



SYSTEM DIMENSIONS	CHEMICAL AND PHYSICAL	BIOLOGICAL COMPONENTS	HUMAN USES
Extent Pattern	Nutrients, Carbon, Oxygen Contaminants Physical	Plants and Animals Communities Ecological Productivity	Food, Fiber, and Water Recreation and Other Services

❓ Natural Ecosystem Services

What Is This Indicator, and Why Is It Important?

This indicator would report on the levels of key services provided by “natural” ecosystems—forests, grasslands and shrublands, fresh waters, and coasts and oceans. The goods, or products, these ecosystems provide—such as fish, wood products, and food—can be counted, and a monetary value often placed upon them (key ecosystem products are described on p. 58).

Some services, such as recreation, are also fairly easily quantified (pp. 60, 109, 132, 153, and 174). But

many of the services provided by natural ecosystems are less tangible and more difficult to quantify, including such vital processes as purification of air and water, detoxification and recycling of wastes, regulation of climate through storage of carbon dioxide, regeneration of soil fertility, and maintenance of the earth’s startling variety of plants and animals, which we use to sustain ourselves, but which we also enjoy for their own sake. Natural ecosystem processes reduce the severity of floods, promote pollination of crops and natural vegetation, ensure dispersal of seeds, control agricultural pests, and protect coasts and hillsides from erosion.

These services are often unrecognized, or at best taken for granted—until conversion or loss of the ecosystem results in loss of the services. For example, wetlands and floodplains can play a vital role in minimizing flood peaks, but this was often not recognized until downstream flooding increased following upstream conversion and filling. Or a steep hillside, formerly stabilized by trees and shrubs, slides downward, taking with it the houses that replaced the trees. Indeed, one of the greatest environmental, social, and economic disasters in the nation’s history—the Dust Bowl—occurred when the intangible services provided by the natural grassland ecosystem were lost as a result of widespread agricultural conversion.

Land can also change from agricultural use into a more natural condition (this occurs less often for urban lands). For example, demographic and economic changes in New England have replaced farmland production with forest ecosystem services, and the Conservation Reserve Program (which removes environmentally sensitive farmlands from production) implicitly acknowledges that the ecosystem services provided by these lands can outweigh the value of their agricultural production.

Why Can’t This Indicator Be Reported at This Time? We report indirectly on some ecosystem services by reporting on changes in the extent of major ecosystem types. Since many ecosystem services are lost or exchanged for other, different, services when natural ecosystems are converted to farmland or urban/suburban use, or when wetlands are filled, tracking changes in ecosystem extent is the best way we currently have of quantifying changes in ecosystem services.

Although it is the best we have, it is not good enough, because changes in the condition of an ecosystem—short of outright conversion to another land use—can alter the amount and type of services the system provides. An alternative, but also unsatisfactory, approach involves very detailed studies of individual systems and services. Neither the broad-brush surrogate method nor the tightly focused individual service approach allows measurement of broad categories of ecosystem services, such as would be necessary for national reporting.

What Steps Are Necessary To Achieve Reliable National Coverage? There is substantial scientific uncertainty about ecosystem services—not about whether they exist or whether they are important to society—but about how to measure them, which ones to track, and the like. This is an area of active research among ecologists and ecological economists.

There is no technical note for this indicator.

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Indicator Development Needed