

# Science for Environment Policy

## Land use can affect fresh water supplies

**New research has shown that supplies of fresh water** provided by rivers depend not only on rainfall, but also on the land use within the river catchment. In the Spanish Basque Country, grasslands were found to supply the greatest amount of river water, followed by native woodlands, with exotic woodland plantations providing the least. The researchers also call for more comprehensive analyses of ecosystem services, including carbon sequestration and biodiversity, to inform land use policy.

**Ecosystems can provide vital services**, such as fresh drinking [water](#) supply, which help humans adapt to [climate change](#). Experiences in the Basque Country illustrate the need to better understand how [land use](#) decisions can influence water supply, since this is a highly populated and industrialised area with an increasing demand for water, vulnerable to increasing droughts under climate change.

This study aimed to explore how land use decisions affect the volumes of fresh water provided by rivers and streams in the Basque Country. Fifteen catchments were studied, with similar geology, topography (shape of the land's surface) and climate. Over two years, rainfall was analysed and related to river flow levels in areas with the following land uses: grassland pastures, native woodland, and exotic (mainly pine) tree plantations.

The researchers defined the fresh water supplied by different land uses as 'water productivity', the monthly discharge of water by rivers, divided by the total rainfall received within the catchment. Therefore water productivity was higher when a greater proportion of rainfall reached rivers and streams. The study focused on this simple ratio of water provision, instead of considering how water productivity might relate to [soil](#) erosion rates or the steadiness of water supply over seasons.

Exotic pine plantations were shown to yield the smallest flows of freshwater. This is likely to be because exotic trees, such as pines and eucalypts, have high water requirements, leading to the drying of soils and less rainfall reaching rivers. Native woodlands were also of low water productivity, though most of the native woods studied were recovering from previous usage as plantations and were therefore in the early, immature stages of woodland development. Traditional grazing pastures were the most water productive of the land uses.

The researchers criticise plantations as a land use, since they yield 50% less water than pastures over the course of a year. In addition to their low water yields, the researchers also drew attention to plantations' limited biodiversity and declining economic value, and other studies which have shown decreased water quality resulting from clear-felling of plantations.

The study also draws attention to the value of quantifying water provision from local land usages when establishing water 'Payment for Ecosystem Services' schemes. Finally, it concludes that, in addition to measuring water productivity, land use policy should be informed by a comprehensive analysis of ecosystem services, including factors such as carbon sequestration and biodiversity.



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