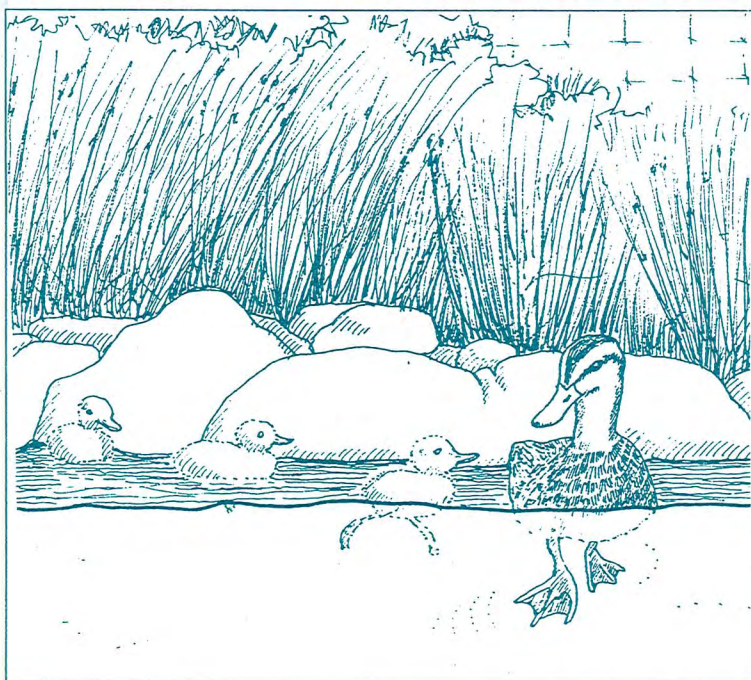


Living Streams

A guide to bringing watercourses
back to life in south-west
Western Australia



Waterways Information No 7

By Dr Luke Pen and Karen Majer



Waterways Commission
June 1993

The Living Streams Award

You or your school, business, local council or community group could be eligible to win an award and \$1000 to assist in a project to care for a local stream or foreshore. The Living Streams Award is being offered to encourage protection, rehabilitation and management of drains and creeks, river and estuary foreshores.

The award is part of the Western Australian round of the National Landcare Australia Awards. It is sponsored by the Waterways Commission, Water Authority of Western Australia and Department of Agriculture.

This booklet provides information on how to go about planning, creating and caring for a living stream. The section on Further Reading provides more detailed references. Useful contacts for advice and local information are listed under For More Information on the back cover.



Waterways Commission

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BRINGING BACK LIVING STREAMS

What is a living stream?

A living stream is a complex ecosystem supporting a wide range of plants and animals. It may be a narrow creek which runs only in winter, a permanent creek, a large river or the lower estuarine reaches of a mighty river system which drains a huge area of land. Whatever its size, a living stream has certain characteristics which distinguish it from a simple flow of water. It has stable vegetated banks with many plant species and provides a variety of habitats for animals such as freshwater crayfish, fish, frogs and waterbirds. It is a beautiful feature of the landscape, a refuge for bush birds and other native animals to feed and shelter, and for people to enjoy.

The loss of living streams

When rain first fell on the earth, the movement of water across the land formed streams which eroded the land and carried sediment downstream to the ocean. Over millions of years plants colonised the stream valleys, binding the soil together and greatly retarding erosion. This enabled stable habitats to become available for plants and animals, and over time streams not only functioned as drainage systems but also as ecosystems.

Aboriginal people put a very high value on streams and estuaries, for water, fishing, hunting and harvesting plant foods. Streams are often special places of spiritual significance.

European settlement in the south west heralded great changes for our streams. Agricultural and urban development required drainage of low-lying land. An extensive drainage network was constructed on the Swan Coastal Plain and in parts of the south west, and natural creeks and rivers

were often altered to improve their drainage functions. This involved clearing natural debris such as logs and branches, straightening the watercourse, and even channelling through concrete pipes and culverts.

