

# PRODUCTIVE WATER FOR AGRICULTURE IN SENEGAL

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## Retention Basins and Well Development Project (BARVAFOR)

In Senegal, agriculture is the principal economic activity in rural areas. Because of population growth and increasing urbanisation, higher domestic agricultural production has become a prerequisite to ensure food security.

To achieve this goal, Senegal and Belgium have jointly designed the Retention Basins and Well Development Project (BARVAFOR), which aims to ensure that livestock breeders and farmers in the Diourbel, Fatick, Kafrine, Kaolack and Thiès regions have sustainable access to productive water in view of increasing production.

BARVAFOR finances the construction of water retention basins and the re-equipment of existing water boreholes to supply agricultural irrigation systems, to water cattle or to raise the water level of freshwater ponds and foster fisheries. The project also plans to build anti-salt dams in view of reclaiming saline land, preventing saline water from contaminating production water and avoiding the loss of farm land. Finally, regeneration work on the mangrove ecosystem must contribute to sustainable agricultural production.

In total, 147 localities are touched by BARVAFOR, or 40% of the former rural communities in Senegal.

The project lasts 5 years (2011-2016) and the budget amounts to 11,571,000 euros, with 11 million euros (7.5 billion FCFA) funded by Belgium and 571,000 euros (375 million FCFA) by Senegal.

Technical supervision of the project is in the hands of the Directorate for Retention Basins and Artificial Lakes (DBRLA) of Senegal's Ministry of Agriculture and Rural Equipment (MAER), in joint management with the Belgian development agency (BTC).

## Sustainable hydro-agricultural infrastructure requires the involvement of local actors

### Key points

- The realisation of hydro-agricultural infrastructure such as embankments, anti-salt dams and boreholes aims to meet the growing need for water of the agricultural sector. The technical aspects of this type of project often are dominating and risk to outweigh participatory aspects that are important for the targeted populations to take on ownership of the infrastructure.
- Because of the profound changes triggered by such infrastructure, the involvement of populations in designing the projects and in any further step towards their achievement are fundamental to ensure the investments are sustainable.
- Genuine ownership of the hydro-agricultural infrastructure can only be achieved through the actual involvement of the actors concerned (populations, local administrative and traditional authorities, partners, etc.). Otherwise, weak involvement of local actors may lead to resistance and disagreement, or even the refusal of the infrastructure itself.
- BARVAFOR aligned its strategies with local and national integrated water resource management policies, through an inclusive approach based on the demands of populations and their development priorities.



Market produce area of Guerlé (Diourbel). Photo: © BTC / Marcella Pasotti



## Increasing pressure on productive water

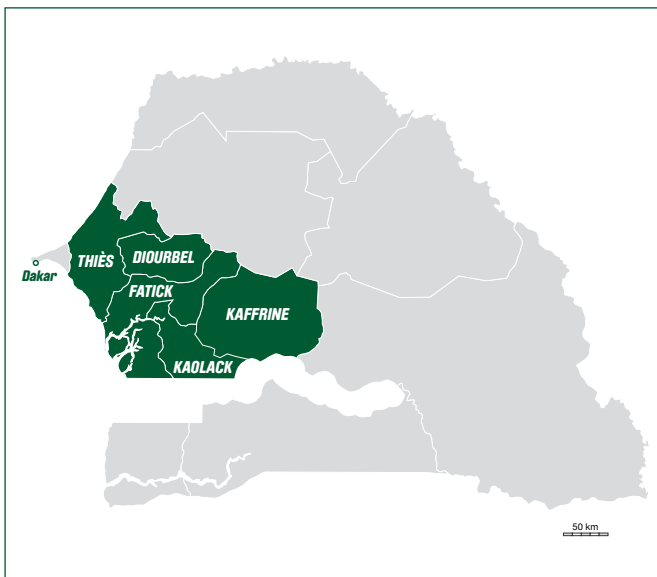
“ *The development of agriculture in West Africa is not limited by the availability of water, but by the lack of infrastructure to store and supply water to farmland and to protect farmland from flooding* <sup>1</sup>. ”

Globally, agriculture claims close to 70 percent of freshwater appropriated for human use<sup>2</sup>. In Senegal, withdrawals for agricultural purposes even take up 93% of available freshwater<sup>3</sup>.

