

## Guideline 4: Ecological restoration and remediation projects – planning and implementation

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### Primary benefit

- Ecological restoration projects restore and maintain biodiversity values and the health of restored ecosystems. They also enhance wildlife habitat values.

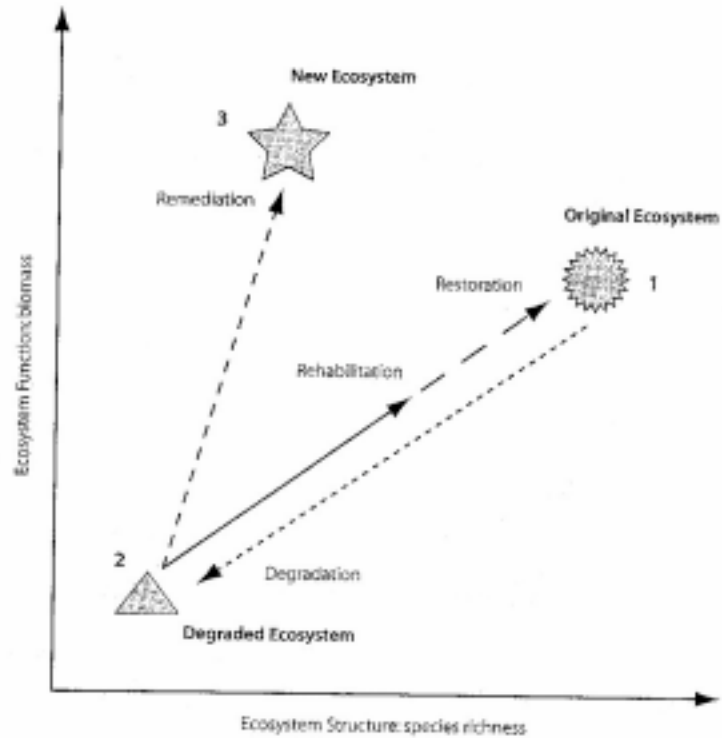
### Other benefits

- This guideline shows how to plan and implement projects to minimise the risk of omissions and inappropriate works and to make the best use of available resources. These measures significantly increase the probability of achieving successful outcomes for the projects.

### What is it?

- 'Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices' — Society for Ecological Restoration (1998).
- The aim of ecological restoration is to re-establish a functional ecosystem of a predefined type that has enough biodiversity to continue the maturing process via natural processes and to evolve in response to changing environmental conditions over the longer term.
- There are three types of projects — restoration, rehabilitation and remediation. Restoration involves re-establishing an ecosystem to a high ecological integrity. To do this, rehabilitation is used. Sometimes, due to fundamental changes to environmental conditions, it cannot be restored and a new ecosystem will need to be created; this is remediation (see Figure 12 below, from A Rehabilitation Manual for Australian Streams, Vol 1, LWRRDC, 2000).
- Ecological restoration at a project site aims to improve ecological community structure and restore and maintain the richness of both fauna and flora species to achieve a condition similar to a substantially undisturbed site.
- Success of the ecological restoration process is generally measured by comparing the site to a similar but undisturbed reference ecosystem located nearby.
- Remediation may include any of the following:
  - Repairing a damaged ecosystem.
  - Creating a new ecosystem of the same kind to replace one that has been entirely removed (e.g. in a mining area).
  - Creating another kind of regional ecosystem to replace one that was removed from a landscape that was irreversibly altered (e.g. due to urban development).
  - Creating a replacement ecosystem where an altered environment can no longer support any previously occurring type of regional ecosystem (e.g. at former landfill sites).
  - Creating a replacement ecosystem because no reference ecosystem exists to serve as a model for restoration (e.g. areas that have been densely populated for centuries and all remnants of the original ecosystems have been obliterated).

**Figure 12 – Restoration, rehabilitation and remediation**



### Limitations

- The aims of ecological restoration cannot always be achieved. This is often due to the severity of disturbance and degradation, or a lack of adequate resources. Projects that produce ecological benefits but cannot achieve the aims of ecological restoration should be referred to as rehabilitation.
- If a reference ecosystem is not available near the site, then evaluating the success of the project will be difficult and subjective.
- Even if a reference ecosystem is available, that ecosystem itself is likely to have changed over time.
- Planning, implementing and monitoring ecological restoration and remediation depends on the involvement of an ecologist with extensive knowledge of the ecosystems being restored.
- Restoration and remediation works need to be carried out by people with adequate knowledge and skills to avoid damage to the remnant vegetation and wildlife habitat values of the ecosystem.