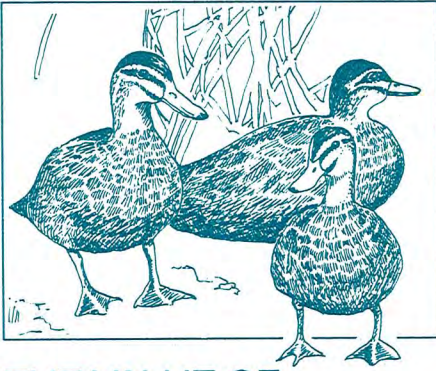
Clearing and building altered runoff patterns, and urban, industrial and rural land uses degraded water quality. Many of our south-west streams have become saltier. Most now carry excessive quantities of plant nutrients and sediments, and in some cases pesticides and other pollutants. The streams carry their pollution loads downstream to estuaries and inshore oceanic waters, causing environmental problems in those areas as well.

One of the major impacts on stream environments has been the loss of natural fringing vegetation. Clearing of this vegetation, accompanied by stock or human access to the banks, has resulted in erosion, undermining of trees, and loss of the rivers' scenic, recreational and habitat values. Many urban streams have become open drains, lined with litter and weeds, carrying polluted water, slimy algae and sediment along a narrow strip of disused land, often behind an unsightly fence.

Bringing streams back to life

There is no reason why many streams cannot function both as parts of drainage systems and as aquatic ecosystems, greatly increasing their value to people and other living things.

With work, a drain can be brought to life. Whether it be a stream passing through pastured farmland, a section of urban drain, a degraded creekline or a section of estuarine foreshore, individuals or groups of people can restore the elements of a living stream. In time, the revitalised stream will become a valued part of the environment, with some if not all of the scenic, educational, recreational and ecological values which natural streams offer.



THE VALUE OF BRINGING STREAMS BACK TO LIFE

Wildlife habitat

A living stream provides a range of habitats for a great variety of plants and animals. Fringing vegetation provides habitat for spiders, insects, lizards, birds and mammals including bandicoots. Submerged and floating aquatic vegetation, along with stream debris, provide shelter for frogs and native fish. The water is also home to insects like mayfly and dragonfly larvae and water beetles, native snails, shrimps, freshwater crayfish and amphibians.

The shade provided by fringing vegetation is especially important. Many cold-blooded native animals, especially fish, need shelter from predators and shade to help them keep cool on warm days.

Ecological corridors

A living stream provides a windbreak, shelter belt, and a corridor of land and water along which many animals can move to feed or to get from one habitat to another. Other animals need to migrate as part of their reproductive behaviour, for example fish moving up or downstream to spawn.

Strategic linking of living streams with remnant stands of native vegetation will increase the survival chances of many native plant and animal populations and help to conserve our natural heritage.

Erosion control

The roots of trees and large shrubs bind the soil of stream embankments and prevent them from subsiding into the stream valley. The tiny root and rhizome systems of smaller shrubs, herbs, grasses and sedges serve an equally important role of holding the soil together between the large roots, preventing the soil from being washed away and protecting the vegetation from being undermined. This function is most important along the very edge of the stream flow.

Biological filters

Healthy fringing and aquatic vegetation acts as a biological filter. It sieves out both organic and inorganic material carried in floodwaters and stormwater and will take up a portion of the nutrients flushed from the catchment.

Landscape

Living streams are beautiful features of our Western Australian landscape. The landscape of many urban and rural areas will be improved by turning open drains or eroded creeklines into scenic corridors of trees and shrubs. Using local plant species will retain the unique character of different regions.

Lifestyle

Streams and estuaries are refuges for people as well as wildlife. Streams can be shady green corridors through housing developments, places to walk, relax and

enjoy. The open water and shady banks of rivers and estuaries are popular for many recreational pursuits including yachting, canoeing, waterskiing, windsurfing, swimming, picnicking, marroning, fishing, prawning, crabbing, birdwatching and simple appreciation of wildflowers and nature. The enjoyment of all these activities, and the economic benefits associated with tourism and commercial and recreational fisheries, mean that restoring the scenic and productive values of our rivers is of benefit to the whole community.

TYPES OF DEGRADED STREAMS

The urban drain

Urban drains can be in the form of a closed conduit drain or open drain. The typical open drain is a straight flow of water along a deep open ditch. The banks are steep and support a dense growth of introduced grasses and other weeds, as does the adjoining drain reserve. The bed is usually sand or clay, obscured by abundant growth of introduced aquatic weeds and slimy algae. Few native animal species are present, but there may be insects and introduced fish such as "mosquito fish". These pests often eat native fish and tadpoles and compete with native animals.

