NETHERLANDS SCIENTIFIC COUNCIL FOR GOVERNMENT POLICY

PERSPECTIVES FOR RURAL AREAS IN THE EUROPEAN COMMUNITY

PRESENTATION BY PROF DR IR R. RABBINGE
TO THE COUNCIL OF MINISTERS ON OCTOBER 1, 1991

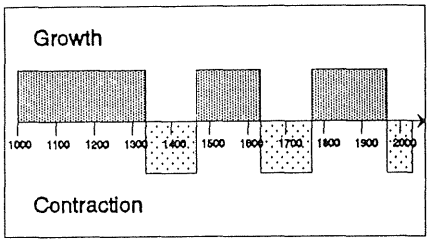
1

Land use in Europe

- fluctuations in cultivated area
- fluctuations in demand for agricultural products

2

Agricultural area in EC



3

Present situation

- continuing rise in productivity
- self sufficiency
- budget problems
- other goals (environment, employment, income)

1

I will today present to you some preliminary results of a study by the Council on possible changes in land use in the EEC.
The Council foresees major changes in land use during the coming decades. We wanted to get some quantitative information on what the future may hold.

Land use changes are of all ages. Under the influence of changes in demand, caused by demographic events, the cultivated area of Europe has shown considerable fluctuations.

2

Historical records show periods of growth or expansion of the cultivated area and periods of decline or contraction.
Traces of agricultural contraction can for instance be seen on areal photographs where 'footprints' of lost villages from the Middle Ages are visible. During distinct periods large numbers of agricultural settlements were abandoned.
The idea that we may be facing a new period of contraction is therefore not exceptional.

3

At present the situation in EEC agriculture can be characterized as follows:
a. Productivity continues to rise thanks to advancements in agronomic knowledge and - more importantly - by the built-in incentive to increase productivity. The use of inputs per unit of output decreases when higher yields per hectare are realized. So increasing the yields per hectare adds a bonus.
b. In the Community this has led to a situation of self-sufficiency for most agricultural products.
c. After self-sufficiency was reached, productivity growth continued to rise. This led to overproduction with major budgetary consequences.
d. At the same time attention has grown for other goals than agricultural production. Environment, employment and farmers income are nowadays tightly linked to developments in agriculture.

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Perspectives

- food security guaranteed with a low number of farmers
- more space for nature conservation and recreation

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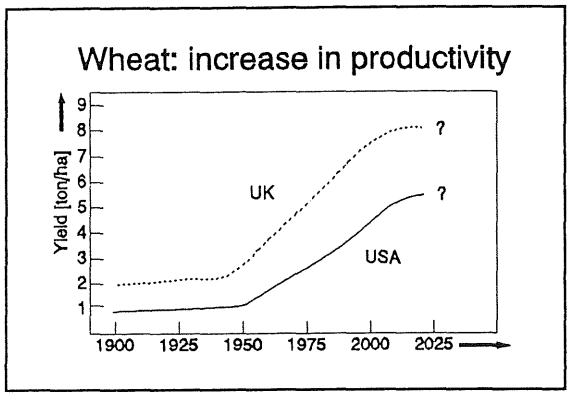

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Limitations

- well defined yield maxima
- maximum demand
- constraints due to non-agricultural objectives

4

From this outline of the present situation we can already see some perspectives. The continuing rise in productivity means that *food security within the Community can be guaranteed with only a relatively small number of farmers on a relatively small area.* Much space and work force can be used for other aims, like nature conservation and recreation.

5

Developments in productivity show a steady increase all over the world. In this graph the increase in yield per hectare for wheat is shown. Both the UK and the USA show an ongoing rise in productivity especially after World War II.
Of course these developments will not go on for ever, although until now there is no slowing-down. When and at which level the maximum will be reached is not very clear.

