

# Which agroecological innovations in agropastoral systems ?



In subarid regions, farmers of agropastoral systems have to deal with increasing uncertainty about water availability in time and space and with a reduction of surface and quality of arable land. Evolutions of rainfall patterns influence available vegetation for animal feeding. Inventoried agroecological innovations contribute to strengthen these systems' flexibility. In response to the effects of climate change, some smallholders work collectively to optimize water resources management. They also adapt their practices to deal with water scarcity and to enhance soil fertility. In addition, farmers compensate the loss of spontaneous vegetation with the production of alternative feeds and an improved management of transhumance. They compensate for animal productivity reduction by adding value to their production and diversifying it. Agropastoral systems 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 and AVSF (Valentine Debray) in the framework of project PAMOC 2 of the Commission Climate and Development of Coordination Sud. You can find it at : [www.desertif-actions.fr](http://www.desertif-actions.fr) in « Thematic bibliography ». The complete study will be available at [www.coordinationsud.org](http://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

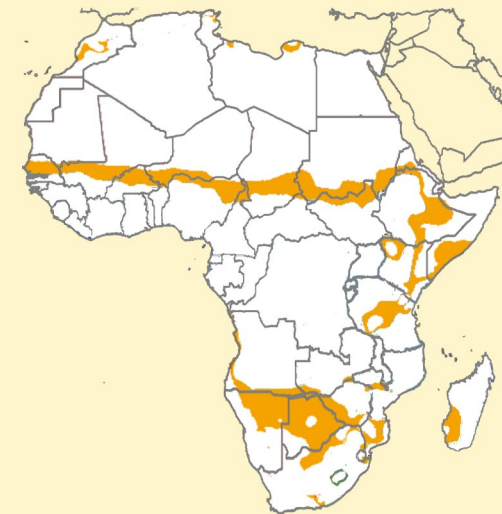
## Subarid Africa



Niger (CARI, 2007)

### What type of climate ?

Subarid zones are found at the borders of deserts. They generally receive between 250 and 500 mm of rain per year. The dry season, which lasts during the major part of the year, is followed by a short wet season. Sub-arid climate is also characterized by seasonal extremes: the warmest month averages more than 29°C and the coolest as low as 16°C.



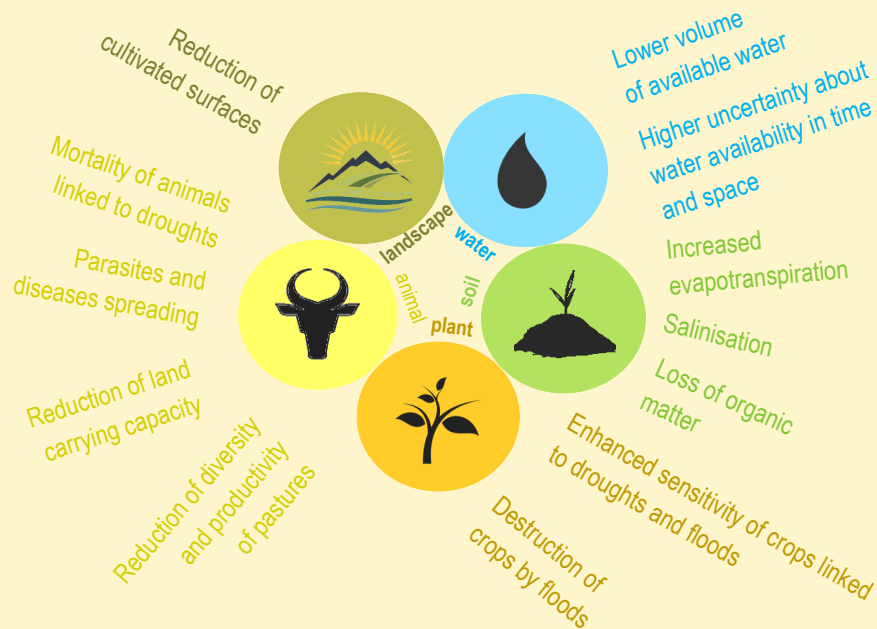
### For what forms of agriculture ?

In subarid zones, natural vegetation is mainly composed of short grasses, which provide forage for animals. Farmers produce foods principally in rain-fed systems. Agricultural production is therefore largely dependent to rainfall, and especially to the onset date of rainy season, the distribution of rainfall during rainy season and the annual sum of rainfall. In driest regions, we find mostly cereals and livestock, with transhumance systems.

## Which major climate changes are observed and projected in subarid Africa ?

In subarid regions, climate tends to warm up and precipitations to reduce. Indeed, mean annual rainfall decreases in Sahel, while mean temperatures raise. In some regions, a relative increase of precipitation amount has been noticed, but concentrated in short periods of time. Climatic models predict higher frequency and intensity of extreme events such as heavy rains and droughts.

### Effects of these climate changes on natural resources and production means



### Which challenges regarding food security ?

Populations of subarid African regions also have to deal with challenges of food security. Climate change effects sometimes constrain peasant families to abandon traditional activities. Such evolutions may generate familial conflicts. Furthermore, increasing scarcity of natural resources accentuates competition for fertile land, which leads to territorial conflicts that limit local populations' capacity to work collectively for food security. 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 agropastoral systems

### What is an agropastoral system ?

Agropastoral systems concentrate in areas with low densities of populations. They are based on the integration of livestock and crops. Animals contribute to soil fertilization while crops provide them with feeds. Herds' mobility ensures them access to water resources and rangeland in some periods of the year. Transhumance towards drier regions during wet season leave arable land free for cultivation. There exist a wide diversity of agropastoral systems, depending on animals' level of mobility and the type of crops cultivated (dry cereals, irrigated cereals, fodder trees). Herds are generally composed of small and big ruminants from local breeds.



Niger, (CARI, 2007)

### Why a focus on agropastoral systems ?

Agropastoral systems are representative of peasant activities in subarid Africa. Besides the source of income they represent, animals have an important social value. Agropastoral systems present certain resilience to climatic hazards. Herds' mobility allow animals to valorize resources according to climatic constraints along the year. Produced species variety permits to diversify risks linked to climate while adding value to local varieties and breeds adapted to specific conditions. These characteristics, associated with fertility transfer between animals and crops and to the collective aspect of transhumance management, make agropastoral systems agroecological.

### Which effects of climate change threaten agropastoral systems ?

- Reduction of cropland surface
- Insufficient 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 agropastoral systems ?

Peasant of agropastoral systems have to conciliate cultivated areas expansion and herds mobility. Transhumance is also limited by grazing paths degradation. This situation accentuates conflicts concerning access to land and water, but also to animal free movement on cultivated fields.

Agropastoral systems contribute to food security of local populations. It therefore highly matters to implement strategies aiming at maintaining such systems, to secure vulnerable populations that are reliant on them.