

EUruralis: a scenario study on Europe's rural areas to support policy discussion  
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Europe's rural areas are expected to witness rapid changes due to changes in demography, (agricultural) policies, global trade, climate change, technology and enlargement of the European Union. Expecting that major developments affect the rural areas in Europe, pro-active rural and agricultural policy has to be informed timely and in a targeted and tempting way.

With the software package EURURALIS policy makers obtain insight in the future of rural Europe in the context of four scenarios (till 2030). The scenarios cover the uncertainties around the degree of liberalisation and the role of the government. EUruralis deals with sustainability and provides indicators in the people, planet and profit dimensions.

The development should result in a new CD version of Eururalis (EURURALIS 2.0). The version improves the first version in the following areas:

- broadening of subjects (e.g. biofuels)
- deepening of subjects (e.g. regional economic data)
- explicit treatment of policy options (Common, Agricultural policy, implementing the biofuel directive)
- interactive system

To perform the analysis a consistent modelling framework was constructed, consisting of an modified version of the macro-economic model GTAP and a more ecological-environmental based model framework (IMAGE). In this modelling framework the long-term economic and environmental consequences of different scenarios are quantified and analysed in time steps of 10 years, starting from 2001 up to 2030. GTAP is the main model for economic analyses used for Doha issues. We used information from the OECDs Policy Evaluation Model (PEM) to improve the GTAP production structure and a new land allocation method that takes into account the variation of substitutability between different types of land. Also a new land supply curve was introduced that allows for the conversion of idle land to productive land as well as abandonment of agricultural land, taking the level of intensification of land use into consideration. The link with IMAGE (Integrated Model to Assess the Global Environment) was through yields and feed efficiency rates changes. In the approach used, the exogenous land efficiency parameters in GTAP are updated in an iterative process with the IMAGE model using yields calculated by IMAGE. The output of GTAP used as input for the IMAGE-iteration is sectoral production growth rates and a management factor describing the degree of land intensification. The IMAGE model then calculates yields, the demand for land and the environmental consequences on crop growth productivity. This procedure gave new yield levels, which are again used as input in the GTAP model. The iteration process stopped when land use was the same in both models.

Furthermore, the GTAP model is extended with the demand and supply of biofuels.

## Results

Developing regions such as Africa, Asia and South and Central America obtain the highest growth in total agricultural land use. The position of a region on the land supply curve, yield developments, and developments in food demand are important determinants. In these regions agricultural land can still be expanded between 33% and 75% without leading to a high increase in the rental rate of land. The conversion of idle land to land use for agricultural production is mainly driven by macroeconomic factors such as GDP and population growth.

Our study shows that the agricultural land use changes in EU 15 are relatively small in all scenarios compared with other countries and ranges between 2 and 15 percent. The negative impact of policy on the agricultural land use is mitigated by the macroeconomic factors such as GDP and population growth that have an impact on the demand for agricultural products and hence production.

The liberalization and agricultural policies play important role in the agricultural land use in EU15, especially in the globalization scenarios and causes a decrease of the total area of agricultural land use in the production process. The macroeconomic factors are less important than for developing regions.

For the EU15, the high GDP and population growth in the profit driven scenarios compensate the negative impact of reduction of domestic and border support for agriculture, and small changes in the agricultural land use are observed for these scenarios in EU15.

The relatively low GDP and population changes in the scenarios assuming strong government regulation accelerate the negative impact of the domestic and border support on the agricultural land changes and causes a significant but not massive reduction in the total agricultural land use in the production process.

When crop and livestock production development were analyzed, we observe that crop production growth in EU15 is mainly achieved by production intensification and accompanied with a decrease in harvested area. The pasture production for livestock increases in all scenarios and is driven by high production growth in profit driven scenarios and extensification in the regulation driven scenarios.

The impact of the biofuel directive is limited for agricultural production in the EU, although high subsidies are required to meet the directive.