From time to time, the drain becomes clogged with plant material and accumulated sediment and litter that obstruct flow. The drain is usually cleaned out by spraying weeds and digging away grasses from the embankments. In this way, many drains have become wider and deeper over time. The disturbance means that only the most resilient plants and animals can find a home. Unfortunately, most of these are introduced weeds and pests.

The farmland drain

In farming areas, drains are usually old creeklines which have been cleared of their natural vegetation. Some areas of the coastal plain have complex systems of artificial farm drains which were established by the Government to open up large areas for farming. The abundant growth of grasses and other weeds, so typical of urban drains, is prevented by livestock grazing. Unfortunately, livestock also damage the embankments, dislodging soil and exposing areas to water erosion. This means that farm drains carry heavy sediment loads and are marked by severe disturbance. As with urban drains, they usually support only the most resilient of animal species.

Degraded creeklines

Many natural creeks and small rivers are now part of urban drainage systems and, although their natural fringing vegetation has not been completely cleared, they have become infested with weeds. Water quality is often poor due to pollution from urban stormwater. In rural areas, creeklines are often part of the farm paddock. Some still retain a few trees but no understory and are of little habitat value.

Disturbed foreshores and river valley embankments

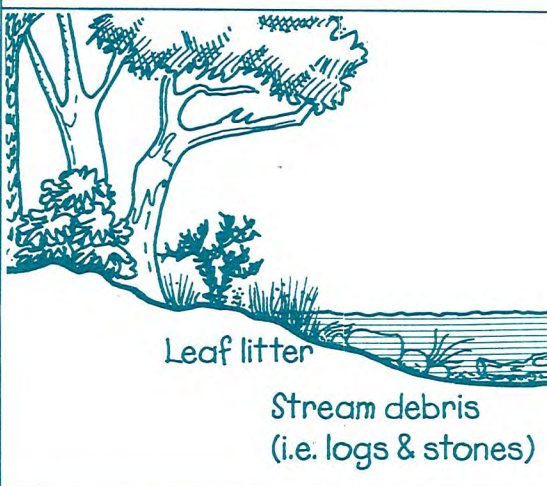
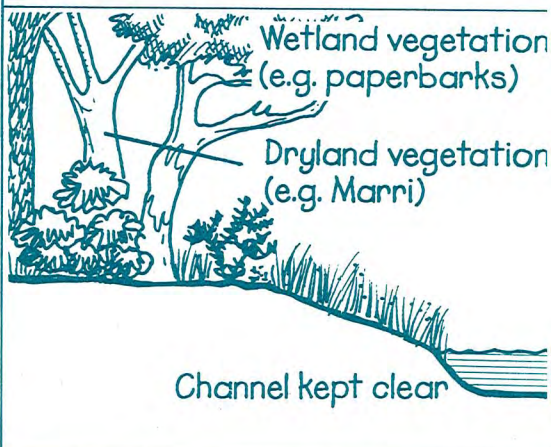
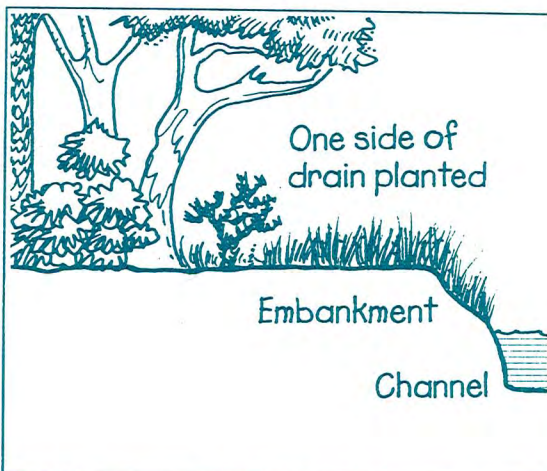
The foreshores and embankments of large inland rivers and the downstream estuarine sections of rivers are often subject to severe disturbance. The most common forms include clearing of the natural fringing vegetation, livestock grazing and trampling, human trampling and vehicle activity. The result is bank erosion, invasion by weeds and loss of scenic and wildlife values.

