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# Land Use Management, Ecosystem Services and Biodiversity

## Developing Regulatory Measures for Sustainable Energy Crop Production (LÖBESTEIN)

**Science for the Environment**

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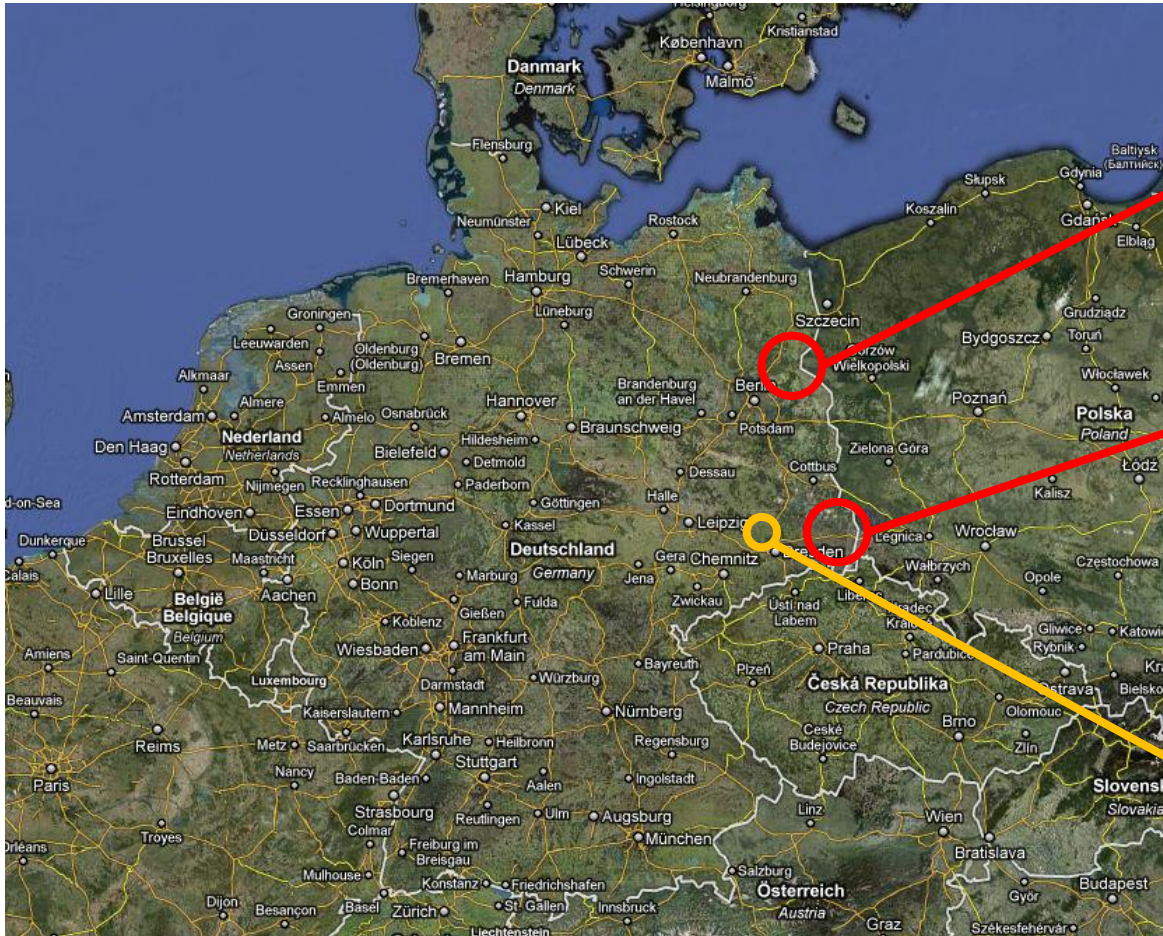


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# Methodology

- **Participatory approach**, involves practitioners (e.g., energy crop producers, decision makers ...) in the whole research processes
- Using the concept of **Ecosystem Services** (ESS) for energy crop production → development of an adapted method to evaluate impacts of an increased energy crop production on ESS, one focus will be **socio-economic ESS**
- **Evaluating the Concept of ESS in practical use** with stakeholders and the example of an increased energy crop production

