Environmental trends in Europe

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Introduction

The aim of this short paper is to give a brief overview of environmental pressures that are apparent in Europe. Since the focus is on agriculture, not all environmental issues are described, but only the environmental issues that have or are expected to have a substantial impact on the agricultural sector. The importance of environmental conditions for agriculture is self-explanatory: soil, water and atmospheric quality are crucial for agricultural production. Environmental deficiencies can be compensated by 'anthropogenic' actions, like fertilizer, irrigation systems and greenhouses, but these actions are more capital-intensive. The future environmental impacts on the one hand, and the effects of anthropogenic responses on the other hand can be simulated by combining different modeling and scenario efforts with an integrated assessment model like the IMAGE model (MNP, 2006).

Climate change

There is increasing evidence that most of current global warming is human-induced and is having widespread impacts (IPCC, 2007a). Europe is warming up faster than the global average and the number of extreme weather events and climate-related disasters such as floods, storms, droughts and heat waves has increased (EEA, 2004a). For the agricultural sector, climate impacts are diverse. Crop productivity is projected to increase slightly at mid to high latitudes globally for local mean temperature increases of up to 1-3°C depending on the crop. Globally, the potential for food production is projected to increase with increases in local average temperature over a range of 1-3°C, but above this it is projected to decrease. In Southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a region already vulnerable to climate variability, and to reduce water availability and crop productivity. In Northern Europe, climate change is initially projected to bring mixed effects, including some benefits such as increased crop yields and increased forest growth. However, as climate change continues, its negative impacts (including more frequent winter floods, endangered ecosystems and increasing ground instability) are likely to outweigh its benefits (IPCC, 2007b).

The EU has set a long-term target to restrict global temperature increases to a maximum of 2°C compared to pre-industrial levels. This will require major changes in greenhouse gas emissions worldwide. While global emission scenarios allow an initial increase in emissions, rapid growth in developing countries will require earlier – and immediate – action from industrialized countries; such that EU-25 emissions in 2025 are some 25–40 % below 1990 levels (Criqui et al., 2003). In the early decades, many of these greenhouse gas mitigation efforts can be taken in the agricultural sector like livestock and fertilizer use (RIVM, 2004).

Energy policies

Promotion of renewable energy is a major priority in EU energy policy (EC, 2000). Whereas large-scale hydropower is able to compete in a free energy market, other renewables still need policy support. To this end, Member States apply a blend of policy instruments. The main instruments used to support renewable energy are feed-in tariffs that guarantee a fixed favorable price for each kilowatt of renewable electricity produced (e.g. in Denmark and Germany) and regulation that guarantee a certain level of demand (e.g. in the UK and Italy).

For the agricultural sector, current policies to implement biofuels are very important. It is estimated that in order to meet the EU 2010 target of 5.75 % share of biofuels in transport, 4 – 13 % of the total agricultural area in the EU-25 will need to be cultivated with biofuel crops (EC, 2003). In 2020, the EU wants to have a share of 20% of use of renewables, of which 13% will have to come from biomass. The European Environmental Agency estimated that in 2020 almost 100 Mtoe can come from biomass from abandoned agriculture, on the basis of assumptions that Common Agriculture Policies are removed entirely (EEA, 2006). However, from other European agricultural studies it is concluded that the availability of agricultural land is highly dependent of decisions in CAP-reform (WUR/MNP, 2007). In the Table below, the land availability of different studies shows the high uncertainty in this matter, indicating the uncertainty in biomass potentials in Europe. Concluding, die to new biomass policies, the link between the agricultural and energy sector becomes even stronger than it was before.

Table 1: Availability of abandoned land in Europe (in kha; EEA, 2006 and WUR/MNP, 2007). First row is taken from EEA, the second and third row from EUruralis (WUR/MNP, 2007). The second row is based on full liberalization (Global Economy scenario) and the third row on continued protection of European agriculture (Continental Markets scenario).