According to the FAO, irrigation water withdrawal in 93 developing countries is expected to grow by about 14% by 2030 while some additional 45 million hectares of irrigated land will be created in these countries<sup>4</sup>. So, as the pressure on water resources rises, so do the stakes for today's and tomorrow's agriculture.

In the course of the past few years many Sub-Saharan countries have committed to building hydro-agricultural infrastructure to meet the growing needs of agriculture.

In this type of construction, civil and rural engineering aspects often dominate. The risk exists of eliminating social engineering aspects which are also important for the projects to succeed and be sustainable. The construction of infrastructure requires a participatory approach for all actors concerned in the different phases of the process.



Senegal. The five regions where BARVAFOR intervenes, aka 'the groundnut basin'.

## BARVAFOR intervention strategies

The strategies adopted by BARVAFOR are aligned with the Integrated Water Resources Management strategies elaborated at the regional and national level.

As a governmental cooperation project, BARVAFOR works closely with the various state structures in Senegal, namely the technical services of the State and the administrative authorities.

The partners of BARVAFOR are the Regional Development Agencies (ARD) which aim to support local governments in coordinating and harmonising local development interventions. Following an Execution Agreement, these Agencies are responsible for a certain number of activities of BARVAFOR and interact directly with the local governments and accompany populations and grassroots organisations, such as producers, economic interest groups, well users associations, and women's rights groups...

Participation and involvement of populations constitute the basis for the actions. In view of ensuring genuine ownership of the infrastructure, BARVAFOR focuses its intervention on three main strategies: demand-driven approach, synergies between actors and capacity development.

“ *A water infrastructure project is first and foremost a social change project.* ”

Water Resources Coordination Unit  
[www.wrcu.ecowas.int](http://www.wrcu.ecowas.int)

### Demand-driven approach

In a first phase, people of the intervention region are asked to identify the needs of their community in terms of productive water and to submit a project application. In this application the populations present the agricultural challenges that their region is facing and they justify their request for a water basin, a filtering embankment or anti-salt dam or the re-equipment of one or more of their wells. So, the application is the result of a consultative and participatory process within the community, in which farmers, village heads, women and youth are involved. Technical validation is by a Regional Technical Committee (CTR) that brings together, under the coordination of the ARDs, the regional services.



Birame Senghor, president of the producers' group of the village of Bakhala (Fatick). In the Bakhala Valley BARVAFOR has built three anti-salt dams which has allowed producers to reclaim 124 hectares of arable land. In the neighbouring villages, 160 women have joined forces and formed an economic interest group to better exploit desalinated land. Photo: © BTC / Marcella Pasotti

### Partnership and synergies between actors

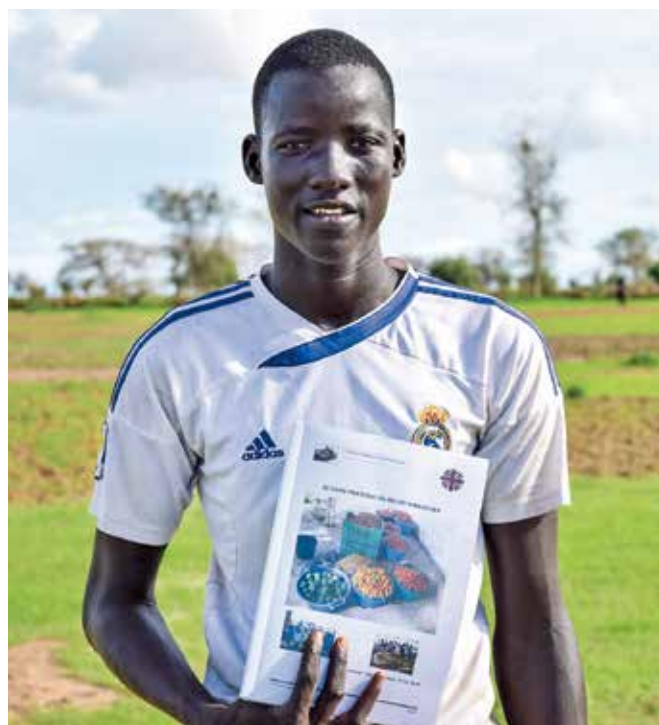
In their application, the communities must identify a local or international organisation that is willing to support them with boosting local agriculture. The support of these partners, which mostly are already promoting rural development in the intervention zone, must allow to optimally exploit the agricultural potential on the one hand and to accompany the communities in the future management and maintenance of the infrastructure on the other hand.

