DAMS FOR BIODIVERSITY

Nature Conservation Information Sheet

Converting dams to living wetlands

Dams provide an excellent opportunity to create habitat and enhance biodiversity on your property. This Information Sheet provides an overview on ways you can improve the habitat value and water quality of your dam. It also outlines what you can do to minimise the impact of your dam on downstream ecology.

IMPROVING HABITAT VALUES

Shape and depth. To maximise habitat, the ideal shape and depth for a dam is gently sloping banks, the longest possible shoreline, and a variety of depths including shallow areas. This provides a diversity of environments for plant establishment and wildlife habitat.

Established steep sided dams can be modified by earthworks to create shallow areas and/or planting shelves.

Habitat elements. Adding elements such as native plants, logs, rocks, open areas, islands and nesting boxes to your dam and surrounding environment will provide habitat and resources for many fauna species. These habitat elements are briefly discussed below.

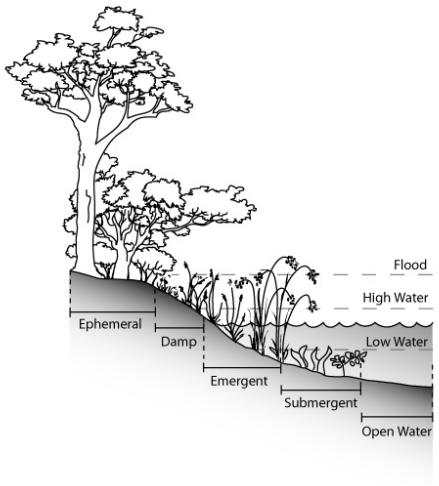
<u>Plants</u>

Using plants that are native to the area is highly recommended. These plants are adapted to our soils and climate, valuable to local wildlife and will not become a weed problem in the future. Use a broad range of species and types of plants. Revegetating using all layers including trees, large and small shrubs, groundcovers, rushes and sedges will improve habitat values. Diversity will also creates a complex food web which encourages natural pest control.

It is important to plant rushes and sedges as they are a key component of wetland ecosystems. They provide food and habitat for a wide range of aquatic species, assist with aeration of the sediments, and protect water quality by filtering and binding pollutants, particularly nutrients.

When undertaking revegetation you should also think about what to plant where. Dams are made up of different zones defined by the level of inundation and plants need to match the area in which they are being planted. Zones include:

Shallows (*Emergent*) supports plants which have their roots submerged beneath the water for at least some of the year, but extend their leaves and stems above the water surface. This area can range from 1 m deep in winter to damp in the driest part of summer. This zone is very important for many fauna species, providing shelter and food along the shallow edges. It is also an important area for erosion control, and nutrient and sediment removal.



Seasonally Wet (*Damp*) is permanently damp or damp at the surface for most of the year, without having standing water, except for flood events. Almost all of the rushes and sedges can live happily in this zone.

Upper Banks (*Ephemeral*) is quite dry for much of the year and may only become wet in flood events. The upper banks are the interface between the bushland and the riparian zone.

IMPORTANT NOTE: Deep-rooted plants such as trees and tall shrubs should not be planted on constructed dam walls as they can cause cracks, leaks and structural instability. Constructed dam walls can be safely planted with a variety of rushes, sedges, groundcovers and shrubs.

See Nature Conservation Information Sheet: *Revegetation with Local Natives* for a list of suitable plant species.

Logs, rocks

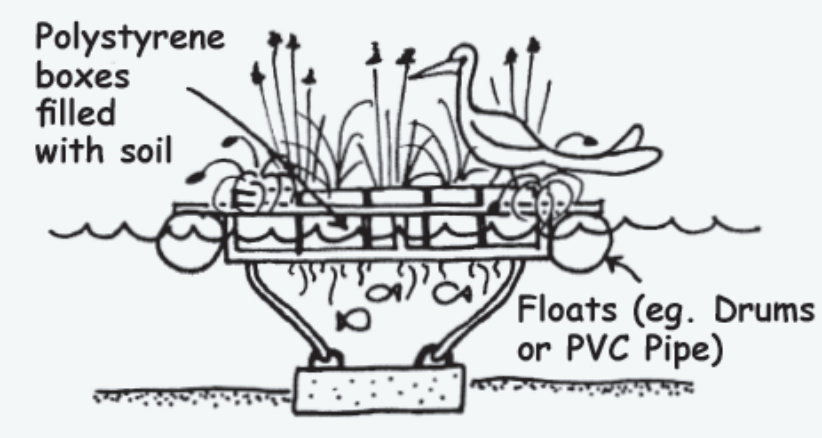
The inclusion of fallen timber into your site will provide habitat for a range of insects, birds, fish and lizards. Logs can be positioned within the dry margin around the dam, on the dam banks and within the water. Having logs extending from within the water up on to dry land provides perching sites for birds. Timber on the edges of the dam may need to be secured to ensure it doesn't float and move when water levels vary.

Open areas

Some areas of bank should be kept open to provide varied habitat and safe entry points to the water. These areas could be lined with sand or gravel or planted with short native grasses and groundcovers.

Islands

Islands provide a refuge for birds to nest safe from foxes and cats. Floating islands are easy to build. There are a variety of designs. The figure to the right shows an island made from a polystyrene box filled with soil, perforated to allow for drainage and root growth, and attached to floats.



A raft can also be made of PVC pipes (with watertight joints), covered with a double layer of wire netting or shade cloth filled with straw. The islands can be planted with rushes and an assortment of wetland plants and should be anchored in place with enough rope to allow for water level changes.

