4 Driving forces for spatial change in agriculture

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Agriculture is an economic sector that covers most of the land surface in Europe. Due to political, economical, technical and social changes the allocation of agriculture has changed over time. This process will continue in the future. Because of the vast area of land used by agriculture changes will affect spatial planning policies in the various member states and regions of the EU25. At present, spatial consequences are hardly being taken into consideration in the debates on agricultural policy.

Introduction

The laws of economics dictate that agriculture can only survive in the long term in areas where it is profitable, that is, where yields exceed costs. In a situation where there is a large market with more or less uniform prices (e.g., the world market or the common EU market), profitability is largely determined by costs. Areas offering favourable production conditions allow more efficient production. Such areas are said to have comparative cost advantage and offer the perspective of a lasting and sustainable agricultural production.

Aspects that come to mind in relation to production conditions are often abiotic and climate factors. Traditionally, aspects like the availability of fertile soil, sufficient water of adequate quality, easy access and suitable parcelling are regarded as the decisive factors for land-based agriculture. Ever since the 1950s, land use planning schemes in the Netherlands and also elsewhere in Europe have therefore concentrated heavily on improving these production conditions. However, it are not only the physical conditions which

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determine farmland allocation; other factors include land price (insofar as it does not result from physical qualities but from the demand for space by other functions) and the proximity of infrastructure elements, suppliers and customers.

In this contribution we describe two examples of the influence of different aspects on the spatial configuration of several agricultural sectors (primary production). The European example illustrates an analysis of 'most suitable' regions on a European scale. The Dutch example illustrates an analysis of driving forces for change within the Netherlands.

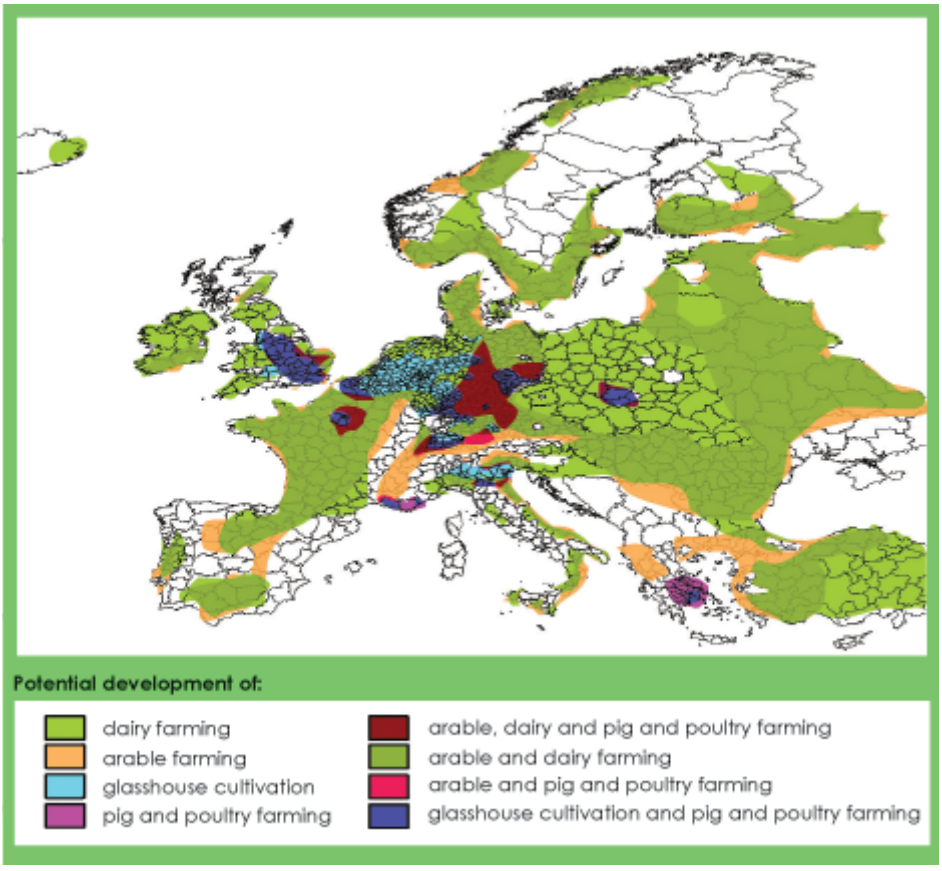

Figure 4.1: Optimal allocation of primary production sectors in the EU-25 (see text).

