OpenNESS

Operationalisation of Natural Capital and Ecosystem Services

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EU BIOENERGY POLICIES AT THE CROSSROAD

KEY MESSAGES:

Bioenergy production management

- Several **negative ecosystem service impacts can be reduced with careful planning and operation**. For example, limiting crop and forest biomass extraction to maintain soil carbon levels, and avoiding significant disturbances (such as stump extraction or monocultures), which cause additional impacts on biodiversity and nutrient retention. Water impacts can be controlled with buffer strips, and species dependent on coarse woody debris can be safeguarded by leaving retention trees on logging sites.
- Bioenergy production **can be managed in a way that maintains ecosystem services in the long run**, e.g. by introducing mulching and/or catch crops to minimize water run-off and erosion and by minimizing the use of fertilizers and other agrochemicals.
- **The scale of sustainable bioenergy production is finite**. There are limits in the carrying capacity of ecosystems due to the multiple societal demands and trade-offs, such as between food – feed – bioenergy – biomaterials production, regulatory functions for clean air and water, space for recreation and nature protection.

Bioenergy policy-making

- **The risks of bioenergy production processes should be controlled**. This means using reliable and feasible indicators to assess risks and trade-offs between ecosystem services and possibly new standards and regulations to limit the most risky production processes.
- In a situation where ecosystem services **cannot be secured with standards and regulations, compensating or restoring the ecosystem service losses** can be done through payments for ecosystem services (PES). New policies on bioenergy should reserve a public budget or identify funding sources among businesses in the bioenergy production value chain, which can be channeled to maintain and improve ecosystem services.
- When designing new bioenergy policies, **the interest groups preferences' for different ecosystem service impacts should be assessed rather than assumed**. This can generate win-win solutions, like in the Finnish forest bioenergy case study (see Box 1), where all stakeholders preferred a bioenergy production option based on thinning wood and harvest residue collection and rejected stump removal.

FOR MORE INFORMATION
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Photo: General view of the Rio Claro municipality region, SP State, Brazil. © Rafaela Ap. Silva

BIOENERGY CASE STUDIES

The OpenNESS project, focusing on the operationalization of ecosystem services, has studied bioenergy production in three different c
Summaries of these analyses are presented in Boxes 1, 2 and 3.

BOX 1: THE ECOSYSTEM IMPACTS OF FOREST BIOENERGY PRODUCTION IN FINLAND

Focus

Assessing the short- and long-term impacts of forest bioenergy production on the provisioning of ecosystem services. Studying stakeholder's preferences and perceptions regarding different forest bioenergy production options.

Background

In the forest sector, a big sustainability challenge relates to the increasing demand for bioenergy production from logging residues to comply with renewable energy targets. At the moment, about 9 million m3 of wood-based biomass (comprising mainly of branches, stumps and wood from early thinning) is used for energy production, covering 24 percent of Finland's energy consumption. The national goal is even higher (10-12 million m3 annually). The Finnish case study analyses three forest bioenergy production options (1. Collect nothing; 2. Collect only aboveground harvest residues; and 3. Collect aboveground harvest residues and stumps) together with stakeholders in a medium-size river basin in Southern Finland.

Results

Intensive removal of logging residue
forests. For example, short-term ne
the emissions of energy produced w
emissions were negative. Biodiversit
wood, also faced negative impacts.
and other logging residue were rem
scenery without stacks of logging re
regional authorities, NGO represent
representatives), for different reaso
involved only harvest residue collec
wide agreement on sustainable fore

Photo: Typical rill erosion observed on a sloping maize field in Central Germany.
© Daniel Wurbs, geoflux GbR Germany

BOX 2: IMPACTS OF BIOENERGY PRODU

Focus

Assessing how current and expected future land-use c
trade-offs between bioenergy provision and other eco
Saxony, Germany.

Background

The federal state of Saxony is located in the Central Ea
is dominated by agricultural land, and production is fo
bioenergy policies, areas of rape seed and maize have
past 15 years, covering 1/3 of the agricultural area.

BOX 3: OPPORTUNITIES FOR THE OPERATIONALIZATION OF ECOSYSTEM SERVICES IN BRAZIL

Focus

Exploring and, if pertinent, developing and operationalizing a 'payments for ecosystem services' (PES) scheme in a representative region of Brazil's sugarcane belt.

