Territorial resources mobilisation shapes agroecological transitions in crop-livestock systems

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Learning from traditional societies for the agroecological transition of Western livestock systems

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The application of the agroecology framework to livestock farming is based on 5 principles: integrated management of animal health (P1), reduction of inputs using ecological processes (P2), closure of cycles to reduce pollution (P3), use agronomical diversity to increase resilience (P4), and preserve biodiversity (environmental and agronomical) by adapting practices (P5). We examine here to which extent traditional livestock farming societies (TLFS) complies with these principles, through 2 contrasted examples. Andeans systems use cattle, alpacas, llamas and sheep to exploit a variety of natural forage resources, including crop residues, along altitudinal gradient from 2,000 to 4,500 m a.s.l. Mongolian systems use goats, sheep, horses, cattle and camels, quasi exclusively fed on natural rangelands. Both systems produce a variety of products, for markets and for subsistence, and both benefit from their diversity to build resilience strategies. In the Andes, manure fertilise crops and exchange can take place with crop farmers. In Mongolia, herders sell some of their resistant camels or horses to rebuild their goat herd, when this latter has suffered severe winter losses. These TLFS comply with 3 agroecological principles as they use few inputs (P2), aims at closing cycles through crop livestock integration (Andes) (P3) and use species diversity to increase resilience (P4). This compliance is however imposed by the difficult climatic conditions, and the low availability of resources. It is also labour-intensive and exposes herders to climate uncertainty. To inspire agro-ecological transition in Western countries, research should address TLFS weaknesses through 4 questions: How could the labour burden needed to exploit the diversity of resources be reduced? Could it integrate farmers traditional knowledge? Which production optimisation should be targeted to preserve resilience? What importance should be given to the breed phenotypes? How could systems anticipate hazard and not only react to them? Could agro-climate prediction models help? What is the attitude of farmers towards such systems? Could they consider it as examples? Can farmers representation of modernity be an obstacle to the replication of such systems in Western context?

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Recent advances on agroecological transitions are mainly based on concepts and theories and are not grounded to a specific territory, while transitions need specific resources to occur. By exploring 8 farming systems over 4 territories we aimed at underline the role of the diversity of resources in the sustainability of farming systems. We defined four kind of territorial resources: natural (soils, water, ecosystems), technical (equipment, infrastructures, factories), social (knowledge sharing, training, farmers' groups), and economic (supply chains, public policies, local community support). Among the diversity of farming systems within each territory, we select two that are far apart in term of agroecology mobilisation. Both systems combine different resources. But, when agroecological systems rely on resources linked to a proximity area and based on biodiversity, other systems look at resources allowing global exchanges and needing inputs. Farming systems try also to mobilise resources that are connected between them. As an example in Brittany, grassland dairy cow system refer to natural resource 'permanent grassland', on social resources delivering knowledge on permanent grassland management and on economic resource valorising labelled products. In the other hand the diversity of resources mobilised allows duplication of certain knowledge increasing its resilience to resources changes in the territory. As an example in Aveyron grassland dairy sheep systems combine technical knowledge on natural breeding but also integrate the network of local breeders and share their experiment on natural breeding. We conclude that, the larger the diversity of resources is, the easier will be the possibility to find a path to change while remaining resilient.