DEGREES OF STREAMLINE RESTORATION

Not all streamlines can be restored or developed into fully functioning creek ecosystems. Some will have to be left as they are, to serve their primary role as totally unimpeded drainage lines. For example some drains will be made of stone or concrete while others carry too great a volume of water at certain times of the year to enable successful planting. However, most streams will permit some degree of living stream development. It may be only a line of trees or shrubs along one side of a drain reserve, but even this small planting will provide food and shelter for wildlife and improve the scenery.

Some drains or old creeklines easily handle the volume of water discharged to them and could support fringing vegetation without impeding flow and causing upstream flooding. A vegetated zone could be developed along the entire stream or sections of it, with trees and shrubs at the upper level of the embankment and sedges and rushes along the periphery of the stream itself. Maintaining the drainage function would involve clearing the channel of obstructions such as fallen branches and aquatic weed growth.

In areas where occasional flooding is not a problem, such as on some farmland or near parkland, fully functioning creek ecosystems may be appropriate. A dense band of fringing vegetation, sometimes growing right across the stream, could be planted. To further broaden the range of habitats, other elements such as logs and stones could be added to the main channel, and small islands, lagoons and riffle areas could be developed. In such a restored living stream, some of the aquatic fauna which had become extinct in the stream could be re-introduced.



One side of drain
left to provide access



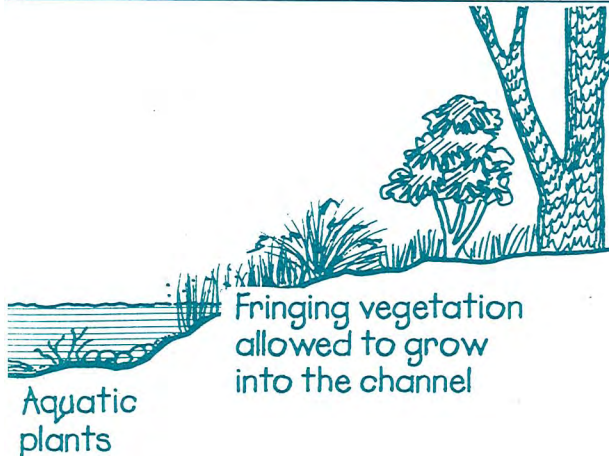
Level 1

Limited - One side of the
drain reserve planted only.



Level 2

Partial - Stream
embankments and
channel edges planted,
but the central channel kept
clear for efficient drainage.



Level 3

Full - Embankments,
channel edges and the
channel itself support
vegetation and logs and
stones are placed in the
channel to create aquatic
habitat.

HOW TO CREATE A LIVING STREAM

This section provides an overview of what is involved in building a living stream. For detailed descriptions of the revegetation methods the reader is referred to the Further Reading section where a number of excellent books on the subject are listed.

Evaluation and planning

Whose stream is it?

Before you do anything, it is necessary to find out who owns the stream or what government agency is responsible. A visit to your local council, or a letter to the Department of Land Administration, should give you the answer.

If the land is privately owned, you will obviously need to discuss your plans and gain the permission of the landowner. Many farmers or hobby farmers may be happy to obtain help to restore a degraded creekline as part of a community landcare effort. Local councils may encourage community involvement in rehabilitating a foreshore reserve, and creeks flowing through or near school grounds can provide an ideal opportunity for a project that supports teaching of subjects across the curriculum.

Most urban drains and many of the larger country drains are vested in the Water Authority. As the areas they drain are often subject to drainage rates, it is important that their drains function to the satisfaction of their ratepayers.

If the stream is a gazetted drain, you must consult the Water Authority or the local government authority responsible for its maintenance to ensure your project will not interfere with the prime function of the drain.

How much is appropriate?

Once a section of streamline has been selected, it is necessary to evaluate the site to determine how much can be done. The landowner or the vesting authority may place restrictions on the project, but to a large extent what can be achieved will be determined by the site itself. For example, a deep v-shaped drain offers little opportunity to plant the embankments, but the area above the embankment on one side of the drain, where access is not required, could be planted with trees and shrubs. On the other hand, a shallow drain or old creekline which carries only moderate amounts of water could be developed to a full creek ecosystem.

