



THE **farm dam** HANDBOOK





Hawkesbury-Nepean
Catchment Management Authority



Sydney
Catchment
Authority



Primary
Industries



The publishers are pleased to allow material in this publication to be reproduced in whole or part, provided the meaning is unchanged and its source and publisher are acknowledged.

ISBN 978-1-74263-186-8

Published June 2011

Booklet prepared by Margaret Turton, Epacris Environmental Consultants

Illustrations by Fiona Lumsden

Design and printing by Clickmedia Digital Printers

Photography courtesy of the Hawkesbury-Nepean Catchment Management Authority, Sydney Catchment Authority, Department of Primary Industries and Office of the Hawkesbury Nepean.

This publication aims to provide advice on best practice management of farm dams in the Hawkesbury-Nepean and Southern Rivers catchments and Sydney drinking water catchments. Advice on the construction and structural issues of farm dams should be sought from the Office of Water. The publisher is not responsible for any actions taken on the basis of the information provided here or for any errors or omissions.

CONTENTS

INTRODUCTION2

YOUR FARM DAM -

MANAGEMENT ZONES 3-13

Catchment zone.....6

Shade zones8

Shelterbelt zone9

Filter zone.....9

Dam zone..... 10

KEY ISSUES 14-37

Livestock.....14-16

Stock impacts..... 14

Stock health..... 16

Vegetation18-23

Groundcover 18

Paddock trees.....20

Degraded areas20

Riparian areas22

Planting around your dam22

Wildlife24-27

Water quality28-35

Nutrients, fertilisers and algae.....31

Aquatic weeds32

Pesticides33

Salinity34

Soil erosion34

Dam maintenance36-37

MORE INFORMATION 38-40

Landholder Grants38

Land Management Courses39

Contact Agencies..... 40

ACKNOWLEDGEMENTS41



INTRODUCTION



A healthy farm dam is an important resource to keep stock healthy and provide water for farming properties. It also provides a valuable habitat for local wildlife. This book provides advice to help you keep your dam in good condition to enhance the health of your property.

Farm dams:

- provide water for stock, irrigation, and gardens
- provide water for fire management and protection
- provide habitat for wildlife
- increase productivity and property values
- are attractive property features that can also be used for recreation.

What does your farm dam look like? Is the water clean? Do your stock like drinking the water? Are the banks well vegetated and stable? Does it have a stable spillway? Or are there problems like silt, algae, weeds and erosion? A poorly kept dam can cost you money, put your property and stock at risk, and be a risk to neighbours and down-stream users and environments.

On large properties, it may not be practical to follow all of the tips in this book for every farm dam. You can prioritise your dams for different actions such as fencing, by considering how close they are to waterways, how often your stock use them, the size of the dam, and existing environmental features or problems.

YOUR FARM DAM - MANAGEMENT ZONES



To manage your farm dam properly, you need to think not only of the dam, but also its catchment. That includes the land, drainage lines and drainage depressions that flow into the dam. By managing the catchment area of your dam as a whole, the dam will be healthier and have flow on benefits for stock health and farm productivity.

Figures 1 and 2 (pages 4 and 7) show a sample layout for a farm dam and catchment, including important areas for trees and shrubs. Use it as a guide and to think about the layout of your property.