The applications that the CTRs have approved are then considered for pre-selection by selection committees that are presided by the region's governor. Two calls for projects were launched, one in 2012 and 2013. Once the sites are retained, BARVAFOR recruits bureaus that are responsible for conducting preparatory studies, which include an analysis of the social and economic situation at each site. Next, enterprises are contracted to carry out the works.

### Capacity development

As the works are launched, BARVAFOR encourages the agricultural exploitations and the communities – the project applicants – to create local entities that are to monitor, manage and exploit the infrastructure. For the dams these entities become official Managing Associations of Runoff Retention Works (ASOREP) and for the borehole sites they become Market Garden Management Committees (CGPM). Their membership consists of farmers and members of grassroots community organisations which benefit from the infrastructure.

These Associations and Committees are coached by a Capacity Development Operator. Through the Operator's coaching and training (organisation dynamics, financial and account-



A young farmer of the market garden of Guerlé (Diourbel region) where the population applied for re-equipping a well. A channel of approximately 400 metres brings water to the market garden. Photo: © BTC / Marcella Pasotti

ing management, conflict prevention and management, etc.) the associations and committees can obtain the necessary know-how and tools to ensure fair, democratic and sustainable management of the infrastructure. BARVAFOR aims to professionalise the ASOREPs.



**“ It is my duty as the president of the ASOREP of Tattène Teup Dal to ensure that the Association functions well, that information is disseminated to the people and that people benefit to the fullest from the infrastructure. ”**

**Amdy Pouye**

President of the ASOREP of Tattène Teup Dal (Thiès), where BARVAFOR realised a filtering embankment.

### **Integrated Water Resources Management**

Integrated Water Resources Management (IWRM) is ‘a process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems.’ The concept of Integrated Water Resources Management was elaborated in 1992 at the International Conference on Water and the Environment in Dublin.

#### **IWRM in West Africa**

In 2004, the Economic Community of West African States (ECOWAS) constituted the Water Resources Coordination Centre (WRCC) to monitor and supervise the integrated management of water resources<sup>5</sup>.

In 2012, the Coordination Centre published guidelines for the development of water infrastructure in West Africa<sup>6</sup>. These guidelines strongly recommend including the targeted populations as actors, partners and beneficiaries in view of achieving genuine ownership of the infrastructure.

It is key to inform populations during all phases of the project, with messages delivered in an accessible format and language. Otherwise, the lack of information and transparency will lead to distrust from populations.

Also, the communities must be involved in all stages of decision making; to be successful the technical projections of the consultants must be supported by local populations.

Local actors involved must be supported in order to ensure their effective participation to the decision-making process: adherence to the project can be obtained and disagreement can be prevented through the strong involvement of local structures.

Finally, considering the risks involved in large dam projects, it is important to put in place a remuneration plan based on exhaustive, objective and updated evaluations of the property of affected populations. A rigorous preliminary analysis of the situation and a good property census are key prerequisites to avoid later grievance<sup>7</sup>.

#### **IWRM in Senegal**

Since 2007 Senegal endeavours to elaborate a national action plan to harmonise and coordinate the integrated management of its water resources. The aim is to ‘strengthen the management tools and to reform the institutional, legal and organisational frameworks in view of improving the protection and technical, economic and financial management of the water resources by involving all actors<sup>8</sup>.’

