

What are the Public Goods from Agriculture?

This fact sheet was prepared to support discussions and contribute to the debate on the future of agricultural policy. This was developed as part of a study to explore how the resources currently spent on CAP basic and coupled payments, as well as agri-environment, could all be redirected to pay for the delivery of public environmental goods. A number of assumptions were made and this work aims to provide an illustration of potential outcomes.

Public goods are all the things we enjoy and value in life, but we cannot buy the way we do with other goods. Whoever we are, wherever we are, public goods should be accessible to all. Many human activities have an impact on these public goods and therefore we have the choice to make decisions that will deliver the greatest benefits for society as a whole.

Almost any form of agriculture has some form of environmental cost. But there are differences between systems in their impact on the public interest, whether it is environmental quality, human health and wellbeing or the preservation of natural resources.

It is not always easy to distinguish public goods from private goods on farms. So as a rule of thumb, if farmers deliver benefits for society that go beyond what is required by regulation, then their work can be rewarded by the public for delivering public goods.

Healthy ecosystems mean greater public goods which will benefit us all.



- ① Converting arable to grass and rotational grazing can help build soil organic matter, mitigating climate change and maintaining soil health
- ② Soil organic matter also helps filter and store water, improving water quality and flood control
- ③ Earthworms and plant roots create channels into the soil, increasing water infiltration and reducing flooding
- ④ Reduced and zero tillage helps conserve soil organic matter, reduce soil erosion and protect earthworms
- ⑤ Legumes such as clover or beans reduce the impacts of nitrogen fertilisers, mitigating climate change and helping keep water clean
- ⑥ Flowering species, including wildflowers and legumes, support pollinators, helping plant reproduction, and other insects that are important food for birds
- ⑦ Diverse wildlife and farming landscapes are attractive to people, supporting public access, recreation and health
- ⑧ Trees and hedges including agroforestry provide shelter and shade, capturing carbon, protecting soils, improving animal welfare and improving air quality
- ⑨ Riverside trees protect river banks and water quality, reducing the loss of soil and nutrients into watercourses
- ⑩ Healthy native woodlands support wildlife while reducing local flooding and capturing carbon
- ⑪ Farmland birds have adapted to co-exist with agriculture, but still need diversity, nesting sites and food sources such as insects to sustain them
- ⑫ Recycling nutrients in crop residues and livestock manures helps conserve non-renewable resources and reduce pollution

Farmers' actions can contribute to the following public goods:

Food security:

Humans are dependent on food as well as clothing and shelter for health and survival. In the strict economic definition, these are all usually seen as private goods as they are tradeable commodities (with some exceptions). Food security can be considered a public good to the extent that access to affordable, or indeed any, food supplies is a basic societal need. Local food production is also important as part of a country's ability to produce its own food.

Farmland biodiversity:

Many species and habitats have been adversely affected by agricultural activity and there is a case for some conversion of agricultural land to wild habitat (nature restoration) to restore ecosystems at the landscape scale, as well as specifically protecting remnant habitats and species. For farmland biodiversity, there is a well-evidenced case for reducing farming intensity and providing wildlife refuges and habitats.

Water quality:

Clean water is important for public health and for the health of ecosystems, as pollution impacts negatively on aquatic and marine ecosystems. Agriculture contributes towards both diffuse and point sources of pollution (from fertilisers, manures and slurries, soil erosion and pesticide applications). Some aspects of pollution risk are covered by regulation. Actions to improve water quality that go beyond regulatory requirements generate public benefits of particular interest to water and environmental protection agencies.

Flood protection and drought control:

Changes in land use and management have impacted on the ability of soils to moderate water flows in catchments, causing significant flooding incidents and economic damage. The conversion of arable land to low-input grass, agroforestry tree lines, woodland expansion, peatland restoration, riverbank restoration, re-meandering and floodplain management can all make positive contributions, both to reducing flood risks and improving drought resilience.

Soil health (functionality) and organic matter:

Healthy soils are perceived as a significant component of natural capital in recognition of their provision of key ecosystem services, including food production. However, because food is a marketable product, not all aspects of soil health (e.g. soil nutrient status) are regarded as a public good, though healthy levels of organic matter and soil biological activity can be considered to be important in terms of natural capital and delivering public benefits.

Air quality:

Clean air is important for public health. High loadings with agriculturally generated emissions such as ammonia (NH₃) can lead to excessive nitrogen depositions, which can adversely affect sensitive habitats such as bogs, as well as impact on animal and human health. Conversely, planting of trees, for example in agroforestry systems or in farm woodlands, can help to capture and remove ammonia, reducing negative impacts.

