



Agriculture + Food Security Network Brief No 3 Climate change: farmers' perceptions and strategies

The A+FS Network has identified the issue of climate resilient small scale agriculture as one of its focus areas. The following brief has been produced within the support mandate of HAFL to the Network.

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Introduction

The climatic conditions in the North of Benin are characterized by alternating excessive and deficient rainfall, as attested by meteorological records available since 1951¹. In the past, the observed trend towards desertification was explained by the overuse of forest resources and the reduction of fields under fallow. Nowadays, we know that the climate change aggravates the "sahelisation", which is due to accumulated extreme weather phenomena, observed in the arid and semi-arid zones in West African countries.

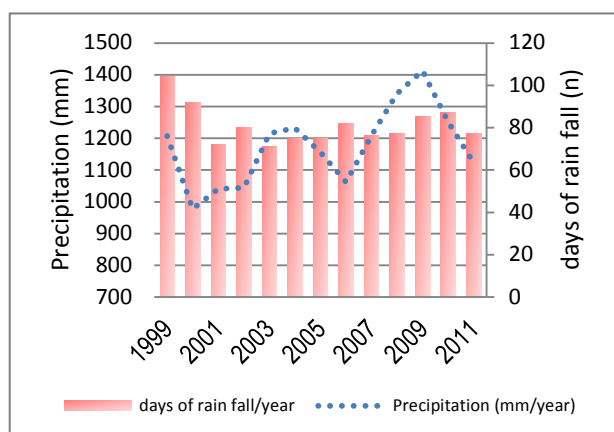


Figure 1 : Yearly precipitation and number of days with rain fall (Source: station of Natitingou, 1999-2011)

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¹ Second national communication of the Republic of Benin about climatic changes (Akindele et al. 2011)

Between February and July 2012, a qualitative survey was conducted in the commune of Boukombé. The aim of the survey was on the one hand to improve the knowledge about farmers' perceptions on climate change and on the other hand to identify possible adaptation strategies of small scale producers concerning unpredictable climatic events. The results of this investigation in the north-west of Atacora, show that occurring climate change tends to sharpen the food insecurity, which predominates in this region since many years.

The increasing number of climatic events such as floods and droughts is acknowledged by the interviewed farmers, who produce mainly for their self-consumption. Unfortunately there is no meteorological station in Boukombé, which could confirm or disprove these observations. The closest station that records precipitation is located in Natitingou (50km away) on the eastern range of Atacora which is too far away considering the large regional climatic fluctuations (Figure 1). However, other studies (OGOUWALE et YAB1, 2003) clearly indicate a declining precipitation in Natitingou (-15.5% comparing the period from 1941-70 with the period of 1971-2000) and an increased average temperature of more than 1° C in central Benin between 1962 and 2009 (GNANGLÈ et al, 2009). Compared with Natitingou, local observations and the local producers' statements in the survey indicate a dryer and hotter climate in Boukombé.

Self-sufficiency and resilience to climate change of agricultural producers?

The study, basically dealing with dry grains², demonstrates that the consequences of climatic changes are particularly dramatic for the self-sufficiency of rural households headed by women. Only 28% of the investigated households that are headed by women achieve to cover the basic annual needs of their families against 43% of male headed households.

The consistently insufficient production forced the producers to adapt to the lack of water and to unfertile soils. More than the quantity of rain, it is the increasing irregularity of rainfall which causes problems (mentioned by 67% of producers; n=67). According to the interviewees, the problem is particularly intense during the start of the rainy season and during the four key months, from June to September. During this period the dry grains, main source of human nutrition, suffer strongly from:

- Late start of the rainy season
- irregularity of rainfall during the rainy season, alternating periods of draught and extremely heavy rainfall
- geographically strong and unequal distribution of rainfall.

In addition to that, women are more affected by unpredictable climatic events than men when considering organizational aspects due to the fact that in this region of Benin the responsibilities are strictly divided among men and women. Often women are burdened with additional work during workload peaks, for example due to late dates of sowing (Figure 3).