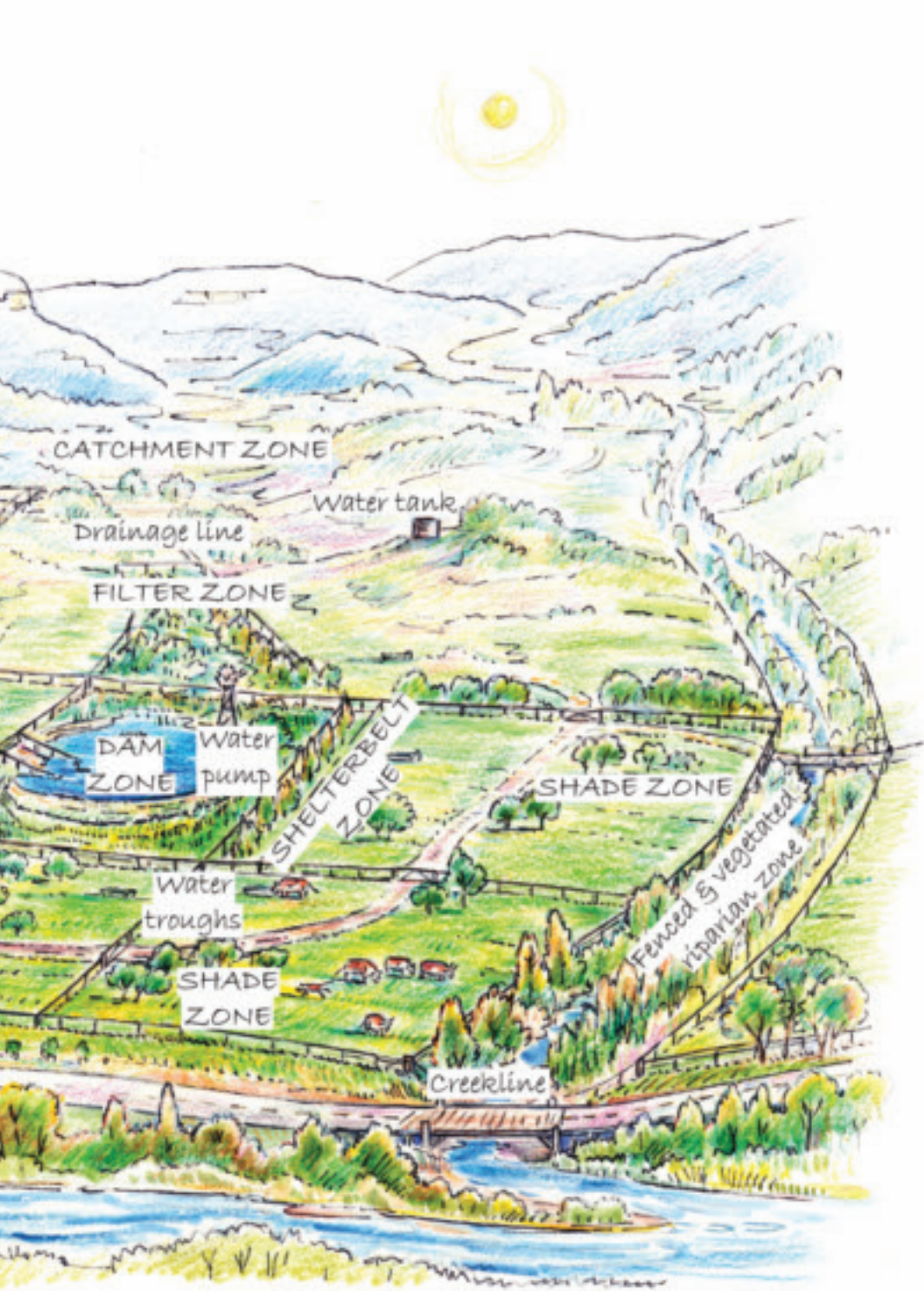
When planning how to manage your dam, it is helpful to think about your property as separate zones: the Catchment Zone, Shade Zone, Shelterbelt Zone, Filter Zone, and Dam Zone.

All of these zones work together to improve farm productivity through better pasture, shelter and shade for stock, and water quality.



Figure 1 - Farm dam management zones





Catchment Zone

The catchment zone is the area of land that captures rainfall that flows into your dam. This area should be well vegetated with at least 80 percent ground cover (ie no more than 20 percent bare ground) and some tree cover. Pasture cover of deep-rooted perennial grasses reduces soil loss, and slows and filters water flows.

It is a good idea to repair any eroding areas, such as gullies and scald areas on hillslopes. If your dam is located on a slope, you can use contour banks and/or well-vegetated strips to slow water flows and reduce erosion and sedimentation.

It is also important to ensure 100 percent groundcover in drainage lines and depressions that flow into the dam. This will help stop soil, nutrients, animal droppings, and other particles reaching your farm dam during rain.



Managing your catchment zone

- Maintain more than 80 percent ground cover with mostly perennial pasture species
- Repair eroding gullies and erosion or scald areas
- Use contour banks and/or vegetation strips to slow water flows coming from hillsides
- Manage pasture to achieve 100 percent ground cover in drainage lines and depressions
- Avoid excessive use of fertilisers or pesticides in the catchment zone, as they will affect the water quality in your dam
- Avoid using any fertiliser near creeks and drainage lines, or in other areas of the catchment zone, if heavy rain is expected as it will run into drainage lines and dams
- Divert run-off from farm stockyards, feed lots, dairies and rich nutrient sources away from farm dams, water courses, and drainage lines to protect water quality.

Figure 2 - The farm dam and its immediate surroundings



Shade Zones

It is a good idea to include clusters of trees and other woody vegetation in paddocks to protect soil and pasture cover. They create 'shade zones' within the wider 'catchment zone'. Trees provide shelter for stock, protect soil stability and improve pasture health by increasing the diversity of invertebrates and micro-organisms in the soil. Trees can also improve pasture growth by reducing wind erosion, increasing the return of soil nutrients, and protecting pasture against frost.

Shade zones are essential to provide shelter and shade for stock. Such vegetation also helps maintain catchment health and stability. Shade zones should generally be located away from the dam itself to discourage stock from gathering around the dam. They should also be located away from drainage lines and waterways. Create several groups of trees to prevent stock from compacting the soil in one area. You can also pipe water from the dam to alternative watering points near these shaded areas to further attract stock away from dams and waterways.

Managing your shade zones

- Check your paddock trees for signs of stress and trees that may be nearing the end of their life. Fence out trees that are showing signs of stress and plant new trees before the existing ones die
- Plant trees and shrubs in several clumps away from farm dams, drainage lines and waterways
- Use local native species that are well adapted to your area
- Protect new plants with fencing and tree-guards while they grow.