The major restriction to building a living stream is flooding. Will the project result in flooding which is likely to cause unacceptable damage to property? This can only be evaluated by knowing something about the history of the site. If it is part of a gazetted drainage network, the Water Authority or your local council will advise on how much can be done. If the creek is not a drain, talk to someone who has lived in the area for 30 years or more and preferably to several people, as memories are not facts. Stories of major floods can be checked in old newspapers. Soil and remnant native trees can often be good indicators of extreme conditions repeated over time. For example, rich red alluvial soil overlying sand is a strong indicator of past flooding, as are species such as paperbarks which are normally associated with seasonally wet conditions.

Local landowners or landcare groups could provide advice.

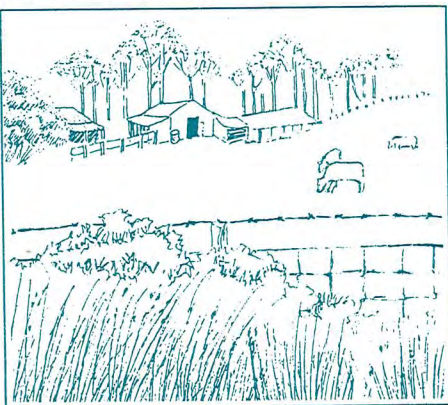
Timetable

A living stream cannot be created all at once. A simple band of trees and shrubs above an embankment can be planted and forgotten, but to be more effective, weeding, vermin control, and replacement of dead plants will have to be carried out for at least a few years.

More complex living stream projects may take many years. For example, if a highly eroded creekline subject to livestock trampling is to be restored, it will first be necessary to fence it off. The higher stable areas should be planted with trees and shrubs to stabilise the embankments. Over time, as erosion is brought under control, planting and seeding can be carried out where sediment has become stabilised, progressing in from the embankments and downstream. The different stages are planned for appropriate times of year, and a timetable can be prepared for obtaining plants and organising volunteers.

Planning

Use of aerial photographs is the most effective way of marking out areas to be planted. If these are unavailable or too expensive, simple sketch maps (using a compass, reference points and pacing out distances) are effective.



Site preparation

Water quality

Water quality is often a problem in both urban and rural areas. Silt, salt, nutrients (from fertilisers and animal wastes) and pesticides are the main problems in farmland. Urban runoff can also add litter, oil, petrol, heavy metals (e.g. lead) and other chemicals spilled or dumped into drains.

If the water quality is poor, with excessive algae, litter, an oily sheen or an unpleasant odour, you will need to identify where the pollution is coming from, and to take steps to reduce the pollution at its source. This may involve fertiliser and pesticide management on rural land, or a more complicated process of community education in urban areas. Oil and silt traps can help to remove particulate matter from stormwater. Once the vegetation becomes established, it will act as a natural filter to improve water quality.

If you see signs of serious pollution (e.g. an oil spill) report it immediately to your local council, or, if you live in Perth, to the Swan River Trust. An emergency response group will go into action to clean up or contain the pollution.

Controlling disturbance

Physical disturbance by vehicles and large animals (including people) needs to be controlled before any planting is undertaken. Livestock must be fenced out and if wave action from boats is a problem along a foreshore, some sort of wave dampener (such as a board secured in the sand or tyres strung together) will be needed to protect the plantings. People using foreshores in residential and recreational areas will have to be directed away from planted areas. Simple wire fences or logs

are often effective. Signs explaining the aims of the project will help to gain community support.

Weed suppression

Weeds are the major threat to the success of revegetation projects. To give seedlings a competitive edge in the first year, physical removal of weeds, or as a last resort spraying with herbicide, is essential. When spraying is being carried out, small native shrubs and sedges should be protected from the herbicide by placing a bucket over them. Choose only a herbicide with low toxicity to aquatic life and a short residual life. Take care to prevent spray drift onto the waterway.

Pest control

The plantings will be grazed or damaged by a range of insects and some birds and mammals. The dominant grazer in disturbed areas is likely to be the rabbit, although kangaroos are often abundant.

Even a few rabbits can cause havoc among plantings. Poisoning and the destruction of warrens is the most effective means of control, with a minimal effect on native fauna. It is necessary to obtain permission from the Agriculture Protection Board and to follow their procedure for baiting. Local landowners should be informed so that they can protect their pets and livestock. Any poisoning carried out in semi-rural areas where dead rabbits may be conspicuous, may have to be monitored to enable the quick disposal of carcasses, because many people find the sight of dead and dying animals disturbing.

