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Land Rehabilitation for Food and Energy Production — A Synergy Policy for the Tropics

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Abstract

Approximately two billion hectares of now degraded land in the tropics have the potential to yield food. The (re)establishment of agroforestry systems is considered a suitable and sustainable solution for many areas. Other regions that are too arid for trees could supply drought resistant grass species, once soil fertility is restored. However, the effort of rehabilitation demands financial resources from abroad, for primary investments as well as to bridge the period until first harvest. These resources could be raised more easily if land rehabilitation became a profitable investment due to simultaneous production of food and renewable energy. Moreover, this policy would provide the opportunity for a selfsufficient development after the initial phase, because high quality energy carriers today have a higher export value than food.

The presented study describes food and energy producing ecosystems for land rehabilitation as well as feasible production-pathways of ethanol and hydrogen from biomass that can be supplied as excess fuel from rehabilitated land. Many woods and grasses provide efficient collection of solar energy and could be processed to either ethanol (EtOH) or hydrogen (H_2) in central conversion plants near their origin. Both energy carriers will play a key role in the future world economy: ethanol as a convenient biofuel for vehicles and hydrogen as renewable universal energy carrier and storage medium. Complementary to food production on rehabilitated land a net energy export of 50 Gigajoule EtOH / H_2 and more per year and hectare is possible. Respective proceeds of 1000,- € per year and hectare on the already existing market may well suffice to refinance land rehabilitation as well as the investment for energy conversion plants.

The development of renewable energies also will benefit from this policy, because biomass is an economic renewable energy source, and its co-production with food on now unused land entails considerably lower opportunity costs than most other concepts for large scale energy production. This obvious win-win-opportunity must not lie fallow.

Keywords: Agroforestry, biomass, ethanol, funding, hydrogen, land rehabilitation, renewable energy, self-sufficient development

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