European scale: agricultural potential in Europe

At the European scale we considered four main factors that determine the allocation of agricultural activities i.e.

- physical conditions
- neighborhood of urban areas
- transport and logistics
- environment

It will be obvious that these four factors do not impact equally on all agricultural sectors. Briefly, the following factors are critical for agricultural sectors:

- Arable farming - physical conditions and the urban system (land price)
- Dairy farming - the urban system (land price) and physical conditions
- Pig and poultry farming - transport and logistics and the environment
- Glasshouse cultivation - transport and logistics and the urban system (land price)

To assess which parts of Europe offer the greatest potential for each of these sectors, maps for each critical factor were made and subsequently combined. The resulting maps offer a (simplified) overview of the areas where a specific sector has potential for growth. White areas on the maps are either unsuitable or are areas where the sector is present but is expected to stabilise or downsize.

Figure 4.1 was obtained by combining the individual maps for each sector. It shows the potential offered by various regions for the different types of agriculture. The map reveals two 'meta-cities': the Po valley conurbation and the North-West European delta metropolis (the polygon encompassing London, Paris, Cologne and Amsterdam). In the immediate vicinity of these two meta-cities there is a zone providing high-return products that are voluminous and hence involve high transport costs. These include especially vegetables, fruit and ornamental plants. At a certain distance from the meta-cities, the zones offering potential for various agricultural sectors seem to overlap. In these areas, land prices are not boosted by urban pressure, while at the same time the distances to the conurbations are not too large and physical conditions are favorable. These areas

include Central Europe and northern parts of France, as well as parts of Great Britain. At greater distances from the meta-cities, agriculture will be largely limited to arable farming and/or dairy farming.

Spatial changes in agriculture in the Netherlands

The objective of the Dutch example is to illustrate spatial differences within the Netherlands. The agrosector encounters different problems, which can be divided into profit, planet and people aspects.

Table 4.1: Context of the three approaches examined

	Profit	**Planet**	**People**
Problem	Limited competitiveness of agrarian holdings on consumer market and land market	High levels of nutrients in soil and water	High population pressure and therefore a high demand on land for housing and recreation
Objective	Competitive agrarian holdings on consumer market and land market	Low levels of nutrients in soil and water	Development of agriculture in areas with lower population pressure
Indicator	Average income per farm and per hectare	Area with potential environmental problems	Urbanized area in proportion to agricultural area

Profit

A sufficient income is the basis for farms to exist. Two indicators were identified to illustrate the economical viability of the Dutch agrosector. One indicator is used to illustrate the competitive position on the international market, the other to illustrate the competitive position on the local land market.

Planet

Due to intensive livestock farming, the Netherlands face eutrophication problems through nitrogen and phosphorus from animal manure. As an example of the impact of environmental aspects, soil properties were indentified that limit the possibilities for agriculture because of accumulation of phosphate in the soil and leaching of nitrogen to groundwater and surface waters.

People
As a social-cultural pressure on agriculture we chose urbanization. We expect that the higher the population pressure, the higher the demand for land for housing, infrastructure and recreation will be. As a result less land will be available for agriculture.

For such an analysis the regional scale is the most suitable scale to use. However, the boundaries of agricultural regions for assessing the profit aspects are not the same as those for the physical-geographical regions for assessing the planet aspects. And demographic regions to assess people aspects know even other boundaries. To tackle this problem, we chose an administrative division at a sub regional level: municipalities. Because the municipalities differ considerably in size, the indicators were not used as absolute figures but as relative figures.

