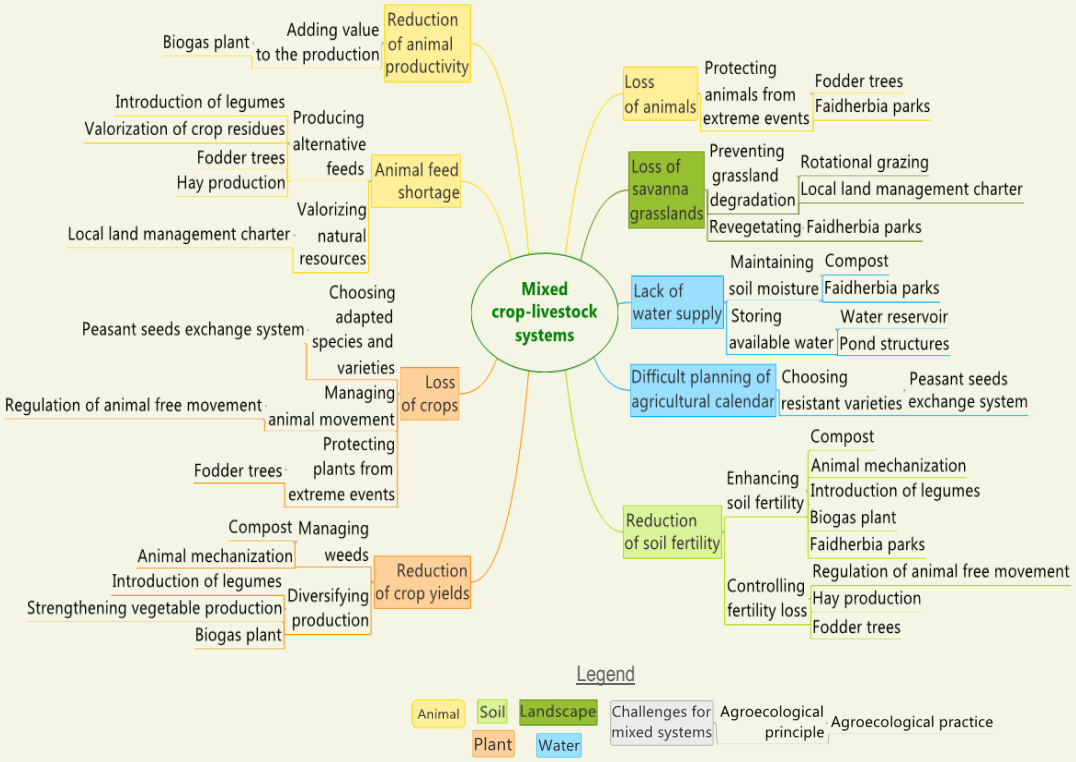
Which agroecological innovations in mixed crop-livestock systems ?

