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Review Article

Agroecology, a Therapy for African Agriculture in the Face of Climate Change

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Abstract

It is necessary to review the impact of man on the environment due to soil exhaustion. Intensive agriculture is a dead end because it kills soil biology. We may wonder what solutions can be found for harmonious optimization of the soil/plant system.

Agroecology is therefore a mode of agricultural development which aims to optimize production while maintaining the balance of the farm with its natural environment, but also economic and social.

Agriculture is one of the only human activities capable, along with forestry and aquaculture, of fixing carbon. Agroecology, like many peasant agricultures practiced throughout the world, makes it possible to respond to the problems of mitigation and adaptation of agriculture by reducing the use of fossil fuels.

Keywords: Agroecology; Environment; Adaptation; Climate change

Introduction

What is climate change?

Climate change refers to changes in the climate accompanied by a general increase in average temperatures on a global level. These changes are due to the increase in the concentration of greenhouse gases present in the atmosphere.

Agriculture, probably the most climate-dependent human activity, is both victim and culprit of climate change, but can also be a solution to the climate change crisis. In Africa, the challenge for agriculture is to ensure the food and nutritional security of the population, a guarantee of social peace and sustainable development in a context of climate change.

Indeed, agricultural production from the predominant family farms remains essentially rain-fed. Consequently, it is highly dependent on the climatic risks generated by warming, which include, among other things, rising temperatures, the drop in atmospheric precipitation, the delay in the onset of rains at the start of the agricultural season, pockets of drought, the early cessation of rains, flooding. Adapting producers to climate risks is a strategy to deal with this major development constraint.

Modern agriculture must face various challenges: ensuring the production of food in quality and quantity, but this by reducing inputs to safeguard natural resources, limit damage to the environment, and preserve biodiversity.

The latest report from the Intergovernmental Panel on Climate Change (IPCC) confirms that global warming is unequivocal and since 1950, most of the changes observed have been unparalleled for decades, even millennia.

Climate change seriously affects a large number of human activities, among which the "land sector" (agriculture, forestry) occupies an important place in the human activity most dependent on climate. Agricultural, animal or forestry production is directly affected by the effects of climate change, whether it is the increase in temperature or carbon dioxide content.

Land users must make major efforts to adapt, especially in developing countries that are more vulnerable than industrialized countries.

Impacts of climate change on agriculture

Agriculture, however, is directly and indirectly affected by climate change, much more negatively in developing countries.

According to CILSS (2016) (Permanent Inter-State Committee for the Fight against Drought in the Sahel), climate change in sub-Saharan Africa is characterized by irregular rainfall, the resurgence of heavy rains, floods and significant increase temperatures.

For climate realists (as opposed to climate skeptics) climate deterioration would be due on the one hand to uncontrollable climatic conditions and on the other hand (in 90% of cases) to anthropogenic actions such as industrial activity, demand for energy wood and timber, agricultural expansion, overgrazing, bush fires.

Faced with this vulnerability, efforts to adapt to climate change have been deployed both at the global and national level to find answers.

Dumas (2007), cited by Gnanglé et al (2011), defines adaptation to climate change as all the measures or adjustments that make it possible to mitigate the damage of change or take advantage of its positive consequences.

How does agriculture contribute to climate change?

Greenhouse gas (GHG) emissions from the agricultural sector represent 24% of global emissions. They are mainly caused by deforestation for agricultural purposes, livestock breeding through the storage of ruminant effluents and the use of synthetic fertilizers.

Africa is responsible for around 15% of global greenhouse gas emissions from the agricultural sector. Agriculture is one of the only human activities capable, along with forestry and aquaculture, of fixing carbon.

Intensive agriculture emits around 24% of greenhouse gas emissions globally. In addition, it does not allow populations to continue to live and eat properly.

Agroecology solution to the sylvo-pastoral problem

Agroecology, like many peasant agricultures practiced throughout the world, makes it possible to respond to the problems of mitigation and adaptation of agriculture by reducing the use of fossil fuels for production (methanization, natural fertilizer, crop association) by an increase in carbon fixation in the soil (Ecosystem restoration, reforestation).

