

# Socio-Economic Impacts Of The Agricultural Valorization Of The Shallows In The Municipality Of Savalou In Benin (West Africa)

Jean SODJI

Laboratory of Rural Geography and Agricultural Expertise (LaGREa), FASHS,

University of Abomey-Calavi, Benin

Teacher-researcher, [jeansodji47@gmail.com](mailto:jeansodji47@gmail.com)

## Abstract

The use of lowlands for agricultural purposes has become an alternative to which farmers in the world in general and those in Benin in particular are turning more and more. This is the case in Savalou where agricultural activities are carried out in the lowlands. The present research carried out on the lowlands of the Savalou District in the Municipality of Sô-Ava has for objective to study the agricultural development of lowlands for a sustainable management of the potential of these ecosystems.

The methodological approach followed is based on documentary research, direct observations in the field and socioeconomic surveys in a real environment. Similarly, data relating to cultivation practices, the problems encountered and the analysis of their results were processed.

Among the techniques used in the development lowland in the study area, manuel plowing is the technique that predominate at more than 68%. The practice of rice cultivation is dominant for 99% respondents. The average rice yield is 3.86t/ha (varying from 2 to 4t/ha). The study shows that the gross production income per sown area is on average 482.500 FCFA/ha while the net income per hectare on average is 92.683FCFA/ha during the last campaign. Indeed, the gains made have made it possible to ensure in the schooling of children, access to health care and self-consumption of food. However, the development of lowlands disturbs the component of the environment. The soil, flora, fauna and water are the most affected.

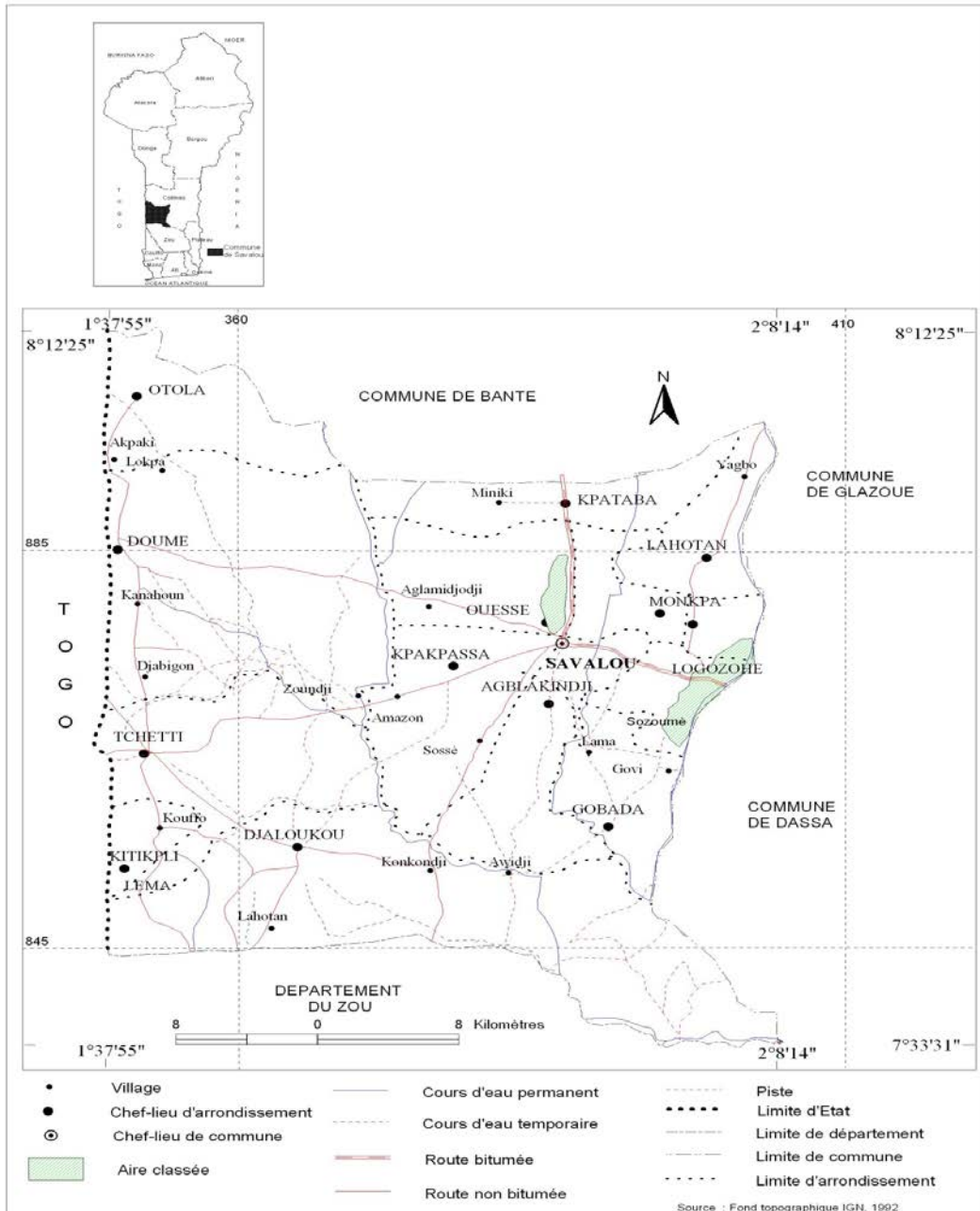
**Keyword** : Savalou, Lowlands, Development, Ecosystem, Agriculture

