

Appendix 2. Overview of the three policy alternatives.

The description of the policy alternatives were initially published in the VOLANTE factsheets A5, A9 and A10, available here:

http://www.volante-project.eu/images/Factsheets/A5_VPA_Nature_Protection.pdf

http://www.volante-project.eu/images/Factsheets/A9_VPA_Payment_for_carbon_sequestration.pdf

http://www.volante-project.eu/images/Factsheets/A10_VPA_Payment_for_recreational_services.pdf

For more details on policy alternative, we refer to Verburg et al. (2013). The implementation settings of EFISCEN are detailed in Kuemmerle et al. (2014).

	Policy alternative description	Implementation CAPRI	Implementation DYNA-CLUE	Implementation EFISCEN
Nature Protection	The Nature Protection policy alternative focuses on nature protection, with expansion of protected zones beyond NATURA2000, a robust ecological corridor network and more stringent constraints on land use and land cover conversions. The policy alternative assumes increased restrictions on forest management and land cover change within an improved network of European protected areas (as listed in the World Database of Protected Areas up to level IV), as well as incentives to limit fragmentation and increase connectivity according to the Pan-European Ecological Network.	A strong focus is placed on nature protection, with expansion of protected zones beyond NATURA2000, a robust ecological corridor network and strengthened constraints on forest management and land cover conversions. CAPRI uses the changed protected areas from CLUE in order to calculate a new land balance (agricultural land availability). The strong restrictions on land cover conversion in protected sites could result in more intensive use of unprotected areas, in and outside the EU.	Increased restrictions on human intervention and land cover change within an improved network of European protected areas (including NATURA2000 and strict protection of areas in the World Database of Protected Areas up to level IV); Incentive measures to limit fragmentation and increase connectivity according to the Pan-European Ecological Network	The policy alternative was implemented by classifying forested areas that are part of Natura2000, but are not classified as protected area according to the World Database on Protected Areas. On the selected, forested pixels, the potential wood supply is reduced using felling restrictions for protected areas calculated by Verkerk et al (2014). Based on these assumptions, the harvest likelihood map used to disaggregate EFISCEN projections, as well as the potential wood supply provided to EFI-GTM were re-estimated. Besides restrictions on forest management, also restrictions on land cover conversions are included by Dyna-CLUE. Modified data on changes in forest area were taken from Dyna-CLUE.

PES for carbon sequestration	<p>This policy alternative aims at reducing land use related carbon emissions and stimulating carbon sequestration. Reducing emissions involves the use of incentives, in order to limit the conversion of grassland. A payment scheme is introduced to protect areas prone to carbon emissions, due to their high soil organic carbon contents. In these areas, incentives are offered for not converting land with higher carbon content into arable land. Emissions from deforestation are limited by avoiding deforestation, as much as possible. Finally, payments are introduced to enhance carbon sequestration in forest biomass and soil.</p>	<p>Policies aiming to reduce carbon emissions and to stimulate carbon sequestration are either introduced or strengthened. In CAPRI this is implemented as the most important feature of the greening of the CAP. That is, the regional farmer needs to increase acreages of grassland by 20% as compared to a reference in 2020. If not, the direct farm payment will decrease by 90%.</p>	<p>The goal is to limit the conversion of grassland to arable land into areas with high soil organic carbon and to minimize deforestation. Reducing emissions from agriculture, forestry and land use sector is stimulated using incentives to limit the conversion of grassland. A PES scheme is introduced for not converting land use into arable land, in areas with high soil organic carbon contents. Emissions from deforestation are limited by avoiding deforestation as much as possible. Conversions to arable agriculture are restricted, a fact which affects the spatial distribution of agricultural land use, especially in the maintenance of grasslands.</p>	<p>The policy alternative was implemented by providing payments to (EU) forest owners for storing carbon in forests. If a forest owner decides to harvest the forest instead, that can only be done when timber prices are high enough to compensate the owner for losing the carbon benefit. The impact on demand for wood from European forest resources as estimated by EFI-GTM is used to project forest resource development in EFISCEN. In addition, restrictions on land cover conversions are included by Dyna-CLUE to limit the conversion of grassland and prevent conversion of forests. Modified data on changes in forest area were taken from Dyna-CLUE.</p>
PES scheme applied to recreational ES*	<p>One of the possible methods to ensure the provision of ecosystem services is through incentives and direct payment to farmers or landowners in exchange for managing their land in order for it to provide a certain service. These are commonly called Payments for Ecosystem Services schemes. In this policy alternative, agricultural areas with a high potential to supply cultural or habitat services are eligible for obtaining such incentives/payments to manage the land less intensively, in order to enhance provision of ecosystem services. To stimulate the supply of ecosystem services from forests, felling restrictions are implemented on forests with high biodiversity value (species richness), since, biodiversity is often considered to exercise a positive effect on the ecosystem service supply.</p>	<p>Areas with a high potential to supply cultural or habitat services are eligible to obtain such payments. The specific implementation in CAPRI is as follows. Locations of the so-called Ecological Service (ES) areas are taken from CLUE. The PES equals € 150 per hectare of grassland, arable land or permanent crop in the ES areas. The necessary budget for the EU27 as a whole is deducted from the direct farm payments in the EU and every member state contributes according to its share in the EU direct farm payments.</p>	<p>The supply of (specific) cultural and habitat ecosystem services is maintained. The goal is to stimulate continuation of current agricultural land and forest management in areas with a high supply of ecosystem services by a PES scheme. As stimulation for land stewardship in areas with a high potential to provide ecosystem services, policy mechanisms need to be established such that would offer farmers or landowners incentives, in exchange for managing areas with specific services, e.g. cultural heritage landscapes and landscapes with potentially high values for rural tourism. Agricultural areas, recognized as providing specific ecosystem services, are targeted. These ecosystem services are recreation; biodiversity (high species abundance) and habitat (linear elements). In total, 631,000 Ha (25 % of the total agricultural area) are given a higher location-specific suitability for their current agricultural land use.</p>	<p>The policy alternative was implemented by modifying the harvest likelihood map that is used to disaggregate EFISCEN projections. A map was created identifying areas with potentially high ecosystem services supply. The map shows zones of potentially high ecosystem services supply due to species richness, we used on potential species richness by Maiorano et al. (2013). To limit the map to forests, non-forested areas were excluded using a forest mask (Brus et al. 2011). Forested pixels with a species richness exceeding the 90th percentile were considered as areas with high biodiversity. Felling restrictions on these sites were applied and the likelihood to be harvested was reduced to 2/3.</p>

*PES scheme describes the broad approach to all PES policy alternatives including recreational services

References

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