Frequency of mention

- Abandon the cropping calendar: wait for the real start of the rainy season.
- Call for the fetishes, making ceremonies and sacrifices.
- Sow late, grow only one crop per year instead of two.
- Adopt short cycle varieties (less than 3 months).
- Intensify the cultivation of riversides, swamps and low laying grounds to increase maize and rice production.
- Re-adopt local crops resistant to drought such as fonio and millet.
- Apply no-till methods (weeding, improved holes, Zai) to conserve organic matter in the soils.
- Build dams to better use lowlands.
- Choose ridge planting, perpendicular to the slope to limit leaching and erosion due to heavy rains.
- Using more fertilizer and pesticides.

Figure 2: Adaptation strategies adopted by the producers (according to the frequency of mention) as a reaction to the lack of water and to mitigate erosion damages due to heavy rain (source: survey, April 2012)

Agricultural adaption strategies to the climatic evolution

In order to achieve an efficient production despite irregular precipitation, certain producers have modified their techniques of soil preparation and/or optimized it by using different species and varieties of seed of dry grains. The strategies mentioned in Figure 2 are classified according to the frequency of mention in the interviews. These strategies have not necessarily been developed because of the climate change – which is a rather abstract notion for farmers – but they were often adapted to the changing conditions. Sometimes these strategies are based on beliefs, the relevance of which is no longer given in the new context, or they are not that strategic in a long term perspective considering the degradation of production conditions. As a matter of fact, producers often make quick decisions to cope with emergency situations rather than anticipating risks that are likely to happen due to irregular rainfall.

Agricultural calendar

In order to adapt to more and more erratic rainfalls since a decade, many producers have abandoned their cropping calendar. They follow their intuition or signals given by their fetishes during traditional ceremonies to identify the best sowing time, i.e. when the rainy season has really started. These are proper farmers' initiatives as climate change is not yet included in Benin's agricultural extension programmes. No new cropping calendar specific to the region has yet been provided to the farmers.

² Includes grains from cereals, legumes and other crop species

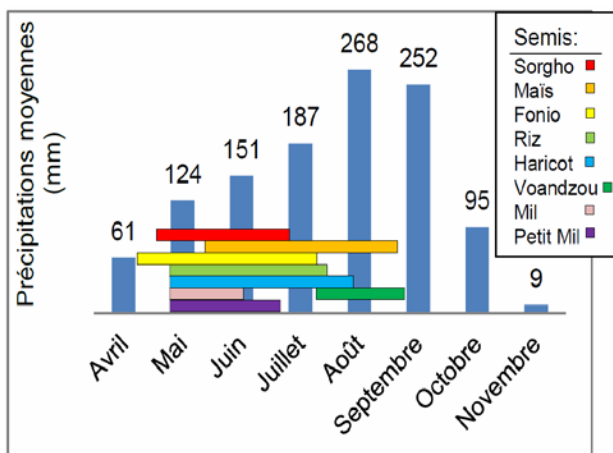


Figure 3 : Seeding Calendar and average annual precipitation. In case of late rain fall, all sowings fall between May and June, and so does the weeding (Sources : survey, 2012 and station of Natitingou, 1999-2011)

Short cycle seeds

Farmers prioritise short cycle varieties, originating from governmental services (maize, rice) and from the region (fonio (*digitaria exilis* Stapf), beans). However, these varieties and crops must respond to some organoleptic criteria such as: good quality flour, reduced waste and re-sowing not required (Figure 4). The role of certain dry grains for traditional ceremonies is crucial. This forces farmers to grow them even when they are less productive. This explains why certain ancient crops such as sorghum or small millet are maintained, even if they need up to 8 months to develop.



Figure 4 : Seeds of yellow maize (2 months cycle) disadvantaged to white maize (Rochat 2012)

Diversification or intensification

Intensification of imported rice and maize varieties allow higher yields, but some do not resist to dry periods (Figure 5 shows a test of germination in maize under optimal conditions, conducted in Boukombé in 2012). Therefore, some producers prefer to return to traditional, more robust dry grains, such as fonio or millet. These crops, which have lost much of their importance during the sixties along with the introduction of maize, are now reviving, despite the fact that they are hardly promoted in extension and research programmes.



