

Agro-ecology... a means to achieve food self-sufficiency In Sub-Saharan Africa

AGRO-ECOLOGY

• Agro-ecology can be considered as a discipline of agricultural practices; an implementation of the concepts and principles of ecology in agriculture. Despite the several definitions of agro-ecology that exists, all are based on, “the need to develop sustainable food production systems” (Dalgaard, Hutchings and Porter, 2003).

Basil Bensing, an American agronomist of Russian origin, used the term for the first time in 1928. The basis of agro-ecology as a science are mainly focused on the disciplines of agronomy, ecology and of agro-biodiversity (Wezel and Soldat, 2009)

The knowledge of Agro-ecology deals with fieldwork agro-ecological practices. Those who carry out agro-ecology reject a purely technical or technicity approach. They bring forward a global approach with the recognition of rural knowledge and practices and the valorization of convergent efforts (INRA, 2008) and diversity (appropriate use of the local natural resources via “biomimetics”, i.e. the “mimic” of useful natural processes in agriculture).

Main properties and characteristics of agro-systems

- Biophysical Aspects

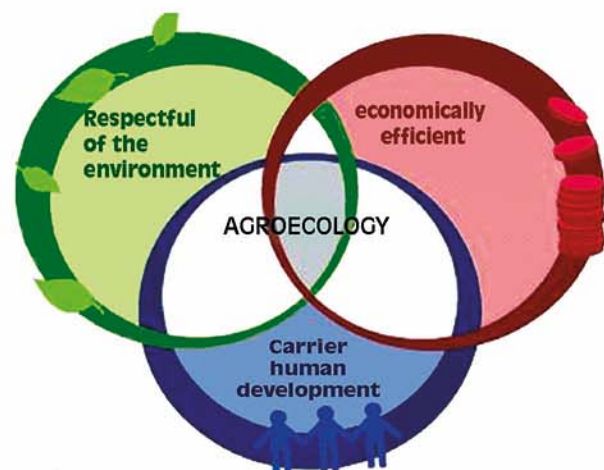
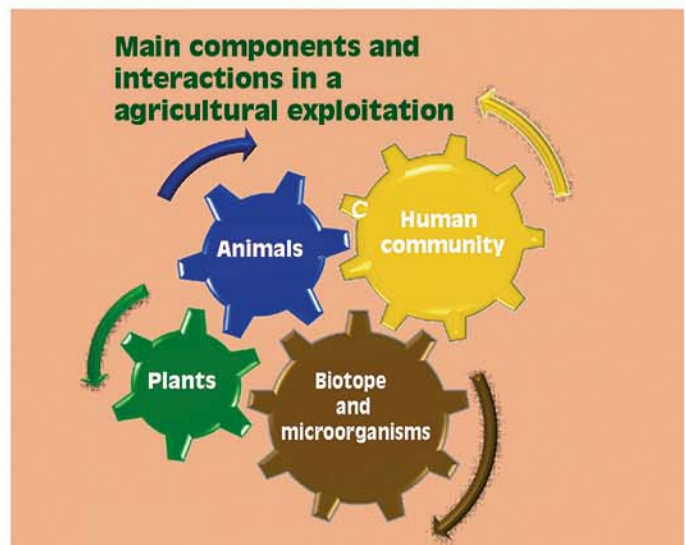
Agro-ecological practices aim at the:

- conservation of the fundamental processes of nature which are substitutes to soil tilling or ploughing in conventional agriculture
- Improvement of soils health;
- Preservation and rational use of water resources, a key concept;
- Preservation and the improvement of biodiversity which favors more stable, resilient and productive agro systems;
- Preservation of soil and plant trapped carbon, which play an important role in reducing the adverse effects of climate change.

- Socio-Economic Aspects

- Agro-ecology takes into account peasant farmers, their communities, their social and economic contexts ensuring equity;
- The management principles of Agro-ecology requires emphasis on the marketing and sales of local inputs and products;

- Currently, the farmlands used for agro-ecological practices are generally small whereas production systems’ sustainability greatly depends on the large size of the plantation.
- Peasant farmers and basic Community Organizations (BCO’s) are important players in the food supply chain. Often neglected by the regional markets, they are however the crucial actors in agro-ecological practices that bring these markets closer to the consumers.
- Agro-ecology implies much more labor than conventional agriculture, thus offering more job opportunities;
- Agro-ecology encourages traditional, scientific and technological practices.



