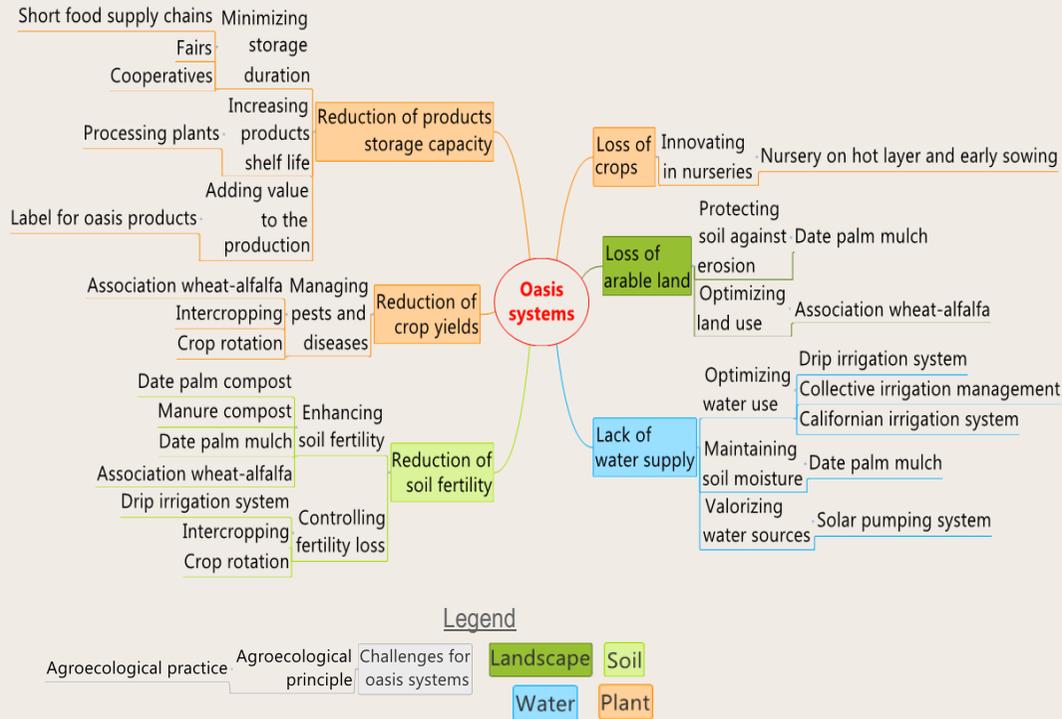
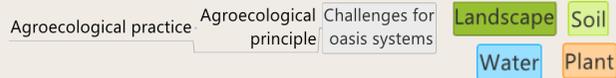


Which agroecological innovations in oasis systems?



Legend



Oasis systems have to face major challenges of water supply and soil fertility degradation, which are accentuated by climate change. These systems present characteristics of flexibility which should allow them to adapt to more and more restrictive conditions. The inventoried agroecological innovations contribute to strengthen these characteristics. Techniques of irrigation and humidity maintenance must allow to add value to scarce available water resources. Furthermore, practices that enhance soil fertility and protect it from erosion are implemented in order to control accelerated fertility loss. In addition, peasants modify their practices of crop management to adapt to novel conditions. Finally, collective organization of farmers must allow them to better valorize their production while ensuring food security of local populations.

Oasis 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 in « Thematic bibliography ». The complete study will be available at www.coordinationsud.org from September 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

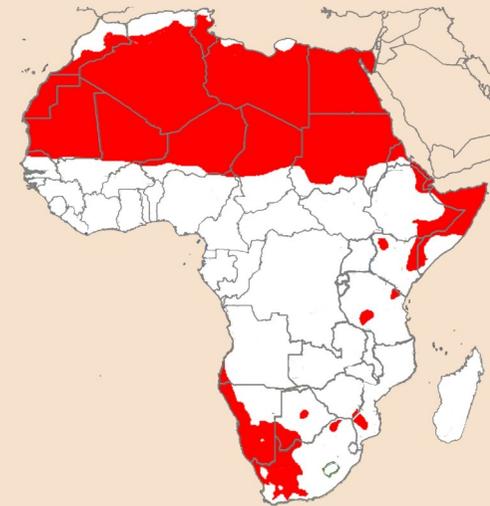
Arid Africa



Morocco (CARI, 2014)

What type of climate ?

Arid zones are characterized by a desert climate with a precipitation deficit lasting more than eight months. They generally receive less than 50 mm of rain per year. Annual mean temperatures average 20 to 20°C with maximal mean ones over 45°C. Thermic amplitude is high between day and night; minimal temperatures can be close to 0°C in the night. These regions are also characterized by a high potential evaporation.



