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Biofuels and biodiversity: an assessment of the impacts of biofuels on biodiversity and the appropriate policy responses

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Biofuels have been heralded by some as the silver bullet to mitigate greenhouse gas emissions and provide energy security. Many nations are in the process of setting, or have already set, targets for the proportion of biofuels/bioenergy in their energy mix. To achieve these targets of increased biofuel uptake, governments are providing subsidies and/or tax incentives to producers and consumers of biofuels. To this end, the debate and much of the literature around biofuels has focused upon their performance in reducing carbon emissions (Fargione et al. 2008, Searchinger et al. 2008, Gibbs et al, 2008); with impacts upon biodiversity largely addressed in terms of the carbon losses resulting from the direct encroachment of biofuel plantations into carbon rich ecosystems such as tropical forest. More recently, the indirect impacts of biofuels through displacement of agricultural land into natural ecosystems have been examined (Gallagher, 2008). Far fewer studies have explicitly analysed the impact of biofuel plantations on biodiversity, although recent reports (Fitzherbert et al, 2007; Koh & Wilcove, 2007) have suggested that these can be significant. It is clear that biofuel production can have adverse impacts on biodiversity. This includes the loss, fragmentation and degradation of natural ecosystems, reduced water availability, and impacts arising from the biofuel plantations themselves such as soil degradation and increased susceptibility of monocultures to invasive species. A review of the potential biodiversity impacts of different biofuels will be presented. The potential of second and third generation biofuels to meet targets whilst reducing adverse impacts on biodiversity will also be assessed. Given the likelihood of increasing biofuel production the options for limiting the adverse impacts will also be examined. Ideas and initiatives for the certification of biofuels and sustainability criteria will be presented, including a discussion of the possible perverse incentives that might be thrown up by the options under consideration. One of the major issues surrounding sustainability criteria is the land that will be 'eligible' for biofuel production, which is often referred to as 'degraded land'. However, there is little agreement on what this term means. Similarly, 'high conservation land' is being earmarked for exclusion from biofuel production, although defining this term and mapping such land on a global scale is difficult. In addition, the issue of indirect conversion of natural ecosystems to agriculture as a result of biofuel production has yet to be adequately addressed; can we introduce sustainability criteria to all agriculture on a global scale? These are important points to clarify, both for biodiversity and climate change, as the production of biofuels on carbon rich natural ecosystems can increase greenhouse gas emissions and reduce biodiversity; whereas the limitation of biofuel production to low biodiversity value, low carbon land could potentially offer a role to biofuel in the mitigation of climate change.

References

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