Integrating livestock, agriculture and forestry at the landscape scale. Experiences in West Africa and Brazilian Amazon Regions

Poccard-Chapuis René[1†], Ba Alassane[2], Navegantes Livia[3], Thales Marcelo[4], Claudino Livio[3], Ferreira Laura[3] and Coulibaly Doubangolo[2]

[1]CIRAD, Embrapa Amazonia Oriental, 66095-100 Belém, Brazil; [2]Institut d'Économie Rurale, Mali; [3]Université Fédérale du Pará, Brazil; [4]Museu Paraense Emilio Goeldi, Brazil

This paper explains the importance of the landscape scale for building integrated agriculture, livestock and forestry production systems. It analyzes two contrasted situations of integration agriculture – livestock – forests on a landscape scale: the subhumid zone in West Africa, and the deforestation frontier in the eastern Brazilian Amazon. Three concepts are used.

The landscape is the level at which are defined and directly implemented several fundamental ecosystem services (biodiversity, soil fertility, water in the ground and atmosphere). To produce these services, agricultural practices should integrate landscape organization. In addition, it is at this level that the mineral nutrients and organic manure flows between subsystems are defined, especially in African systems where part of the resource is located out of the exploitation, on collective spaces. Conceiving some integration systems at this level should also improve the performance of animal productions, at the regional scale, thanks to the proximity for producing animal rations, and recycling dejections. Lastly, the evaluation of the ecosystem services on a landscape scale makes it possible to set up systems of qualification of territories, an important tool for the sustainable development and dynamics of green economy.

In West Africa, the methodology is based on cartography tools and a conceptual model of organic manure flows between the breeding and farming systems, on a landscape scale. Data were produced during 15 months accompanying practices of 80 agricultors in a subhumid region. The analysis highlights two principal limits of integration on a landscape scale. On the one hand, the collective management of the resources was not efficient and resulted in a simple appropriation in individual logics, which resulted in the degradation of natural resources. In addition, this appropriation benefitted the largest exploitations, which developed only a very partial integration, which caused losses of nutrients on the territory. Despite everything, the integration of the systems led to a new structuring of the territory, between natural vegetation zones, non fertilized zones of culture, and zones of fertilized cultures.

In the Amazon region, the methodology was based on remote sensing analyses, combined with survey programs at the farm and plot scales, in three agrarian frontier regions. Landscapes are dominated by the expansion of cultivated pastures, whose function is firstly land tenure, and not only livestock production, which results in very extensive management practices. This system caused deforestation, degraded soil and grasslands, and strongly eroded biodiversity. Integration agriculture – livestock – forests can make it possible to develop eco-efficient agricultural landscapes, producers of ecosystem services, developing the strong Amazonian potentialities (biomasses, biodiversity). The technologies already exist, but their adoption is not easy in pioneer regions. This does not facilitate investments in the middle or the long term, nor the coordination between local actors. Experiments in progress show that, conceived on a landscape scale, integration should become more effective and more interesting for the local actors. The implementation of technology profits from indirect effects which facilitates their diffusion and generalization. The qualification of the territories and marketing chains, around the production of ecosystem services, gives access to markets and investors, reversing the trajectory of the frontier regions, towards a durable territorial development.

† E-mail: renepoccard@gmail.com