The national action plan aims to improve the know-how on and tools for managing water resources, to create an environment that fosters the integrated management of water resources by legal, organisational and policy reforms and to improve communication, information, education and awareness about water.

#### **IWRM within BARVAFOR**

BARVAFOR has incorporated IWRM as from the formulation of projects. The communities were required to draw up their applications for funds following IWRM stipulations. For instance, one of the criteria to be fulfilled was the representation of women in the decision-making instances managing mobilised water. Today, out of 23 management committees, three have women presiding and 49% of the membership of executive offices are women. Also, in choosing where to plan water retention works the watershed approach prevailed and all uses are considered in resource management.

## BARVAFOR achievements

In total, approximately 200 rural communities from the five targeted regions have identified their need for productive water and have actively applied for funds from BARVAFOR.

In November 2015, the selection committees withheld 101 projects. Among these, 24 were implemented by BARVAFOR and 31 were entrusted to the Ministry of Agriculture and Rural Equipment to find investment partners.

Among the 24 works realised by BARVAFOR feature eleven retention dams, three filtering embankments and five anti-salt dams as well as the re-equipment of five wells.

The retention dams will store almost seven million m<sup>3</sup> of water, which will allow producers to grow rice and market garden produce on approximately 1,000 hectares year-round with two or even three yields per year.

The filtering embankments for their part will contribute to re-charging groundwater reserves and consequently provide producers with easier access to water.

The anti-salt dams will allow farmers to reclaim almost **650 hectares** for the rice culture. Finally, the five re-equipped wells will allow farmers to develop market garden activities on approximately **50 hectares** of land.

## Lessons learned and recommendations

### How to guarantee genuine involvement of populations?

*The municipality of Taiba Ndiaye (Thiès) submitted an application to construct three filtering embankments in view of re-charging groundwater reserves. Their request was approved and the works could start. Some producers however voiced their opposition when the works started, which indicated a lack of interaction between the municipality and beneficiary populations. With the assistance of the Regional Development Agencies and the administrative authorities of Thiès the project invested in mediation but with no success. BARVAFOR therefore decided to suspend the construction of the three embankments.*

### Lessons learned

Populations can only take ownership of infrastructure through genuine involvement in all phases of design and decision making. Involving concerned citizens in elaborating the project application is necessary, but not sufficient. Populations must be informed at each stage of the project, from design to realisation. Otherwise, opposition might grow and the construction may even be rejected.

### Recommendations

Throughout the project several feedback moments must be organised on site, with populations, project representatives and local administrative and traditional authorities attending. When the project is approved, the selection committee must organise a first on-site feedback moment, even before the technical studies are started, in order to inform all citizens concerned about the initiative taken by the municipality. At a second feedback moment any potential changes are shared with populations in order to obtain their approval. A third feedback moment must be organised to inform about the details of the works to be realised.



Kayemor (Kaolack), retention and overtopping dam.  
Photo: © BTC / Marcella Pasotti



### Communication and procedures

The communication strategy has changed as the BARVAFOR programme progressed. In the beginning, the communication activities – such as radio broadcasts – essentially aimed to inform about investment opportunities offered. These activities were a real success as is witnessed by the 200 project applications submitted by rural communities.

Two years passed between the selection of projects (April 2012) and the effective launch of the works (June 2014) due to slow public procurement. In addition to such delays BARVAFOR had difficulties with managing communication. The slow progress and lack of communication led to some partners abandoning the project as well as to a certain distrust of the people. To address these issues, BARVAFOR strengthened its communication and recruited a communication officer and elaborated a communication strategy.

### Lessons learned

Communication is a key element to achieving genuine ownership by the various actors. Insufficient or unclear communication risks demotivating them and jeopardizes all joint efforts made. The information tools used during the first phase of the project to disseminate information to the general public about the opportunities offered by BARVAFOR were relevant.