## Introduction

In Africa and everywhere in the underdeveloped countries, agriculture occupies a very important place in development. The growth of food and energy needs places it at the forefront of the international scene. Thus, the future of agricultural activities and the populations who devote themselves to them constitutes a major global issue (CIRAD, 2008, p. 26). The great challenge of the XXI century is how to ensure a sufficient, healthy, and diversified diet for nine billion men and women in 2050. This challenge is demanding because it is a question of producing without compromising the satisfaction of the needs of future generations, which implies reviewing agricultural practices and food systems and promoting those that are more energy efficient, respectful of the environment and socially fair (INRA and CIRAD, 2011, p. 1).

Agriculture is the most important economic activity in West African countries (MEF, 1998, p. 105; cited by A. Houintchekpo, 2009, p.79). It provides 30 to 50% of the Gross Domestic Product (GDP) and represents the largest source of income and livelihood for 70 to 80% of the population. In Benin, agriculture is the first economic sector after that of services. It contributes an average of 32.7% to GDP, 75% to export revenues, 15% to state revenues and

provides about 70% of jobs (MAEP, 2020, p. 12). But the performance of this activity remains low, because the demographic pressure on land resources, in this case plateau land, no longer allows rotations and forces producers to exploit the same land every year. This results in falling yields and rapid degradation of cultivable soils. To compensate for this deficit, certain ecosystems are prioritized. This is the case of the shallows which offer vast valorizable potential for agricultural production. Their exploitation is a viable economic activity because the crops practiced are profitable and perfectly value the factors of production (O. A. Daoudou, 2012, p. 06). Consequently, the shallows with their natural resources are the object of increased interest in certain regions (D.P. Lavigne and L. Boucher, 1996, p. 417).



**Figure 1:** Geographical location of the municipality Savalou

In Benin, like other West African countries, the basfonds are exploited for various crops: rice, corn, sorghum, onion, chili pepper and other vegetables, cowpea, sweet potatoes and others (V. Orekan, 2000, p. 82).

In the municipality of Savalou, nature has favorably endowed the fields with production and low funds, thus making it a municipality with strong agricultural potential. Producers invest in it daily (T. E. Attolou, 2018, p. 11). But it is clear that the fruits do not keep the promise of the flowers; the efforts made greatly exceed the yields obtained at the end of the harvest. The first question that we are entitled to ask ourselves is to know what justifies this failure. This research aims to analyze the socio-economic effects of the agricultural valorization of the shallows in the municipality of Savalou. It is located in the department of Hills. It is between 7°33'31' and 8°12'25' north latitude and between 1°37'55' and 2°8'14' east longitude (Figure 1).

## 1. Data and methods

### 1.1. Data used

The data collection takes into account the nature of the various data collected, the collection tools and materials and the methods used. Table I presents a summary of the nature of the data collected, the places of collection and the description of the information collected.

Table I: Nature and contents of the data

Nature of the data	Sources	Description of the information collected
Geographical data	Savalou Municipal Development Plan,	These are the administrative and land use maps of the municipality of Savalou
Data relating to the development of the shallows	Documentation supported by the field trip	These are the technical information relating to the development of the shallows
Data relating to activities carried out on the shallows	Field investigation	These data concern the way the bottomland is used between the different actors involved at the site level
Data on difficulties, inadequacies and strengths	- Women's cooperatives - Support structure for low-lying cooperatives - ATDA (cell) of Savalou	It is about the difficulties encountered at the level of the management of the shallows, the assets available to the shallows
Protection and durability of the development works	- support structure for cooperatives - ATDA (cell) of Savalou - Town Hall of Savalou	They concern the various measures put in place for an efficient and sustainable management of the development of the shallows

Source : Field investigation

### 1.2. Methods used

Several statistical and cartographic methods were used as part of this study to process the information collected. The sample was constituted in a simple random way and in proportion to the size of the population on the basis of a certain number of criteria namely: to be a producer; trader of agricultural products; carrier of agricultural products. As for the authorities in charge of the municipality, the head of technical service, the head of the district, the district

heads of the targeted districts of the District were interviewed. A total of one hundred and thirty-four (134) people were interviewed, including: one hundred (121) agricultural households from the three (03) villages in the district, four (04) agents from the town hall of the town of Savalou, five (05) agents from the Territorial Agency for Agricultural Development (ATDA), three (03) village head and one (01) District Head (CA).

After the fieldwork, the collected data underwent a restructuring phase. The data processing is reduced to the manual recalculation of the survey and maintenance sheets. The data obtained are read and then distributed according to their nature and the objectives set. Several software programs have been used to process the collected data. These are in this case the Excel software for the realization of graphs and tables, the Word software for the entry of the text of the thesis and the Arc View software for the realization of the maps. The results from the data processing were analyzed.