Source :

<http://prise2terre.files.wordpress.com/2011/07/agroecology-schema.jpg>

Some restrictions to a greater adoption of agro-ecology

- Women and youth are the active forces of agriculture; however, they have only a limited access to land and to resources. This slows down the adoption of agro-ecology;
- The monopoly of big agrofirms in the food market favors the consumption of their products and hinders small scale producers from adopting new approaches;
- The negative impacts of conventional agriculture are very often noticed within the communities subjected to it. These communities pay heavily with their health and their environment. Unfortunately, the absence or the ignorance of alternative practices such as agro-ecology that gives healthy and best quality products do not free them from this set up.
- Customers who depend on their needs to create markets generally choose their goods from advertisements. But agro-ecology is known very little by the public to be largely vulgarized by this means.

In tropical countries, agroecology serves primarily to protect a fragile ecosystem, weakened by soils spoilt by the climate. Extreme climatic conditions and fragile soils strongly require a more sustainable management of soil fertility in tropical countries than in temperate countries.

Some examples of agro-ecological practices

Fertilization of soils

Aerial composting

Aerial composting is a cheap method to make a compost which was developed by the National Institute of Agronomic Research of Niger (NIARN). The technique requires the mixing of organic debris (plant residues, decomposable household wastes and dung) on the ground, followed by abundant watering. The mixture takes 4 weeks to ferment during which it is turned over every 10 to 14 days.

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Conservation Farming

No-till success

In Kailo, Kasongo and Kabambare, in the Maniema province of the Democratic Republic of Congo, peasant farmers have been successfully carrying out no-till farming or conservation farming since 2009. Peanut production has increased by 63 %, corn by 132 %, cowpea by 80 % and rice by 62 %.

Spore n°170 June -July 2014

Cassava

New technologies enable double outputs

The use of cassava strains with high grade starch resistant to diseases combined with good practices, have enabled farmers from western Nigeria to increase their yields from 12 tons/ha to 22 tons/ha. More than 8000 farmers sell cassava to Allied Atlantic Distilleries Company LTD, the greatest African producer of ethanol from cassava.

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Market gardening

Insects biological control traps

A team of scientists from several institutions, including CIRAD and USAID, has successfully tested the use of nets placed on vegetables with small farmers in Benin and Kenya. These simple nets are easily used and have led to the reduction of insecticide spraying from 70 to 100 per cent on cabbage and tomato cultures.

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Ecological Agriculture – “a silver mine”

Small farmers, who carry out agro-forestry and the “Push-pull”* technology, even when agrochemical products are subsidized, have a far better financial situation than their neighbors who use agrochemical products.