On the other hand, the information that needed to be disseminated later on the specifics of each local, small-scale project was of a different nature. Such a specific context requires a type of pyramid-like communication involving all structures (Regional Development Agencies, municipalities, management associations of runoff retention infrastructure, management committees and farmers). It also allows initiating and promoting communication between actors, which can last until after the project and will thus contribute to a sustainable management of the infrastructure.



Founding meeting of ASOREP of Notto Ndioukhane.  
Photo: © BTC / Marcella Pasotti

### Recommendations

It appears it is indispensable as from the start of the project to have a communication strategy, which must be inclusive and followed throughout the stages of the project. Each planned activity must be adapted to its target audience and to the message to be disseminated. In view of promoting communication between the local actors, it is necessary to have information pass through the pyramid-like structure of existing local structures.

### Technical studies prior to the works

In the Notto Diobass municipality (Thiès region) four project applications were approved, namely three filtering embankments (in the villages of Notto Ndioukhane, Ndioungane Péléo and Tattène Teup Dal) and a retention dam (Hanène site). According to the technical studies, the required backfill material had to be sourced from the bottom of the Diobass Valley. It appeared that that location was already used by farmers who developed market garden activities there. Sourcing backfill there would bring about economic losses since those farmers would lose their crops. Because people refused to free the land, the enterprise was forced to source its backfill further away, which meant an 18% increase of expenditure for the project.

### Lessons learned

High-quality preliminary studies substantiated by detailed and reliable data are an essential condition for an infrastructure project to succeed. Such studies must include exhaustive information on the social and economic situation of the zone where the project intervenes. If the population is involved actively in the study phase, it can supply all necessary elements required for elaborating a high-quality study. Otherwise, incorrect information may cause technical, economic, social and financial problems.

### Recommendations

Preliminary studies must include the following information:

- An inventory of land affected by the works as well as the delineation of the parcels and identification of the owners. Such inventory must be drawn up in collaboration with the land service of the municipality.
- Determination of flooded surface: marking must be carried out once the height and location of the dam are identified by the studies.
- The exhaustive analysis of the social and economic situation: the study must be based on a participatory methodology, with diagnostic tools allowing people to visualise the stakes involved in the works and showing the zones and aspects that might be of interest to them. If international consultants are responsible for the study, they must be supported by domestic social anthropologists.

### Reparcelling and rehabilitation of land

The village of Keur Sayib Ndoye (Fandene municipality, Thiès) submitted a dam-building project. The preliminary studies carried out by the study bureau defined the surface that would be affected by the dam, but it had not identified the owners of the parcels that would be effectively touched. When the works started, it appeared that part of the flooded land concerned land from farmers of a neighbouring municipality. These farmers refused the dam construction because the water would flood their mango groves. To address the issue, the project worked closely with the mayors of the two municipalities and with the administrative authorities to find a solution. But regardless of the many meetings, the project unfortunately had to be suspended because consensus was lacking.

### Lessons learned

Hydro-agricultural infrastructure impacts land planning of the sites chosen for the infrastructure. The land impacted by the infrastructure is usually used by people. Addressing the land issue and clearly allocating responsibilities in terms of reparcelling or remunerations consequently appears to be essential for the technical studies phase in order to prevent land conflicts and resistance from populations during construction.

### Recommendations

It appears it is essential to work in close collaboration with the municipality on land ownership. The municipality is responsible for the reparcelling and rehabilitation of land for those who will lose land following the construction of the works. Such reparcelling must be designed in collaboration with the management associations of the runoff retention infrastructure and the management committees by jointly elaborating a land allocation and occupation plan.



The Bakhala Valley (Fatick) during the dry and during the rainy season. Above, one of the three anti-salt dams built by BARFAVOR in response to the demand of the people of Bakhala. Photo: © BTC / Marcella Pasotti



Construction site at Notto Ndioukhane (Thiès), construction of a filtering embankment. Photo: © BTC / Nicolas Widmer



**BTC**

BTC, the Belgian development agency, supports and provides expertise for development programmes for the account of the Belgian State and other commissioners.

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