6

Our study is aimed at defining the limitations to this growth in productivity. In the end those limitations will define the possibilities of agriculture in the Community.
The limitations are of three types:
Firstly *technical limitations*: there is a well defined yield maximum for each crop, given crop properties and climatic conditions. This tells you how much useful product can be produced when plants grow under optimal conditions.
Secondly *demand limitations*: now that population growth in the EEC has come to a standstill, consumption will no longer rise and non-food uses of agricultural produce appear to be limited.
Thirdly *limitations that stem from policy-goals*: socio-economic goals, and aims in the field of nature conservation, recreation and the like.

In our study we focus on the effects of policy in relation to the technically possible productivity growth.

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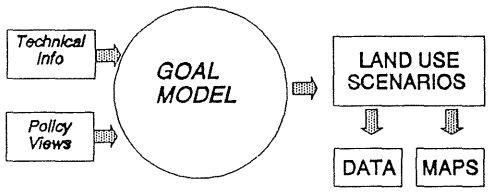
Objectives of the study

- explore policy options
- show consequences of policy choices
- evaluate instruments

8

Method



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Results: technical info

- land evaluation

7

This leads to the following approach.
Firstly we explore alternative policy choices, given the developments within the agricultural sector.
Then we show the consequences of different policy goals for developments within agriculture.
And finally, once the consequences are clear, we can evaluate instruments in order to define policy options.

8

For our study we developed a computer model which calculates **optimal** land use in the Community of the twelve member-states (the territory of the former GAR has not been included).
Inputs in the model are:
Technical information, about the possibilities of agricultural production.
Policy views that indicate a desired priority between different goals and the levels to which these goals should be fulfilled.
With these data the model creates different scenarios for land use. Policy-makers can now see how their priorities will affect land use en how the effects are distributed over the EEC.
It must be clear that these scenarios show *possible options under optimal conditions for agricultural production*. We assume that farmers use the best technical means and that farming activities are located where soil and climate conditions are optimal for a given crop.
The scenarios show the extremes in the form of *data* (how many hectares and how many farmers are needed for production) and *maps* (where agricultural production will take place if one optimizes conditions).

9

Our study has generated a lot of technical information.
Firstly we have carried out a land evaluation of the EEC. Strangely enough such land evaluations have been performed for a lot of developing countries, but are hardly available for Europe.

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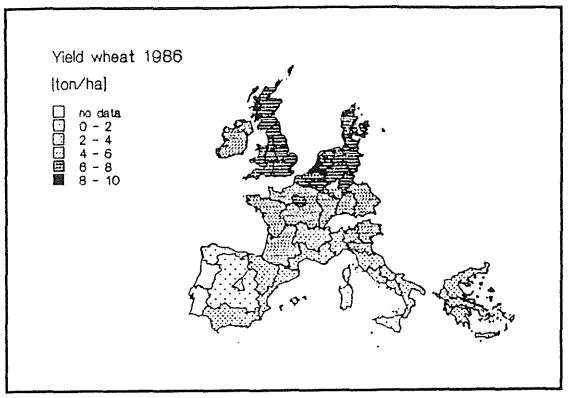

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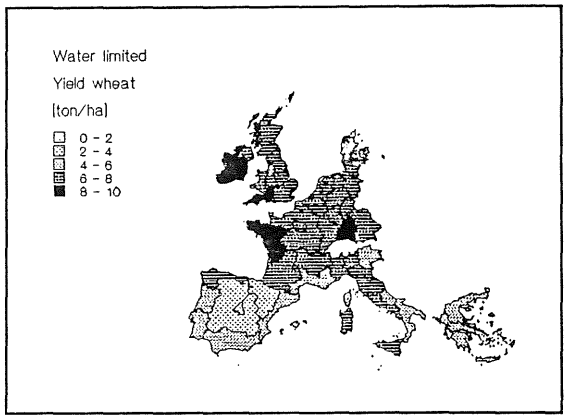