Shelterbelt Zones

Shelterbelts are often planted as windbreaks to protect pasture and provide shade and protection for stock. They can also be used to protect your dam if they are located upwind. This helps prevent banks and dam walls from being scoured and damaged by wave action, and decreases evaporation of dam water by protecting the dam from strong winds. Windbreaks can protect areas to a distance of 12 times the height of the trees.

Managing shelterbelt zones

- Position shelterbelts in the direction of strong prevailing winds
- Avoid locating shelterbelts for stock shade along waterways and drainage lines.

Filter Zone

The inflow area of your dam acts as a filter zone or silt trap for water flowing into your dam, improving water quality. Inflow areas should be well covered with grasses, sedges and shrubs to provide 100 percent groundcover. This will help slow down water flowing into the dam, and will catch and retain heavy particles such as soil, small rocks and animal droppings. Reeds and rushes planted at the dam edge will also help trap soil and other particles. Fence your filter zone to protect it from grazing and trampling until plants are well established. Avoid using fertilisers or pesticides in the filter zone to keep them out of your dam water.

Managing your filter zone

- Provide 100 percent ground cover using grasses, sedges and shrubs
- Do not continually graze this zone. You should only allow selective grazing during strong growing periods such as spring
- Keep fertilizers and pesticides away from the filter zone and the dam
- Fence filter zones at least until vegetation is well established
- Plant reeds and rushes in shallow water at the dam edge to help trap soil and other particles.

Dam Zone

There are three important areas in the dam zone: the dam wall, the spillway and the farm dam itself.

The dam wall holds back the water in your farm dam. Avoid having trees and shrubs with deep roots on the dam wall as these can cause it to seep, leak or even collapse. Mat-forming perennial grass and small shrubs with outward extending fibrous roots on the dam wall will help to keep it strong and minimise erosion. A mat-forming water-tolerant grass species planted on the up-stream side of the wall will also help reduce wave erosion. Check the dam wall area regularly for impacts from burrowing animals.



Spillways that carry water away from the dam during overflows should have 100 percent groundcover. Avoid planting or encouraging trees and shrubs to grow on the spillway as they can block debris and cause erosion and channeling during overflows. Use deep-rooted, perennial grasses that will help to hold the soil and prevent erosion during overflows.

You need to actively manage the dam area itself to provide secure water for stock and other purposes. Limiting direct stock access to your dam is important to keep the water clean and minimise erosion and other damage to the dam. The best solution is to fence the dam and pipe the water to troughs or tanks for stock to drink. Where this is not practical, drinking points can be planned so that stock only have access to limited sections of the dam. In this design, it is important to keep stock away from the inflow, dam wall and spillway areas.

You can also restrict stock access to the dam by only having one entrance where the water is deeper, and fencing off the rest of the dam. The access point should always be away from the inflow, dam wall and spillway areas. You should build a rock, stone or gravel ramp to this access point to prevent erosion and sedimentation. Install a gate at the entrance for more control over stock access to the dam.

This dam zone can be a valuable refuge for wildlife. A dam, with water depths ranging from deep to shallow, helps plant growth and provides a range of habitats for different aquatic invertebrates and other wildlife. Islands in a dam are attractive and provide a predator-free place for birds to nest. Grass and small shrubs planted in this zone help to stabilise soil on dam banks and provide habitat for invertebrates and frogs.

You can use trees and shrubs to shade areas close to the dam to benefit fish, stock, and waterbirds. It will also help reduce evaporation, and the risk of aquatic weeds and algae. When you are planting trees and shrubs, choose areas away from the dam edge and that are downslope from the dam to minimise stock dung being carried into the dam by rain. Avoid planting trees and shrubs in the filter zone (inflow area), or on the spillway and dam wall. Create other accessible shade areas in nearby paddocks so that stock don't gather at the shade area near the dam and pollute the water.

Managing your dam zone

- Manage stock access to the dam through fencing and alternative water (where required) or by designing suitable access points
- Don't plant trees and deep-rooted shrubs on the dam wall. Plant mat-forming perennial species or small shrubs with outward-extending fibrous roots to keep the wall stable
- Plant mat-forming water-tolerant grasses on the up-stream side of the dam wall to help reduce wave erosion
- Regularly check the dam wall for damage from burrowing animals. Repair the wall and control burrowing animals as necessary
- Regularly check trickle pipes in the dam wall to ensure they remain unblocked
- Ensure that the spillway area has 100 percent pasture cover with mostly perennial species. Don't plant trees or shrubs on the spillway
- If you do plant trees and shrubs near the dam, choose small to medium, slow-growing species. Plant them away from the dam edge and downslope from the dam. Avoid planting trees and shrubs in the inflow area, or on the dam wall and spillway.

Farm dams can also be well managed without the need for fences as shown here. The unfenced dam has a grassed bank and spillway but without trees and shrubs. This approach maintains the integrity and function of these structures. Reeds and rushes are present at the inflow area to trap nutrients, sediment, and animal droppings. A small stock shelter (left background) and various shade trees are located away from the dam. This protects water quality by encouraging stock to use shade areas away from the dam itself.