Nesting boxes

Installing nesting boxes around the dam will provide birds, mammals and bats with somewhere to nest. Hollows can take over 80 years to form, so if there are no old remnant trees to provide hollows naturally, then providing a variety of nest boxes will help to encourage local wildlife. Go to www.birdlife.org.au for information on nesting boxes for birds. For nest box designs for possums go to www.possumcentre.com.au/Pages/nestbox_1.html and https://geocatch.asn.au/wp-content/uploads/2018/01/Nest-Boxes-for-Native-Animals.pdf

Introducing fauna

Use only local native fish and crustacean species if stocking dams. Avoid stocking dams with introduced species such as yabby, red-fin perch, trout and gambusia (mosquito fish). These introduced species out-compete local species as they prey on them and reproduce more vigorously. It is illegal to release introduced species into the natural environment.

MANAGEMENT

Weed control

Dams often provide an ideal environment for weed growth. Weed control will be needed prior to planting and for a number of years after planting to ensure the best chance of success.

Invasive priority weeds around the site should also be controlled where they compete with native plants or are likely to spread into remnant vegetation or revegetation areas.

Fencing

Control of stock access to the dam is essential to enable establishment of native vegetation, and to prevent erosion and negative impacts on water quality. When fencing, consider including an adequate area of land around the dam to ensure enough space for planting vegetation and to be an effective filtering strip to catch nutrients, effluent and sediment. Ideally this margin will be a minimum of 10m from the high waterline.

The provision of off-site or restricted stock watering points may be required if stock previously accessed the area for water. See http://www.water.wa.gov.au/water-topics/waterways/managing-our-waterways2/water-notes for Water Note 7: Livestock management: watering points and pumps.

MINIMISING IMPACTS ON STREAM ECOLOGY

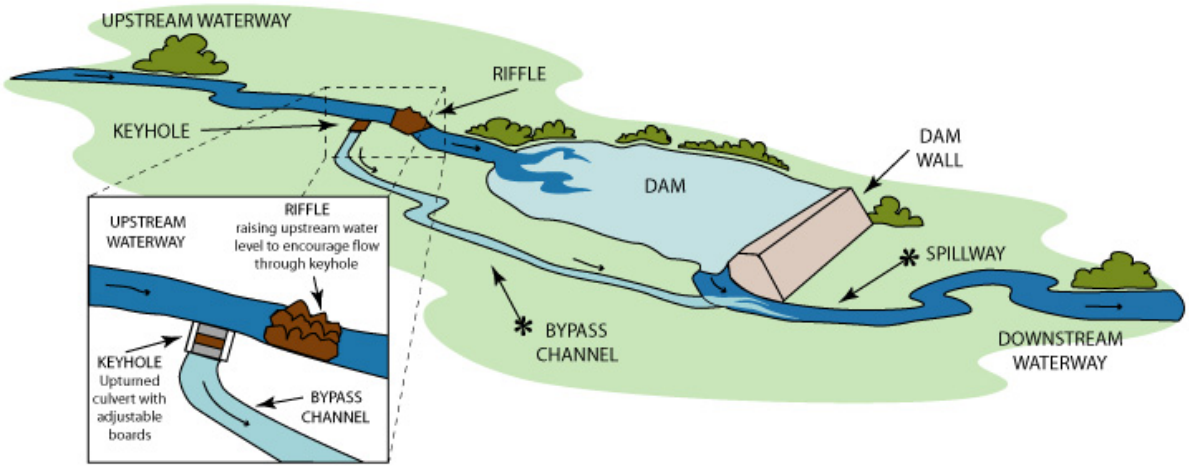
Dams built on streams (gully-wall dams) can have a significant impact on the ecology downstream. This is a result of the dam impeding both any streamflow that may occur from heavy rainfall events in summer and/or the early flows at the beginning of the rainy season. These low stream flows are important to downstream ecosystems and play a role in retaining riparian vegetation, providing cues for breeding migrations of native fish, and providing habitat for aquatic insects and crustaceans, waterbirds and the larval stages of some terrestrial insects.

The following dam management practices can reduce the potential impacts of gully-wall dams on downstream ecology and protect water quality in dams.

- The correct use of underwall pipes or bypass valves. The valve should be opened at the start of the rainy season (as soon as water is flowing into the dam). The dam will still fill over the winter months, and once it is full to overflowing, the bypass valve can be closed. Releasing early flows ensures that the ecosystem downstream of the dam receives water when it is meant to. Any salt or sediment that has built up in the dam over summer will safely be diluted by the rest of the flows.

- If an existing dam does not have an underwall pipe a siphon system can be installed to achieve the same objective. A length of piping can be laid over the top of the dam wall extending into the deepest part of the dam (secured via a weight) and down the dam wall past the level of lowest water depth. A tap can be placed at the end of the pipe and be turned on and off as required. If the tap is turned off (but the pipe left in place) once the dam has overflowed, water will be retained in the pipe and there will be no need to prime the siphon in subsequent years.

- The ideal situation is for dams to have a low flow bypass system such as the one in the diagram below. This system allows flows to automatically bypass the dam so that the downstream ecosystem doesn't need to wait for the dam to fill and overflow. The bypass can be an earth channel as in the diagram but could also be a pipe. A bypass system is most easily constructed when a dam is being built. However, it is also possible to retrofit one to an existing dam.



References and further information

EPA South Australia (2007) *Safe and effective herbicide use: A handbook for near-water applications*. Environmental Protection Authority, Adelaide, SA

DWER, Water quality protection note no. 53 June 2018 Dam construction and operation in rural area

Detailed information on management of streams and wetlands at:
http://www.water.wa.gov.au/water-topics/waterways/managing-our-waterways2/river-restoration-manual

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