Austria	Czech Rep	Finland	France	Germany	Greece	Hungary	Italy	Lithuania	Poland	Spain	Sweden	UK	EU-25
266	314	299	1000	2000	298	512	1786	882	4321	2582	168	1118	16170
460	0	608	3045	2975	425	315	2438	293	0	1928	792	744	15813
311	15	243	238	862	0	80	1177	0	168	0	458	156	4752

Nature and biodiversity

Biodiversity represents the abundance and richness of genes, species and habitats. To date, the abundance of characteristic species in Europe has been reduced – on average to about 45 % of its level some 150 years ago (see Figure 1; RIVM, 2004). These provisional estimates are based on model results and literature. This means that many characteristic species have become much less abundant or even extinct, and a few other species much more abundant and widespread. This is a process that has been driven by increased and intensified land use through urbanization, agriculture, forestry and pollution. On the other hand, Europe's traditional agricultural landscapes have made room for new biodiversity. Europe still has large areas of low-intensity agricultural land with a high nature value, especially in the Southern and Eastern parts of continental Europe and Northern UK (EEA/UNEP, 2004). At the same time, the high level of biodiversity in these parts is vulnerable; both intensification and land abandonment will result in a loss of biodiversity. In other words, agriculture over many centuries is a main driver of biodiversity loss in Europe and likewise, policies to protect biodiversity will also impact agricultural practices to a large extent (CBD/MNP, 2007).

The EU has set an objective to significantly reduce or even halt the loss of biodiversity by 2010 (Convention on Biological Diversity, Gothenburg Council on the EU Sustainable Development Strategy and 6th Environmental Action Plan). To achieve this objective, the European Biodiversity Strategy focuses on three areas:

i) protection of natural habitats and species. The central pieces of legislation are the Birds Directive (1979) and the Habitats Directive (1992). These require the designation of protected areas as contributors to the EU's Natura 2000 network of nature areas;

ii) integration of the protection of biodiversity into environmental policy, e.g. the Water Framework Directive and the NEC directive;
iii) integration of biodiversity in sectoral policies, such as fishery, forestry and agriculture.

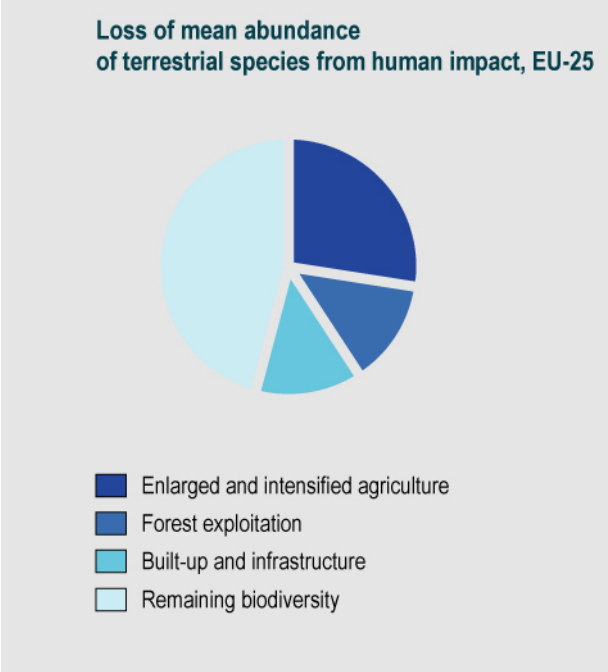

Figure 1: Pressures driving loss of mean abundance of terrestrial species in the EU-25. The baseline (100%) indicates biodiversity around 1850 (RIVM, 2004).

Nitrogen policies

By aiming to ensure a high-quality chemical environment, EU environmental policy provides boundary conditions for protection of biodiversity. A large number of environmental directives are designed to reduce reactive nitrogen pollution in the air, groundwater and surface water in order to protect forest and water ecosystems from eutrophication, one of the most important environmental problems in Europe. These policies are mainly impacting agricultural practices.