Stock impacts

Your farm dam is a source of water for your stock, so they naturally gather around it. You need to manage stock access to avoid erosion, pugging (excessive soil disturbance), and damage to the vegetation cover on the banks around the dam. These problems can contribute sediment to the dam and over time they can damage the dam wall and spillway.

Preventing or limiting stock access to the dam is the best long-term answer to maintain clean and reliable water, and to minimise damage to your dam. You can control stock access by fencing around the dam and piping water to other watering points such as troughs or tanks. Where it isn't possible to fence your dam to exclude stock, plan drinking points to allow only limited access at the dam edge. You can use a single access point if it is supported with a hard base made of rock, stone or gravel. However, the inflow, dam wall and spillway areas should be protected from stock access in these designs.



Poorly managed farm dams can lead to damage from stock, over-grazing, erosion and aquatic weeds

**STOCK THAT
HAVE EASY
ACCESS TO
CLEAN WATER
WILL DRINK
MORE,
BE HEALTHIER,
AND BE IN
BETTER
CONDITION**

Stock impacts on your dam can increase dramatically during dry periods, as they have to move further into the dam as the water level drops. When this happens, animals can also become trapped in the mud at the bottom of the dam. It is especially important at these times to create watering points away from the dam.

By fencing your dam to restrict access, you will also make the area safer for everyone, especially children.

Stock health

Good quality dam water helps keep your stock healthy. This can be achieved by actions that stop stock from directly fouling water, limit dung being lifted and carried into the water, and which minimise the transfer of disease between animals.

Many animal-borne diseases are transmitted through stock dung and carried in water. For example, human and stock infective pathogens such as *Cryptosporidium* and *Giardia* can enter farm dams and waterways during rain and infect healthy stock. Limiting stock access to farm dams, and potentially to the drainage lines that feed into them, minimises the chance of dung reaching the water creating health risks to your stock. These pathogens also die when they are exposed to persistent sunlight. Good pasture cover increases the ability of your paddock to trap pathogens and expose them to sunlight before they reach water. Keeping drainage lines and depressions, and the areas around your farm dam well vegetated helps protect the water quality in your farm dam.

Stockyards, laneways, drought-lots, and other areas where stock are gathered create areas where dung can build up. Locating these away from your farm dams and the drainage lines and depressions that feed into them will help reduce the risk of dung entering your farm dam.

Sick animals, juvenile animals and their lactating mothers shed more pathogens such as *Cryptosporidium* and *Giardia* that can cause disease in stock and people. The best way to prevent water contamination is to have dedicated hospital and maternity paddocks that keep juveniles and sick animals away from farm dams and the drainage lines and depressions that feed into them.

Another animal health issue relevant to farm dams is Liver Fluke *Fasciola hepatica*. Liver fluke are an internal parasite of sheep and cattle that are spread by a host snail (*Lymnaea tomentosa*). Larval stages of fluke infest the snail. After leaving the snail some months later they attach to grasses in wet, snail-infested areas where they are ingested by livestock. You should regularly check your inflow and spillway areas for the presence of snails. Excluding stock from inflow (filter) areas and spillway areas when these areas are wet and particularly when snails are present will help reduce stock being infected.





MAINTAIN GOOD GROUNDCOVER IN THE CATCHMENT OF YOUR DAM FOR BETTER WATER QUALITY

Groundcover

Groundcover is the layer of grasses, clover, and other plants, including litter, that protect soil from the impact of rain. Good vegetation cover in the catchment area of your dam helps achieve good water quality by keeping soil stable, and minimising the amount of fertiliser, animal droppings and other pollutants from entering your dams.

Good groundcover helps protect against erosion and filters pollutants before they reach your farm dam. It also helps slow rainfall runoff and keep paddock soil moist for pasture growth and productivity. Groundcover of 80 to 100 percent that is mostly perennial pasture species is best.





You can improve pasture cover and longevity by subdividing paddocks and using rotational grazing. This allows paddocks to rest and replenish their pasture cover after grazing.

Encouraging perennial pasture plants helps make your pastures more resilient and provides more consistent stock feed. Maintaining native grass species can be an effective way to do this. You can also encourage perennial pasture species in run down pastures by practising strategic grazing rather than set stocking, and by improving soil fertility.

Perennial pasture species provide better pasture cover during drought and help reduce the amount of soil that is washed into your dam during rain after drought. Develop a drought management plan

to identify the best paddocks and farm dams to use during drought to help minimise its impact on your property.

For more information, talk to your local Department of Primary Industries district agronomist (soil specialist) about soil and pasture management.

**MAINTAIN
MORE THAN
80 PERCENT
GROUND COVER
IN PADDOCKS
WITH MOSTLY
PERENNIAL
PASTURE SPECIES**

Paddock trees

Paddock trees provide valuable stock shade. Maintaining and planting paddock trees away from your dam will help to discourage stock from 'camping' or gathering around it. This will help improve dam health. Establishing tree cover as shelterbelts or scattered shade trees also has flow on benefits to your property by protecting pastures from drying winds and frosts, providing wildlife habitat, and overall assisting soil stability, water quality and animal health.

