Agricultural land use of European Union new member states in the context of ALARM scenarios

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Introduction and aims

Agriculture has been a more important sector in terms of agricultural land use, employment and gross value added in the European Union (EU) new member states than in the old member states. However, the socio-economic and political changes during the 1990s have changed the land use structure and patterns in the new member states in a significant speed. Due to the rapid economic development in these countries, the threat to agricultural biodiversity has become more pronounced than in the past. Since the changes in land use and intensity are among the most significant pressures on biodiversity [1], the policy responses to protect biodiversity have to comprise of actions at farm, ecosystem as well as at national level.

The aim of the current study is to analyse the agricultural land use as a driving force for agricultural biodiversity changes in the now EU new member states before the EU accession and in the EU in the context of the ALARM[1] land use scenarios. The trends in new member states are compared to those in the old member states.

Method

The ALARM land use scenarios [2] are based on three socio-economic storylines developed within the ALARM project [3]: BAMBU (Business-As-Might-Be-Usual) – a baseline scenario; GRAS (GRowth Applied Strategy) – a liberal, free trade, globalisation and deregulation scenario; SEDG (Sustainable European Development Goal) – a backcasting scenario dedicated to integrated environmental, social, institutional and economic sustainability.

The land use scenarios are applied on six categories of land use until 2080 in 10 EU new member states: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia (New-10) and 15 old members states (EU-15). Downscaling of the scenarios in resolution of 250 m was done by using the CORINE as a baseline land cover dataset. Biofuels were calculated as a percentage of cropland and forests [4].

Results

From the six CORINE land cover classes (cropland, grassland, permanent crops, forests, built-up land and others), the ALARM land use scenarios show especially sharp decline in cropland in new member states (Figure 1). According to BAMBU and GRAS scenarios the share of cropland (food crops) will be 17–20% smaller than now by 2080. In the SEDG scenario the share of cropland will decrease by around 5% up to the year 2080. The share of grassland and permanent crops is also decreasing, but much slower than cropland.

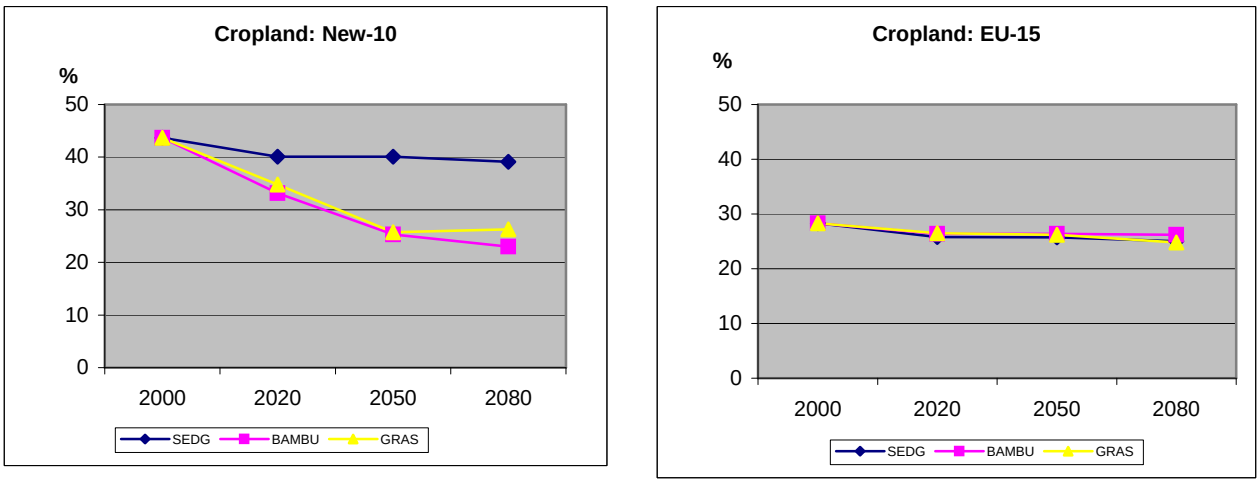

Figure 1. Share of cropland in New-10 and EU-15 in ALARM scenarios up to 2080

[1] ALARM – EC 6 Framework Programme project "Assessing large-scale environmental risks for biodiversity with tested methods" (COCE-CT-2003-506675), www.alarmproject.net

