Agricultural Risk Assessment Study

In the Livestock farming and Fishing sub-sectors

Abdrahmane Wane
Research economist
CIRAD/ILRI

Alioune Badara Sy
International fishing consultant
Team Work

In collaboration with:

MINISTERE DE L'AGRICULTURE
ET DE L'EQUIPEMENT RURAL

Study conducted by:

Livestock farming sub-sector
Dr Abdrahmane Wane, Research economist at the Agricultural Research Centre for International Development (CIRAD) on assignment to the International Livestock Research Institute (ILRI)
Aliou Diouf Mballo, Statistician economist based in Dakar (Senegal)

Fishing sub-sector
Alioune Badara Sy, international fishing consultant
Part One

Senegal Agricultural Risk Assessment Analysis
Livestock sub-sector

Study conducted by:

Abdrahmane Wane
Research economist
CIRAD/ILRI

Aliou Mballo Diouf
Statistician economist
CIRAD/ILRI
Livestock sector in Senegal (1)

- 30% of agricultural GDP
- 4.2% of total GDP
- average annual growth of 6.1%
- 350,000 families
- 3,000,000 individuals (quarter of total population)
Livestock sector in Senegal (2)

**The Niayes area:** along the Atlantic coast of Senegal
- great potential for agricultural and animal production
- high sensibility to AAT highly prevalent in this area.

**Ferlo - Senegalese Sahel:**
- mobile production system and livelihood
- herd more and less adapted to uncertain environments
- 2 sub-systems

**In the South-East region**
- a system based on mobility and the use of natural resources to produce endemic ruminant livestock (ERL) particularly resistant to trypanosomiasis.
- open space making ineffective any eradication operation of tsetse
- agropastoralism
Livestock Risk Environment

Main shocks:
- Bushfires
- Animal diseases
- Climate
- Markets
- Conflicts
- Locust invasions

Non-market inputs:
- animals
- natural resources
- family labor

Market inputs:
- animals
- wage Labor
- animal feed

Productions:
- livestock
- derivatives (milk, butter)

Diversification

Global Productions

Stored Production

Sold Production

Self-consumed Production

Transportation

Final consumption

LOSSES
(volumes, quality, economic value)
Main Sources of Losses

- Animal diseases 68.9 per cent
- Droughts 1.9 per cent
- Unseasonal rains 2.2 per cent
- Conflicts 0.8 per cent
- Bushfires 25.1 per cent
- Locust invasions 0.7 per cent

Average annual loss

XOF 601.05 billions
<table>
<thead>
<tr>
<th>Types of data</th>
<th>Statistical series</th>
<th>Sources</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Monthly data, 1960-2014</td>
<td>National Civil Aviation and Meteorology Agency of Senegal (ANACIM)</td>
<td>Monte Carlo simulation and Extreme Value Theory, time series analysis</td>
</tr>
<tr>
<td>Bushfires</td>
<td>Annual data, 2003-2013</td>
<td>Ecological Monitoring Centre (CSE)</td>
<td>Descriptive statistics, Extreme Values Theory</td>
</tr>
<tr>
<td>Animal diseases</td>
<td>2014-2015</td>
<td>Directorate of Veterinary Services (DSV)</td>
<td>Descriptive statistics, mapping</td>
</tr>
<tr>
<td>Markets</td>
<td>Monthly data, 2012-2016</td>
<td>Commissariat for Food Security (CSA)</td>
<td>Descriptive statistics, time series analysis</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Annual data, 1960 to 2015</td>
<td>FAOSTAT (indirect measures based on the cattle decrease on some periods)</td>
<td>Descriptive statistics, Secondary data analysis</td>
</tr>
<tr>
<td>Cattle thefts</td>
<td>-</td>
<td>Directorate of Livestock - Livestock Theft Unit</td>
<td>Secondary data analysis</td>
</tr>
</tbody>
</table>
## Overall Risk Prioritization

Risk score = \(0.75 \times (\text{Average Severity} \times \text{Frequency})^{0.5} + 0.25 \times \text{Worst Case}\)

