

Drought conditions and management strategies in Senegal

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Background

Senegal is located in the Sahelo-Sudan zone where drought occurs sporadically since several decades. Drought observed during the rainy season (May to October) is characterized by highly variable dry spells that result in severe rainfall shortage or poor distribution of rainfall in space and in time. During the last decade, several parts of the country have experienced these phenomena. In 2007, the rainfall deficit compared to the average for 2001-2010 was 26%, 30% and 36% respectively in the localities of Ziguinchor (south-west), Kaolack (centre-west) and Kedougou (south-east), which are important rainfed agriculture areas and a fall of 15% of the country's agricultural production was observed (SECNSA et al., 2014). Following the drought in several parts of the country in 2011, a decrease of 20% of the production of grain and 31% of groundnut production was also observed (SECNSA et al., 2014). This led to an inflation of food prices and food insecurity for a population estimated at 800,000 people of which the majority depends mainly on agriculture. In rural areas, drought exposes particularly children to malnutrition and affects their education. For surface water, drought affects the flow of rivers and the filling of reservoirs (lakes, ponds). This causes a reduction of recession crops in the Senegal River Valley and affects irrigation activities, inland fisheries and livestock watering in the areas of Lake Guiers and Ferlo. Defect of filling of Lake Guiers can affect drinking water supply of some cities supplied by the lake. On the north coastal zone (Niayes Zone), repeated droughts do not allow for adequate recharge of groundwater used for drinking water and small scale irrigation. In this region and in Casamance region, the rainfall deficit has also favoured the salinization of groundwater and soils. On the livestock sub-sector, early depletion of natural pastures in the north exposes livestock to severe diet. Herders are forced to an early transhumance towards the south, increasing the pressure on the vegetation of this area. This causes conflicts between farmers themselves and between herders and farmers and is also the cause of major cattle raid in protected areas, causing great difficulty in managing livestock-wildlife interface. The drought has also affected biodiversity with the regression of some ecosystems (mangroves, palm grove etc.), the displacement of wildlife and the modification of the stay of migratory birds on their predilection sites. Another important consequence of the drought is the migration of rural youth in cities and out of the country in search of safer jobs (housework, petty trade etc.) and sometimes taking unnecessary risks.

Drought monitoring and early warning systems:

Drought monitoring may be performed using many parameters among which, the rainfall deficit over a given reference period and the duration of dry spells. Other biophysical parameters like soil moisture, soil temperature, soil cover condition, air temperature, air relative humidity, evapotranspiration, surface water levels are also used as indicators of drought. Socio-economical parameters like acreage and expected returns, migration of people from rural areas to cities and the livestock status can be used for drought monitoring. ANAMCIM which uses a network of observation stations spread across the country and satellite images, disseminates information that help to monitor drought. This network includes synoptic stations which measure parameters such as temperature, rainfall, evaporation, soil temperature etc. and rainfall stations. For water resources, DGPRE has an observation network (gauges and piezometers) on the main rivers and groundwater. Environmental monitoring agencies like the CSE and Environment Observatory of the Senegal River basin also have data to assess the effects of drought. DAPSA of the Department of Agriculture, provides information on the crop year including expected outputs. These institutions have an important role in the monitoring of drought because information is used to predict the extent of the drought and the concerned areas, for a good management of relief actions. However, they need improvement of their capacity in terms of optimization of observing networks and analytical capacity. In regional level, CILLS is an interstate organization which disseminates information on the weather forecast and the risk of food crisis.

Vulnerability assessment:

Senegalese agriculture is mainly rainfed and is the sector most vulnerable to drought. There is only one cropping season (May-October) for this rainfed agriculture and drought causes a deficiency of production, an underemployment and a rural exodus. Failure to peanut production, which is the main cash rainfed crop, threatens life income of small farmers while the decrease of grain production causes food insecurity. Irrigated production of vegetables is also vulnerable to drought, mainly in the Niayes area (water table depleting) and also around Lake Guiers, where the defect of lake filling leads to the lack of water in the irrigation channels used by farmers and to a loss of income for small farmers in the area. Livestock sub-sector which depends mainly on natural pastures is also very affected by droughts. The undernourished cattle must travel long distances in search of pasture and water points. To avoid loss of animals, herders have to sell their livestock at low price. Drinking water supply may also be affected by drought for many localities supplied by the Lake Guiers. In many localities, repeated droughts since the 70s have resulted in the decline of groundwater and drying of wells (Gastellu, 1988) in which, populations rely heavily in rural areas. The area of inland fisheries is also very vulnerable to drought particularly in the north of the country (Magrin G. Seck and SM 2009). In terms of biodiversity, the reduction of vegetation cover and the extinction of plant and animal species are noted (Ecodit, 2008). In forest areas, forest products form the basis of much of the rural economy (forest fruits, gum, wood, products of mangrove ecosystems, hunting products etc ...). All these products are affected by the drought. Finally drought exposes the poor sandy soils to wind and water erosion and decreased fertility.