BAMBU and GRAS scenarios assume that agricultural subsidies will be reduced or phased out and yields will increase due to the technological development while SEDG scenario encourages extensification and organic farming and thus technological impact on yields is low. Because of a projected increase of yields in BAMBU and GRAS much of the agricultural land will be abandoned or changed to other type of land use. Partly such land may be taken into use for biofuel crops, partly for new forest, partly may potentially be good for nature restoration.
Particularly high share of abandoned agricultural land may be converted to biofuel production in new member states due to the higher availability of such land there according to BAMBU and GRAS scenarios (Figure 2).

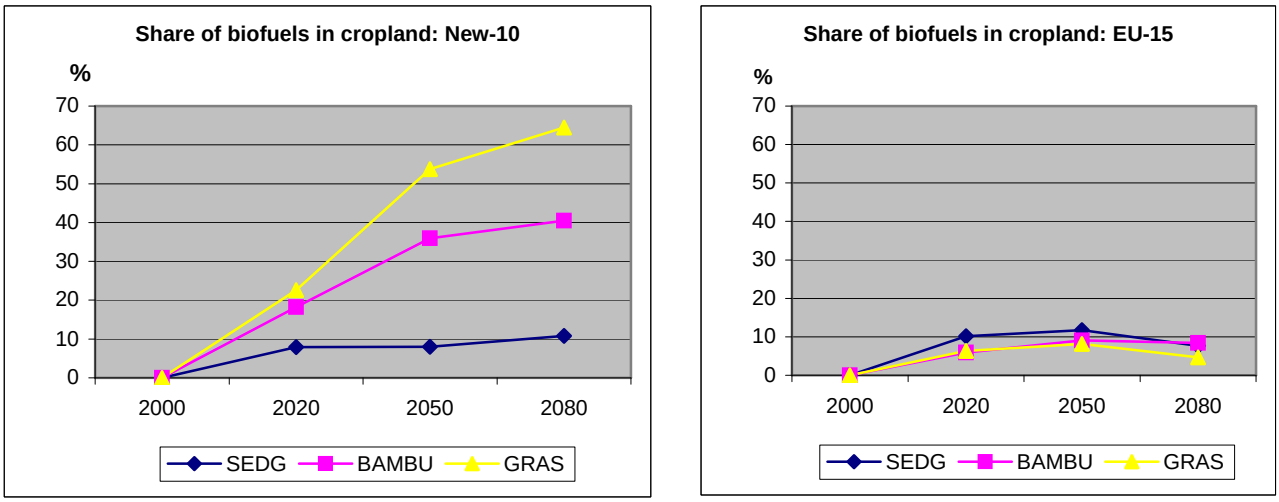

Figure 2. Share of cropland under biofuels production in New-10 and EU-15 in ALARM scenarios up to 2080

At the expense of abandoned agricultural land forest area is likely to increase more in New-10 than EU-15 (Figure 3). However, the vegetation succession takes long time before the final stage – forest has replaced the agricultural land.