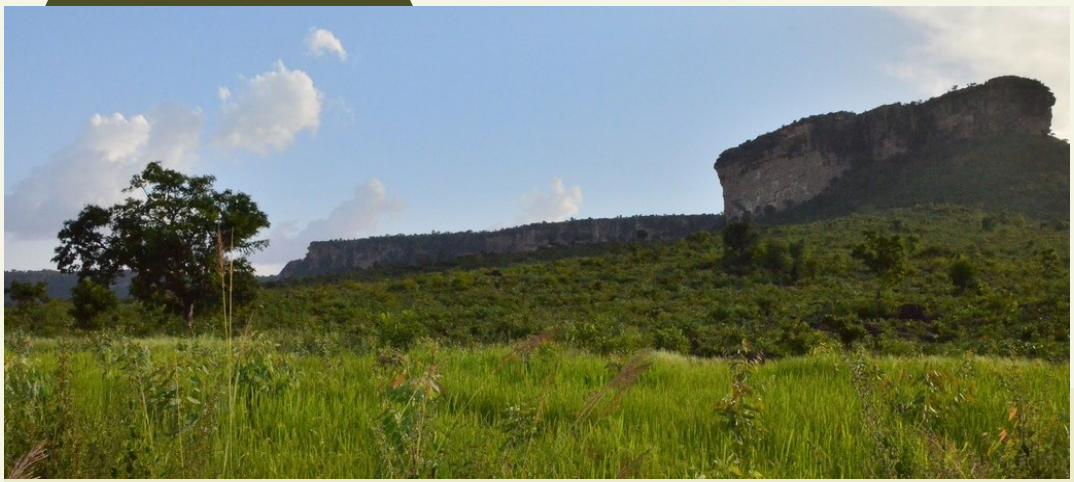


Farmers of mixed crop-livestock systems in sub humid Africa must face increasing variability of rainfall and appearance of temporary droughts. These factors are accompagnied by indirect effects of climate change: reduction of grassland surfaces, pests, weeds, diseases and parasites spreading. Some smallholders implement agroecological practices that contribute to respond to those challenges. They aim at maintaining soil humidity while choosing crop varieties that are more resistant to the lack of water. Furthermore, practices that favor soil fertility and protect it from erosion are implemented in order to limit soil fertility loss. To face the lack of forage, peasants valorize unexploited resources and produce alternative feeds. They also aim at controlling crop yields reduction through improved weed management and try to limit animal free movement on cultivated fields. Mixed crop-livestock sytems therefore present adaptation opportunities to climate change, based on agroecological principles.

Brochure extracted from the study « Agroecological innovations in a context of climate change in Africa» carried out by CARI (Valentine Debray) and AVSF in the framework of project PAMOC 2 of the Commission Climate and Development of Coordination Sud. You can fin it at : **www.desertif-actions.fr** in « Thematic bibliography ». The complete study will be available at www.coordinationsud.org from Septembre 2015. The information presented in this brochure is the result of interviews and literature review and is thus not exhaustive.

Agroecological innovations and climate change

Sub humid Africa



Togo (AVSF, 2014)

What type of climate ?

Sub humid zones are found between desert areas and tropical rainforests. Their climate is characterized by two distinct seasons: a long and dry winter, followed by a very wet summer that can last up to six months. The monsoon starts in may and generally brings 380 to 650 mm of rain, with higher precipitations close to rainforests than near deserts. Mean temperatures are above 18°C all year round.

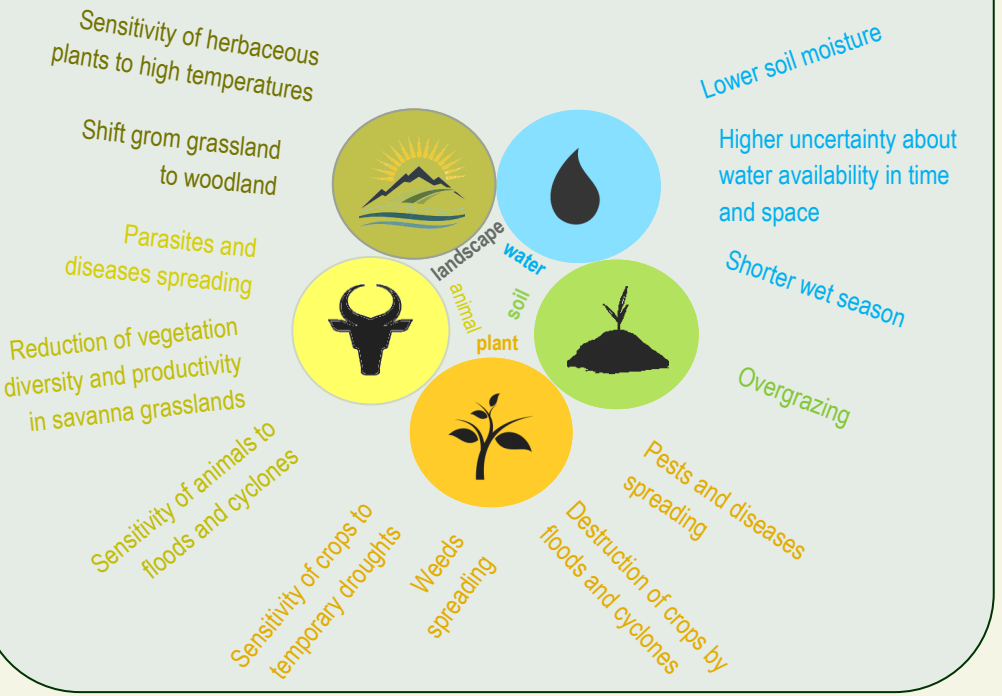
For what forms of agriculture ?