<table>
<thead>
<tr>
<th>Risks</th>
<th>Worst Case Scenario</th>
<th>Average Frequency</th>
<th>Average Severity</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bushfires</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>5.00</td>
</tr>
<tr>
<td>Animal diseases</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>4.60</td>
</tr>
<tr>
<td>Climate</td>
<td>Very high</td>
<td>Medium</td>
<td>Very high</td>
<td>3.84</td>
</tr>
<tr>
<td>Markets</td>
<td>Very low</td>
<td>Very high</td>
<td>Very low</td>
<td>2.62</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Medium</td>
<td>Very low</td>
<td>Very low</td>
<td>1.81</td>
</tr>
<tr>
<td>Locust invasions</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
<td>1.31</td>
</tr>
</tbody>
</table>
## Risk Prioritization by Region

<table>
<thead>
<tr>
<th>Risks</th>
<th>Ferlo</th>
<th>The Niayes</th>
<th>South-East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bushfires</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
</tr>
<tr>
<td>Animal diseases</td>
<td>Medium</td>
<td>Very high</td>
<td>Very high</td>
</tr>
<tr>
<td>Climate</td>
<td>Medium</td>
<td>Medium</td>
<td>Very low</td>
</tr>
<tr>
<td>Markets</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Conflicts</td>
<td>Very high</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>Locust invasions</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
</tbody>
</table>
# Livestock Risk Management

<table>
<thead>
<tr>
<th>Risks</th>
<th>Risk management procedures and instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bushfires</td>
<td>The Ecological Monitoring Centre</td>
</tr>
<tr>
<td>Animal diseases</td>
<td>The Directorate of Veterinary Services has set up a National Epidemiological Surveillance System (NESS) to monitor priority diseases.</td>
</tr>
<tr>
<td>Climate and feeding</td>
<td>National Fund of Agricultural Insurance of Senegal (CNAAS)</td>
</tr>
<tr>
<td></td>
<td>Disaster risk management system based on the OSB (Livestock Safeguarding Operation)</td>
</tr>
<tr>
<td></td>
<td>Pan-African drought index insurance facility under the Agricultural Risk Capacity (ARC) initiative</td>
</tr>
<tr>
<td>Markets</td>
<td>The Commissariat for Food Security (CSA) - price monitoring on sentinel cattle markets</td>
</tr>
<tr>
<td>Cattle theft</td>
<td>The Livestock Theft Unit (CLVB)</td>
</tr>
<tr>
<td>Conflict</td>
<td>In March 2013, drawing up a pastoral code</td>
</tr>
</tbody>
</table>
Conclusion

- From emergency responses to threats towards long-term risk management
- Making reliable information gathering a sovereign prerogative
- Strengthen passive and active surveillance systems for key threats
Part Two

Senegal Agricultural Risk Assessment Analysis

Fisheries sub-sector

Study conducted by:

Alioune Badara Sy
International Fishing Consultant
Introduction

Scope of study
• To provide a comprehensive mapping and assessment of the risks in fisheries sub-sector in Senegal

The country context
• Importance of fisheries sub sector in Senegal. Fisheries are of major economic and social importance. Fisheries (fishing and post-harvest) contribute 13.45% to the GDP. Production is estimated at around 500,000 tons per year
• Fish consumption is a major contributor to protein supply.
• In 2015 fishing products rank first in terms of export revenues

Focus on small-scale coastal artisanal fisheries
• They account for 80% of total landings, 60% of supplies to exporting factories, and about 90% of national fish consumption
Identification of main risks (1)

The main risks are:

• **Operational risk:**
  Each fishing trip can create a loss due to the random nature of the fishing activity (hunting activity) or the resource scarcity (consequence of the overexploitation and the poor regulation of the exploitation by the Government)

• **Variability of environmental conditions**
  These conditions influence the abundance of several fish stocks. Small coastal pelagics that account for more than 80% of the fishery potential depend for their abundance on the dynamics of the hydro-climatic system, (surface water temperature and upwelling intensity)
• **Meteorological and climatic risks**

Bad weather often cause temporary cessation of fishing activities or accidents at sea such as capsizing, collisions, destruction of production equipment, loss of human life etc.

The climatic risks manifests itself in various forms : i) The sea level rise and its consequence (coastal erosion, destruction of habitat and fishing infrastructures ; ii) extreme weather events such as storms and high swells, iii) changes in temperature that can have significant influences on the reproductive cycles of fish and the spatial distribution and abundance of some species
Illegal, unreported and unregulated fishing (IUU fishing)

IUU fishing often causes environmental damage through prohibited gear, damage to ecosystems. IUU fishing also impacts smaller-scale fishers by stealing fish from near-shore waters or undermining the ecosystem on which the fish depend. It threatens the sustainability of fish stocks.