The SWOT model (Strengths- Weaknesses- Opportunities- Threats) was used to take stock of the agricultural valuation made in the Municipality of Savalou. The use of the SWOT matrix is based here on the principle of dividing the information relating to the agricultural strategies developed by the various actors of the district. It allows the identification of the strengths and weaknesses of these strategies, in the light of the opportunities and threats of the external environment.

## 2. Results

### 2.1. Strategies for agricultural valorization of the shallows of the Municipality of Savalou

#### 2.1.1. Type of culture

In the villages of the arrondissement, agriculture is carried out twice a year according to the rainfall regime. The producers are thus subjected to the rain. The cultures practiced are summarized as follows in Table II.

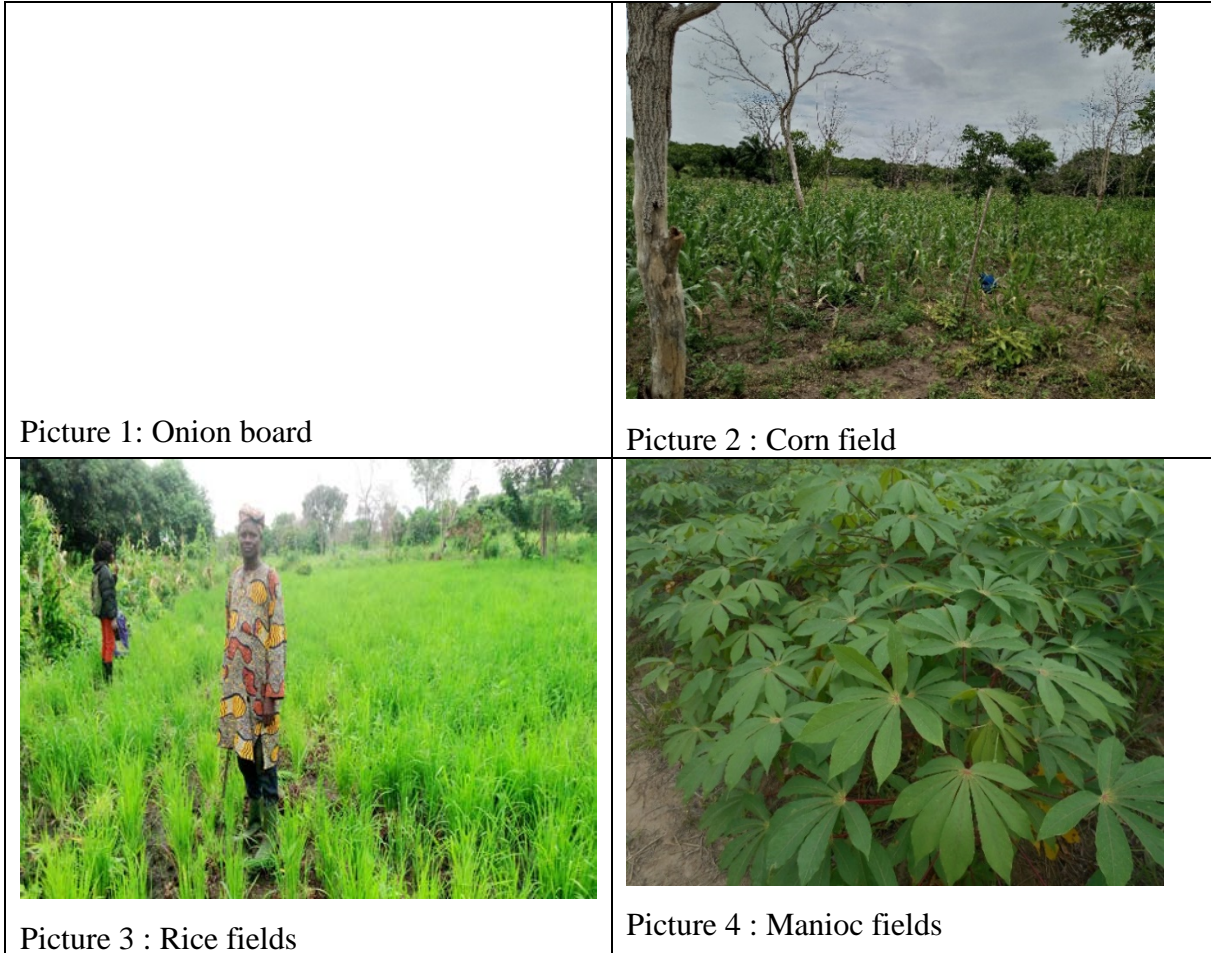
**Table II:** Crops cultivated

Corn	Roots/tubers	Maraichères	Cereals	Legumes
Local, Improved	Manioc	Tomatoes, Chillies, Okra, Horsehair and Onion	Rice, Corn	Soy, Cowpea, Peanut

**Source :** Field investigation, 2022

Table II presents the cultures practiced in the Municipality of Savalou. It shows the crops of rice, corn, tubers/roots as well as legumes. During the decrease observed between November and January, farmers take the opportunity to collect cashews before now starting to grow corn or tubers / root crops on several lands in the shallows. Plate 1 shows examples of cultures.