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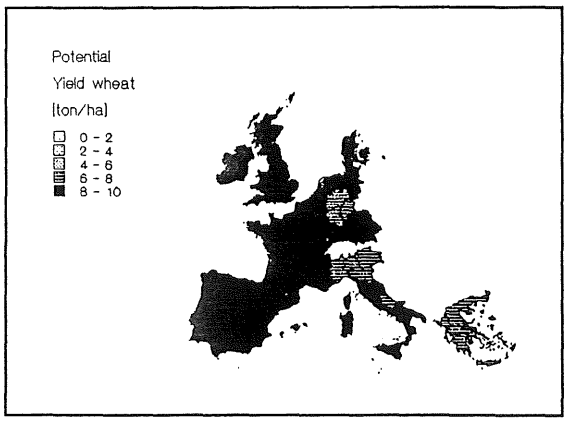

We used this land evaluation to assess where crops could be grown and what maximum crop-yields are at a given location.
To that end we discern between two situations: a maximum yield, using only the available water (rain-fed agriculture) which we call "water limited yield" and a maximum yield when irrigation of drainage removes limitations (we call this "potential yield", because it shows the absolute maxima).

10
Let us take wheat as an example.
On this map the actual yield of wheat is shown for regions within the EEC. The colours show the actual yield **per hectare** within that region.

11
We can compare the actual productivity with the *water-limited* yield that the land evaluation shows. This map shows the maximum attainable yield per hectare within each region under optimal conditions, but with the water-supply limited to rainfall. The differences are clear.

Looking at a map like this one, one must be aware that the given results are averages: parts of the regions indicated are in fact not suitable for wheat farming. Annex 1 contains a map that shows the locations where wheat actually can be farmed. In our study we worked with this more detailed information.

12
If the water limitation is removed, this is the very spectacular result; the assumption is here that in some regions extensive irrigation schemes will be introduced.
Please note that this gain is an extreme, showing what is technically possible. No account is taken of the possibilities or impossibilities of irrigation in real life.
We have performed this land evaluation not only for traditional agricultural products, but also for forestry. It turns out that areas favourable to forestry coincide with the higher yield-

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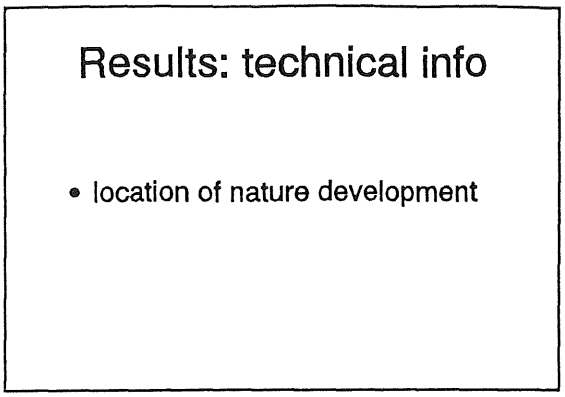

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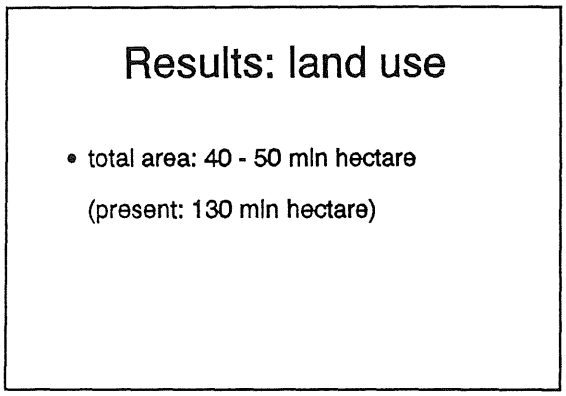

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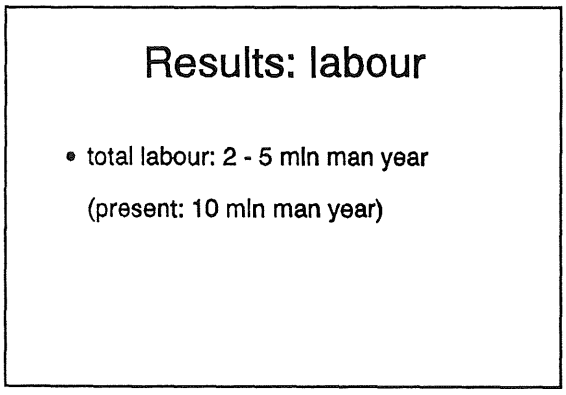

ing arable farmlands, even in the case of low demanding tree species.