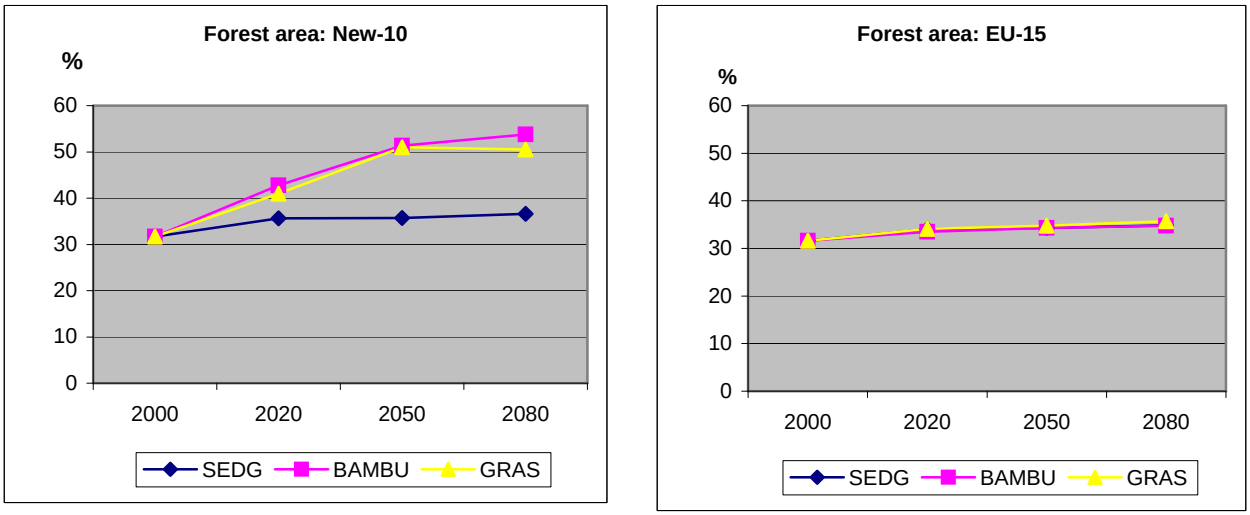

Figure 3. Share of forest area in New-10 and EU-15 in ALARM scenarios up to 2080

In forests substitution of timber production by bioenergy production is a strong possibility (Figure 4).

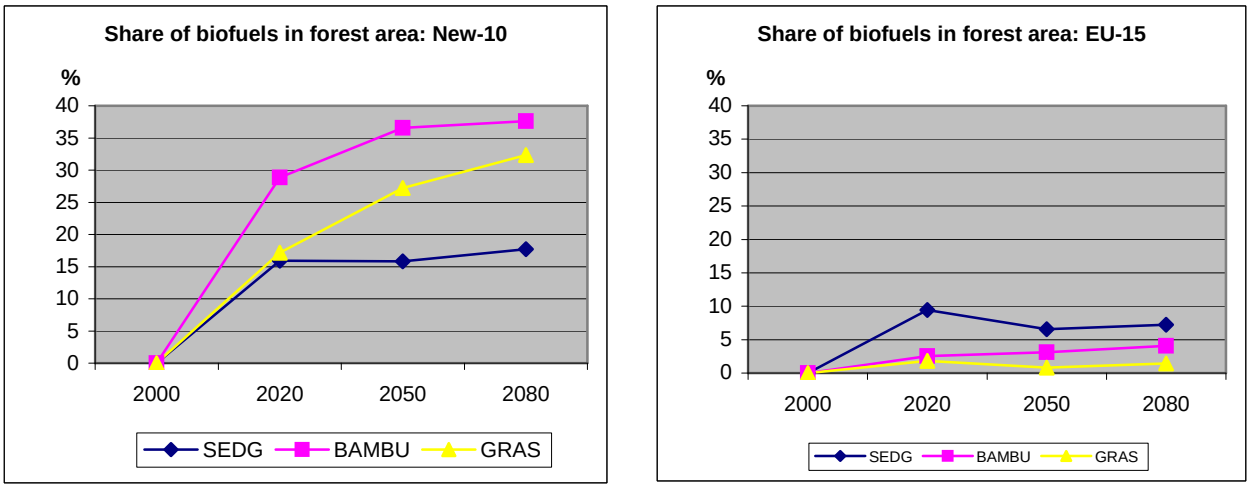

Figure 4. Share of woody biofuel crops in forest New-10 and EU-15 in ALARM scenarios up to 2080

Discussion

From the three ALARM core scenarios, SEDG – the Sustainable European Development Goal – foresees the smallest changes in land use compared to the current land use of new member states. At the expense of the reduced food crops, grassland and permanent crop areas, in all scenarios forest land and urban land will increase.