**Plate 1:** Fields and Crops in Savalou

**Shooting:** SODJI, July 2022

On this board, picture 1 shows an onion board, picture 2 a corn field and picture 3 shows a rice field and picture 4 shows a manioc field. These crops are those practiced in the Municipality and tubers / roots that are also grown there.

### 2.1.2. Agricultural practices

The agricultural valorization of the shallows in Savalou is done through the following agricultural practices :

- Polyculture;
- Crop rotation;
- The monoculture

#### 2.1.2.1. Polyculture

It is a system that consists of making several crops in the same field. Most often, farmers grow cassava, cowpea, groundnut and corn at the same time. This allows them to have several productions to sell while taking advantage of the space of the fields as much as possible. It also allows a complete use of the fields in order to occupy the available space.

#### 2.1.2.2. Crop rotation

It consists of making a succession of crops on the same field. Table III shows the types of crop rotation practiced in the district.

Table III: Crop rotation

<b>Period</b>	<b>Type of rotation</b>
<b>Mid December - Mid February</b>	Market gardening
<b>Mid-March - Mid-June</b>	Cassava, Corn, Cowpea, Peanut
<b>Mid-June - Mid-November</b>	Soy, Rice

**Sources:** Field investigation and documentary research, 2022

Since agriculture in Savalou is carried out according to the rainfall regime, farmers practice a little market gardening during the decline from mid-December to mid-February to benefit from the moisture of the soil and the silt left by the withdrawal of the waters as summarized in Table III. During the rainy season, they practice the cultivation of corn, cassava, soybeans. Rice is practiced during periods of floods from mid-June to mid-November. The flood occurs sometimes already in mid-July: it is the abnormal flood.

### **2.1.2.3. Monoculture**

It consists of practicing a single crop on a field. Sometimes farmers with several scattered fields practice it by dedicating each field to a particular crop in order to maximize the harvest. In addition, those who mainly practice rice farming resort to this practice where they cultivate rice on large areas (3ha). Monoculture is also practiced by those who sometimes grow only corn during the season.

### **2.1.3. Types of landscaping in the shallows**

Two types of development are generally distinguished, the peasant development of the low-lying areas operated on the basis of endogenous knowledge and modern developments characterized by the implantation of hydro-agricultural structures equipped with an irrigation system.

#### **2.1.3.1. System of peasant development of the shallows**

The peasant development system is the set of techniques developed by peasants for the management of agrarian space, water and various productions as part of the enhancement of their bottom. During wintering, these arrangements consist in particular in the manufacture of large ridges arranged one parallel to the circulation of the water to facilitate drainage, the others perpendicularly upstream and downstream of the first series, the assembly forming baffles which allow the management of a blade of water between the ridges.

The maintenance of the runoff water in the intervals favors the infiltration, the lasting moistening of the ridges and, by this, the securing of the water supply of the associated crops. In this system, the association of crops is the rule, and the spatial arrangement of the crops around the ridges meets the water requirements of these. Crops that are undemanding to water (corn, chili pepper) are placed on the ridges; sorghum and tarot are put on the side of the ridges and rice that is demanding on water is sown in the furrows. The seedlings start at the beginning of June to allow the plans to grow sufficiently before the first floods in the shallows.

In the margins of the shallows, it is rather flat plowing that is practiced, because the crops in these areas are less prone to flooding. It is mainly a question of vegetable growing practiced in the back (-) and counter-season using cesspools in straw or earthen enclosures.

#### **2.1.3.2. Traditional or HIMO facilities (High Labor Intensity)**

Traditional management brings together all the water management techniques developed by farmers, based on their endogenous knowledge. These techniques have been described by Daoudou (2012), and they consist of :



- The making of large ridges or large mounds arranged in staggered rows, forming baffles that slow down the flow of water and promote infiltration ;
- The installation of cofferdams by means of stakes arranged in the manner of fascines ;
- The diversion of the waters of the rivers in the shallows with the help of irrigation canals ;
- The construction of lockers using diguettes following the contour lines ;
- The association of cultures and especially the spatial arrangement of these cultures around the mounds and ridges.

The advantage of this system is its adaptation to local conditions (polyculture and low development cost). But its disadvantage lies in the fact that, given the many hazards (partial control or not of the water), the crops can be quickly lost. Plate 2 presents HIMO developments in the borough.



Picture 5 : Ridged development of a soybean field



Picture 6: Summary layout of the shallows

Picture 7: shallows fitted out

**Plate 4:** System of peasant development of the shallows in Savalou

**Shooting:** SODJI, July 2022

Picture 5 shows the ridges used for sowing the soybean crop in a field. Picture 6 and 7 show the basic and low-background layout set up for rice production in the district.

#### **2.1.4. Cultural techniques for highlighting the shallows of Savalou**

The cultivation techniques developed include soil preparation, the different forms of plowing, maintenance and harvesting.

#### **2.1.4.1. Soil preparation in the shallows**

It brings together all the cultural operations that lead to the realization of the bed of cultures. There are mainly clearing, weeding and drying.