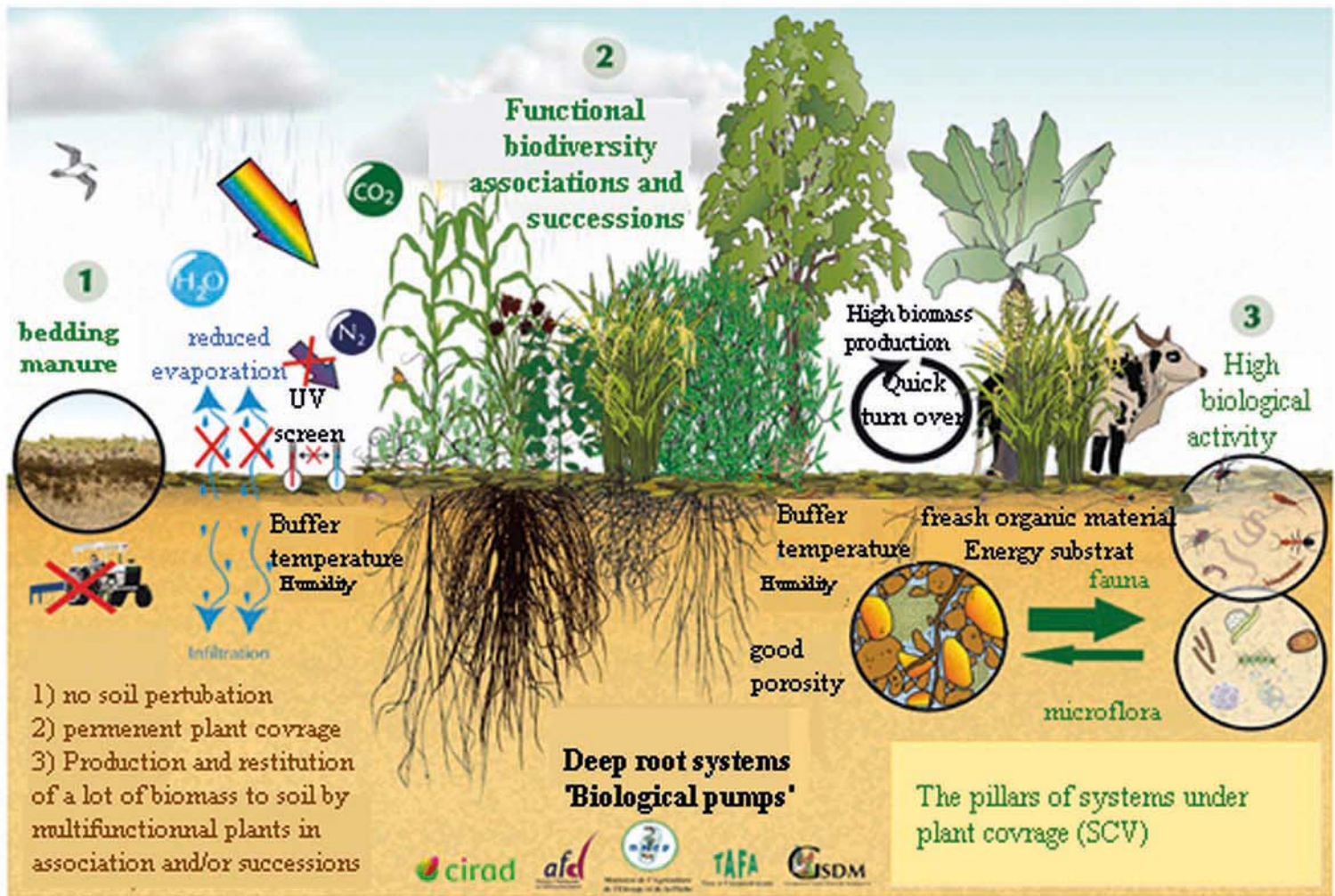
**The “Push-pull” also called “attraction-repulsion”, approach concerns a biological fight to repel harmful insects from the main plantation and attract them towards the edges of the farm.*

This method depends on the organized inclusion of plants with biological and chemical properties of repelling, attracting or trapping insects thus avoiding chemical insecticides. (GMO)

In Malawi, agro-forestry has led to higher revenues of about \$97 /100m² for corn cultures compared to farmers who use chemicals and do not practice agro-forestry.

In Kenya, “push-pull” technology helped farmers increase their income to \$343 /100m² in corn farming, which is considerably more than those of farmers who do not use these technologies.

<http://www.greenpeaceafrica.org/financialbenefits>



Source : <http://gsdm-mg.org/piliers-des-scv/>

Some agricultural experiences without chemical inputs carried out in West Africa.

- 1 A program for promoting organic cotton was led by Helvetas in 2002. In 2004, this program enabled 571 producers (among which 34 % were women) to produce 169 250 kgs of cotton seed and 68 041 kgs of cotton fiber according to organic farming standards on a total area of 170 ha in the area of Kolondieba and Yanfolila in Mali. The cotton seed production went up to 170 000 kgs or 68 tons of cotton fiber commercialized. The average yield per hectare increased by 20 % in 2003 and reached 570 kgs/ha (Helvetas Mali, in 2009).
- 2 Inquiries carried out in 2007 in Burkina Faso, during a study on a sample of 700 production units showed that the rate of adoption of water and soil conservation techniques was 53 %. Most farmers use a combination of several techniques. The most common are the stone retaining walls and the zai. The use of organic manure is widespread with more than 67 % of the production units haven adopted the technology (Billaz R, 2012).

