IRRIGATION SCHEMES AND WATER MANAGEMENT IN COTE D’IVOIRE
Area: 322,462 km²

Geographic location: Western part of Africa limited by:
- Mali and Burkina Faso in the North;
- Guinea and Liberia in the West;
- Ghana to the East;
- Atlantic Ocean to the South.

Four (04) seasons:
- Two (02) raining seasons (April - July; September - November);
- Two (02) dry seasons (July - September; December - March).

Baouléan climate or equatorial transition regime
Precipitation: 1200 mm/year

Sudanese climate or tropical transition regime
Precipitation: 1000 mm/year

Attiean climate or equatorial transition regime
Precipitation: 1500 mm/year

Mountain climate
Precipitation: 1400 mm/year

Humid tropical climate very suitable for vegetable cropping
**Agricultural Sector**

- Strategic sector of Côte d'Ivoire's economic development since the independence;
- 9.5 million ha cultivated on 24 million cultivable;
- Diversified agriculture (food crops, cash crops, industrial crops);
- provides more than 2/3 of the jobs;
- contributes up to 24% to the Gross Domestic Product (GDP) and;
- accounts for nearly 70% of export earnings, making the country one of the world's leading producers of agricultural raw materials (coffee, cocoa, oil palm, rubber, cashew, yam, plantain, cola, etc.);
- Contribution of the irrigated production to the national GDP: 7% from the export of industrial crops and only 3% from irrigated subsistence agriculture mainly carried by rice and vegetable cropping;
- +90% rainfed agriculture
Hydrographic network and main watersheds

The Côte d'Ivoire hydrographic network includes:

- **Main watersheds:** Cavally, Sassandra, Bandama, Comoé.
- **Small coastal rivers:** Tabou, San Pedro, Nioumouri, Boubo, Agnéby, Mé, Bia.
- **Branches of the Niger River:** Baoulé, Bagoé, Gbánhala.
- **Small branch of the Black Volta river:** Kouida.

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Number of Dam</th>
<th>Storage capacity</th>
<th>Quantity %</th>
<th>Storage capacity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sassandra</td>
<td>10</td>
<td>8,337,6</td>
<td>1.7</td>
<td>21.8</td>
</tr>
<tr>
<td>Bandama</td>
<td>267</td>
<td>28,796,4</td>
<td>46.2</td>
<td>75.3</td>
</tr>
<tr>
<td>Comoé</td>
<td>99</td>
<td>37,3</td>
<td>17.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Cavally</td>
<td>1</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
</tr>
<tr>
<td>Niger</td>
<td>73</td>
<td>31,7</td>
<td>12.6</td>
<td>0.08</td>
</tr>
<tr>
<td>Black Volta</td>
<td>42</td>
<td>969</td>
<td>7.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Bia</td>
<td>2</td>
<td>-</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td>Agnéby</td>
<td>82</td>
<td>24</td>
<td>14.2</td>
<td>0.06</td>
</tr>
<tr>
<td>San Pedro</td>
<td>1</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>578</td>
<td>38,223</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Country have innumerable natural potentialities, including considerable land reserves in lowlands and irrigable plains.
Facilities and irrigation

- 636 retaining structures, for all purpose, of which 362 have an agricultural vocation. Of these 362, there are 184 water reservoirs (dams) and 178 other water works exclusively for agriculture (EPDI, 2003).

- Irrigation techniques
  - Surface irrigation (49.6%);
  - overhead irrigation (44.3%);
  - Localized irrigation (6.1%)
**Facilities and irrigation**

- 3 types of irrigation schemes development:

Development by simple diversion from the watercourse

It is an irrigation scheme with partial or complete control of the water.

This type of development is economical, with an estimated cost of works ranging between **3 and 5 million CFA francs per hectare**.
Facilities and irrigation

facilities with the realization of weir crest

It is an irrigation schemes with partial control of water; a single crop cycle. This type of development cost around **3 and 5 millions francs CFA par hectare**.
Facilities and irrigation

the facilities under dam

It is an irrigation schemes with total control of water and allows to plant large areas and secure two crop cycles per year.

This type of development cost around **20 and 30 millions francs CFA per hectare**
Facilities and irrigation

Facilities under pumping

It is an irrigation scheme with total control of water and allows to plant large areas and secure two crop cycles per year.