So many solutions that ensure food safety, sustainability and environmental protection. Agriculture emits greenhouse gases, but it is possible to reduce these emissions through agroecological practices that promote an increase in soil organic matter.

It is also possible, through these practices, to increase atmospheric carbon capture by fixing carbon in the soil and thus contributes to the mitigation of climate change while improving soil properties, which simultaneously makes it possible to improve adaptation of agriculture to climate change.

Some examples of agroecological practices

A. Diversify crops by integrating legume crops in particular, which allow better maintenance of organic matter in the soil and extend their rotation durations.

B. Establish or maintain meadows and agroecological infrastructure on agricultural land: hedges, streams, trees, etc.

C. Establish plant cover, maintain permanent vegetation on plots whose aim is to protect the soil. (Agroforestry).

These different practices make it possible to improve the quality of the soil: they therefore have a better capacity to store water, increase their richness and are more resistant, particularly to diseases. They also have the advantage of producing healthier and more diversified food, better paying farmers and offering them more autonomy, and promoting biodiversity.

Today, it is essential to quickly reduce our greenhouse gas emissions, of which the agricultural sector is one of the main emitters (19% of territorial emissions in France).

The change in climatic conditions brings other consequences, in particular favoring the development of certain diseases affecting plants or animals, or the proliferation of harmful insects [1-11].

Recommendations

The results of this study suggest the following policy and program recommendations:

a) Design and implement good policies and programs in agricultural development.

b) Increase investments in favor of agricultural productivity.

c) Relaunch national research and extension programs.

d) Encourage community adaptation strategies.

e) Make adaptation of agriculture a key point of climate negotiations

Conclusion

It can nevertheless be concluded that, worldwide, natural systems are being affected by changes in regional climate, particularly rising temperatures, and that this warming is most likely due to the original greenhouse gas emissions. anthropogenic.

However, countries now have a historic opportunity to embark on a path to green, resilient and inclusive development. Decisions

made today will determine the extent to which the world makes further progress on development, sustainable job creation and resilient, low-carbon economic transformation.

References

1. Anderson K, Peters G (2016) The trouble with negative emissions. Science 354(6309): 182-183.
2. Balesdent J, Arrouays D (1999) An estimate of the net annual carbon storage in French soils induced by land use change from 1900 to 1999. C R Acad Agri 85: 265-277.
3. Bessou C, Basset-Mens C, Benoist A, Biard Y, Burte J, et al. (2015) Life cycle analysis to elucidate the links between agriculture and climate change. In: Torquebiau (Ed.), Climate change and world agriculture. Versailles, pp. 246-256.
4. Challinor AJ, Koehler AK, Ramirez VJ, Whitfield S, Das B (2016) Current warming will reduce yields unless maize breeding and seed systems adapt immediately. Nat Climate Change 6(10): 954-958.
5. FAO (2011) Climate-smart agriculture sourcebook. Rome: FAO, p. 560.
6. GIEC (2014) Climate change 2014: synthesis report. Contribution of working groups I, II and III to the fifth. In: Assessment report of the Intergovernmental Panel on Climate Change Geneva, Switzerland, p. 161.
7. Karsenty A, Vogel A, Castell F (2014) "Carbon rights", REDD+ and payments for environmental services. Environ Sci Policy 35: 20-29.
8. Lal R (2004) Soil carbon sequestration impacts on global climate change and food security. Science 304: 1623-1627.
9. IPCC (2007a) Climate Change 2007: Impacts, adaptation and vulnerability. Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change. In: Parry ML, Canziani OF, Palutikof JP, et al. (Eds.), Cambridge University Press, Cambridge, United Kingdom, p. 976.
10. GIEC (2007b) Climate Change 2007: The physical science basis. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change. In: Solomon S, Qin D, Manning M, et al. (Eds.), Cambridge University Press, Cambridge, United Kingdom and New York, United States of America, USA, p. 996.
11. GIEC (2007c) 2007 assessment of climate change, synthesis report, IPCC, Geneva, Switzerland, p. 102.