# Study Areas



Uckermark District:  
Validation

Görlitz District: Test  
area with intense  
interviews and and  
modelling activities

(Pilot area e.g. for  
pretests Moritzburg  
Small Hill  
Landscape)

# Why Görlitz District?

- **Reasons** for Görlitz District
  - Favorable Stakeholder constellation and initiatives, however not a “best practice example”
  - Görlitz District offers a good cross-section of Central European physical regions (lowland plains, hill area and mountain ranges, rural and urban areas)
  - Already problems of climate change predictions typical for western central Europe visible (drought, water scarcity, flooding, weather extremes)

























# Political Goals for Energy Crops

- Biomass is set to **cover 10% of the whole energy demand in the EU by 2020** (COMMISSION OF THE EUROPEAN UNION 2007)
  - Biomass production has to **double** in the coming years to reach these EU Road Map goals
- Biofuels are often seen as **per se sustainable** and received a lot of governmental support
- Political goals of biofuel production are also set to **improve economic, social and ecological situation** (e.g. creating regional added value, jobs in rural areas, reduce CO<sub>2</sub> emissions to limit climate changes)



# The Concept of Ecosystem Services (ESS)

- The concept of **ESS** is used to assess the cultivation energy crops, since it addresses **environmental** and **societal claims**, with special consideration of **economic aspects** (see COSTANZA 1991, DE GROOT et al. 1992), since all these level of sustainability are explicitly addressed in biomass policies
- Describe the benefits people obtain from ecosystems and includes economic, ecological and social aspects
  - Supporting services (e.g. nutrient cycling)
  - Provisioning services (like food)
  - Regulating services (e.g. climate regulation)
  - Cultural services (e.g. recreation and tourism)

# The Concept of Ecosystem Services (ESS)

- An anthropocentric approach (“the use humans have”)
- The attractiveness is based on its broad **integrative**, **interdisciplinary** and **transdisciplinary** character linking environmental and socio-economic concepts
- ESS aims to measure different services of nature, which are often “complimentary”, or **public goods** without or a very limited market (e.g. pricing, scales etc.)
- The assessment of ESS should use the same scales and include **all levels of sustainability** (ecology, economy and social aspects)
- Great **political relevance**, e.g. in Millennium Ecosystem Assessment (MEA 2005), and in TEEB report (2009)



# The Concept of Ecosystem Services (ESS)

- ESS seem to be able to offer an approach for addressing and describing the **multi dimensional impacts** of an increased biomass production
  - competition with other goods (e.g., production of food or drinking water)
  - regulatory services (e.g., climate protection, water runoff, water pollution control)
  - cultural services (overall appearance of the landscape and recreation opportunities)

# Energy Crops – What is intended...

- **New possibilities** for agriculture and forestry (e.g., forest residues, roadside vegetation, landscape management material)
- Mixed cultures, perennial crops, and agro-forestry systems outmatch agro-ecosystems in **delivering services** i.e. providing habitats, slowing down run-off, recycling wastewater etc. as well as to restore services on degraded land
- **Coppice** can **increase structures** in intensively used agricultural areas and provide habitats for nesting birds, and increase scenic qualities, and contribute to a green infrastructure
- Biomass production enables **minimizing inputs** like fertilizing, tilling or using herbicides



## ...and what we get!

- Mainly **maize** with a high demand of **nitrogen** input and nitrogen spillovers are cultivated
- **No increased use** of landscape management material
- **Small private forest owners** do not increase their cuts, although this is possible and maintenance of these forests is poor (also from the point of looking at necessary adaption strategies for climate change)
- **Unification** of crops and vast monocultures
- **Loss** of biodiversity
- Cultivation of **water demanding crops** is a problem, especially when looking at **climate change** corresponding with a decline of **water availability** and demand for protecting groundwater