This type of development cost around **15 and 25 millions francs CFA per hectare**
From the technical point of view, any development of irrigation schemes with total control of water must result from an Irrigation Development Plan which itself is realized from an analysis of the technical aspects (soil analysis, rainfall, hydrography ...), sociological, environmental and economic.

*Unfortunately, Côte d'Ivoire does not currently have an Irrigation Development Plan.*

However, a study of the Irrigation Development Plan was initiated by the Ministry in charge of Agriculture and was carried out from 2002 to 2004.
This study provides guidelines that are used to date as basic principles in irrigation schemes development projects.

The main guidelines are:

- The only water sources that can be considered for irrigation are the surface ones given the insufficient flow of the groundwater supply.
- In the south and west of the country, irrigated cultivation can be done in lowlands during rainy periods and in dry periods.
- In the north and east, subject to longer drought periods, irrigated cultivation can only be done after developing irrigation schemes (including realization of dams and reservoirs).
**Role of the actors**

**State and its components**

- The development or updating of sub-sectoral operational strategies in line with the global strategic orientations;
- The organization of the consultation with the various actors involved in the development of the rural sector;
- Creating an enabling environment by improving the legislative, regulatory and institutional framework and promoting good governance;
- Mobilization of resources (financial, material and human) necessary for the implementation of operational programs and investment programs;
- Monitoring / evaluation of the process
- Capacity building of the beneficiaries
- Repairs of large works, main canals, electromechanical equipment.
Role of the actors

Local communities and grassroots communities.

- Participation in the elaboration and implementation of operational programs and investment programs at the regional level and local development plans
- Participation in the development and management of natural resources
- Involved in the management of project/programs and the resources (human, material and financial) made available by the Government;
- Facilitation of the consultation frameworks of the various actors involved in rural development at regional or local level;
- Participation in the formulation, implementation and monitoring / evaluation of operational programs and investment projects concerning local communities;
- Promotion of employment and income generating activities;
- Participation in monitoring / evaluation of the process.
Role of the actors

Professional organizations and private operators

- Participation in the formulation and implementation of operational programs and investment programs;
- Participation in the financing of certain projects (principle of co-financing of investments at the local level);
- Participation in the training and senzitation of the various actors;
- Participation in the consultation of the various actors;
- Involved in the implementation of programs and projects;
- Participation in the monitoring / evaluation of the process
Role of the actors

Donors

• Participation in the political dialogue with the government;

• Participation in the consultation with the various actors;

• Support for the development of sub-sectoral operational strategies;

• Support for the formulation and implementation of operational programs and investment programs;

• Providing technical assistance for strengthening the institutional and operational capacities of the administration and professional organizations;

• Participation in mobilizing the necessary resources for the formulation, implementation and monitoring / evaluation of development programs and projects;

• Participation in the monitoring / evaluation of the process
Development of the irrigation schemes

Need rehabilitation or development of new irrigation schemes
- The State initiates (seize sub-tutelary or dedicated structures as the case may be) or
- The beneficiaries make a request (addressed to the local authorities, the ministry or the dedicated structures)

Conducting relevant studies
Identification of the sites

Technico-economic feasibility study: socio-economic, the environmental and social impact, the land aspects,
preliminary study on the project, Detailed design study. IPR>=10%

Development of irrigation schemes
Execution study
Control and monitoring of the works
Environmental Management
Land management

Monitoring and maintenance of facilities
Financing the development of irrigation schemes

The financing of the development of the irrigation schemes is to date made by the Government alone and in several forms:

- With bilateral donors, especially for major projects,
- Counterpart funds obtained through the sale of equipment (KR / Japanese Cooperation) or cereals (KR and PL 480 / US cooperation),
- National budget.

Funding by donors or counterpart funds is granted after requests.
In order to allow the good exploitation and management of infrastructures and equipments realized by the Government ➔ Systematic implementation of a Management Committee of the facilities (MCF) for each of the developed perimeters which has for principal tools:

- Rules of procedure
- A water management guide
- An infrastructure maintenance guide
A MCF must be put in place by the farmers for each perimeter.

**Role:**

The MCF is responsible for managing production factors (water, inputs, agricultural machinery) and perimeter infrastructures.

To do this, MCF ensures the application of a water policy concerning preventive maintenance and reparation of the perimeter and its works.

The internal regulations define the rules of the water management of the irrigation in the plot.

