INSEA – Project Summary

Greenhouse Gas Mitigation in Agriculture & Forestry

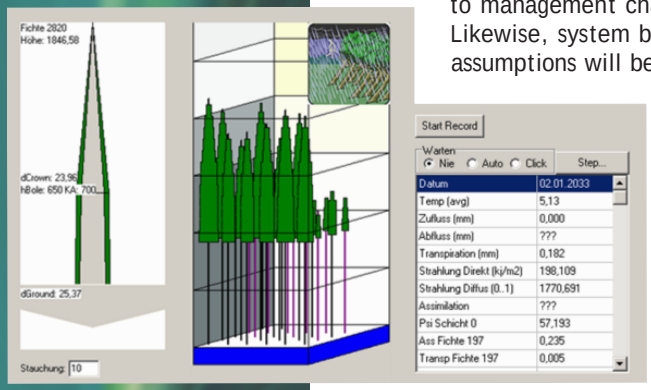
Among the key global public goods that require special attention and governance, the climate, global food security, the protection of natural resources, and the supply of sustainable energy are unprecedented challenges. The Integrated Sink Enhancement Assessment (INSEA) project aims at an understanding of how the forestry and agricultural sectors contribute to the production of these public goods and, eventually, how these two sectors can contribute to a sustainable-development process by the adoption of environmental technologies mitigating anthropogenic greenhouse gas (GHG) emissions. The project aims at developing a transparent toolbox that can be trusted, understood, and shared by stakeholders, as well as sharing scientifically validated data.

Greenhouse-gas mitigation measures in agriculture and forestry are part of the Bonn/ Marrakech Accords within the Kyoto Protocol. If adopted, these measures could turn out to be instrumental in attaining climate-mitigation goals in an efficient manner, contribute to sustainable farming and also to become a major driver of how terrestrial ecosystems are managed. A thorough integrated economic and environmental assessment of the economic and sustainable potentials of these measures has yet to be carried out, however, either for the European Union or internationally. The INSEA project seeks to develop appropriate analytical tools for policy assessment of these practices and thus contribute to the climate negotiation process as well as support the implementation of the Kyoto Protocol commitments and the post-Kyoto negotiations. The originality of the INSEA project is its consistent combination of sector-specific tools cutting across a number of science and policy fields. Thereby, it aims not only at quantifying *ex ante* the impacts of sector-specific strategies in climate, energy, agriculture, and forest policies, but also at the identification and quantification of a number of potential ancillary benefits and possible negative externalities of policy actions.

By their very nature, land use, land-use change, and forestry (LULUCF) activities occupy space. Starting with a thorough analysis and modeling of the emission balance of agriculture, forestry and livestock activities as a function of technologies, the INSEA approach seeks to integrate farm-level and forest-plot models with regional and national models for an assessment of the potential economic and environmental impacts of policy change. A multifaceted approach across different scales should guarantee robustness and consistency in the assessment of sustainable and cost-effective GHG emission mitigation policies. The bottom-up approach on the one hand will facilitate the validation of aggregate results and, on the other, will help illustrate behavioral change on the micro scale that the policies seek to influence.

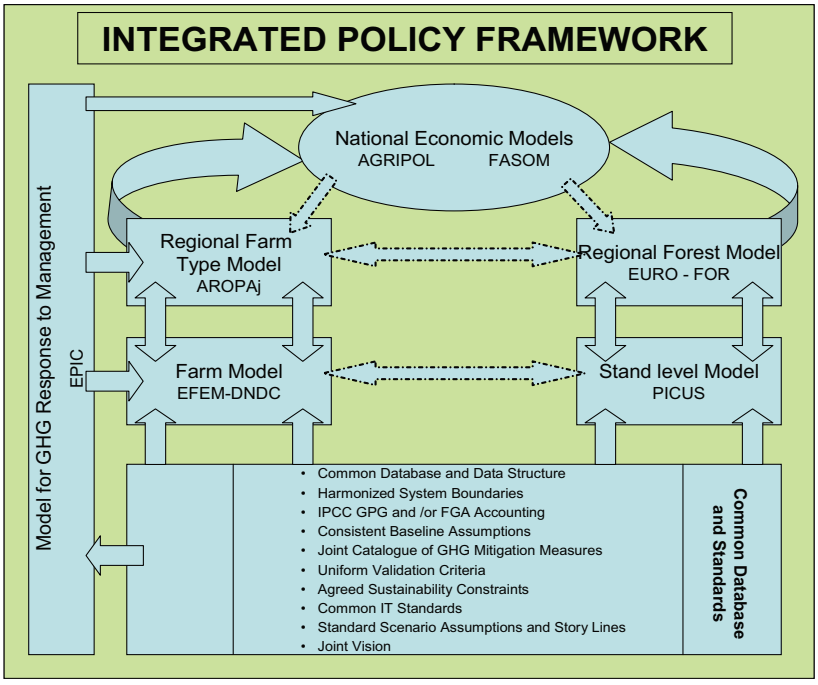
The consortium consists of 12 multidisciplinary partners, bringing together a critical mass of researchers from different disciplines. The team covers the broad fields of agricultural sciences, forest science, energy engineering, economics and political science, geostatistics, mathematics, informatics and geoscience. At the same time, members of the consortium have very close links with, or are directly involved in, a number of policy or assessment

processes, such as the IPCC and the IGBP-IHDP-WCRP's Global Carbon Project. *Figure 1* illustrates the interaction between the different scales of analysis, the models used at each level and the interactions between them. Right from the start (see box at the bottom of *Figure 1*), a common database will be made available to all partners and, with some restrictions, to the outside. Common GHG accounting and cost-accounting standards will be developed providing input to detailed biophysical models assessing GHG - mitigation effects due to management change as a consequence of technological adoption. Likewise, system boundaries and baselines all the way to scenario assumptions will be harmonized. The next two blocks, as depicted in *Figure 1*, are about micro-level modeling with an individual farm model on the agricultural side (EFEM-DNDC) and forest-plot models on the forestry side (PICUS). The results from the farm models will be checked for consistency with the regional results from the model AROPAj. In addition, the interplay between these two models, both based on data from the European Farm Accountancy Data Network, will help to quantify the GHG mitigation implications of Common Agricultural Policy (CAP). Results from the EURO-FOR model—a forest-management model operating on a regional scale—will be downscaled to a number of half-degree grids in order to validate results from the stand-level PICUS model. Results from the regional (meso-scale) models from both sectors will then feed into the FASOM and AGRIPOL models, which will be used for aggregate analysis augmented by market effects. The agronomics and carbon implications of management change in the agricultural sector will be quantified with the latest version of EPIC and DNDC.



A set of a first-cut modular structure for the European Union is due by September 2004. This structure will then form the basis for incremental improvement to tailor the approach to the requirements of the stakeholders within an integrated policy framework.

Figure 1: Overview of the linkages between INSEA modeling tools and databases. Together the cluster of INSEA tools allows for impact assessment of policy change on the micro- as well as on the macro-level.



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