

MN358: Ecosystem services

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Local people in poor rural villages such as Mariarano depend on the natural environment for almost all their daily needs. In the Mahamavo region, the main economic activities are rice agriculture, fishing, charcoal production and zebu pastoralism.

There is considerable scope to work with local people and our social scientists to elicit this traditional ecological knowledge and develop a conceptual model of which provisioning and regulatory ecosystem services are considered important (e.g. the fisheries, fresh water, pasture for zebu, wood from the forest), who uses the services, how far they travel to obtain services, what kind of forest/lake/mangrove, etc. is most suitable for a particular resource use and whether it is possible to place monetary value on any services (e.g. with market prices or substitution costs).

The next step might then be to cross-walk this information into parameters of GIS models for the probability that landscape units will provide particular services. In this way it should be possible to build a robust map of the provision of particular ecosystem services across the landscape. Such outputs would be extremely useful in conservation planning, especially if they can be compared with maps of biodiversity value.

You might want to select some of the following services to focus your research.

Provisioning

- Rice production on agricultural land
- Pasture for zebu grazing
- Water flow
- Fuelwood
- Fisheries

Regulatory

- Soil erosion protection
- Carbon

You could explore the patterns of rice productivity and pasture productivity using remote sensing (especially MOD 17 NPP) to identify the relative pattern of provision of these services across the Mahamavo watershed. It should then be possible to use market price approaches to monetize these services.

Fuelwood and construction wood for subsistence use is not marketed, however it would be possible to use Dempster-Schafer or Bayesian belief approaches to identify which parts of forest landscape provide these services to local people.

Parts of the landscape such as the mangrove and estuaries which are especially important for fisheries could be identified using similar Bayesian modeling approaches. Additionally, fish catches and prices could be estimated from interviews with fishers in the market.

An adequate discharge in rivers is essential for irrigated agriculture. Although some communities use wells to obtain drinking water from groundwater, many villagers use surface water for drinking. To explore where this service is provided, and at which times of year, simple distributed hydrological models could be developed based. Fresh water provision might be monetized by considering substitution costs.

Forests make important contributions to the provision of regulatory services, especially the retention of soil on slopes which maintains productivity and prevents sedimentation of wetlands, the sequestration of carbon in trees and regulation of water quality.

The revised universal soil loss equation can be used to assess the degree of soil conservation provided by landscape units. Please refer the guidelines on MN345 and MN344 for more details of how carbon sequestration can be measured. This service can be relatively easily monetized with reference to a global carbon price.

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