**The "Zai" farming technique which originates from West Africa is a particular kind of culture on hill sides enabling the concentration of water and manure (from 1 to 3 t/ha in micro-basins (from 30 to 40 cm of diameter and 10 to 15 cm of deep). It is dug with a hoe 'daba' in a zigzag arrangement at about 80 cm apart from each other, where the grains are sown. (about a dozen grains of sorghum on heavy ground or millet in sandy or gravel soil).*

- 3 The "WullaNafa" project, carried out in Senegal and financed by USAID, is a successful example in the development of "conservation farming" in the 17 rural communities of Fatick, Kaolack, Tambacounda and Kedougou. A thousand, two hundred and twenty two (1222) producers of corn, millet and sorghum practice this type of farming on 885 ha of cereal.

TO THE DISCOVERY OF KAYDARA: A PROMISING EXPERIENCE OF AGRO-ECOLOGY IN SENEGAL

The agro-sylvo-pastoral framework law of Senegal adopted in 2004, encourages the research and the implementation of alternative farming practices capable of increasing the yields, and protecting natural resources and the environment (DPES, 2011). The Association of Africa Gardens (Association Jardins d’Afrique, AJA) (created in 2000) opened an **agro-ecological farm school called KAYDARA** in the village of Samba Dia, Rural council of Fimela in the region of Fatick.

Organization

The Kaydara farm covers 10.5 ha in all and is divided into 5 sites numbered 1, 2, 3, 4 and 5. The first exploitation that extends up to 5 ha is called the Kaydara 1 Farm.

The land has been fenced. Nine wells and 18 water retention tanks have been constructed to facilitate watering and irrigation.

Since 2006, the farm recruits a group of 10 to 15 student farmers every 3 years, which is the duration of the training.

A manager is designated for each domain (poultry, rabbit hutch, cattle rearing, the sales of the products, partnership etc.

On Kayadara 2 (which has an area of 2.5ha) are installed a modern hydraulic infrastructure; a solar pumping system (functioning with the solar energy) and a windmill to bring up water. The well, which has a diameter of 2 m, a depth of 7 m, is connected to a water tower of capacity 20 m³. Eight taps supply Kaydara 2, the practical training plots and their households with water.

The use of local materials is a priority (the fence is made from “Tang” which is the mid rib of the leaves of the Palmyra tree (*Borassus aethiopum*)).

In order to perpetuate the initiative, one of the admission conditions of farmer students is that they must possess at least 1 ha of land where after graduating they can settle and reproduce the experience.

Sector of activities

Arboriculture : helps in fixing the soil and creating a favorable microclimate.

Market gardening : the products are both for subsistence and for sale.

