Costing Mother Nature's service

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The significant and multiple roles of wetlands are now gaining economic and political weight. Australia is leading the world in assessing and valuing ecosystems' 'free' services.

The central role of healthy ecosystems in providing critical services has been, until very recently, overlooked and often taken for granted. **Professor James Salzman** reflects.

When we bite into a juicy apple, we might think of soil and water but probably not of the natural pollinators that fertilise the flower so the fruit can set. When we think of clean water, we may not think beyond the tap, but the real source of the clean water lies many miles upstream in the wooded watershed that filters and cleans the water as it flows downhill. When we think of a fun day at the beach, we appreciate the warm sun but perhaps not the carbon sequestration by plants that contributes to climate stability.

Created by the interactions of living organisms with their environment, a suite of 'ecosystem services' underpin society by purifying air and water, detoxifying and decomposing waste, renewing soil fertility, regulating climate, mitigating droughts and floods, controlling pests and pollinating vegetation.

While awareness of ecosystem services dates back to Plato, ecologists and economists have only recently begun systematically examining the extent and value of their contributions to social welfare. Not surprisingly, recent research has demonstrated the extremely high costs to replace many of these services if they were to fail. They are in the order of billions of dollars in the US for pollination alone.

Given their significance, one might expect that ecosystem services would be prized by markets and explicitly protected by the law. With few exceptions, however, neither has been the case.

The primary reason ecosystem services are taken for granted is that they are free. We explicitly value and place dollar figures on certain 'ecosystem goods' such as timber and seafood, yet the services underpinning the production of these goods – almost without exception – have no market value because there is no market to capture and express their value directly. When we buy a wetland, we are paying for location and scenic beauty, not its role as a nursery for sea life. Such circumstances make ecosystem services easy to forget – until they fail.

Consider the service of water purification and the Catskills watershed in New York state, USA. Under a new US law in the

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early 1990s, water suppliers were required to filter their water unless they could show they had taken alternative steps to ensure safe drinking water. New York City faced a choice: it could invest in building a filtration plant for US$6 billion to $8 billion (and another $300,000 annually to operate) or it could invest in natural capital, restoring water purification services in the upstream Catskills watershed at a cost of roughly $1.5 billion (to pay for changes in land management practices).

The City chose to invest in the ecosystem service, the lowest cost option. Upper catchment landowners, the stewards of the watershed, are compensated for the purification services they provide to the city.

More broadly, those who value other services supplied by the Catskills ecosystem (e.g. carbon storage, aesthetic and recreational benefits, cultural preservation) will see these better protected under the umbrella of water purification.

Despite examples in the US such as the Catskills, Australia is far and away the leader in ecosystem services research. That's why I've spent the last year 'Down Under' as a Fulbright Senior Scholar, collaborating with CSIRO to study the progress and challenges in protecting nature's services.

Starting with European settlement and continuing today, Australia has been undergoing a long period of deforestation. It is well publicised that the clearing of native vegetation to establish pastures and European-based agriculture has had negative impacts on biodiversity and soils, including salinisation, acidification and erosion.

In response to these threats, ecosystem service protection initiatives have blossomed around the country. The Murray-Darling River Basin offers the most impressive examples. Pilot programs such as BushTender in Victoria use a reverse auction mechanism, asking landowners to submit bids on how they will manage their land to protect native vegetation, and then paying those farmers who provide the greatest biodiversity bang for the buck.

The Environmental Services Investment Scheme in NSW uses a similar approach to not only promote protection and re-establishment of native vegetation, but to reduce recharge for salinity control and enhance provision of other services, as well.

The Macquarie River Food and Fibre association of irrigators, with the assistance of NSW State Forests, pays landowners in the upper catchment to plant trees, in other words, for the service of evapotranspiration and reducing the water table level lower in the catchment.

These and other initiatives have the potential to protect and restore an ecosystem service at lower cost than engineering alternatives. The exciting potential of such projects is that the farmers of the future continue to earn money cropping and grazing, but in addition, will also enjoy revenue from provision of services, whether that be storing carbon, conserving biodiversity or reducing salinity.

An ecosystem services perspective that gives an explicit focus on protecting and restoring services provides two potential benefits. The first is political. The role of ecosystem services powerfully justifies why habitat preservation and biodiversity conservation are vital, though often overlooked, policy objectives.

The second benefit is instrumental. Efforts to capture the value of ecosystem services will spur the creation of institutional structures and market mechanisms that can capture and maximise service values. If given the opportunity, natural systems can in many cases quite literally 'pay their way'. The key challenge is how to make this happen. Australia is taking the initiative.

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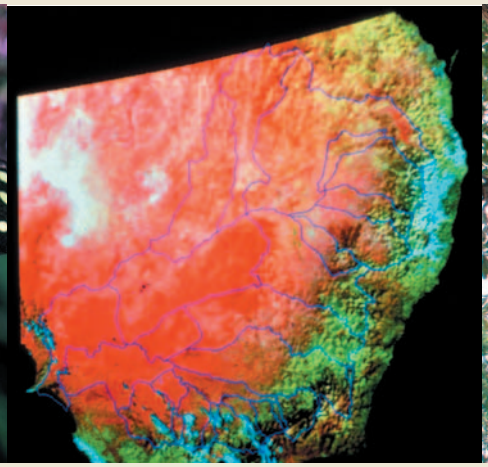

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Left: The green-spotted triangle butterfly, *Graphium agamemnon ligatum*, pollinates across tropical north-east Queensland. The essential, everyday service of pollination by insects has been roughly costed in economic terms at billions of dollars in the US alone.

Middle: The Murray-Darling Basin, Australia's giant catchment region, is vital to regional habitat health and our economy.

Above: Entomologists represent one of many scientific branches increasingly focused on researching the pivotal and complex service roles played by biodiversity.

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More information: http://www.ecosystemservicesproject.org/html/publications/index.htm