



Australian Government

Department of Agriculture,  
Fisheries and Forestry  
Bureau of Rural Sciences



# Understanding the benefits that vegetation provides

Managing vegetation for multiple ecosystem services





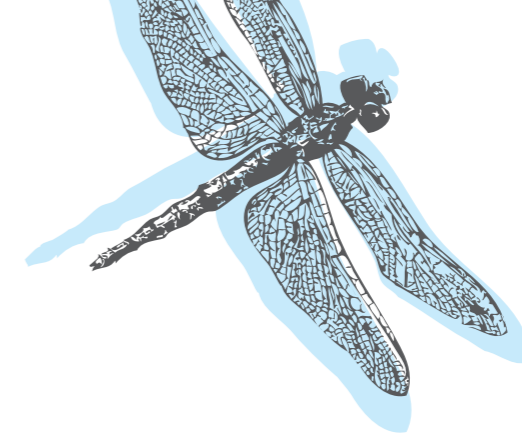
When you eat breakfast tomorrow, consider the role that ecosystems have played in developing the products around you, such as your breakfast cereal, milk, tea and coffee and daily newspaper.

All of these aspects of your morning routine rely on processes that are part of ecosystems and the environment. Milk production relies on the growth of pastures, which in turn need fertile soils rich with micro-organisms. Pastures and cereal crops control the interception of rainfall and the runoff of water into waterways, helping to filter it of impurities. Carbon dioxide produced by your car will be absorbed by growing trees, which in turn are the source of your daily newspaper.

### What is an Ecosystem?

An ecosystem is a community of plants and animals that interact with one another and with their physical environment. It can be as small as a puddle or as large as the entire planet. Ecosystems include physical and chemical components, such as soils, water and nutrients that support the range of organisms living within them, from bacteria to the tallest trees and largest animals—including people.

Within ecosystems, vegetation is particularly important, because it delivers environmental and life-supporting functions. It is the starting point for all food chains and provides much of the fibre, fuel and building materials on which our life depends.



### What are Ecosystem Services?

Ecosystems provide a wide range of economic, cultural, aesthetic and spiritual benefits to both individuals and society. These benefits are called 'ecosystem services' and they underpin all societies.

Although most people are aware of the direct, tangible products produced by plants in ecosystems, such as timber from plantation forests and grains from crops, we are often unaware of the extent of ecosystem services or can take them for granted. They are rarely valued from an economic perspective.

Whether we are in a rural or an urban environment, living in a developing or a developed country, ecosystems provide a range of goods and services that are vital to maintaining human societies.





## The Role of Vegetation

Vegetation has a vital role in the structure and functioning of ecosystems. Through the process of photosynthesis, plants capture and transform light energy into the food that all animals, including humans, depend upon. Photosynthesis relies on the consumption of carbon dioxide (CO<sub>2</sub>) from the atmosphere, making vegetation a vital CO<sub>2</sub> sink and helping to balance the emission of CO<sub>2</sub> by processes such as the burning of fossil fuels.

Vegetation, both domesticated and wild-grown, has a crucial role in all human societies as a source of food, fuel, fibre and medicines. It also provides structural aspects to the landscape, holding soil together and moderating weather. Many cultural and recreational activities are also connected with vegetation.

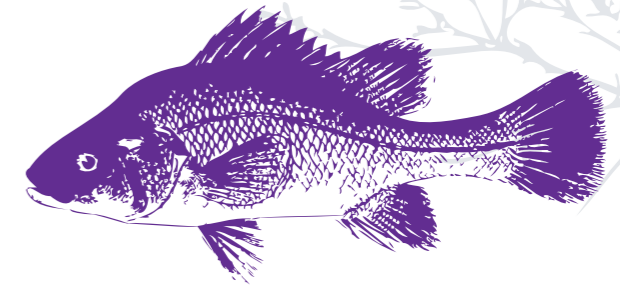
Vegetation in ecosystems provides services such as:

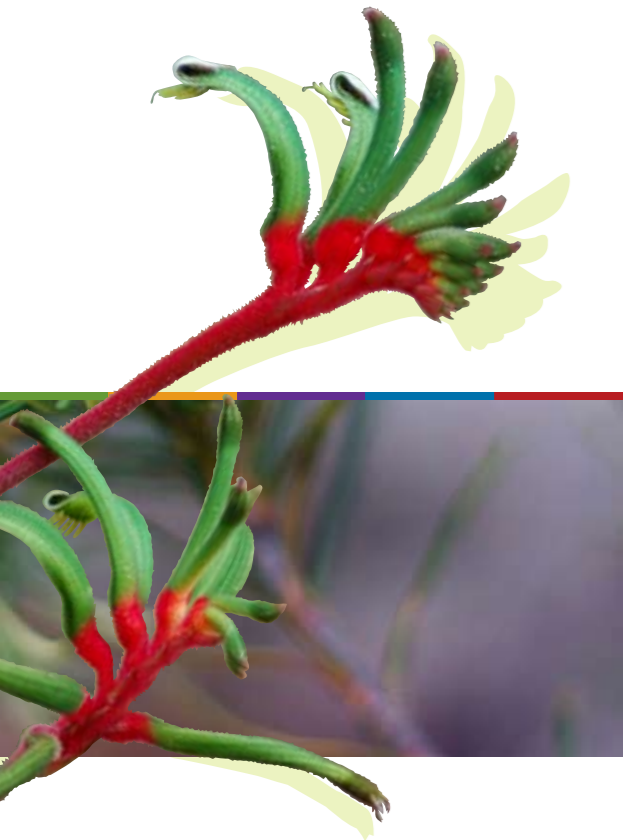
- » moderation of weather extremes and their impacts
- » mitigation of droughts and floods
- » prevention of soil erosion
- » maintenance of biodiversity
- » filtration pollutants from water and air
- » generation and preservation of soils and renewal of nutrients
- » mitigation of the effects of salinity
- » removal of carbon dioxide from the atmosphere
- » production of food and fibre for human use
- » provision of shade and aesthetic appeal
- » opportunities for recreation
- » compounds for the production of medicinal products.