13
Another result of the study is a map that shows the preferred locations for nature conservation and development.
This technical information, based on a set of criteria, is also used as an input for the scenarios.

We use the model to calculate scenarios on the basis of alternative policy views.
Each policy view results in a different scenario, but there also some general results.

14
All options imply a radically diminished use of land for agricultural purposes. At present in the EEC about 130 mln. hectares are used as farmland. *All scenarios show a spectacular decline to roughly 40 to 50 mln. hectares.*
Even if one tries to maximize labour within agriculture, no more than 50 mln. hectares will be needed for production under optimal conditions.

15
Another result from the scenarios is that by using best technical means under optimal conditions *only 2 to 5 mln. man years are needed for the total agricultural production.* At present about 10 mln. man years are involved in the primary production.

16

Results: pesticides

- use: 40 - 80 mln kg active ingredient

  (present: >400 mln kg a.i.)

16

Another striking feature of all scenarios is the *dramatic decrease in the use of pesticides.* Under optimal conditions only 40 to 80 mln. kilograms active ingredient are needed throughout the EEC. Presently more than 400 mln. kilograms are used.

17

Results: land use allocation

A• free market - free trade
minimize costs

B• autarchy
maximize employment

17

If we look at the maps which result from the scenarios, we see the location of production given different policy views.
I will demonstrate this starting from two alternative policy views. In our final report more views will be taken into consideration.
The first view is based on free market - free trade ideas. In this scenario costs of production are put as low as possible.
The second view is based on reaching autarchy within the EEC. In the scenario calculations employment is maximized.

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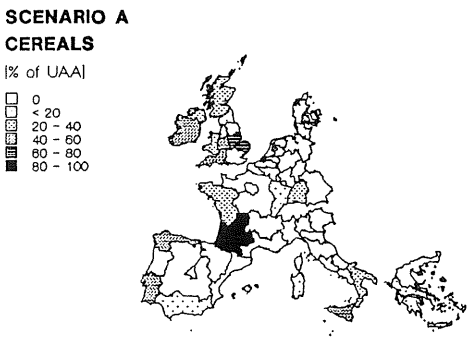

18 & 19

These two maps show the locations of cereal production according to these alternative policy views. The volume of production is equal in the two scenarios, but the location differs. In scenario B the production is spread wider across the regions in order to fulfil the goal of regional employment. In scenario A only the most efficient regions are used for production.

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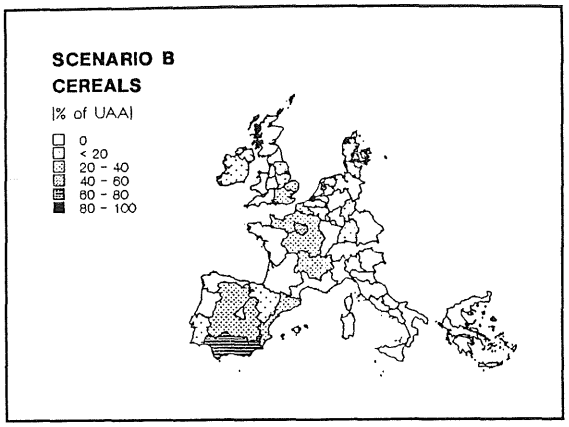

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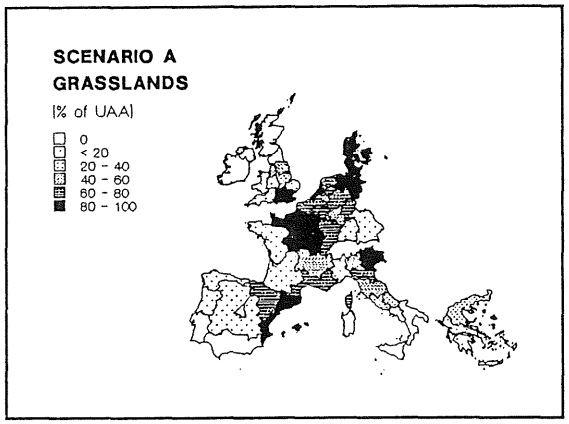