Background

Brazil is currently the world's biggest producer and user of bioethanol originating from sugarcane, and it has a political objective to expand production especially for the export of ethanol. São Paulo State is the center of Brazil's bioenergy production, 60% of sugarcane and 67% of bioethanol is produced there. The EU is an important importer of Brazilian bioethanol and in 2008 it approved a certification process, in which exporters must develop social and environmental 'good practices'. However, it is expected that the spatial extent of sugarcane fields as well as the negative environmental impacts (erosion, eutrophication, decreasing natural vegetation and indirect land-use change) will increase in the near future.

Results

The case study addressed the key st
PES scheme. The main findings are:
natural vegetation areas, which cov
majority of farmers recognize the in
be compensated for their conservat
are interested in a PES scheme, but
interests or the availability of funds
opinion survey conducted were awa
and only 16 percent of them respon
addition, the results strongly sugge
forests, given the multiple ecosyste

ase studies: forest bioenergy production in Finland and agricultural bioenergy production in Germany and Brazil.

es was found to affect key ecosystem services in
t CO_2 emissions of forest bioenergy were higher than
vith coal. In the long term (over 20 years) the net
ty, especially threatened species relying on decayed
Recreational opportunities were better if branches
oved from the ground, but most people appreciated
esidues. All stakeholders (e.g. a municipality officer,
atives, a business representative and interest group
ns, preferred a bioenergy production option, which
tion, not stump removal. This suggests that there is a
est bioenergy production.


Photo: Collected woody biomass drying beside a road. Most of the interviewed stakeholders preferred a scenery without logging residue piles. © Timo Sadeharju

CTION ON OTHER ECOSYSTEM SERVICES IN GERMANY

hanges affect the synergies or
osystem services at regional scale in

astern part of Germany. Land cover
ocusing currently on cereals. Due to
been increasing 42% and 63% in the

Results

Maize has a higher erosion risk than winter cereals or rape seed and the growing areas of maize fields are increasing these erosion risks in the region. This was found to be especially relevant for conditions under which farmers consider short transportation distances to the biogas plants more important than adapted land management, and therefore grow more maize on sloping lands to reduce transportation costs. In Saxony, 92 interviewed citizens did not perceive negative impacts of bioenergy production on landscape aesthetics. This differs from other regions in Germany, where more widespread maize monocultures are perceived negatively by many citizens. Increasing rape seed production could have a positive impact on pollination by wild bees. However, there are risks of lower pollination rates and lower crop yields in the centers of large fields due to e.g. increasing field block sizes and oversupply of bee feed due to the large areas of rape seed fields flowering all at the same time.

akeholders that would be involved in a potential
1. The majority of ecosystem services are located in
er only a small fraction of the study region; 2. The
nportance of the natural vegetation and would like to
ion and restoration efforts; 3. Local decision makers
their actions may be limited by conflicting political
; and 4. Nearly all of the 400 respondents of a public
re of the ecosystem services present in the region
ded that they would not support a PES program. In
st that a PES scheme in the region should focus on
m services provided.


Photo: Sugarcane crops in Rio Claro region, SP State, Brazil. © Rafaela Ap. Silva

Bioenergy production impacts ecosystem services

The rationale of bioenergy production is to reduce greenhouse gas emissions by replacing fossil fuels with renewable energy. The consumption of bioenergy has approximately doubled in the EU during this Millennium, accounting currently for about 60 percent of renewable energy. Its use is still increasing. However, bioenergy production can have negative consequences on the capacity of ecosystems to provide other services such as climate regulation, nutrient buffering, recreation and soil quality. For example, intensified removal of logging residues for forest bioenergy production decreases the annual carbon sink of the forest and leads to indirect CO_2 emissions, which can be comparable to the emissions of fossil fuels in the short term. Thus, the use of forest bioenergy may not help to meet the urgent need to cut down greenhouse gas emissions. In a similar way, agricultural bioenergy crops may increase erosion risks compared to alternative crops or natural vegetation.

EU bioenergy policies in transition

The EU bioenergy policy will be revised in the coming years. First, the EU Commission is expected to provide suggestions on the new land-use, land-use change and forestry (LULUCF) policy during the summer of 2016. Second, as a contribution to the EU's 2030 climate and energy framework, the renewable energy directive is going to be renewed during 2016–2017. The renewable energy directive process is envisaged to deliver a new bioenergy policy framework. Third, as a part of the implementation of the Paris climate agreement, the land-use carbon accounting rules will be updated. In addition, other policies such as the circular economy strategy as well as policies addressing agriculture, forests and biodiversity influence land allocation for bioenergy production and the ways in which bioenergy is produced and utilized.

Policy brief authors

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Photo: © Tuomo Björksten

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