Plant new seedlings to replace old or dying paddock trees. Most Australian trees, such as eucalypts, provide shade all year round. Species that are native to your local area are best as they are adapted to local conditions.

Degraded areas

Degraded areas reduce productivity and can cause erosion and sedimentation in your dam. Fence these areas to exclude stock to help native grass, shrubs and trees to recover and stabilise the soil. You may need to plant introduced grasses until the native plants are properly established. Badly eroded areas may need earthworks before fencing and revegetation. Funding is often available to help with this work.

For more information, contact your local catchment management authority office.





Paddock trees provide good shade for stock and help biodiversity, particularly when planted in clumps. Locating paddock trees away from farm dams also helps attract stock away from the dam to minimise impacts on water quality.

Riparian areas

Riparian areas are lands next to rivers, creeks or streams. This can include the land surrounding gullies and drainage lines. Riparian vegetation can include trees, shrubs and grasses. These areas are important to protect water quality and often provide valuable habitat for native plants and animals.

Riparian vegetation areas are common along waterways downstream of your farm dam. Riparian vegetation can also grow along the drainage lines and depressions feeding into your farm dam.

Fence riparian areas to protect waterways and drainage lines from stock impacts such as water fouling and erosion. You should manage riparian areas to achieve 100 percent groundcover with a mix of grasses, shrubs and trees.

Contact your local catchment management authority for more advice.

Planting around your dam

Vegetation around your dam can help stabilise the banks and improve the longevity and environmental values of your dam. However, care needs to be taken in what plants you choose and where you place them.

Avoid planting large trees on or close to your dam walls as the roots can cause the dam wall to become unstable.

Mat-forming perennial grass and small shrubs with outward extending fibrous roots are ideal for this area.

It is good to shade some of the water body to keep water cool and reduce evaporation and the chance of algal blooms. Plant shade trees and shrubs near to the water but don't plant them directly on the dam wall, spillway, or in the inflow area (filter zone). Use wetland plants such as reeds and rushes to help control nutrients. Aquatic plants, reeds and sedges can also help control wave action from high winds that can erode banks.

Choose plants carefully to ensure they are suitable for local conditions but not invasive. Plant species that are native to your local area for best results.

Check with your local council or catchment management authority office for a list of plant species suitable for your area.



KEY ISSUES



Making your dam wildlife friendly will benefit the environment and your property. Clean water and natural habitats attract animals such as birds that help control crop damaging insects. A well maintained dam is also attractive and an asset to any property.

Animals you will commonly find in and around your farm dam include waterbirds, frogs, and reptiles like the long-necked turtle. However, larger animals such as kangaroos, wallabies and wombats may also visit your farm dam for water.

Farm dams provide habitat for native wildlife but different animals need different habitats to feed, live and breed. You can improve the biodiversity of your property by providing habitat in the form of clean water, trees, vegetated riparian areas and native grasses. For example, a thick groundcover in the filter zone (inflow) area can provide good habitat for frogs as the area will often stay moist, even during extended dry periods. Sedges and bushes a short distance from the dam edge can provide breeding sites and nesting materials for water birds. Islands within the dam itself provide safe nesting areas that are free from foxes while retaining old hollow trees in your paddocks provides breeding habitat for gliders, possums, owls, parrots, wood ducks, and teal.



Encouraging wildlife provides beneficial ‘ecosystem services’ to your property including nutrient and waste recycling, shelter for stock, soil formation and soil health, pest control and pollination. Encouraging biodiversity in and around your dam also helps maintain natural balances in the environment that directly benefit farm health and productivity. For example, the common backswimmer and the nymphs of dragonflies and damselflies are aquatic animals that eat mosquito larvae. Adult dragonflies and damselflies also prey on mosquitoes and crop damaging insects such as aphids.

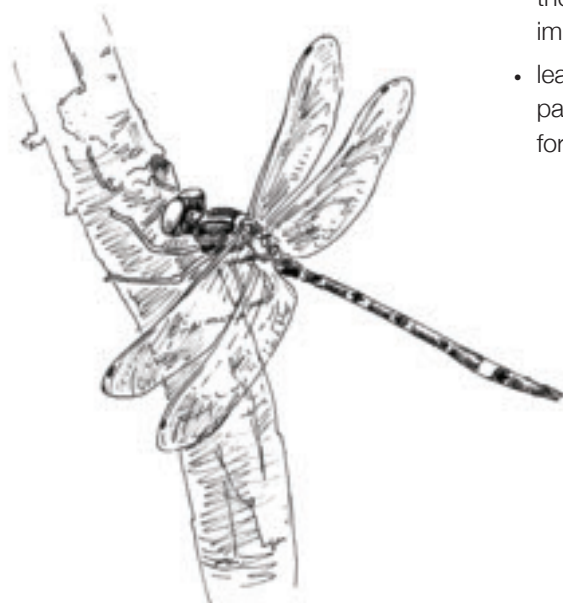
A FARM DAM CAN PROVIDE HABITAT FOR MANY NATIVE SPECIES AND INCREASES THE BIODIVERSITY VALUE OF THE PROPERTY

Some landholders stock their farm dams with yabbies and fish for angling and domestic consumption. Having fish in your dam can help with mosquito control and may help attract birds to your dam. Use fish and yabbies that are native to your area and avoid the introduction of feral fish such as carp and mosquito fish.