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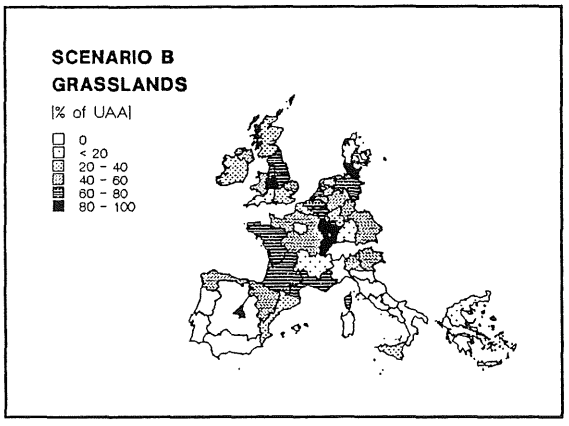

20 & 21

In these two maps the locations of grassland are shown in the two scenarios. Of course, these maps must be interpreted together with the previous two. The location of grassland, combined with the location of cereals and combined with all other forms of land use, forms an optimal solution to the different policy views.

It can be seen that grasslands in some areas near the Mediterranean are optimal in terms of minimizing production costs.

This will be an effect of the longer growing season in Southern regions.

The scenarios generate not only information on important macro policy indicators, but also on the optimal allocation of land use.

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Conclusions:

- in all policy options major changes in land use are inevitable

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Conclusions:

- room for mitigations by policy is present but limited

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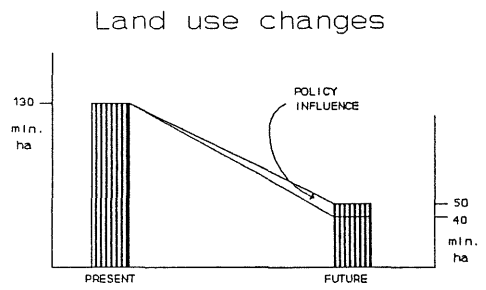

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The conclusions from our study can be summarized in three statements.

i. As demonstrated, major changes in land use are inevitable in all policy options. All scenarios point to a *dramatic decrease in farmland*.
About one third of our present area under cultivation will be sufficient once productivity in the EEC reaches the optimum.

23

ii. The differences between the scenario results indicate that there is room for policy, but the possibilities to mitigate effects are limited.
This is illustrated by the following graph.

24

This graph shows that present land use of 130 mln. hectares will eventually come down to the range that was mentioned, be it that these figures are extremes.
Technical development will bring about a maximum decrease of 90 mln. hectares. Through policy intervention it is possible to opt for either the lowest figure of 40 mln. hectares or the highest figure of 50 mln. hectares. So policy will have an effect, but compared to the decrease brought about by technical improvements this effect will be limited.
Of course, as shown on the distribution maps, policy can have a major impact on the distribution of agricultural production locations over the member states.

25

Conclusions:

- study offers a tool for strategic policy choices

25

iii. Finally, we can conclude that our study, once finished, will offer an effective tool for strategic policy choices. I hope that you will use it to this end.

I thank you for your attention.