Market risk

This risk concerns mainly access to European Union markets that are remunerative but very demanding in terms of compliance with sanitary standards or traceability of catches. In case of non-compliance, the country faces the risk of suspending the entry of its fishery products into the European market, causing a drop in exportations.
Identification of main risks (4)

- **Restriction on access to the EEZs of the neighbouring countries**

  Senegal is in situation of fishing overcapacity. This is why a significant part of the fishing fleet operates in neighboring countries through bilateral fisheries agreements. These fisheries agreements are becoming more difficult to negotiate. A suspension of these fisheries agreements will affect the fishermen revenues.

- **Political and institutional risks**

  The political risk is linked to the public nature of fisheries resources requiring a regulation of their exploitation in order to avoid distortions and unfair situations between fishermen. Access to resources in Senegal is largely unregulated for the small scale sector. This situation generates overfishing and contributes to operational losses. Political and institutional risks also encompass corruption and weak institutional capacity.
Identification of main risks (5)

• **Other risks**

They mainly concern:

i) industrial waste discharged at sea, causing a high mortality of fish

ii) post-harvest losses due to the lack of conservation infrastructure
Policy environment

The fishing policy document adopted in 2009 and updated in 2016 provides with risk management tools but these tools do not cover all risks. Also, in most cases, existing tools are inefficient or not applied.

Fisheries management plans

Efficient tool for reducing the risk of exploitation but they are poorly implemented.

Variability in environmental conditions

The strategy of fishermen is to migrate towards more productive fishing grounds. There is no tools from the government aiming to manage this kind of risk.

Meteorological and climatic risks

Since 2015, initiatives have been taken to deal with meteorological risks through strengthening capacities of local actors on safety at sea, and their access to meteorological information and alerts. An insurance system to cover this type of risk has been developed.
**IUU fishing risk**

The Ministry of Fisheries has adopted a national action plan in 2014. In addition to the action plan, Senegal has adopted a new fisheries act in 2015, one of the major innovations is a substantial increase in fines for IUU fishing offenses.

**Restriction on access to the EEZs of the neighbouring countries**

Senegal is not currently prepared for any restriction or closure of access to EEZs in neighboring countries. This risk is likely to generate strong social tensions in Saint-Louis, for example, or to exacerbate overcapacity in Senegal's waters due to the repatriation of this fleet.

**Market risks**

The catch certification system put in place and the current sanitary control system are efficient tools.
The total cost of the identified risks is estimated at around:

150 billion CFA (250 Million USD)

The risks associated with IUU fishing rank first in terms of financial impact.
## Ranking of most severe risks

<table>
<thead>
<tr>
<th>Nº</th>
<th>Risk</th>
<th>Average frequency</th>
<th>Average severity</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IUU fishing risk</td>
<td>High</td>
<td>Very high</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>Operational risk</td>
<td>Very high</td>
<td>Medium</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Climatic risk</td>
<td>High</td>
<td>Medium</td>
<td>3.5</td>
</tr>
<tr>
<td>4</td>
<td>Variability of environmental conditions risk</td>
<td>Very low</td>
<td>Very high</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Other risks: pollution risk</td>
<td>Medium</td>
<td>Medium</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Other risks: post harvest risks</td>
<td>High</td>
<td>Low</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Restriction on access to the EEZs of the neighbouring countries</td>
<td>Very low</td>
<td>Medium</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Meteorological risk</td>
<td>Medium</td>
<td>Very low</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Market risk</td>
<td>Very low</td>
<td>Very low</td>
<td>1</td>
</tr>
</tbody>
</table>
Conclusions and recommendations

Fishing is a **high-risk sector** and the cost of identified risks is also very high. This can be explained by the fact that this activity is based on the exploitation of a public resource.

A **poor regulation** of this sector by the Government thus increases the risks on production and adds to the natural risk which is intrinsic to fishing activity.

For that reasons, the strong recommendation is to **improve governance** and **strengthen current risk management tools**:

1- Providing support to fisheries management plans

2- Improving the governance, in particular promoting transparency in the licensing system and fighting against corruption.

3 - Providing support to the national action plan to combat IUU fishing
THANK YOU

✉️ parm@ifad.org  ☢️ www.p4arm.org  🐦 @parminfo