Improving wildlife habitat

To improve the habitat potential of your dam:

- choose native plants that are local to your area
- plant a variety of native plants rather than just one or two species
- create irregular edges around the dam shoreline for habitat variety and to attract birds
- have a few hollow logs around your dam to provide habitat for wildlife
 - half submerged logs also provide perching spots for birds and turtles
- provide rocks and boulders around your dam for reptiles and frogs
- have variable depths of water across the dam
- build islands in your dam for birds and animals to avoid predators
- limit or exclude stock from the shallow water inflow zone
- If you have more than one dam, keep some farm dams free of fish to encourage frogs
- do not stock your dam with fish from other dams, creeks or rivers as they may be exotic species that can impact on native aquatic animals
- leave dead trees with hollows in your paddocks, as this provides habitat for many birds and mammals.







Rain replenishes the water in your farm dam, but the run-off can carry soil, fertilisers, animal dung, pesticides and other pollutants (Figure 3, page 30). These can affect water quality and the general productivity of your farm. Over time, soil deposited as sediment will decrease the water holding capacity of your dam. High nutrient levels from fertiliser and nutrient-rich soils can lead to algal blooms that can affect stock health and encourage aquatic weeds. Pathogens and other diseases carried in animal dung can also affect stock health. During extreme rainfall, your farm dam may overflow and carry pollutants and weeds downstream. This can adversely affect waterways, aquatic habitats, and water quality for downstream users.





Clean water is essential for stock health, pasture productivity, and crop irrigation. It is also important for farm health, long-term viability and productivity.

The quality of water flowing into your dam is directly affected by how you manage its catchment. You need to review your ground cover, stock, land management practices, and potential environmental risks that occur upstream or upslope from your farm dam.

**TO MAINTAIN
CLEAN
DAM WATER,
YOU MUST
ACTIVELY
MANAGE THE
DRAINAGE LINES
AND DRAINAGE
DEPRESSIONS
THAT FEED
WATER INTO
YOUR DAM AND
THE WIDER
CATCHMENT AREA**

You can assess water quality by physical indicators such as colour, turbidity (whether it is murky or clear), odour, temperature, and the presence of algae. Chemical testing can identify issues with pH, dissolved oxygen, salinity levels, and nutrients. These indicators are a valuable monitoring tool to assess the health of your dam.

The Department of Primary Industries can test your water quality to see if it is suitable and healthy for stock to drink (pH, chloride, turbidity and salinity).

Figure 3 - How run-off enters the farm dam



Nutrients, fertilisers and algae

Nutrients such as phosphorus and nitrogen are important for healthy pastures. However, in high concentrations they can cause algal blooms in farm dams and stock water. Algal blooms lower oxygen levels in water. Blue-green algae can be particularly problematic at high levels as it can cause an unpleasant odour and taste. It can produce toxins that are harmful for stock and people.

Algal blooms can be caused by excessive fouling of water by stock or by poorly applying fertiliser close to farm dams or in their catchments. They can also be caused by nutrient-rich soil being exposed and carried into the farm dam in runoff from rainfall. You can reduce the risk of increased nutrient levels and algal blooms by excluding or managing stock access to your farm dam. However, to minimise these risks you also need to effectively manage the paddocks beside and upstream of your farm dam.

You can use wetland species and reeds along farm dam edges to help with the uptake of nutrients and minimise the movement of nutrients into the farm dam. Algae prefer direct sunlight, so you can discourage algal growth by planting trees and shrubs near the dam to provide shade. Check regularly for aquatic weeds that can indicate high levels of nutrients in the water. Try to encourage frogs to breed in your dam as the tadpoles of many common frog species help control algae.

Try to minimise tillage and soil disturbance in or near upstream drainage lines or depressions, and close to the farm dam. Conduct soil tests on your paddocks to see whether the pastures actually need fertiliser, and to decide the right type and amount of fertiliser you need. Avoid applying fertilisers close to the drainage lines that feed into your farm dam. In particular, avoid applying fertilisers when intense rainfall is expected, such as high intensity summer storms. This will help fertiliser to stay where it is needed and not cause a water quality problem in your dam.





Tertiary Salvinia



Alligator Weed



Water Hyacinth

Aquatic weeds

Plants are an essential part of any ecosystem. Floating and submerged plants provide food, shelter and oxygen for mammals, birds, fish, frogs and invertebrates living in and around your dam.