ANNEX 1

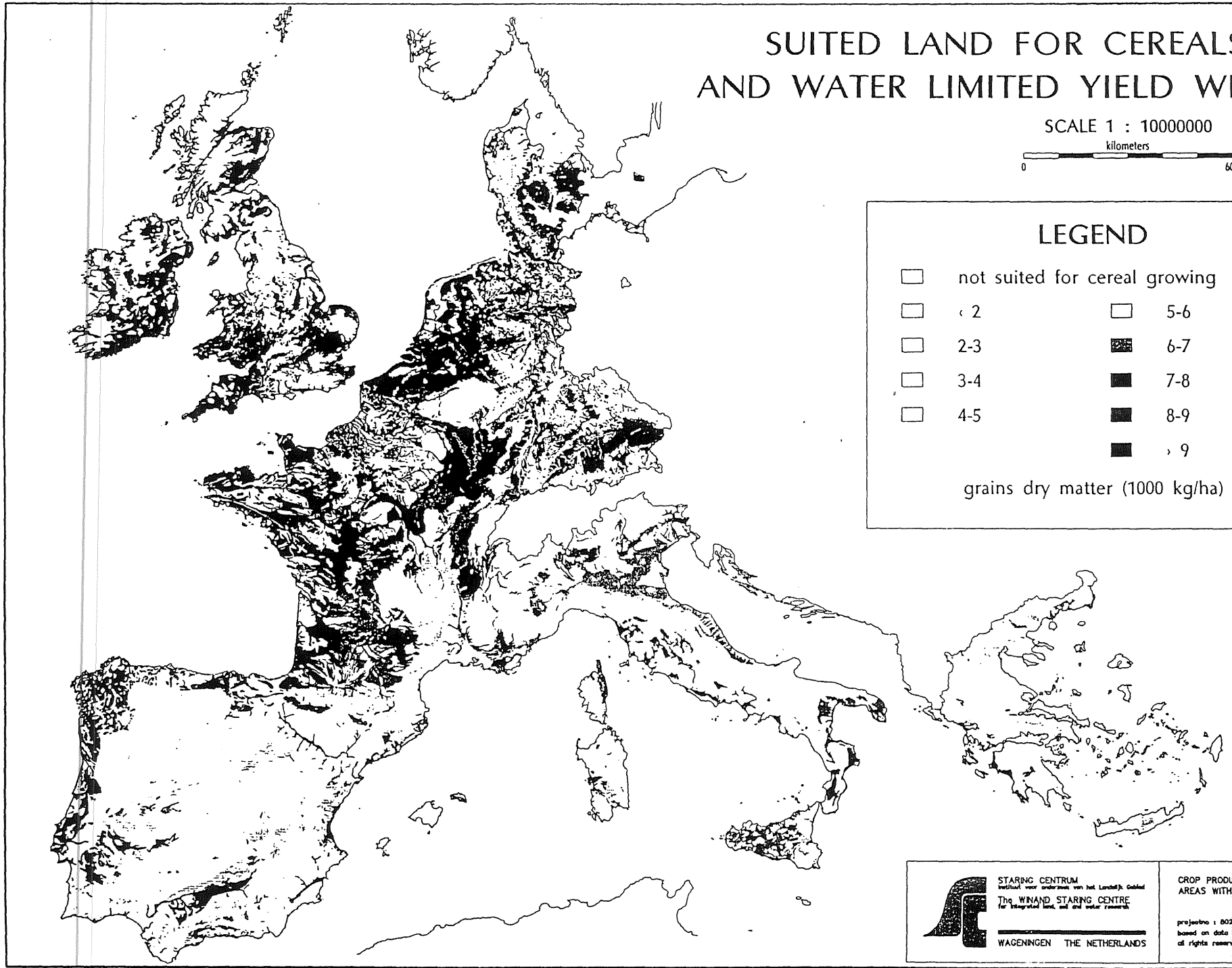
SUITED LAND FOR CEREALS AND WATER LIMITED YIELD WHEAT

SUITED LAND FOR CEREALS AND WATER LIMITED YIELD WHEAT

SCALE 1 : 10000000

kilometers

0 600



LEGEND

- not suited for cereal growing
- ‹ 2
- 2-3
- 3-4
- 4-5
- 5-6
- 6-7
- 7-8
- 8-9
- › 9

grains dry matter (1000 kg/ha)

STARING CENTRUM
Instituut voor onderzoek van het Landelijk Gebied
The WINAND STARING CENTRE
for integrated land, soil and water research
WAGENINGEN THE NETHERLANDS

CROP PRODUCTION POTENTIAL OF RURAL AREAS WITHIN THE EUROPEAN COMMUNITY

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based on data provided amongst others by CORINE

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