Developing tools to identify marginal lands and assess their potential for bioenergy production

Spyridon Galatsidas (1), Nikolaos Gounaris (1), Elias Dimitriadis (1), Nils Rettenmaier (2), Tobias Schmidt (2), and Despoina Vlachaki (1)

(1) Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Pantazidou 193, GR-68200 Orestiada, Greece , (2) Institute for Energy and Environmental Research (IFEU), Wilckensstraße 3, D-69120 Heidelberg, Germany

The term "marginal land" is currently intertwined in discussions about bioenergy although its definition is neither specific nor firm. The uncertainty arising from marginal land classification and quantification is one of the major constraining factors for its potential use. The clarification of political aims, i.e. "what should be supported?" is also an important constraining factor. Many approaches have been developed to identify marginal lands, based on various definitions according to the management goals. Concerns have been frequently raised regarding the impacts of marginal land use on environment, ecosystem services and sustainability.

Current tools of soil quality and land potentials assessment fail to meet the needs of marginal land identification and exploitation for biomass production, due to the lack of comprehensive analysis of interrelated land functions and their quantitative evaluation. Land marginality is determined by dynamic characteristics in many cases and may therefore constitute a transitional state, which requires reassessment in due time. Also, marginal land should not be considered simply a dormant natural resource waiting to be used, since it may already provide multiple benefits and services to society relating to wildlife, biodiversity, carbon sequestration, etc. The consequences of cultivating such lands need to be fully addressed to present a balanced view of their sustainable potential for bioenergy.

This framework is the basis for the development of the SEEMLA tools, which aim at supporting the identification, assessment, management of marginal lands in Europe and the decision-making for sustainable biomass production of them using appropriate bioenergy crops. The tools comprise two applications, a web-based one (independent of spatial data) and a GIS-based application (land regionalization on the basis of spatial data), which both incorporate:

- Land resource characteristics, restricting the cultivation of agricultural crops but effectively sustaining bioenergy plants (soil, climate, topography, vegetation, etc.)
- Bioenergy plant characteristics and their ability to grow on marginal lands
- Needs and concerns on environmental issues and ecosystem benefits and services (biodiversity, carbon sequestration potential, soil organic carbon trend, etc.)
- Sustainability assessments (incl. e.g. LCA) of biomass production at market scale
- Analysis results of generic scenarios for biomass production, harvesting, logistics and conditioning, as well as biomass conversion and use from pilot cases growing various crops

The SEEMLA approach of marginal lands evaluation will provide private and public stakeholders with necessary guidance for selecting suitable lands and implementing efficient exploitation strategies for bioenergy production, on the basis of sound environmental and socio-economic criteria.