Emergency relief and drought response

In case of drought, as was the case in some localities during the 2014 cropping season, food (mainly cereals such as rice) is distributed to the most vulnerable populations who reside mainly in rural areas. To encourage beneficiaries to invest in assistance programs, food is sometimes provided for work as in the case of the program "food for work" of WFP. The main beneficiary sector is agriculture with the livestock sub-sector which also benefits from food allocations for safeguarding livestock. Beneficiary identification is usually performed using surveys to identify the most drought-affected populations. At the national level, CSA is particularly involved in the assessment of food insecurity and in the implementation of government action to provide food and material support to the affected populations. There are also agricultural insurance initiatives particularly with CNAAS which allows its subscribers (individual or groups) to be compensated in case of drought. At the regional level, Senegal has signed the agreement establishing the CRA, which aims to ensure against drought and climate disasters the subscribing countries. For the regional harmonization of mitigation of drought impacts, there are mechanisms like PREGEC and FCPN. In recent decades, several organizations including UN agencies (FAO, WFP, UNICEF ...), USAID, EU, JICA etc. as well as bilateral cooperation programs and NGOs have allocated grants or have organized humanitarian actions for several million dollars (Acedo, 1995). In terms of efficiency, it is to improve the organization of assistance and targeting of beneficiaries to ensure that aid reaches the most needy and timely.

Practices to alleviate drought impacts

One of the main measures to reduce the impacts of drought is the improvement of water management to reduce the dependence of agriculture on rainfall. The development of irrigation projects and water retention ponds, contributes to this objective. In terms of agricultural research, activities are carried out in research institutions such as ISRA and universities, for the adaptation of crop varieties tolerant to drought and water saving technologies. At environmental level, programs safeguarding of vegetal and animal heritage (reforestation, classified forests, national parks, protection of certain species) are implemented by ministries particularly at DEFCCS and DPN. Among these programs, there is the development of alternatives for wealth creation, especially with the participatory management of forest formations for the production of fuel wood and other valuation of forest products (wild foods, beekeeping, etc.). In addition, some guidelines are used in the management of drought and among these, there are the "Lettre de Politique Sectorielle de l'Environnement et des Ressources Naturelles", the "Plan National d'Actions de Lutte Contre la Désertification", the "Strategie Nationale de Conservation de la Biodiversité" and the "Politique Nationale de Gestion des Zones Humides". International organizations, bilateral cooperation programs and NGOs play an important role in the mitigation of drought impacts by intervening in the financing of emergency aid and development projects for the control of water resources and the restoration of livelihoods of communities affected by drought.

The need for knowledge and skills on drought management

Repeated droughts are one of the manifestations of the global phenomenon of climate change and thus, a better understanding of the impacts and mitigation measures is needed. The problem of insufficient data availability and efficient means of analysis affects the effective management of drought. It is necessary to improve data collection systems using optimized monitoring network for environmental and socio-economic parameters associated with drought. In addition, it is important to define an operational platform synergy for efficient management of information on drought, particularly on the dynamics of natural resources. The capacity of analysis of spatial and temporal data should be improved for a better understanding of the relationships between drought and other socio-economic and environmental parameters. For decision support and rescue management, modelling tools should be better used in the characterization of drought, the vulnerability classification and the forecasting of crisis situations. Programs of adaptation and resilience to drought must be supported by capacity building in some areas among which:

- the design of simplified technologies of soil and water conservation in vulnerable areas
- the development of innovative practices through the funding of research programs that promote the use of adapted crop varieties and water-saving technologies for agriculture, industry and domestic use.

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Acronyms and Abbreviations

- ARC : African Risk Capacity
- ANACIM : Agence Nationale de l'Aviation Civile et de la Météorologie
- CILLS : Permanent Interstates Committee for Drought Control in the Sahel
- CNAAS : Compagnie la Nationale d'Assurance Agricole d'Afrique de l'Ouest.
- CSE : Centre de Suivi Ecologique
- DAPSA : Direction de l'Analyse, de la Prévision et des Statistiques Agricoles.
- DEFCCS : Direction des Eaux, Forêts, Chasses et de la Conservation des Sols
- DGPRES : Direction de la Gestion et de la Planification des Ressources en Eau
- DPN : Direction des Parcs Nationaux
- FAO : Food and Alimentation Organization of the United Nation
- ISRA : Institut Sénégalais de Recherches Agricoles
- JICA : Japonaise International Coopération Agency
- OMS : Organisation mondiale de la Santé
- ONG : Organisation non Gouvernementale

PREGEC : dispositif régional de Prévention et de Gestion des Crises Alimentaires

RPCA : Réseau de Prévention des Crises Alimentaires

NU : United Nations

U E: Union Européenne

UNICEF : Fonds des Nations Unies pour l'Enfance

SECNSA :Secrétariat Exécutif du Conseil National de Sécurité Alimentaire

USAID: U.S. Agency for International Development

WFP. World Food Program