At least 30-40 % of rivers and lakes in the EU-15 show signs of eutrophication symptoms or bring high nitrogen fluxes to coastal waters and seas. Some 55 % of terrestrial ecosystems in EU-25 also receive nitrogen loads above the critical values (Posch et al., 2003). Although there is no indicator for the overall excess nitrogen load on the environment in EU countries, sectoral data indicate that EU regulations have caused a slow but steady decrease in the total nitrogen load to the environment in Europe (Figure 2). Nonetheless, Member States face a major task in meeting the targets set in several nitrogen directives, such as the ceilings for NO_x and NH_3 in the NEC directive, the limit values for NO_3 concentrations in groundwater in the Nitrate Directive and emission reduction targets for nitrogen in the Urban Wastewater Treatment Directive (RIVM, 2004).

As a consequence of these strict policies the nitrogen surplus in the EU-15 is slowly but steadily being decoupled from production (Figure 3, left). Where numbers of animals are fairly constant (EEA, 2003), the gradual decline in excess nitrogen might be due to more efficient use of nitrogen by cattle and crops. Nonetheless, implementation of the Nitrate Directive has not been easy in a number of Member States. Decoupling is much less in evidence for pesticide use

(Figure 3, right). Today, pesticide policy is still strongly influenced by national policies, which differ among Member States. Denmark is one of the countries with the most restrictive policy: it not only controls the supply side of the market through strict laws but also taxes pesticide use. Harmonized testing and market authorization of pesticide components at the EU level is ongoing; a thematic strategy on the sustainable use of pesticides will be finished in 2004. This can, in the near future, strengthen the effect of EU policy on decoupling.

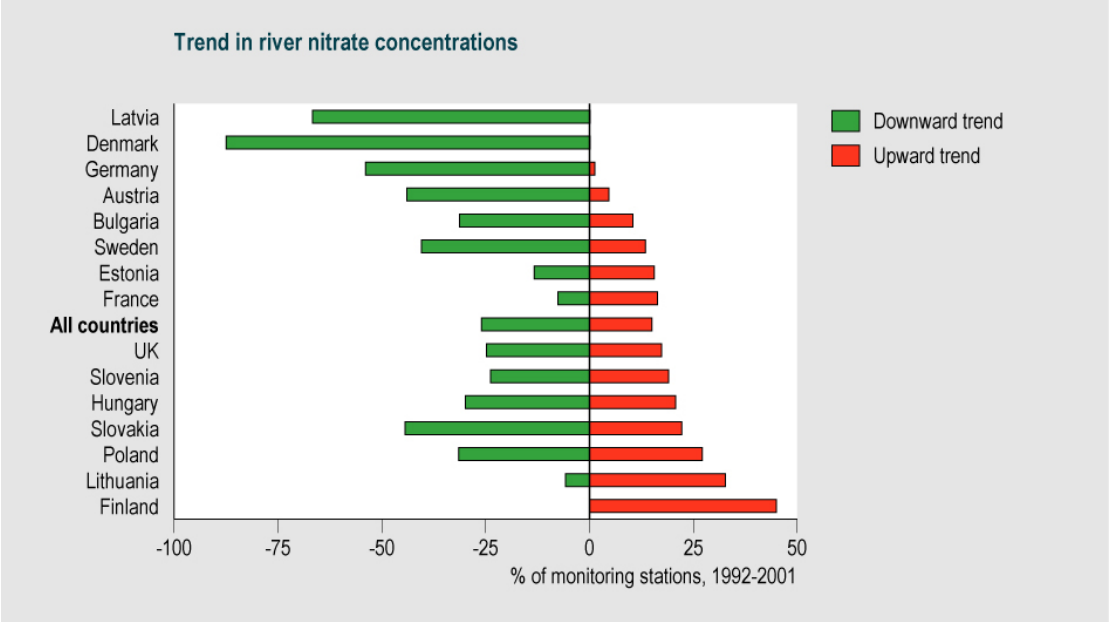

Figure 2: Trends in river nitrate concentrations (1992-2001) in the EU (EEA, 2004b).