Climate change mitigation:

Agriculture is associated with a range of greenhouse gas emissions that contribute to climate change. Conversely as a biological, plant-based industry, agriculture also has the potential to fix CO₂ through photosynthesis and to sequester carbon in wood and soils for longer periods. While the agricultural industry can reduce its own emissions through changes in management practices, enabling woodland expansion, improving native woodlands' condition, peatland restoration, large-scale nature restoration will also contribute to climate change mitigation while delivering an array of other public goods.

Climate change adaptation:

Many of the impacts of climate change are expected to be felt as more extreme weather conditions (hotter summers, more wet winters, more extreme rain events). Farmers and other land managers can contribute to the broader societal challenge of adaptation through efforts to moderate flood risks, hedge and broadleaf tree planting to improve micro-climates (e.g. through shading) and maintaining soil cover to protect soils from erosion.

Fire resilience:

Drier weather conditions in the UK have resulted in increasing incidences of moorland fires affecting farmland, biodiversity, livestock and the built environment, both through fire itself and the impacts on air quality. Management practices to reduce the potential for fires spreading, and the ability to control fires when they do happen (e.g. through improved water storage facilities), can generate some wider public benefits (e.g. recreation) beyond the interests of individual farms.

Pollinators:

These have an important role in enabling plant reproduction, including in many agricultural crops. Activities specifically to support pollinators beyond the normal commercial interests of farmers are not normally required by regulation and therefore are likely to qualify as wider public benefits. Drawing the boundaries between public and private benefits can be difficult, as for soil management practices above.

Agricultural landscapes:

Often the overall landscape impact is the result of activities on multiple holdings, and not directly related to individual land managers. However, the provision of landscape elements (including trees, hedges, copses, and ponds), the reduction of field sizes, the diversification of farming systems and large-scale nature restoration can all generate public benefits by contributing to more attractive landscapes.

Public access to land:

With a largely private land-ownership structure, access to land is already recognised as a public good through the granting of a right of access open to all under the Land Reform Act (<https://www.outdooraccess-scotland.scot/>) in Scotland. However, public policy considerations relating to the enjoyment of the countryside, recreation and health determine that in order for access to happen, there is a need to provide facilities and/or maintain these.

Conservation of non-renewable resources:

Circular economy principles, including waste minimisation and the closing of cycles (e.g. retaining resources, reducing waste and returning nutrients exported to urban areas back to the land, rather than losing them to the wider environment) are key issues to be addressed to limit the extraction of non-renewable resources. The extraction and utilisation of these resources is treated generally as the supply of marketable private goods. However, some aspects of reducing non-renewable resource use, and using renewable resources more sustainably, such as helping with the transition towards more regenerative agriculture (e.g. through training and advice), is in the public interest.

Farm animal welfare and animal health:

To the extent that poor animal health impacts on productivity, then actions to address animal health issues are related to the production of private goods. However, farm animal health and welfare may be associated with environmental, biosecurity and public health impacts, in addition to potentially public moral, ethical, cultural or religious standards, some of which go beyond regulatory requirements.

Connecting people with the land:

Public health, including mental health, may be impacted positively by access to land for recreational benefits, as well as by direct involvement in food production (e.g. allotments, home gardens, Community Supported Agriculture (CSA) initiatives). Activities at below cost to the farmer are often not subject to market mechanisms and regulations and could be considered as public goods.

Culture:

Not always identified as a public good from agriculture, there are many instances where farming communities provide the basis for distinctive indigenous societies and rural cultures, often reflected in languages and cultural traditions – Welsh and Gaelic being good examples in the UK.

Rural vitality:

Economic activity, business profitability, employment and incomes are usually considered as consequences of market activity and therefore private goods. However, there are key public policy issues relating to the survival of rural communities, including social structures, the level of access to facilities and the retention of young people.

Further Information

This fact sheet on public goods is supported by a full report prepared for NatureScot:

Lampkin N, Shrestha S, Sellars A, Baldock D, Smith J, Mullender S, Keenleyside C, Pearce B, Watson C 2020. Preparing the Evidence Base for Post-Brexit agriculture in Scotland – Case studies on alternative payments. NatureScot Research Report No. 1201 - NatureScot use only.

Case studies are also available:

Rewarding Environmental Public Goods on Arable and Mixed Farms – Case Study

Rewarding Environmental Public Goods on Dairy Farms – Case Study

Rewarding Environmental Public Goods on Lowland Livestock Farms – Case Study

Rewarding Environmental Public Goods on Hill Sheep Farms – Case Study

Rewarding Environmental Public Goods on Crofts – Case Study

<https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/agriculture-and-land-use-policy-development>

Contact:

cecile.smith@nature.scot or ross.lilley@nature.scot