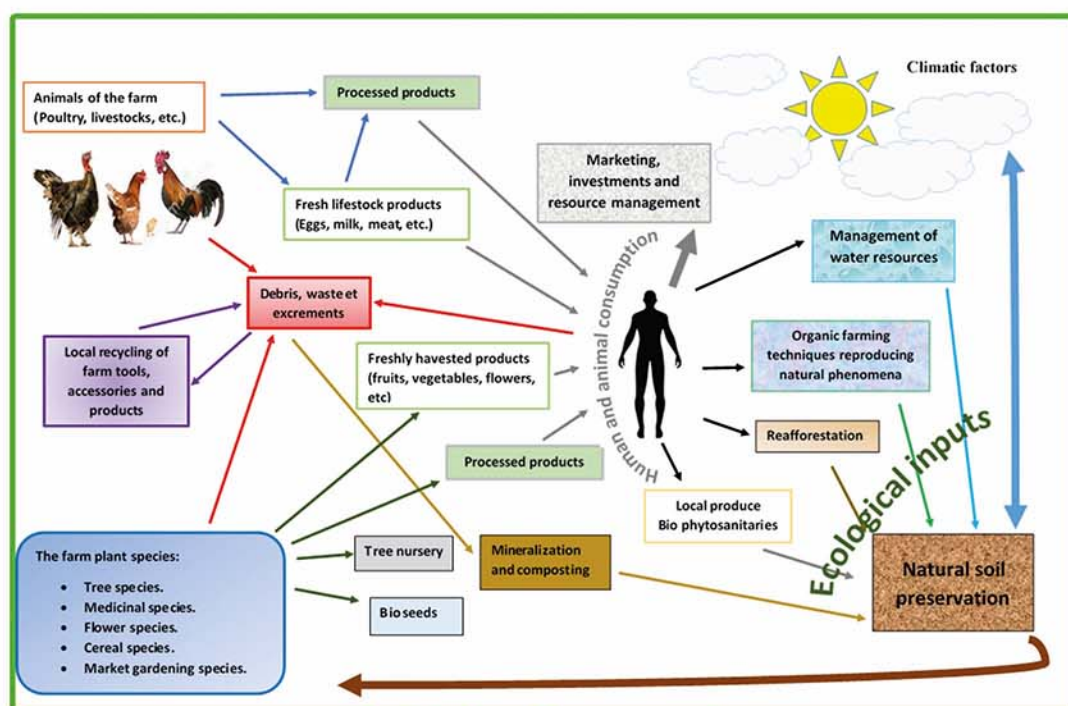
Breeding : manure for composting is obtained from this activity.

Floriculture : is a source of income and of pollen for the insects.

Tree nursery : provides production of local seeds.

Hydraulic installation : source of water supply made possible by Solar panels and wind mills which also provide light. These installations are very useful in water management. Farming and breeding constitute the main activities of the farm.

All the sectors of activities are inter related and dependent on one another in the farm. In 2013, 28 cultivated species were counted among which 8 were trees, 3 were rain cultures and 18 were vegetables. Sheep, cows, pigeons, rabbits, brahma chicken, ducks, guinea fowls, turkey cocks and geese are the species bred within the farm.



The Kaydara farm ecosystem

Facilities and advantages of the farm.

The water table is shallow 3 to 4 meters.

The tourism sector is in total increase in the area with the development of road infrastructures, hotels, touristic camps, secondary residences, as well as the development of the big orchards.

Light soil (sandy and sandy clayed).

Limitations

The difficulties of acquiring land by the peasants mainly due to land grabbing by big firms or private investors, limit the expansion of Kaydara Farms because one of the criteria for admission into the farm school is to have at least a 1 ha plot.

The settling fund available at the end of the training is small compared to the investment necessary for an autonomous taking off; there is a real need for support to perpetuate the activity.

For the vulnerable populations and from the economical and feeding point of view, agro-ecology is a means of generating a more important production, with a greater diversity of quality products: food, textile and medicinal products, both for the family consumption and for sale. (PANNA,2009)

Main socio-economical and environmental impacts

The Kaydara agro-ecological farm:

- fights against rural exodus and provides an alternative to the land grabbing in the region;
- trains in a controllable agriculture with a business initiative and creativity spirit;
- protects and preserves the genetic heritage of plants and local seeds by using biological adapted seeds;
- Participates in the improvement of the living conditions of farmers by the promotion and the valorization of local resources;
- encourages and supports the habit of maintaining a "woody village" via reforestation;
- promotes ecological practices (compost, natural phyto-sanitary treatment etc.), the management and the recycling of waste and reduces as much as possible the use of industrial and chemical products in farming;
- promotes renewable energies, which are very economical and ecological;
- encourage the culture and protection of medicinal plants useful for the natural medical treatments, which are cheap and efficient;
- encourages the habit of making grazing lands for feeding domestic animals;
- cultivates healthy biological products at a reasonable cost;
- etc.



Kaydara farm phone number : Gora Ndiaye : +(221) 77 151 75 14



A cultivated Land is not only a simple substrate to which we have to administer chemicals, but a living organism with a biological metabolism, which has to be cared for with intelligence and awareness. It is an "art" which relies on science and above all on the observation of life in all its forms (Robert Morez).

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Webography

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