Figure 5: testing the germination of yellow maize, 2 months (Rochat 2012)

Combat against erosion

The strategies to improve traditional techniques, such as the construction of dams in low lowlands or ridge planting, are part of extension methods against erosion, a very problematic issue in the region (Figure 6). Many interviewed farmers show great interest for this kind of technical improvement, however only few of them are applying them so far.



Figure 6: Ridges on a weeded surface for fonio (Rochat 2012)

No-tillage

Those producers who have adopted no-tillage techniques instead of ridges or ploughing have proved to be quite innovative. While they are continuing their traditional practices, as for instance sowing in seed holes or weeding, they have adopted these techniques for the new crops, realising their positive effects on the conservation of their soils (Figure 7).



Figure 7: Weeding to sow sorghum (Rochat 2012)

Limitations to adoption of new techniques

Of course, the declining quality of the dry grains and the decreasing productivity are not only due to changing climatic conditions. The interviewed farmers reported numerous factors which limit their capacity to adapt. These limitations are complex and difficult to identify. Evidently, the numerous propositions of a range of projects that were active in this region had only limited success. Even though methods for improvement exist for this rural population, the bridging period is hard to overcome and the capacity of resilience remains weak. The strategies of agricultural production struggle to overcome certain technical, cultural and geographical barriers, in order to reach remote areas and finally become adopted. The most obvious barriers according to the survey are presented below.

Accessibility

Despite extension programmes that became more and more comprehensive since the sixties, the practices actually adopted by the producers were introduced more than twenty years ago. Even if the department of extension services has efficient tools at its disposal, like no-tillage or compost integration, only the farmers who have tested the

methods can actually attest their efficiency. Therefore, the reasons that push the producers to discontinue traditional practices are found in a lack of access to know-how and to means of production. Access is strongly reduced in rural areas, in particular for organisational reasons and lack of infrastructure. On the other hand, the cultural issue is a challenge for the working methods of development organisations (NGOs and governmental organisations). This lack of efficiency might be due to a lack of field work or of inadequate extension methods, combined with the reluctance of the population to try new strategies and change their habits.

Communication and follow-up

External organisations have large knowledge gaps about the situation in the field and the local population, which often reduces their ability to adequately address the most vulnerable groups. This is illustrated by the difficulties to optimise the cultivation techniques and to select the varieties in general. Improved techniques are applied by only 2 to 3 % of the interviewed farmers. This corresponds roughly to the share of the population who had access to training and follow up of their activities (n=104). To promote an efficient selection of varieties, it would be necessary to interact with kinship networks, as 35% of the producers obtain their seeds through inheritance (n=104). These local seeds offer a limited choice, and the lack of seed renewal causes ageing and degeneration, and thus a poor productivity. However, even certified maize or rice varieties which have been multiplied locally for too many years bring potentially lower yields.

Motives for adopting strategies

The soil preparation techniques that are mostly applied in Boukombé arose from tradition and they are well handled. But the increased frequency of extreme meteorological phenomena is challenging those techniques: the producers realize the depletion of the soils. For example, it is still common to hear that mineral fertilizers would be the only option to maintain secured yield in the long run, but those remain expensive and are hardly accessible.

Conclusion

To overcome the communication barriers with the local population and to cope with the expected fast evolution of the agro-climatic conditions prevailing in Northern Benin, it will be necessary to bridge the gap between traditional or cultural communication systems and external awareness raising and extension concepts. This can be done by developing – in a participatory manner – adapted and accepted solutions concerning economic, social, environmental and cultural matters. Thus, to support the producers in their choices and to ensure a follow-up in a long run, a number of precautions should be considered. In particular the key role of local NGO's and farmers' organisations as intermediaries for knowledge transfer and sharing needs to be acknowledged and supported. As far as options for the future are concerned, it would be important to support the producers in growing more short-cycled varieties that are resistant to drought by proposing them in a participatory manner a broader choice of those seeds. Regarding cultivation techniques, it would be beneficial to promote the Zaï technique – at present hardly applied – for improved conservation of soil and water. For the overall coordination, a new cropping calendar should be developed to better select the used agricultural products (seed and inputs) as well as their applications.

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