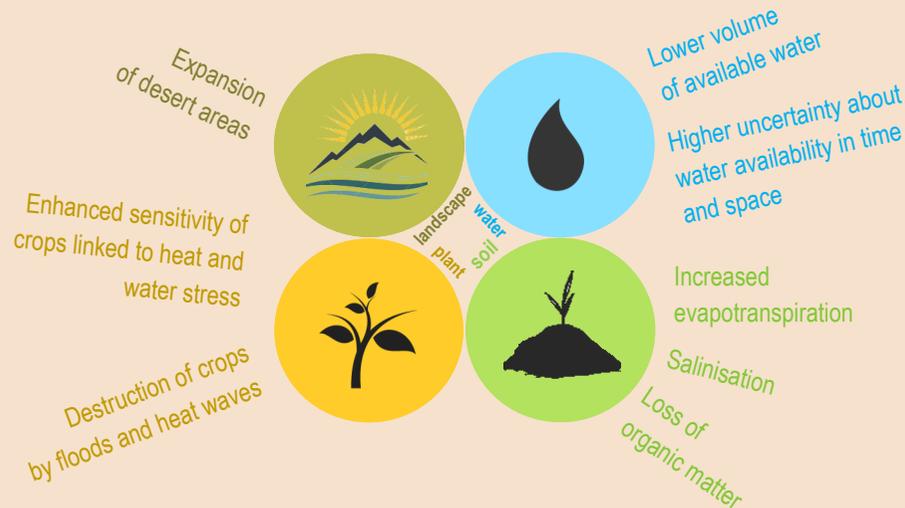
For what forms of agriculture ?

Arid regions depend on rainy season for water supply. Furthermore, farmers have to deal with low soil fertility and high density of weeds and pests. Subsistence farming is predominant. It is based on cereals and legumes. Agricultural production rely on rain-fed systems or specific irrigation techniques. Other products are also well represented: roots, forages, fruits and vegetables. Livestock breeding is relatively restricted by the lack of pasture land.

Which major climate changes are observed and projected in arid Africa ?

In arid regions, climate tends to warm up while aridity increases. Indeed, mean annual precipitations decrease and mean temperatures raise. In parallel, extreme climatic events multiply and intensify. Climate projections expect higher frequency of droughts, heat waves and floods. If precipitations amount was to increase, it would be concentrated in short periods of time, accentuating flooding risk.

Effects of these climate changes on natural resources and production means



Which challenges regarding food security ?

Populations of arid zones of Africa also have to deal with challenges of food security. First, decrease of arable land surface and crop yields decline restrict cereal offer. In addition, reduction of storage capacity, linked to high temperatures, limits products' shelf life. In parallel, cereal prices' instability at global scale makes access to foods even more uncertain. Finally, populations migrations linked to climate changes accentuate conflict risks and insecurity while restricting available working force on farms.

Agroecological innovations to face climate changes : The case of oases

What is an oasis ?

Oases, which are found in Saharan regions, are systems of space optimization that host intensive agricultural production. This production relies on a specific design in several vegetative strata which generates a microclimate allowing for cultivation on poor soils where water lacks. Oases present a great biodiversity adapted to tough climatic constraints. The tree layer (date palms), the shrub layer (vines and fruit trees) and the herbaceous layer (cereals, legumes, medicinal and aromatic plants) provide with a wide range of foods. The core of the palmgrove hosts crops irrigated with specific submersion systems while extensive livestock breeding is practiced on vast surrounding pastoral zones.



Maroc (CARI, 2006)

Why a focus on oasis systems ?

Oases occupy the majority of utilized agricultural land in arid Africa. They constitute real models of adaptation to tough climatic conditions and therefore present a great potential for facing challenges of climate change. Indeed, oases have shown certain flexibility to extreme climatic events such as the droughts of the 1970's and 1980's. This resilience is partly due to agroecological characteristics. Production in different strata favors interactions between plants, and with animals, and provides varied alimentation. This model permits to optimize the use of restricted space and diversifies climate risks.

Which socio-economic challenges to oasis systems ?

Peasants of oasis also have to deal with the challenges posed by population migrations towards cities, which restrict available work force for maintenance and production. Farmers often rely on external revenue as agricultural income is not sufficient anymore. The lack of organization and professionalization of producers further threatens oases preservation. Furthermore, traditional knowledge and know-how are progressively being lost, due to a lack of transmission between generations. Finally, oases are in increasing competition for water resources with modern palmgroves of external investors.

Oases should significantly contribute to food security of rural populations if they are well maintained in the coming years. It therefore highly matters to implement strategies in order to ensure their maintenance in spite of climate change and socio-economic challenges.

Which effects of climate change threaten oasis systems ?

-  { Loss of arable land
-  { Insufficient water supply for crops and animals
-  { Reduction of soil fertility
-  { Reduction of crop yields
-  { Loss of crops
-  { Reduction of storage capacity