These rules of procedure must be accepted by all rice farmers and their application is therefore binding on all.

**Financial resources obtained through membership dues and harvest levy is used for the operation and financing of the facilities**
<table>
<thead>
<tr>
<th>Responsible</th>
<th>Role</th>
<th>Objective to reach</th>
<th>Actions to be done</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Guarantor of the internal regulations of the perimeter</td>
<td>Effective and equitable management of the water resource; A good level of maintenance of the facilities</td>
<td>Schedule maintenance work</td>
</tr>
<tr>
<td>Secretary</td>
<td>Assist the president in his task</td>
<td>Good management of the &quot;water&quot; resource by farmers; Un bon niveau d’entretien du périmètre</td>
<td>Inform farmers about maintenance work;</td>
</tr>
<tr>
<td>treasurer</td>
<td>Ensure the financial management of the perimeter</td>
<td>Ensure a good evaluation of the specifications of the technical works; Ensure compliance with the fees</td>
<td>Ensure a good evaluation of the work specifications;</td>
</tr>
<tr>
<td>statutory auditor</td>
<td>Control the financial management of the perimeter</td>
<td>Establish transparent financial management at the perimeter level</td>
<td>Check the financial movement; Check the accuracy of the accounting documents</td>
</tr>
<tr>
<td>Responsible for valve, pump</td>
<td>Provide hydraulic management at the perimeter</td>
<td>Have a fair water distribution</td>
<td>Ensure equitable water distribution; Check the flow at the exit of the valves, the duration of the irrigations and the height of the thresholds in the canal; Organize meetings for adoption of the irrigation program</td>
</tr>
<tr>
<td>Chief or irrigation unit</td>
<td>Responsible for water management at the irrigation unit level; In charge of the maintenance at the level of the irrigation unit</td>
<td>Ensure the supply of water; Supervise maintenance work</td>
<td>Report to the MCF any anomaly in the supply of water at plot level; Set the threshold to the required height; Close the box after irrigation and check for leaks; Ensure the free passage of water in the downstream canal;</td>
</tr>
<tr>
<td>Rice producer</td>
<td>Exploiting one's plot</td>
<td>Good hydraulic management of the plot and the entire perimeter; Good level of maintenance of its plot and perimeter; Good exploitation of his plot</td>
<td>Maintain the plot and the perimeter; Avoid any waste of water; Learn about the adopted irrigation schedule and respect it</td>
</tr>
</tbody>
</table>
**Water Management Guide**

The development of any perimeter and the achievement of a good performance require an **efficient management of the water resource**. It is based on the following principles:

- At the dam, or the water mobilization structure,
  
  *good water management = good performance of water-retaining structure*,

- In the main canals and between plots,
  
  *good water management = efficient irrigation of plots*

- In the rice boxes,
  
  *good management of water = planed plots*

To date, the water charge is not applied. Reflections are underway for its implementation.
**Perimeter Maintenance Guide**

**Maintenance of the water mobilization work:**
- **Dam:** Excavation of the dike, digging of the foot ditch, clearing of the threshold, cleaning the chute, lubricating the valve, draining the valve chamber....
- **Pumping Station:** Maintenance of the surroundings and valve chambers ....
- **Surface irrigation and Threshold:** valves monitoring, strengthening of embankments and the installation of bridge protection structures ......

**Maintenance of the irrigation network:** Regular cleaning of the canals, regular cleaning and reinforcement of the bunds, strengthening of the embankments and the protection around the regulating and setting works, valves monitoring, regular planing of rice pots ...

**Maintenance of the drainage network:** Clearing the bottom and the banks of the drains....

Reflections are underway to set up a financing mechanism for monitoring and maintenance activities.
## General overview

- High Performance technical itinerary (SRI)
- Easy and profitable mechanization (use of agricultural machinery in large rice area)

## Intervention Methodology

### Farm modernization
- Increased yields of (1 to 4t / ha)
- Cost savings by economy of scale
- Increasing the number of cycles (1 to 2)
- Mitigating the effects of climate change

### Improved productivity
- Better organization
- Switching from subsistence rice growing to market rice growing

### Professionalization of farmers
- Fight against itinerant agriculture

### Stabilization and sustainability of land holdings

### Various socio-economic impacts
- Job creation, increased income, diversification of activities, drinking water supply...
Thank you for your attention