Choosing plants for your dam is important. You should have partial surface cover to help reduce evaporation and to keep the water cool. The floating native plant *Azolla* should be avoided in farm dams, as it can cover the entire water surface and block sunlight, affecting dissolved oxygen levels. Poorly managed nutrients can cause excessive growth of aquatic plants. These can blanket the water surface, lower water quality, deplete oxygen supplies to animals living in the dam, and make the habitat unattractive for water birds. Aquatic weeds can also block or restrict water inflows and make the dam unattractive.

Specific aquatic plants such as Alligator Weed, Water Hyacinth and Salvinia are declared Noxious Plants and pose a major threat to the Australian environment. Landholders are legally responsible for controlling these plants and stopping them from travelling downstream. There are also regulations about other aquatic plants. Seek immediate advice from your local council weed officer or catchment management authority to identify any unfamiliar aquatic plants in your dam as a first step to manage any negative impacts.

Pesticides

Pesticides are chemicals used to control pest species. Commonly used agricultural pesticides include insecticides (to control insect pests), herbicides (to control weeds), fungicides (to control fungi), and nematicides (to control animal parasites such as through drenching).

If they are not used correctly, pesticides can kill stock, native animals, fish and birds. They often last longer in water than on the ground, so the closer you are to water, the more careful you need to be when using pesticides. Your farm dam provides stock water so you need to ensure that your pesticide does not enter the waterway directly or as runoff into the dam. Never dispose of unwanted pesticides or their containers in or near farm dams, waterways, gullies or drainage lines.

For weeds immediately around your farm dam, you may need to apply herbicides by hand or using a small hand-held sprayer. You may also need to do this along drainage lines and depressions that lead into the dam. Avoid using misters and boom sprayers along drainage lines and depressions that lead into your farm dam or in other areas very close to the dam. Remember that wind can carry pesticides over large distances into your dam.

Avoid applying pesticides before rainfall or storms. Always remember to read the label and use the pesticide as directed. Use personal protective clothing and equipment (PPE) where advised.

The ChemClear program provides for collection and disposal of unwanted agricultural and veterinary chemicals. Call ChemClear on 1800 008 182 for bookings or 02 6230 4799 for more information.

The drumMUSTER program provides for collection and recycling of cleaned, eligible and non-returnable crop production and on-farm animal health chemical containers. Contact your local council or drumMUSTER on 1800 008 707 or 02 6230 6712 for more information.

For more advice about pesticide use and training, contact the Department of Primary Industries on 1800 808 095.

Salinity

This is the one time where crystal clear water may not be a good thing. If your dam water is very clear, it may be a sign of high salinity. Salinity is often caused by removing trees and deep-rooted perennial grasses and shrubs from the landscape, leading to a rising water table that brings salt to the surface. Salinity affects pasture productivity by reducing groundcover which can increase erosion. Salts entering dams make the water more saline, less drinkable for stock, and unproductive for irrigation. Drinking water for livestock should not contain more than 4000 mg/l of total dissolved salt for cattle and 5000mg/l for sheep.

Indicators of salinity include crystal clear water in your dams (dissolved salts settle clay particles), and salt scalds and invasion by salt tolerant plants on your paddocks. Planting deep-rooted perennials and trees in the catchment area of your dam will help control salinity and improve water quality.

For more information about identifying, managing and treating salinity, contact your local catchment management authority or Department of Primary Industries on 1800 808 095.

Soil erosion

Muddy dam water may indicate that erosion is occurring in your dam catchment. Erosion happens when water flows across the ground, moving soil particles and carrying away topsoil. Paddocks with poor vegetation cover or bare soil are particularly susceptible to erosion. Erosion in the catchment can lead to soil washing into your dam causing siltation and turbid water. Muddy water is less palatable for livestock and a problem for irrigation as it can block pipes and pumps. A dam which is collecting silt and other sediment will have less water holding capacity. It will also increase farm management costs over time for dredging and de-silting.

Sediment build-up can also be caused by poor farming techniques or intensive farming close to the drainage lines that feed into your farm dam. Within cropping paddocks, avoid cultivation or soil disturbance in drainage lines and watercourses that lead into your dams. Ensure there is a vegetated buffer with good groundcover between crops and drainage lines. Also avoid directly disturbing, ploughing or spraying drainage lines and depressions to help retain ground cover and minimise sediment entering your farm dam. You can restore eroding areas using revegetation and other techniques.

For advice about rehabilitating eroding areas, contact your local catchment management authority.



A reasonably well maintained farm dam with good groundcover and no trees on the dam wall. But there is some erosion occurring under the shade trees which are close to the dam. Fencing out eroding areas assists revegetation and improves water quality.

KEY ISSUES



A well managed dam and its adjacent catchment zones should need little maintenance. Regularly check your dam for problems such as algae, aquatic weeds and sediment to identify issues arising in the catchment which may need to be managed.

Animals such as wombats and rabbits can burrow into dam walls leading to the wall failing. Other feral animals such as wild pigs and goats can also have an adverse effect on water quality. Feral pigs will wallow in water if not restricted and can cause major issues. You may need to exclude or control these species if this happens.