##### **- Clearing**

It is an operation aimed at cleaning the fields before starting cultivation.

##### **- Weeding in the shallows**

The vegetation of the shallows being essentially herbaceous, weeding is done by men with machetes and hoes. It takes place according to the availability of the workforce to be used and as many times as necessary.

##### **- Breathlessness**

It is the act of pulling out the stumps of felled trees on a field. During each agricultural year, the farmers sometimes deforest the fields in order to increase their exploitation. The trees are cut down in order to avoid the effect of their shading on the development of the crops.

#### **2.1.4.2. Ploughing**

Plowing is one of the main operations for preparing the soils of the shallows. There are three forms of plowing: manual plowing, plow plowing and motorized plowing.

Manual and plow plowing are the technique practiced by the producers. Motorized plowing is not used for lack of means. Others such as hilling, ridging are also used.

##### **- Hilling**

It is suitable for fairly loose soils and it is easily piled up along the banks. This technique is practiced for tubers and roots (cassava, yam etc ...). Hilling prevents soil erosion by runoff water. However, it makes weeding restrictive in the fields.

##### **- Billeting**

It is a practice that consists of a layout of a series of land elevations (ridges). The aim of this practice is to facilitate the aeration of the soil and the easy burial of the roots and tubers of the plants in the soil. The making of ridges takes place at the beginning of the rainy season. It retains more water and allows the association of cultures.

##### **- Temporary nursery**

This consists in the planting of seedlings between the crops in the ridges to then plant them in order to cultivate them on their beds.

#### **2.1.4.3. Maintenance**

The maintenance includes two operations namely: chemical weeding, and phytosanitary treatment in the shallows.

##### **- Chemical weeding**

For chemical weeding, it is recommended to use two types of herbicides. These are the total herbicides that kill everything that belongs to the plant kingdom and the selective herbicides that only kill the herbs and leave the cultivated plants.

Total herbicides are used before sowing or no later than the second day after sowing. The application doses are made according to the degree of grassing of the site (4 to 6 liters / ha).

Selective herbicides are those used during the vegetative phase. They are used 15 to 20 days after sowing at a rate of 4 to 6 liters / ha.

##### **- Fertilizer intake**

###### **\* NPK Manure**

It will occur after the first weeding 15 to 20 days after sowing and after a good rain. It takes at least 8kg / locker of 400m<sup>2</sup> or 200kg / ha. But it can be done as background manure at the time of planing or sowing.



The ideal will be to make a spreading by closed poquet but failing that we could scatter it with a line of about 5cm from the line of the plants. In any case, never on the fly because it is poorly distributed and causes burns to young plants.

**\* Urea maintenance fertilizers**

It will be done as soon as the plants begin tillering (25 to 35 days after sowing) at a dose of 25 kg / ha. The second phase at the beginning of flowering (60 to 75 days after sowing) at a dose of 50 kg /ha and the third phase at the ripening stage (80 to 90 days after sowing) at a dose of 25 kg / ha. That is to say a total of 100 kg / ha of urea. Urea fertilization is done on the fly due to the plugging of the rice plants. But we will make sure that it is evenly distributed in the locker.

**2.1.4.4. Harvest**

The harvest must take place from the moment when the upper 2/3 of the panicle are ripe (and the base seeds are still milky) for the rice

In an operational way, it is carried out as follows :

- Cut the rice plants with a sickle, with a knife about 15cm from the ground very early in the morning until 11 am or 12 pm at the latest to avoid losing more seed.
- Make sheaves tied by the waist and pile the sheaves in small millstones or bundles. These are preferably deposited in the shade, the panicles facing up (the risks of breaking the grains due to excessive heating by the soil are thus reduced)
- Do the threshing by holding the straw and hitting them on a rigid object (tree trunk or overturned container for example: basin) to prevent the grains from breaking enough in their shells which seriously deteriorates the product during husking or the rice obtained at a high rate of breakage. The threshing must be done on a drying air or necessarily on the very wide polyethylene tarps. We will use at least 5 tarpaulins to avoid losing too much grain during threshing.

A first winnowing will take place just after threshing to remove the stems, leaves and other solid debris from the grains. After this first winnowing, proceed to drying for 5 to 10 days in the shade protected from the rains. It is important to stir from time to time so as not to leave parts without light, which can be a source of mold and depreciation of the finished product.

When the grains are sufficiently dry (when they produce a sharp noise when they are broken with the tooth) it is necessary to proceed to a second winnowing where it is cleared of all impurities and dry empty grains. We obtain a paddy ready for parboiling and hulling with a good machining rate

The harvest is an operation that brings together a number of activities such as the breaking of mounds and ridges with the handle of the hoe, the cutter and the traditional sickle, the constitution of heaps of sheaves to expose preferably in the shade... The crops are put in bags or in basins or baskets sometimes from the field after sorting during which the bad crops are separated from the good ones (for the other crops) Plate 3 shows harvested crops or in full harvest.



