessibility of land resources
- Limited access to land
- Allocation of land resources

Cross-cutting constraints are also discussed:
- Lack of multi-actor dialogue
- Training
- Funding

2. Identification of priority research questions

From these four major topics, a work in sub-group was designed to translate identified constraints in research questions.

Questions proposed by the participants to the workshop were as follow:

A. Visions and definitions of intensification paths
- How to define a long term agricultural and territorial vision shared at different levels, in order to implement consistent public policies?
- How to mainstream the Objectives of Sustainable Development in agricultural public policies design?
- How to ensure food security with sustainable crops and production systems?
- How to ensure the competitiveness of chains while preserving the sustainability of production systems?

B. Technical constraints
- Understand the differential yields obtained and potential yields among the different producer groups and between production modes (family farming / agribusiness).
- Loss analysis and wastes on value chains.
- Analysis of the modes of funding, effectiveness and impacts on production and intensification of infrastructures (including public) against the intensification needs in the Valley.

Technical constraints depend also on existing facilities.

Topic Loss and Waste considered as original and important during the final discussion.

C. Markets and competitiveness, distribution networks
- Understand the poor commercialization of the Valley products.
- Quality constraints/commercialization price.
Analyze the opportunities for development of alternative circuits to overcome through commercial quality and positioning the apparent weakness of competitiveness. The aim is to assess incentive perspectives to intensification by the price.

Note: a final debate on the fact that Senegalese rice is now competitive. Senegal could produce even more, bringing back the issue of intensification to a maximization of the production.

D. Access and resources management

- What model of natural resources governance for a sustainable intensification of agriculture in the Valley of the Senegal River?
- What model of agricultural intensification for a sustainable management of natural resources in the Valley of the Senegal River?
- What adequacy and balance between availability of natural resources and intensification dynamics in the Valley of the Senegal River?

All-embracing questions. Possibility to raise specific issues (for example the water quality of the Lac de Guiers, designed to supply Dakar with drinking water and the impact of the different systems on it).

3. Selection of the authors

All these topics and all these questions are legitimate. However, to limit our research field on the paths towards intensification, we target:

- The environmental issue, seldom addressed, is fundamental for the future of the Delta of the Senegal River (water quality, soil salinization, drinking water of the Lac de Guiers destined to Dakar, ...);
- The land and social equity issue (public policies/land «grabbing»);
- The territorial integrated management issue (interactions between chains, production systems and territories, complementarities and competitions between agribusiness and family farming);
- The water efficiency issue (what chains, what production systems, what complementarities to prioritize?);
- The employment issue based on possible paths.
Indicative bibliography


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