Convention on Biological Diversity – Biofuels Notification

Two main tools for dealing with impacts of biofuels on biodiversity are life cycle analysis and environmental impact assessment.

Life cycle analysis addresses net greenhouse gas (GHG) balance and is linked to efforts underway to define sector- and commodity-specific GHG budgets.

Environmental impact assessment

- can accommodate evolving sustainability standards for biofuels; and
- being qualitative, is flexible and can be implemented with a tool as simple as a checklist of potential environmental effects.

Through a checklist, biodiversity-related environmental considerations - including water supply, soil quality, chemical inputs, invasive species, and habitat conversion - can be assessed. Some potential considerations include:

1. Biofuel developments can cause direct land conversion or secondary land use changes that cause GHG emissions and biodiversity losses. Loss of aboveground and soil carbon from affected sites can be factored into quantitative GHG budget models and included in biofuel life cycle analysis. Assessing the impact on biodiversity of changes in land use may require development of new protocols for this purpose.
2. Biofuel developments may have social and economic impacts related to land use, in addition to environmental and ecological effects. These impacts may be mitigated or avoided by respect of traditional rights to land and resource use, avoiding contribution to poverty, and allowing participation of potentially-affected communities.
3. Impacts of biofuel developments may be felt at local, regional or global levels. Imported biofuels or biofuel feedstocks may or may not meet domestic criteria for sustainability. Social, economic and environmental impacts are most likely to occur in the source countries.
4. Risks that new species proposed for introduction as biomass crops may become invasive should be considered.
5. Plants can be bred for biofuel production, by increasing their carbon to nitrogen ratios, yields, starch or oil content; by modifying cell wall lignocellulose; or by incorporating traits that allow cultivation on marginal land. Whether they are created by conventional plant breeding or genetic engineering, risks associated with these new crops, such as invasiveness, should be considered.
6. Enhanced biomass removal creates risks of erosion, loss of soil nutrients, and loss of soil biodiversity. Allowing for retention of adequate agricultural crop residue or logging residue is an important consideration in the sustainable management of soil.

7. Intensification of agricultural land use, or expansion of agricultural lands into sensitive and less-developed areas for biofuel developments, can cause direct habitat loss or lead to habitat fragmentation, with impacts on sensitive species. Effects on ecosystem services such as pollination and natural pest and disease control should also be considered.
8. Pressure to increase the use of woody biomass for biofuel production can lead to conversion of forests to tree plantations.
9. Continuous annual cropping for grain ethanol or biodiesel can cause increased soil degradation and erosion, due to excess tilling, agrochemicals and irrigation, and heavy farm equipment, whereas perennial crops reduce erosion by creating year-round soil cover .
10. High fertilizer and pesticide inputs used for certain crops (e.g., corn) can cause pollution of ground water and surface waters. Farmers may, in some cases, use more fertilizers and chemicals in their attempts to increase yields in response to higher prices for cereals and oilseeds.
11. Commercial nitrogen fertilizer requires fossil energy to manufacture and is a source of nitrous oxide emissions, the most important GHG associated with agriculture. Options for minimizing commercial fertilizer, such as using nitrogen-fixing crops or manure, should be considered.
12. Amounts of water consumed per unit of biofuel produced can be high, with impacts on overall water supply, particularly in drylands. Water is needed for both biomass crop production and for processing to biofuels. Treatment and/or re-use of wastewater from biofuel processing facilities should be considered. Additional dimensions of water use include:
    - How much water and land might be required to grow different kinds of biomass in different regions?
    - Where is water availability likely to be a limiting factor?
    - What are the possible, known, or likely water quality effects associated with increases in production and biomass conversion?
    - What promising agricultural and industrial practices and technologies might help reduce water use or minimize water pollution associated with biomass production?
    - What are the water requirements of existing and proposed processing facilities, and what water quality problems may be associated with them?

Summarized from Dyer, J. (2008). An examination of the impacts of production and use of liquid biofuels for transportation on biodiversity. Environment Canada. Project Report K2A24-08-0013.