Three scenario's for possible changes
We do not know which factor will be the most decisive for the future of agriculture in the Netherlands. Therefore we explored three possible scenario's for spatial changes. We expect that the international market, local land prices and urbanization may be decisive factors for different agricultural sectors. Therefore in each of the scenarios one of these factors is leading. The chosen indicator for

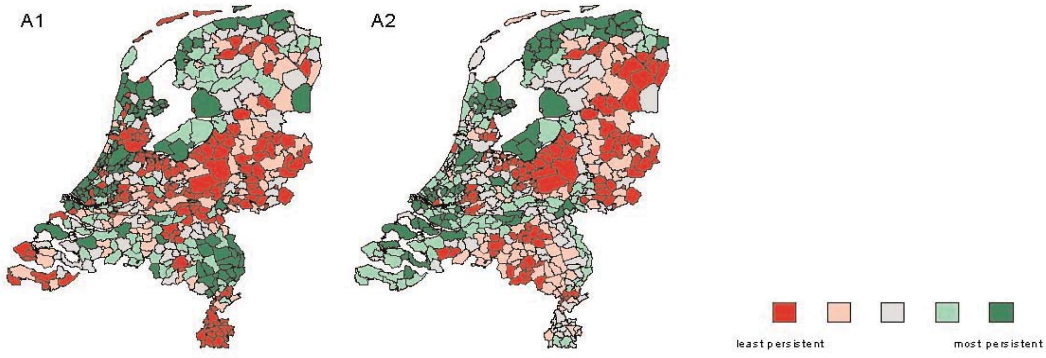

Figure 4.2: Scenario 'International market"; map A1 shows the persistence of agriculture when the international market is leading, A2 shows the results when also the environmental conditions are taken into account. The scale moves gradually from most persistent (green color) to least persistent (red color).

environmental aspects is restricted to livestock farming. Therefore for each scenario an extra map was made to illustrate the effect of the environmental limitations (Figures 4.2,4.3 and 4.4).

The first map (A1) of Figure 4.2 shows the results of the scenario 'International market'. If the competitive position on the international market will be the most decisive small farms will have a hard time to survive. The areas were these farms are concentrated are found in the middle and east of the Netherlands, as well as in the south-east en south-west. Because of environmental limitations scaling up is not a feasible option. In these areas it will be an option to generate more income by means of providing other (green) services like water storage and nature conservation, but also by offering tourist and recreational services.
In the middle and east this process will be accelerated because of the environmental vulnerability of these areas (map A2). From an economical point of view scaling up farms could be an option to meet the immediate demand of more income. The environmental problems however will still be there and demand large investments, which will be difficult to be done. Even more important will probably be the social-cultural aspects. The areas under discussion are areas with highly valued landscapes, which also have a high potential for recreation and nature. Development to multifunctional agriculture, where the role of

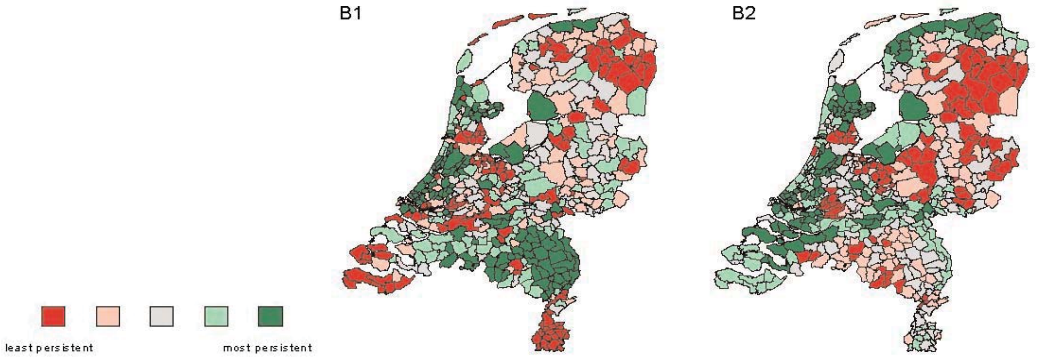

Figure 4.3: Scenario 'Local land market'; map B1 shows the persistence of agriculture when the local land market is leading, B2 shows the results when also the environmental conditions are taken into account. The scale moves gradually from most persistent (green color) to least persistent (red color).

agriculture as source of income will be relatively small and other services provided by the farms may also add to the income.

