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Sustainable Use of Bioenergy: Bridging climate protection, nature conservation and society

An inter- and transdisciplinary approach in Lower Saxony, Germany

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Introduction

The energetic use of biomass is gaining more and more attention. Since the Renewable Energy Sources Act (EEG) was implemented in Germany in 2000, the energetic use of biomass is rapidly increasing (BMU 2011). Very different stakeholders are involved in the process of production and usage of bioenergy. Stakeholders such as farmers, administration, nature protection agencies, energy suppliers, neighbors around the biogas plant etc. have a different view on the whole process chain; therefore conflicts cause by diverse interests are particularly connected to bioenergy. A strategy to combine the different ecological, economical and social interests is mostly missing. Furthermore, the lack of possibilities to participate on important decisions regarding the development of future local and regional bioenergy strategies led to a decline of public acceptance in the last time.

Objectives

In our research we can show, that only an inter- and transdisciplinary approach might reduce the conflicts. The interaction of economical, ecological and social research is necessary to build up a **Bioenergy Decision Support System (BDSS)** aiming a sustainable path for a future usage of bioenergy. This support system can be used for a possible further extension of bioenergy on a local and regional level. The BDSS will be a modular toolset for the decision process to increase understanding between stakeholders, rise up the transparency of decisions and to reveal strengths and weaknesses of different bioenergy concepts. Using this support system the regional energy supply would be based on the natural potentials of the area, might increase the acceptance for bioenergy and the regional added value.

Methods

Diverse methods of natural, business and social sciences are applied to tackle problems with bioenergy.

Problems	Methods and aims
Environmental impacts	GIS-based environmental management software (GHG, Biodiversity), nutrient recycling
Site specific biomass	Modeling of yields different energy crops
Monoculture	Cultivation of alternative energy crops, intercropping and double cropping system
Erosion	intercropping and double cropping system
Use of contaminated sites	Selection systems of energy crops with low transfer factors for harmful elements
Barriers vs. success factors	Questionnaires, interviews
Negative image	Moderated workshops with all stakeholders, dialog based communication
Complexity of decision and lack of transparency	Multi criteria decision analysis (MCDA)
Economic efficiency	Linear optimization modeling of the supply network (heat grid, site attributes), financial impact of environmental management systems
Investment behavior	Questionnaires
Emissions from the combustion of wood, straw	organic and inorganic pollutant analysis during the whole burning process

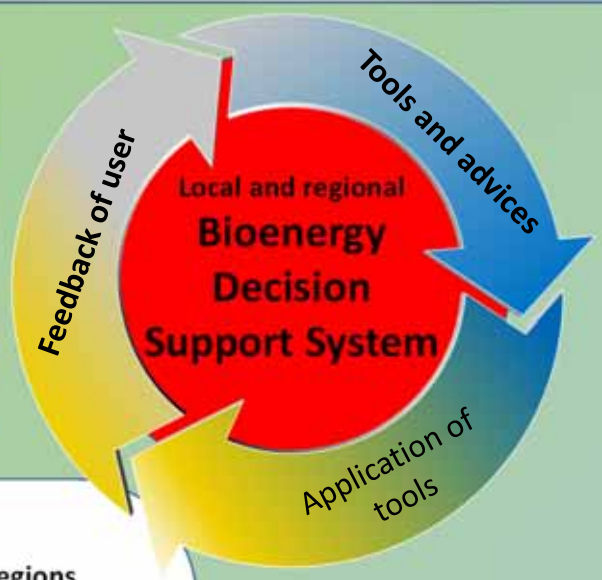
Development of tools, advices and applicable sustainability criteria

Active participation, application of tools, advices and sustainability criteria during workshops and the decision process

- Biomass potentials
- Biodiversity, GHG
- Crop cultivation
- Emissions

- Financial impact of environmental management
- Investment behaviour
- Economical advancement for local and regional supply networks

- Success factors
- Social barriers
- Conflict management



Active participation of

- Local and regional Administration
- Energy suppliers
- Farmers
- Nature protection agencies (NGO`s)
- inhabitants

Regional sustainable bioenergy concept based on:

- Regional potentials
- Balance of different interests
- Involvement of regional stakeholders
- added value created in the region

Results

The results are partly tested during workshops in three regions in the state of Lower Saxony, Germany (see map beside). The three regions were chosen on a set of different criteria. In each region five workshops to different topics (e.g. bioenergy on contaminated sites, energy crops, environmental impacts of biomass production) were organised. The applied tools and advices enhanced the information- and decision processes and were approved by the stakeholders. The dialogue based communication in the moderated workshops improved the understanding between the participants and increased the transparency. During the decision process the energy supply of the regions were discussed in a broader, sustainable context then before and some new sustainable bioenergy projects started in the regions already. The project is still going on and therefore not all results are applicable now. The dataset for the sustainable criteria catalog is still in progress. However, this approach will invigorate the several advantages of bioenergy and places the current problems on an operational base.

BDSS-Testregions Wolfenbüttel, Goslar and Hannover, Lower Saxony, Germany

Conclusion

For the further development of bioenergy diverse stakeholders have to be involved. A Bioenergy Decision Support System can reduce the existing conflicts of interests. Such a system should combine instruments from the ecology, economy and the social sciences. First results in three regions show that the information- and decision processes must be enhanced and the complexity reduced. New sustainable bioenergy projects will be the result of the active involvement of the different stakeholders.

Until now, the tools and advices are mostly for the local level and not applicable in regions. Further research is needed to join the results and extend them into the regional scale. Anymore, the dataset for the sustainability criteria catalogue must be completed and evaluated by practitioners.

Literature

BMU 2011. Erneuerbare Energien in Zahlen. Nationale und Internationale Entwicklung. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit. Berlin

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Further informations: www.bioenergie.uni-goettingen.de, www.izne.uni-goettingen.de