Picture 8 : Harvesting in a rice field



Picture 9 : Bagging of the harvested rice



Picture 10 : Harvesting corn in a field

**Plate 5:** Harvests of some crops

**Shooting:** SODJI, December 2021

Picture 8 and 9 show on the one hand the rice harvest and on the other hand the bagging of the rice harvested in the field. The products will then be displayed for sale in nearby markets or at home. Picture 10 shows the women producers harvesting improved corn in a field.

## **2.2. Socio-economic and environmental impacts of the agricultural valorization of the shallows in the Municipality of Savalou**

The impacts of agricultural valorization include the characteristics of the operators, the size of the farms, the production factors, the environmental constraints, the positive and negative impacts.

### **2.2.1. Socio-economic aspect of the agricultural valorization strategies of the shallows of Savalou**

#### **2.2.1.1. Characteristics of the operators of the shallows**

In the exploitation of the shallows of the arrondissement, there are more men than women. Of the 121 surveyed, men account for 80 (66%). Women account for 61 out of 121 respondents (34%). This can be explained by the fact that women are more considered as laborers for the harvest by their producer husbands, not to mention that they can also help with sales.

#### **2.2.1.2. Size of holdings**

Since most of the farmers are in cooperatives, the farms are pooled so that the members can cultivate the available land together. The minimum cultivated per cooperative is 5ha and the minimum cultivated per person is about 1ha.

#### **2.2.1.3. Factors of production**

##### **\* Accessibility to the lands of the shallows**

The acquisition methods applied are inheritance, pledge, loan or lease. The purchase and donation are made very rarely. In addition, the recorded conflicts are mostly state-owned. The land problem arises too acutely. The producer is aware and to preserve the inherited lands, he cultivates by area. It does not have a single cultivation area. He can have 3 to 5 sites on which he practices different crops (improved corn, soybeans, cowpea, rice, cassava, etc.). There are also conflicts between farmers and breeders whose animals are in permanent rambling.

**\* Labor force**

Labor is one of the most determining factors in agricultural production. There are four forms of labor in the surveyed villages :

- The household workforce, that is to say the father with his wife(s) and his child(ren) ;
- The family workforce: which includes the family in the broadest sense (cousins, uncles and aunts, etc.) ;
- The wage labor force that employs people for work for a fee ;
- The self-help workforce: it is the same members of groups who decide to cultivate the fields of each member in turn and for free.

The household workforce is the most dominant. There is also mutual assistance that is done by the members of the cooperatives. Wage labor is necessary when labor is not enough and this by farmers who are not part of cooperatives.

**\* Financial capital**

Producers have several sources of financing for their operation. It should be noted that there is financing from own funds (financial reserve), that from loans and loans on tontine. However, most often, credit and loans on tontines come to help insufficient equity in most cases.

**\* Income of producers by yield**

According to field surveys, the producer is faced with the sale of fresh products. He does not wait until it is dry. They all declare that it depends on the market. Others sell at the Glazoué market or to the local women processors. There are women traders who come to the area to buy. Table IV summarizes the income made by the producers.

Table IV: Income of producers

<b>Producer</b>	<b>Land area (ha)</b>	<b>Number of harvests per year</b>	<b>Income per harvest (FCFA)</b>
<b>small producer</b>	1ha ; 2ha	2	90 000 à 200.000
<b>Average producer</b>	3ha ; 5ha	2	300.000 à 600.000
<b>Big producer</b>	5ha ; 10ha	2	800,000 to 1 million

**Source:** Field investigation, 2022

As shown in Table IV above, the small producer finds himself from 180,000 to 400,000 FCFA per year. The average producer has an income ranging between 600,000 to 1200,000FCFA per year while a large producer earns 1,600,000 to 2,000,000 per year.

**2.2.1.4. Accompanying actions for the development of shallows**

The accompanying measures for the agricultural development of the shallows basically boil down to the technical frameworks of the cooperatives with the NGO PEH-BENIN. It is about:

- Summary arrangements of the low funds for the production of rice
- Monitoring of producers in production

Plate 4 shows some of the improvements made in Savalou.





Picture 11 : summary layout and realization of the diguettes

Picture 12 : rice production site of a cooperative

**Plate 4:** Accompanying projects for the development of the shallows

**Shooting:** SODJI, July 2022

Picture 11 shows the basic layout of a basement. Picture 12 shows a rice production site in the borough for a cooperative.

### 2.2.1.5. Socio-economic impacts of the agricultural development of the shallows

The use of the shallows allows women to contribute more effectively to the needs of their households (Djagba, 2009). The advantages linked to the development of the shallows and the socio-economic constraints encountered by the operators are studied in this part.

#### \* Socio-economic benefits

The hydro-agricultural developments constitute for the operators a source of improvement of the activities by reducing certain constraints linked to their exercise. In addition, the enhancement of the shallows constitutes an opportunity offered to producers through market gardening, off-season crops and irrigated crops. The exploitation of the forest resources of the shallows is used to satisfy the needs of households in wood energy and charcoal. The cut timber is marketed, which provides an income to the operators. The overall expenses can be summarized as follows in Table V. Apart from these expenses, there are also those relating to the wedding which is quite rare.

