

Coordination of farmers activities and land use patterns: from single-scale management to multi-scale management

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The farmers as landscape managers

In France, as in other countries of Western Europe, agriculture plays a major role in changing landscape, because agrarian land covers as much as 60% of the total land area. Farming activities are the main drivers of land use patterns and landscapes changes. When making decisions on land use, farmers take into account their own prospective as well as informations coming from collaborations with other farmers, advisers, etc. and family objectives. Productions and their relative importance, farming methods and also cropping patterns are important points of the decision process. The results, land use allocation, is seen in fields and landscapes.

Farm territory characteristics (fields characteristics and spatial distribution) and land use allocation decisions are the joint factors of the land use spatial pattern.

The standard view of a farmer running his/her farm is more and more overridden by the view of farmers organised in groups to buy machinery and to help each other in their activities. This necessitates a decision process at both the farm and the farmers group levels. The objective of our work is to understand how this multiple scale decision process influence land use and landscape patterns within small regions.

Farmers organisations and technical coordination

There are various forms of cooperation among farmers from informal networks to cooperative for production.

In France, a specific cooperative network was developed after the Second World War. They are cooperatives for the common use of farm implements (CUMA = Coopérative d'Utilisation du Matériel Agricole). It was created to reduce the costs of the farm mechanisation; but it is also a professional work group. CUMAs allow to compensate the increasing lack of work-force in farms thanks to organisation and, especially, realisation of farming work in common. Not only are equipments mutualised, but also working forces and skills. There is a real technical coordination which allows to share efficiently farmer's resources. The CUMA is, as the farm, a decision making and operational entity (decisions are taken and carried out by the same operators).

The necessity of technical coordination varies according to:

- (i) numbers of people, of equipment and competences to be mobilized to implement an action or a technical operation. A mowing operation only requires a driver and a tractor, whereas a silage operation requires during its most active part, an silage harvester, a minimum of two trailers, three tractors and corresponding drivers. Agricultural activities carried in groups, particularly harvesting, need more technical coordination than individual activities.

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- (ii) time constraints disposition (period) and shaping (duration) of a favourable temporal frame, is also primordial in the technical coordination. Winter activities benefit from a large temporal flexibility owing to a weak competition between activities during this period. Activities can be spread over time and therefore minimise the need for coordination. On the contrary, an activity which takes place in the summer as wheat harvesting does not benefit from the same flexibility, for it competes with other activities (grass regrowth haying, milking, etc.). The available temporal frame is reduced and requires coordination between activities, and also for the realisation of the activity itself (pressing, simultaneous straw collection with two tractors, a press, a trailer and two drivers). Finally, frequency of activity also has an influence. Being in a CUMA for a selective activity such as weighing animals does not have the same implication as carrying a daily activity (e.g. feeding animals).

Technical coordinations have a spatial projection

We make the hypothesis that the field pattern is an important factor for technical coordination. The latter includes a coordination on land use allocation to fields within the set of farms. Three sets of variables are taken into account in the organisation of the work (i) field characteristics as size, shape, type of access (sunken or tarred road), distance, topography, (ii) machinery characteristics (width, height...), and (iii) modes of the financial cost evaluation of the work (on the basis of an hour, hectare or tonne) or modes of functioning. Available land for a given activity will either be reduced or enlarged when decisions are made within the cooperation. Technical coordination can therefore have an influence on land use allocation. Thus, the technical coordination has a spatial projection : the land use coordination.

A survey design has been set to test this hypothesis, which is supported by a survey of CUMAs and of their adherent farms. The aim is to reveal CUMAs organization (functioning, management, decision rules) and then estimate its role as land use spatial organisation agent of farms. The employed method is applied to silage and crop harvesting situations (farming activities which need more coordination) for which we collect organisation forecast (dates, progress, location, contributors, planning documents). We follow farming work while in progress to analyse the discrepancies between actual and projected work. Having identified and measured the gaps between forecasted and realised action, we try to determine how and on which occasion land intervenes. The work mobilizes three types of tool : (i) field pattern maps, (ii) crop successions and grassland management statements, and (iii) involvement of equipment and labour schedules. We choose these three tool types in order to register, visualise and compare, in time and space, CUMAs activities.