Which agroecological innovations in agroforestry systems ?

Peasants who implement agroforestry systems in humid tropical Africa have to face global warming and rainfall patterns evolution. Heavy rains and cyclones, which are more and more frequent and intense, threaten crops, animals and infrastructures. Some peasants implement agroecological practices that contribute to answer to those challenges. They face rainfall variability by better valorizing available water and by apadting their agricultural calendar. Moreover, peasants protect the soil from extreme events thanks to plant covers, crop associations and trees that limit erosion. They also contribute to soil fertility with legumes and the introduction of restricted livestock. More generally, peasant diversify their farming systems, in order to limit the risks linked to climatic variability and ensure a revenue. Agroforestry systems therefore present opportunities of adaptation to climat change based on agroecological principles.

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Agroecological innovations and climate change

Humid tropical Africa

Madagascar (AVSF, 2014)

What type of climate ?

Humid tropical zones ara characterized by the rain they receive all year long, with an average of 1250 to 6000 mm, falling principally during the summer. Precipitations are very variable from one month to the other one, with winter droughts in some regions and sometimes storms and cyclones. Mean temperature varies between 20 and 34°C, with minimum ones during the winter which lasts 2 to 4 months.

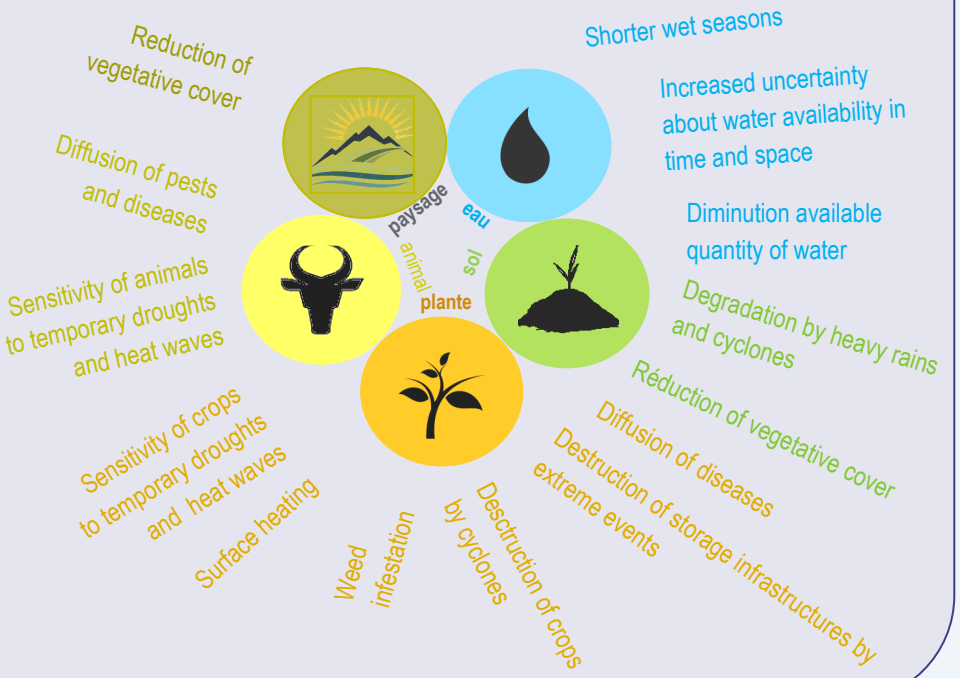
For what forms of agriculture?

Climatic conditions of humid tropical zones (heat and humidity) favor a dense vegetation. Farming systems of these regions are based on the forest, through slash-and-burn systems or sometimes agroforestry ones. Rain-fed rice is often the main staple food.

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

In humid tropcial regions, we observe a global raise of mean temperatures as well as an increase of heat waves' duration. Regarding rainfall, no long term trend has been ovserved in humid tropical zones, although the IPCC projects that annual mean precipitations should decline over rainforests. Rainfall should concentrate in shorter wet seasons while droughts period extend. Moreover, higher temperatures and humidity lead to more frequent and intense heavy rains and cyclones.

Effects of these climate changes on natural resources and production means



Which challenges regarding food security ?

Populations of humid tropical zones of Africa must also face food security challenges. Extreme events such as heavy rains and cyclones destroy the agricultural inrastructures. Foods storage et distribution is therefore limited, impacting populations' food security. Furthermore, this phenomenen restricts peasants' access to markets, and their capacity to generate revenu that allows them to buy other foods.

Agroecological innovations to face climate change : The case of agroforestry systems

What is an agroforestry system ?

Farming systems of humid tropical zones are generally based on forests. Some peasants implement agroforestry systems, as an alternative to slash-and-burn technique which is more and more restricted by land pressure. Agroforestry associates on the same plot trees, perenials, subsistence and cash crops and a plant cover. Agroforestry systems are highly diversified, with productions associated either in space or in a temporal sequence. Livestock breeding is generally marginal in this type of system in humid tropical zones.

Madagascar (AVSF, 2014)

Why a focus on agroforestry systems ?

Agroforestry systems are not necessarily the most representative of agriculture in humid tropical zones, but they are characteristic of these regions and significantly contribute to households' food security. Furthermore, the diversity of species and varieties they host strengthen their resilience to climatic variability and shocks. Diversified production permits to diversify the risks as well as the sources of income. Trees benefit to the agroecosystem in several ways including soil protection and fertilization. Following the principles of agroecology, agroforestry valorizes the interactions between the different species and improves the use of natural resources.

Which effects of climate change threaten agroforestry systems ?

- Surface heating and soil moisture reduction
- More difficult planning of cropping calendar
- Lack of water supply
- Reduction of soil fertility
- Reduction of crop yields
- Loss of crops
- Reduction of products shelf life
- Reduction of animal productivity

Which socio-economic challenges to agroforestry systems ?

Peasants who exploit these systems must also face socio-economic challenges. Population growth accentuates pressure on natural resources, restrincting their availability. Furthermore, peasant systems generally cannot compete with conventional monospecific agriculture in terms of profitability of work in short and medium term and are therefore threatend by their expansion.

Agroforestry systems significantly contribute to food security of local populations and present great advantages and caracteristics of sustainability. It therefore highly matters to implement strategies in order to preserve these systems, to secure vulnerable populations that rely on them.