## ...and what we get!

- **Erosion** processes occur due to extraction of organic material on vulnerable sites, e.g. slopes
- Regulating services such as **carbon storage** and **water retention** are often negatively affected
- **Competition** between energy or food production as well as competition with raw materials for industrial needs (e.g., particleboard production, pulpwood), rising prices



# The Reasons: The German Funding Instrument EEG ...

- Main Goals of German Renewable Energy Sources Act (EEG):
    - Reducing economic costs for energy supply through integration of long-term external effects
    - Conservation of fossil resources and promoting the development of technologies generating electricity from renewable energies
    - Has to be seen in the context of a sustainable development effort concerning climate and environmental protection
    - Renewable energy technology is yet to expensive and so hard to sell to the market
- Funding for electricity from biomass

# The Reasons: The German Funding Instrument EEG ...

- Basic funding for four electric power output classes:
  - Up to 150 kW<sub>el</sub> receive 11.67 Cent per kWh
  - Up to 500 kW<sub>el</sub> receive 9.18 Cent per kWh
  - Up to 5.000 kW<sub>el</sub> receive 8.25 Cent per kWh
  - Up to 20.000 kW<sub>el</sub> receive 7.79 Cent per kWh
- Additional bonus differing by technology: solar, wind etc.
- Biomass adds up to 7.0 Cent per kWh extra
  - Bonus crops are defined but farmer has the choice which one
  - Maize feedstock with the highest revenue (energy content, production cost, revenue)
  - Output classes support mainly plants at larger farms

## ... and privileges

- Mainly law of Fertilizers, Law of Plant Protection Products, Federal Soil Protection Act, Federal Nature Protection Act regulate agriculture to some extent. They only consider some aspects of ESS, however...
- **Agriculture** and forestry are **privileged by law** to a very large extent
- Common legal framework for farming and forestry:  
**"Good Practice Rules"**
  - **No specific rules** of good practice concerning landscape and biodiversity protection
  - Mainly aims to **ensure** an **economically sustainable yield**



## ... and privileges

- **Environmental Impact Assessment** often is applicable and should also cover indirect effects, however e.g. in approval processes of biogas plants, only the **impact of operating the plant** are considered, not the provision of raw materials
- **Landscape planning** concretises goals and basic principles of nature conservation and landscape management which are defined in the Federal Nature Conservation Act and the Nature Conservation Acts of the federal states, but landscape planning is **not strictly binding**

# What about the EU regulation?

- Implementation of EU-Law Directive 2009/28/EG (**Renewables Directive**) in German biomass-electricity-sustainability ordinance
  - No cultivation on “land with **high biodiversity value**” e.g. primary forests or high value grasslands
  - No cultivation on land with **high carbon stock** (peat)
  - Only valid for **liquid biomass** not for solid or gasiform biomass → marginal relevance
- Some changes are on the horizon like **greening of common EU agricultural policy** (only payments when extra effort for biodiversity and other ESS are carried out)
- **Changes of EEG regulation** in Germany in 2012 (limit of 60% maize or corn for biogas plants)

# Does anyone care?

- First preliminary results by **key stakeholders** are selected by the principle of maximum contrast indicate that in the Görlitz district study region despite the energy option stakeholders wanted to see for other ecosystem services to be provided
  - 1. Food and feed** production is seen the most important ecosystem service for Görlitz district
  - 2. Protecting soil fertility/soil erosion**
  - 3. Biodiversity**
  - 4. Ethical value** of landscapes (identity, homeland)



# Next steps

- Together with stakeholders, the desired development of energy crop production will be evaluated by using three two-step scenarios (**2020** and **2050**) considering climate change
  - 1. Business as usual**
  - 2. Large players** on the market, **no greening** of CAP, reduction of payments for using renewables but obligatory blending
  - 3. CAP Greening** and favouring **small-scale use** by EEG (e.g. District heating with combined heat/power production) and emerging regional initiatives
- Jointly develop suiting legal framework and incentives for supporting more favorable biomass types under these conditions like coppice, landscape management materials, mixed seeds, miscanthus (?) ...

# Thank You Very Much For Your Attention!

## Questions, Remarks, Comments?

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