Further decline of agricultural land area is driven by agricultural intensification as well as by land abandonment. The land use intensity has already been increasing in new member states compared to 1990s when during the transition period the input of pesticides and fertilisers dropped significantly due to the withdrawal of state subsidies to agriculture. Since the EU accession the Common Agricultural Policy (CAP) direct payments and support to the farmers have contributed to higher farm incomes in new member states, while farm incomes in old member states have increased less at the same time [5]. Agricultural intensification is resulting in higher pressures to the environment, e.g. release of more chemicals, nutrient-surplus, further simplification of landscapes and spread of monocultures, loss and fragmentation of habitats.

At present the share of extensively used farming areas is still higher in new member states than in EU-15, but is decreasing significantly [5]. This can be characterised by the yield of cereals, livestock density per hectare, share of mixed farming and self-subsistence farms. In mixed farming the income is generated from several kinds of agricultural production and thus the fields are usually smaller, production less concentrated and land less intensively managed. Self-subsistence farms apply intentionally or for economic reasons low level of chemical inputs. Intensification and conversion to arable land are likely to increase especially in species-rich grasslands in productive areas of the new member states. Less favoured areas are threatened by land abandonment, which brings along changes in habitat types (increased area of fallow land and woodland).

A threat to intensification is also the intensive growth of biofuel crops, especially in new member states. If the current drivers (the EU support scheme for energy crops, 10% target for biofuels in overall transport fuel consumption by 2020 and high prices in the market) continue to support the biofuel production, the spread of monocultures, higher input of fertilisers and pesticides will contribute to the further loss of agricultural biodiversity. Therefore legally binding requirements for biodiversity-friendly bioenergy production need to be set at the EU CAP level.

The sustainable and biodiversity-friendly land use needs greater support by the CAP and also by the new member states. In 2007 the CAP expenditures for direct aids and rural development measures were respectively 37 and 12 billion EUR [6]. Agri-environment measures accounted only for about 5% of the total CAP expenditures. The national Rural Development Programmes 2007–2013 show that the budget shares of measures aimed at environmental protection and sustainable land management (Axis 2) are generally smaller in new member states than in EU-15 [7].

Conclusions

Similar trends in land use are followed in new member states as in old ones but in a shorter time period and at a higher speed that may result in biodiversity loss if countermeasures are not taken. The biggest changes compared to the current use are plausible with regard to the land used for food crops and biofuel crops.

The BAMBU scenario – continuation of current EU policies – shows more common results with the GRAS – growth oriented scenario than with the SEDG – the sustainable European development goal.

Thus if sustainable development is to be pursued in the EU, there is a need for far more sustainability oriented policy objectives and measures than present growth oriented ones. However, even the current socio-economic drivers of the SEDG scenario are not strong enough to avoid some further agricultural land use changes, which are not favourable for the agricultural biodiversity.

List of References
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Summary
Agriculture has been more important sector in EU new member states than in old member states in terms of agricultural land use, employment as well as of gross value added. However, the socio-economic and political changes during the 1990s have changed the land use structure and patterns in the new member states significantly. Due to the rapid economic development that is taking place in these countries now, the threat to agricultural biodiversity has become more pronounced than in the past. Land use changes and intensity are among the most significant pressures on biodiversity. This study applies the ALARM scenarios to analyse the agricultural land use and associated biodiversity changes in 10 new EU member states compared to 15 old member states. It is concluded that similar trends in land use intensity are followed in new member states as in old ones but at a higher speed that may result in biodiversity loss if countermeasures are not taken.

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