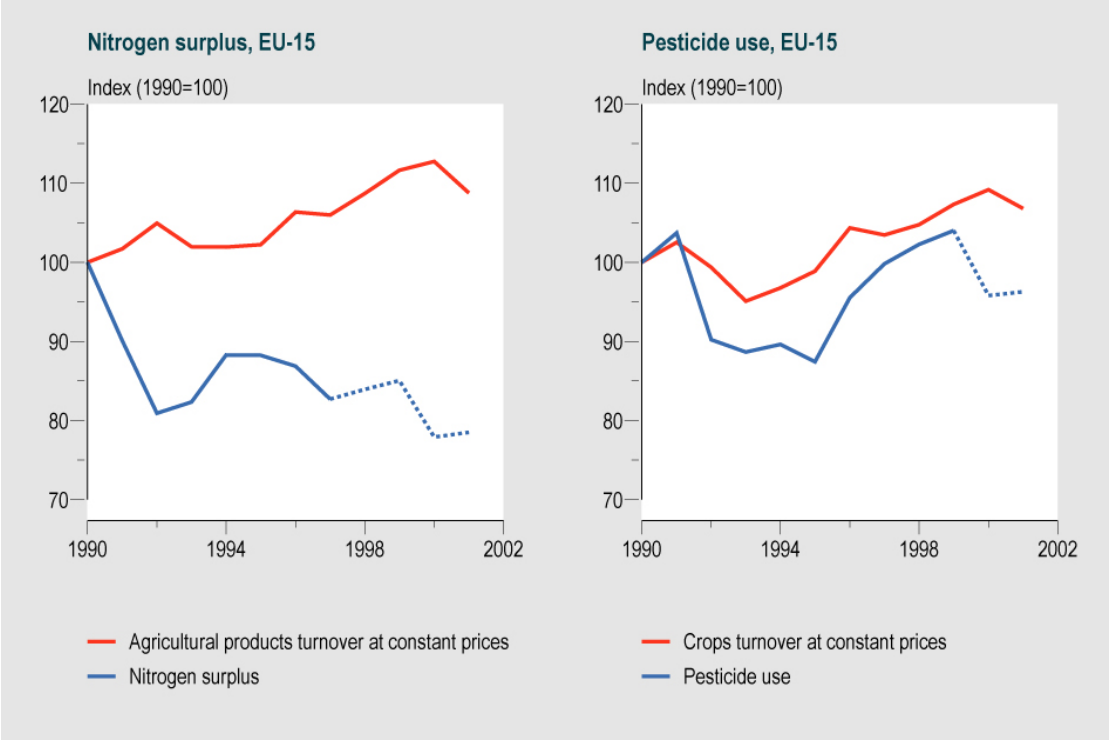

Figure 3: Economic production and environmental performance in EU-15 agriculture. Nitrogen surplus versus turnover of all agricultural products (left) and pesticide use versus crops turnover (right). Dotted lines indicate estimates (RIVM, 2004).

Air quality

From the very start, protection of human health has been a guiding principle in EU environmental policy, resulting in numerous regulations for single pollutants, environmental compartments and/or sectors. These have, in general, led to a cleaner and healthier environment (RIVM, 2004).

If all existing EU policies are properly implemented and enforced by all Member States, a number of pressures will be further reduced. Nevertheless, several EU-wide issues that require action via EU policy remain. Exposure of citizens to air pollution and noise in urban areas is one example. Some one third of urban citizens in the EU-15 are exposed to noise levels that cause annoyance and sleep disturbance (EEA, 1999). All citizens in the EU are exposed to air pollution that is likely to pose health risks and some one third of urban citizens in the EU-25 are exposed to air pollution above current EU limit values (RIVM, 2004). Provisional estimates reveal that the extent of the effects of ozone and fine particle pollutants on life expectancy is in the order of several tens to hundreds of thousands of premature deaths per year in Europe (WHO, 2000). Although emissions of air pollutants are generally declining, many countries are not yet on track towards EU targets such as the NEC emission ceilings (2010) and air quality limit values for PM10 (2005) and NO_2 (2010). Even if the emission reduction targets set for 2010 are met, health impacts are still likely to occur (WHO, 2003). However, this is also partly due to background levels and natural sources of these compounds, which is impossible to address from a European perspective only. The agricultural sector is partly contributing to emissions of air polluters. Therefore, these policies aimed at air quality will also influence future possibilities of agriculture in Europe.

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