### Guidelines

- A Strategic Plan is essential for determining how feasible it is to carry out ecological restoration and remediation in a particular area.
- The Strategic Plan should incorporate enough information to allow an informed decision to be made about the feasibility and resources required to successfully complete the project. It should identify:

- The project site boundaries.
- Ownership and zoning.
- The need for ecological restoration.
- The type of ecosystem to be restored.
- The goals of restoration that relate to social and cultural values.
- Physical site conditions (e.g. slope, soil type, depth to groundwater table).
- The factors causing stress on the ecosystem (e.g. fires, weed invasion, poor water quality).
- Biotic factors that need to be reintroduced (e.g. plants or animal species) or removed (e.g. weeds).
- Landscape restrictions both present and future (e.g. adjoining land uses that are incompatible with restoration, or poor water quality that may be created by upstream land uses).
- Funding sources.
- Human and physical resources required.
- Approvals and permits required.
- Load restrictions on the land within the site.
- Project duration and staging.
- Long-term protection and management of the site.
- As a guide, the following preliminary tasks should be carried out before starting a restoration project:
  - Involve a restoration ecologist with specific knowledge of the ecological system being restored.
  - Assemble a team that includes people with the necessary skills and experiences.
  - Prepare a budget that includes a series of stages.
  - Document the existing conditions and ecological values of the site.
  - Document the site history and factors that have led to the need for restoration.
  - Collect baseline data such as water quality and flow rates, over a period of time if required.
  - Identify a reference ecosystem nearby that will allow the success of the project to be evaluated.
  - Gather information about the recruitment (i.e. population reproduction cycle), maintenance and reproduction of key species, and if necessary carry out trials and tests before starting restoration.
  - Carry out trials to test the effectiveness of any untried restoration techniques that may be proposed for the project.
  - Determine if the proposed restoration goals are realistic, and modify them if necessary.
  - Prepare a list of objectives designed to achieve the restoration goals.
  - Secure all approvals and permits that may be required.
  - Establish liaison with relevant government authorities and other organisations.
  - Plan and implement a program of community awareness, consultation and involvement.

- Install infrastructure, such as access tracks, storage areas, power and water supplies.
- Engage staff to supervise and carry out the restoration works.
- A Project Implementation Plan is needed that describes how the restoration will be carried out. As a guide, the Implementation Plan should:
  - Describe the works that will be implemented to achieve each of the stated objectives.
  - Define performance standards for assessing the project's success.
  - Schedule the restoration works, identifying tasks required to achieve each objective.
  - List the resources to be procured, including equipment, supplies, plant material and other materials.
  - Define the boundaries of the project area and install signs and/or fencing as required.
  - Outline requirements for installing monitoring components, such as permanent transect lines.
  - Explain the restoration tasks to carry out (with adequate supervision and involvement of a project ecologist).
- As a guide, follow-up tasks should include:
  - Protecting the project from vandals, pests and inappropriate access and use of the site.
  - Maintenance works, including erosion repair, weed control and public access control.
  - Regular site inspections by the project ecologist to assess the effectiveness of the restoration and to identify any modifications that may be required.
  - Monitoring in accordance with the program as defined in the Implementation Plan.
- Evaluating the project should include:
  - Assessing the monitoring data in relation to the defined performance standards.
  - Describing the components of the restored ecosystem that are not covered by monitoring data.
  - Evaluating the level of success in achieving the restoration goals.
  - Publishing the results of the project to contribute to the body of ecological restoration knowledge and to assist others doing similar projects.

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### Information sources

- Clewell A, Rieger J and Munro J (2000) Guidelines for Developing and Managing Ecological Restoration Projects. Available on the Society for Ecological Restoration website, [www.ser.org](http://www.ser.org).
- NSW Government Blue Mountains Urban Runoff Control Program, (2003) Bush Regeneration: A Practical Guide to Contract Management, DIPNR, Sydney.