**Table V:** Farmers' expenditure

Expenses		
Household and personal expenses	Alimentation	Purchase of foodstuffs for the household ;
	Health	- Treatment of diseases such as: malaria; respiratory diseases; gastrointestinal diseases and diarrhea ;  - Two types of treatments are used by the producers: the district health center and the traditional therapists (traditional healers).
	Recreation	- Organization almost every weekend of events and funeral ceremonies commonly called "Ago" ;  - Huge expenses in renting chairs and the like as well as food ;



	<b>Schooling of children</b>	Purchase of school supplies for the children as well as tuition fees ;
	<b>Maintenance of the house</b>	-Construction of new buildings ;
<b>Professional expenses</b>	<b>Moving</b>	- Purchase and maintenance of motorcycle or tricycle especially to go to the fields or transport the crops to the house or to the market ;  -Repairs of the various means of locomotion ;
	<b>Agricultural supplies</b>	- Purchase of agricultural tools ;  - Repair of agricultural tools

**Sources:** Field investigation and documentary research, 2022

In Table V it is observed that the producers face personal and professional expenses such as food, health and expenses related to the movement and maintenance of their equipment. The children themselves participate in field work, they sometimes earn money for their school supplies and at the same time can also learn something other than what the school teaches.

**\* Socio-economic constraints**

The socio-economic problems that producers face are the problems of lack of equipment, the insufficiency or difficult access of agricultural credits, the high interest rates linked to microcredit and the dysfunctions of producer associations which for some are experiencing difficulties with their legalization in order to benefit from assistance projects. We must also count the conflicts of interest or other between farmers.

Since agriculture is heavily practiced as a way of valorizing the shallows, periods of floods constitute periods of cessation of agricultural activities, which becomes a problem in the sense that they are the only sources of household income. This therefore leads to the rural exodus of young people and a cessation of economic activities in the borough.

**2.2.2. Environmental impacts of the agricultural development of the shallows**

The analysis of the environmental impacts of the development of the shallows has been carried out on the biophysical environment. This analysis made it possible to evaluate the positive and negative impacts on the components of the environment. The agricultural enhancement of the shallows is done through cultural operations that disrupt the ecological balance. The negative and positive impacts of the exploitation of the shallows are discussed in this part after a presentation of the environmental constraints encountered by the producers.

**2.2.2.1. Environmental constraints**

The farmers are subject to the goodwill of the rainfall which may be abundant or insufficient in this context of climatic changes also influencing the flood. Thus, it may happen that the crops may be drowned by rains or an early flood, especially when the developments are not controlled in time, the water then seeping into the fields. It may also happen that the rains are insufficient. In this case, the arrangements for the drainage of water from the river to the interior may prove ineffective.

It has also been observed the action of pests on crops, most often worms and insects. Farmers also reported a locust invasion a few years ago, the only recorded case at the moment. Plate 5 shows ravaged plants. Apart from the pests, there is also the water hyacinth which invades the drainage channels and obstructs the shipping lanes.



Picture 13 : Ravaged corn plants



Picture 14 : Ravaged cowpea plant

**Plate 5:** Maize and cowpea plants ravaged by pests

**Shooting:** SODJI, May 2022

Picture 13 and 14 of plate 7 respectively show corn plants and a cowpea plant ravaged by the action of worms in fields in the borough. In extreme cases, this could lead to the loss of crops if it is not treated.

#### **2.2.2.2. Positive impact**

The practice of agriculture allows the soil to breathe through the crops that are practiced there. In addition, agricultural diversification maintains and promotes the renewal and fertilization of the soil, which is enriched after each new harvest.

#### **2.2.2.3. Negative impacts**

The enhancement of the shallows is done through outdated cultural practices that disturb the ecological balance. The identified negative impacts are presented by each affected element. The flora constitutes a habitat for several animal species. The vegetation cover offers favorable conditions for wildlife because it lowers the temperature, reduces evapotranspiration and slows down wind erosion. Thus, the different areas exploited for agricultural production contribute to the destruction of the habitat of several animals such as rats, birds.

In order to ensure food security, large agricultural areas are being created, the plant landscape is changing and the existence of trees outside plantations is becoming increasingly rare due to deforestation and desiccation for the practice of agriculture resulting in a strong degradation of the vegetation cover. Also the needs for woody resources and growing soil will increase. Then the duration of this impact is permanent. The impacts extend over the perimeter of the shallows and can be considered as punctual.

In addition, cultural practices such as weeding and plowing destabilize the soils. Soil particles are exposed to wind and river erosion. These practices are renewed with each agricultural year, its impact is then irreversible hence its duration is permanent.

The management of residues from agriculture also contributes to the bushfire phenomenon. They present a degradation of air quality and atmospheric pollution also accentuating climate changes linked to greenhouse gases.

The use of pesticides can also constitute an attack on the microbiology of the soil when it is not properly applied or applied in overdose.

### **3. Discussion**

The development of the shallows has become a major challenge for agricultural development.