Conditions of heat and humidity in sub humid zones allow for grass to grow, with some shrubs and isolated trees. These climatic characteristics favor diversified plant and animal productions. Savannas are generally grazed by cattle and goats. Smallholders often combine livestock breeding and rain-fed cultivation. The major crops are maize, millet, sorghum, cassava, yam, groundnut, cowpea and leguminous forages. In some regions, cash crops such as coffee or cotton are also well represented.

Which major climate changes are observed and projected in sub humid Africa ?

In sub humid regions, climate change accentuates the already high variability of rainfall and temperatures. Indeed, onset and end dates of rainy season are shifting while this wet period shortens. In addition, annual amount of precipitations is declining. In parallel, the frequency and the intensity of heavy rains and floods increase. Furthermore, climatic models expect average daily maximum temperature of the warmest month to rise by up to 2,5°C by 2050.

Effects of these climate changes on natural resources and production means



Which challenges regarding food security ?

Populations of African sub humid zones also have to deal with food security challenges. Extreme events destroy houses and infrastructures. They also lead to populations' displacement, to places where people are not ensured to get access to foods. These migrations also contribute to the reduction of work force availability on farms. Moreover, competition for land and extension of agribusiness threaten smallholders' lands. Finally, indirect effects of climate change on animal health impact food and economic security of populations which are also dependent to livestock breeding.

Agroecological innovations to face climate changes : The case of mixed crop-livestock systems

What is a mixed crop-livestock system ?

Farming systems of sub humid zones generally include livestock, with various levels of integration. Some smallholders alternate between cultivation and pasture on the same plots, some have animals graze under plantations, and some principally rely on the crops they produce and their by-products for feeding animals. Peasants thus valorize interactions between plants and animals for fertilization and animal feeding. Besides pure bovine herds, smallholders often introduce small ruminants into their systems, as they prove more resistant to climatic hazards and easier to manage.

Togo (AVSF, 2013)

Why a focus on mixed crop-livestock systems ?

As rainfall patterns of sub humid zones allow for cultivation, smallholders often combine livestock and crop productions. Numerous families breed animals, sometimes at very small scale. Although mixed crop-livestock systems are highly dependent to spontaneous forage resources, they show certain flexibility to climatic shocks. Diversified production and complementarity of revenues contribute to food and economic security of smallholders. Such systems are based on agroecological principles which strengthen their resilience. Indeed, among other things, these farming systems favor organic matter recycling, biodiversity preservation, soil fertility management, and stimulate social link between farmers and breeders.

Which effects of climate change threaten mixed crop-livestock systems ?

- Loss of savanna grassland
- Lack of water supply for crops and animals
- Difficult planning of agricultural calendar
- Reduction of soil fertility
- Reduction of crop yields
- Loss of crops
- Animal feed shortage
- Reduction of animal productivity
- Loss of animals

Which socio-economic challenges to mixed crop-livestock systems ?

Farmers with mixed systems also have to face socio-economic challenges. Increasing land insecurity, agribusiness expansion, low investment capacity and lack of outlet limit the development of such systems. Furthermore, intensified competition for resources generate conflicts between farmers. In addition, migrations due to climate change also affect agricultural activities and dynamics inside families. Farmers migrate to more fertile areas or to places where they will find non-agricultural activities, leaving women with agricultural work and house-hold management.

Mixed crop-livestock systems significantly contribute to food security of local populations. It therefore appears essential to implement strategies that maintain those systems, in order to secure vulnerable populations that depend on them.