## Value of Ecosystem Services

Natural ecosystems provide a suite of services that are very difficult to quantify, let alone replicate. While it is relatively straightforward to calculate the value of a plantation of eucalypts destined for timber products, a field of canola, or tourism in a National Park, the services that support the production of these goods (such as soil nutrients or habitat for native animals) cannot easily be valued in the economic market. Many of these services are seemingly provided for “free” and so we have trouble calculating their value in economic terms. However, we can begin to calculate some of the financial costs of damage to ecosystem services. Consider the examples below.

- » the replacement of native, deep-rooted vegetation with shallow-rooted, annual crops is one of the major causes of dryland and urban salinity in the Murray-Darling Basin, affecting more than 2.5 million hectares and 220 towns across the Basin. The Murray Darling Basin Commission has estimated that salinity will cost in excess of \$304 million per year in lost productivity, repairing damage and lifestyle adjustments, with more than half of these costs borne by households and farmers.
- » removal of vegetation may result in loss of soil through wind and water erosion. Loss of nutrients resulting from soil erosion on agricultural land in South Australia is estimated to cost more than \$6 million per year; the impact of wind-borne soil particles on the economy exceeds \$23 million per year, more than 85% of which is due to health-related impacts such as asthma.
- » trees and shrubs provide shade and shelter from extremes of hot and cold to stock, and also act as windbreak for crops. Heat stress can reduce both quantity and quality of milk from dairy cows, while shelter from cold weather events can reduce mortality amongst newborn lambs by up to 30%. Providing windbreaks in paddocks can increase wool production by 35%, live-weight gain in sheep by 21% and wheat yields by up to 25%.





### When Ecosystem Services are damaged

Many human activities impact on ecosystems and may reduce their ability to provide the services we value. Growth of human activities (including population, consumption and technologies to produce goods for consumption) and an imbalance between short-term needs and long-term well-being of society can have a significant impact on ecosystem function.

Everyday human activities that disrupt, impair or modify ecosystems include:

- » runoff of pesticides, fertilisers and wastes
- » pollution of land, water and air
- » introduction of non-native species
- » over-use of resources such as timber or water
- » land clearing
- » urban sprawl.

### Who is responsible for managing vegetation for Ecosystem Services?

Everyone benefits from sound vegetation management practices and the ongoing provision of ecosystem services, just as everyone's activities impact on the environment. A shared approach to managing vegetation by governments, landholders and the community is therefore essential if we are to continue to benefit from goods and services provided by ecosystems. Everybody has a stake in ensuring ecosystem services are maintained and enhanced.

The Australian Government has a role to ensure economic, social and environmental security for Australia by promoting development that does not compromise the ability of ecosystems to support and enhance the wide range of activities that Australians

engage in. It would cost Australia many millions of dollars to attempt to artificially provide the wealth of services currently provided by ecosystems and so there is enormous value in finding ways to benefit humans without reducing the ability of ecosystems to provide these vital services.

The *Environmental Protection and Biodiversity Conservation Act (1999)* was introduced by the Australian Government to support ecologically sustainable development for the future well-being and growth of our nation.

The Australian Government understands that the present and future well-being and growth of Australia is underpinned by services provided by ecosystems and has committed to the principles of Ecologically Sustainable Development, as recognised in the *Environmental Protection and Biodiversity Conservation Act (1999)*.

### What can individual landholders and community members do?

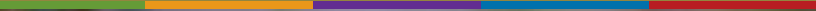
Ecosystems are complex and operate at a range of scales. Anyone who uses or manages land can impact on ecosystem services in a positive or negative way.

Important things to consider in establishing a management program are:

- » understanding how the system you are using operates - the more informed you are, the better you can manage your system
- » aim to protect the basis from which the goods and services you want from the land are produced

- » be aware of any potential off-site impacts of your management practices
- » generally, the condition of your system can be best measured in relation to a benchmark or "ideal" system eg. how similar it is to pre-European native vegetation.





**For more information about ecosystem services, please contact the Bureau of Rural Sciences.**

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