Indeed, the results obtained show that the hydro-agricultural developments constitute for the operators a source of improvement of the activities by reducing certain constraints linked to their exercise. In addition, the enhancement of the shallows constitutes an opportunity offered to producers through market gardening, off-season crops and irrigated crops. This activity allows producers to cover personal and professional expenses such as food, health and expenses related to the movement and maintenance of their equipment. The children themselves participate in field work, they sometimes earn money for their school supplies and at the same time can also learn something other than what the school teaches. Rightly, Clea Rupp (2010, p. 07), believes that the shallows represent the strategic places for the development of rice farming. However, he emphasizes that these places are of great complexity and represent important issues for the various actors who practice multiple activities there.

This research also shows that the development of the shallows is not without consequences. Certain obsolete cultural practices that disturb the ecological balance, in particular the flora, the aquatic fauna, the soils, etc. The results maintained by T. Codjo, (2017, p. 170), corroborate the results of this research by recognizing that hydro-agricultural developments allow, among other things, the improvement of yields, the availability and better accessibility of agricultural products, the improvement of food security and incomes. But, he points out that, this adaptive option is not completely effective against farm flooding. Also, according to him, hydro-agricultural developments contribute to environmental degradation and have impacts on the health of populations.

As for T. E. Attolou, (2018, p. 54), he concludes that the tests of hydro-agricultural developments present in the Town of Savalou favor irrigation, which makes it possible to satisfy the water needs of crops, at any time. Also, hydro-agricultural developments make it possible to limit the impacts of floods on crops since they make it possible to easily evacuate the surplus water from the start of floods, from crops, in order to carry out early harvests before the floods proper. For T. E. Attolou, (2018, p. 54) and T M. I. Wankpo (2018, p. 232), the development of the shallows presents itself as the best strategy for reducing vulnerability and adapting agriculture to climate change. it is therefore urgent to select the best adaptation options, hydro-agricultural development methods based on the availability of water resources and the topography of the study environment.

## Conclusion

At the end of this research, it should be remembered that the agricultural valorization made by the populations of the district of Monkpa is done through rice cultivation and legumes. These farmers also practice other crops in order to exploit well and make profitable the lands of the shallows. In addition there is a bit of traditional breeding often done at home. The analysis of the agricultural exploitation systems of the shallows makes it possible to see that several technical and organizational tools are mobilized not according to the specificities of the environments, but rather according to the promoters. The technical and socio-institutional processes of management of these shallows after development are sometimes inadequate to the organizational and technical capacities of the producers. Thus, it becomes a new constraint for the peasants, whose know-how is based on experience. Under these conditions, the performance of these developments, in particular their ability to mitigate climate risks to make it possible to secure an intensification of crops, is mortgaged. However, producers are more attracted to the developed shallows. Indeed, the low bottoms represent for the producers, huge assets due to its ability to maintain a good humidity which favors the good development of the plants especially for the crops whose production requires a lot of water (or soil moisture). Likewise, it should also be noted that the development of low-lying areas allows good management of agricultural land and, in one way or another, to respond to climate

change problems. The use of low funds for agricultural purposes allows producers to achieve a somewhat high yield, which also increases their income and contributes to satisfying the demand for agricultural products on the market.

### **Bibliographic references**

AKPOVI Akoègninou and HOUNDAGBA Cossi Jean, 1999, Ecological constraints and enhancement of the shallows in the Dassa-Zounmè region (central Benin). JUB, Lomé, Togo, 14p.

ATTLOU Tchédji Edson, 2018, mobilization of rainwater for agricultural purposes in the town of Savalou. Master's Thesis, DGAT, FLASH, UAC, 66 p.

CODJO Hossou Thierry, 2017, Hydro-agricultural developments for the reduction of the vulnerability of the peasantry to climate change in the lower Ouémé valley. Doctoral thesis. EDP/FLASH/UAC, 221p.

CIRAD (2008): Strategic Vision 2008-2012, 26 p.

CIRAD (2011): Global food security as an objective, 1p.

DAOUDOU Olakunlé Aaron, 2012, Valuation of the shallows in the district of Offè (municipality of Savè). Master's Thesis, DGAT, FLASH, UAC, 78p.

Philippe LAVIGNE-DELVILLE and Luc BUTCHER., 1996, The shallows in humid tropical Africa: peasant strategies, agronomic constraints and development. In: Environmental fertility and peasant strategies in the humid tropics: proceedings. Pichot Jean-Pascal (ed.), Sibelet Nicole (ed.), Lacoëuilhe Jean Joseph (ed.). CIRAD-SAR, CIRAD-FLHOR-DIR, France-Ministry of Cooperation. Montpellier: CIRAD-SAR, pp. 148-161.

APRM, SATEC (1984): Lowland development project in the Republic of Benin, phase I: identification, 105 p.

OREKAN Vincent, 2000, Impact of the exploitation of the shallows on the health of the populations: case of the Municipalities of Dassa and Glazoué, DEA in environment and health option, UAC, Benin, 82p.

WANKPO Tognisè Ingrid Maguy, 2018, hydro-agricultural developments and environmental constraints in the lower Sota watershed. Doctoral thesis. EDP/FLASH/UAC, 251p.