Map B1 of Figure 4.3 shows the results of the scenario 'Local land market'. If the competitive position on the local land market will be the most decisive factor arable farming in the northern part and in the south-west will have the most difficult position. Because the environmental conditions in these parts are relatively well, it's likely that livestock farming will take its place (map B2). The challenge will be to shape this process in a way to develop sustainable husbandry.

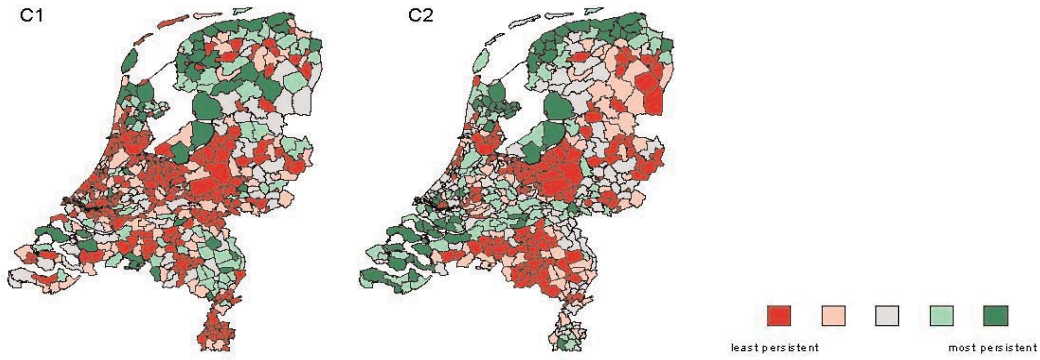

Figure 4.4: Scenario 'Urbanization; map C1 shows the persistence of agriculture when the local land market is leading, C2 shows the results when also the environmental conditions are taken into account The scale moves gradually from most persistent (green color) to least persistent (red color).

If the pressure from urbanization will be the most decisive factor, agriculture in the urbanized areas will have the hardest time. These areas are found in the west and middle. In this case, the economic relatively strong agricultural sectors like intensive dairy farming and intensive horticulture will have to compete with other economical activities. On the other hand, the urbanized areas provide also a good infrastructural network that is important for distribution of the products. In this light, the relatively large and economic strong glasshouse cultivation complexes in the west have a good chance to survive. The relatively small pig and poultry farms in the middle and south that also have to deal with the environmental conditions will have to find an answer to this pressure.

Lessons learned:
Our analyses show that the spatial distribution of the various agricultural sectors is subject to the interplay of a number of mechanisms. The combination of different forms of agriculture and different regional characteristics results in a patchwork of options. This patchwork is, however, not a blueprint of what is happening or supposed to happen. Rather, it indicates the relevant forces which determine the chances of success for certain developments.

Agriculture is complex. Our analyses show that location factors for agricultural sectors, at both the European and the national level, are determined by developments within agriculture (intensification, the impact of transport distances, sustainability, etc.) as well as beyond agriculture (urbanization, struggle for land). The resulting overall picture could be debated from a whole range of perspectives, which is precisely what the authors feel should happen: there ought to be a European debate on the forces that determine the spatial allocation of agricultural activities. It is important to examine the available information on the basis of adequate knowledge of specific circumstances, to allow a balanced view.

In any scenario, agriculture is the key structuring spatial factor in Europe, which means that agricultural policies largely coincide with spatial planning policies. When looking at the economical and physical factors, we expect considerable shifts in the allocation of agricultural activities over the next few decades, which will have great consequences for land use and spatial planning policies in the various member states and regions of the EU25. The impact on the landscape and the livability of rural areas will also be great. At present, spatial consequences are hardly being taken into consideration in the debates on agricultural policy. We therefore feel that an agenda should be drawn up for the combination of agriculture and spatial planning in Europe.

References:

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