You may need to dredge or de-silt farm dams that have high amounts of sediment. It is often best to do this during drought when the dam is dry. Temporary sediment stockpiles should be placed away from the spillway and filter zone of the dam, and other drainage lines or depressions. They should also be protected with a sediment fence on the downslope edge. If you reapply the sediment across your paddocks, it should be thinly spread over well-covered pasture. Alternatively, sediment from the dam can be added to the wall as reinforcement.

For help and advice about repairing damaged or leaking dams, contact your local catchment management authority office.

For advice about managing feral animals, contact the Department of Primary Industries or your local Livestock Health and Pest Authority office.

MORE INFORMATION



Primefacts cover a wide range of topics and are available online from the Department of Primary Industries website:

www.dpi.nsw.gov.au/

The '**Grow me instead**' website lists alternative plant choices to replace invasive plants:

www.growmeinstead.com.au

To find out more about which weeds pose the greatest threat to your property visit:

www.weeds.org.au/

The publication *Wildlife on Farms* (CSIRO Publishing) has a section about managing farm dams for wildlife and also has information about specific frog species that may inhabit dams.

Landholder Grants

There are many grant opportunities available to help better manage your farm. Talk to your local catchment management authority office who will have a full list of grant funding opportunities.

Grants are also available to pay for attendance at FARMREADY approved courses. Visit **www.farmready.gov.au** or call **1800 087 670**.

Landcare

Landcare is a voluntary community movement that conducts natural resource management activities. If you are interested in joining landcare, contact your local catchment management authority about groups in your area.



Land Management Courses

There is a full list of courses run by the Department of Primary Industries at: www.dpi.nsw.gov.au/agriculture/profarm/courses

Courses available in Sydney Drinking Water Catchments are listed at: www.sca.nsw.gov.au/the-catchments/sustainable-grazing-program

A few are outlined below:

PROGRAZE™ - provides skills for participants to assess pasture characteristics influencing pasture and animal production and to assess groundcover. Participants also learn to develop pasture and livestock management plans. Landholders in the Tablelands and Southern Highlands of NSW can call: **(02) 4828 6600**

LANDSCAN™ - a course to help farm managers interpret landscapes and soil testing for sustainable farm management. Landholders within the Tablelands and Southern Highlands of NSW can call:

(02) 4828 6600

Property management planning (PMP) for natural resource management – A course for land

managers and farming families interested in natural resource management for sustainable farm production. For details in the Sydney Basin call: **(02) 4640 6333**

Greening Australia also runs courses. For details visit:

www.greeningaustralia.org.au

Contact Agencies

Hawkesbury-Nepean Catchment Management Authority

Phone: (02) 4828 6747

Web: www.hn.cma.nsw.gov.au

Department of Primary Industries

Phone: 1800 808 095

Web: www.dpi.nsw.gov.au

Livestock Health and Pest Authority (Central Tablelands)

Phone: (02) 6331 1377

Web: www.lhpa.org.au

Livestock Health and Pest Authority (Cumberland)

Phone: (02) 4655 9165

Web: www.lhpa.org.au

Soil Conservation Service

Phone: (02) 8836 5350

Web: www.scs.nsw.gov.au

Southern Rivers Catchment Management Authority

Phone: (02) 4224 9700

(Wollongong Office)

(02) 4842 2594

(Braidwood Office)

Web: www.southern.cma.nsw.gov.au

Sydney Catchment Authority

Phone: 1300 722 468

Web: www.sca.nsw.gov.au



Acknowledgements

This publication has been produced by the Hawkesbury-Nepean Catchment Management Authority in collaboration with the Sydney Catchment Authority and Department of Primary Industries. Agencies and groups contributing towards this handbook include: Southern Rivers Catchment Management Authority, Office of the Hawkesbury-Nepean and Greening Australia.

We gratefully acknowledge Greening Australia for its permission and support to use concepts and text from the Trees at Work publication.

Preparation of the handbook was funded by the NSW Environmental Trust and Sydney Catchment Authority.

Some information and concepts in this handbook have been sourced from the following publications:

- Greening Australia (1991) Trees at Work: Improving Your Farm Dam.
- Hawkesbury-Nepean Catchment Management Trust (1996).
Focus on Farm Dams: Protecting and Enhancing your Existing Farm Dam in the Hawkesbury-Nepean Catchment.
- Industry & Investment NSW (2009). Sustainable Land Management Practices for Graziers: Best Management Practices for Grazing in the Tablelands and Southern Highlands of NSW.

Other Reading

- Lindenmeyer, D., Claridge, A., Hazell, D., Michael, D., Crane, M., MacGregor, C., and Cunningham, R. 2003. Wildlife on Farms. CSIRO Publishing, Collingwood, Victoria.
- Mount Lofty Ranges Catchment Program and Environment Protection Agency, Department for Environment, Heritage and Aboriginal Affairs Government of South Australia. (undated). Farm Dams. WaterWise No.5
- NSW Primary Industries (2006). Fish in Farm Dams. Primefact 89, 3rd Edition.
- Parks and Wildlife Service Tasmania (2003). Farm Dams and Waterbirds.