Soil preparation

Ripping the soil to a depth of 30 centimetres can improve water infiltration and drainage. It makes planting much easier and encourages growth by promoting rapid root

development. Soils which are normally very wet in the winter/spring period and have a high organic content should not be ripped.

Planting and regeneration

Planting trees and shrubs

Where frosts are not a problem and summers are hot and dry, trees should be planted in autumn. In areas where frosts commonly occur and summers are mild, spring plantings are preferred. Seedlings should be ordered at least 6 months in advance. Planting at densities of 1000 to 1300 seedlings per hectare is typical where no native vegetation remains. For example, 1000 seedlings would revegetate a bank one kilometre long and 10 metres wide. In areas of sparse remnant vegetation, a density of 500 - 600 per hectare is suitable.

Wherever possible, local native plant species should be planted in preference to introduced species. Local native species are adapted to the conditions and are most likely to get established, and will support the local fauna. They are also very likely to regenerate. These factors are essential to the development of a natural ecosystem.

Advice on native species can be obtained from Greening Western Australia, Workpower, APACE, or from your local branch of the Wildflower Society (see For More Information).

Transplanting sedges and rushes

Obtaining sedges and rushes from nurseries may be very difficult. Workpower is one source in Perth. The alternative is to transplant them from a site where they are abundant or where they are about to be destroyed by development. The best time of year is early winter when growth is minimal, just before the maximum growth period of late winter to early summer. To reduce the shock of transplanting, the leaves

should be cut off at about 10 centimetres above the root stock.

Before transplanting any plants, you will need to obtain the permission of the landowner or the responsible state or local government authority .

Direct seeding

Direct seeding is the broad-scale sowing of native tree and shrub seed onto a prepared site. It enables establishment of a range of native species with little labour and at a relatively low cost. To be effective, however, a very high degree of weed and pest control is necessary. Even so, results can be highly variable. Combined with a program of collecting local native seed, it can be a most effective means of restoring the local varieties of native plant species.

Encouraging natural regeneration

In many areas, native species are present along a streamline but are not successfully regenerating. There can be a number of reasons for this, including competition from weeds, grazing by rabbits, or frequent fires which kill native plant offspring while encouraging introduced grasses. Keeping these added pressures on the native flora under control will encourage successful regeneration. For example, weeds can be cleared away from seedlings or to enable successful early growth, exclosures can be constructed to keep rabbits at bay, and the frequency of fires can be reduced. Many farmers can tell you of the prolific regeneration of native species in remnant bush once livestock has been fenced out.



Encouraging animal life

Creating a food web

Simply removing weeds and planting local native plants will provide habitat for a variety of animals. Soon, leaves and twigs fall into the water. Bacteria and other micro-organisms come into action and the food chain is started. The micro-decomposers recycle nutrients in the water which feed algae, which in turn support animals such as tadpoles, aquatic snails and tiny crustaceans. These, together with the micro-organisms, will be food for predatory insects and crustaceans, which in turn will be eaten by large insects like dragonfly larvae, marron, frogs, fish and small birds. These provide a rich food supply for large animals such as turtles, predatory birds, and people.

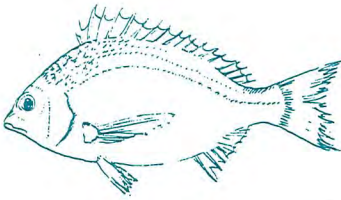
Fringing vegetation also provides food in the form of fallen insects blown from leaves and blossoms onto the water surface. This provides a rich harvest for water walkers, spiders and fish.

Creating habitats

Once a corridor of vegetation has been established along a streamline, it may be time to consider adding other habitat elements. The placement of logs, large stones and heaps of small stones will provide shelter and breeding habitat for a number of aquatic animal species. Similarly, the introduction of an aquatic plant, such as water ribbons, will provide cover for fish and frogs and habitat for water spiders, while not obstructing flow. On a larger scale there may be opportunities to diversify the habitats available by creating lagoons of still water and rocky narrow riffle zones of fast flowing water.

Introducing animals

Once you have recreated these stream habitats, many of the native stream dwelling animals will make their own way back to the stream. If you check the stream over time, you will find that the number of species should increase as the stream matures. If species do not return despite the establishment of their habitat, it may be desirable to introduce animals from nearby streams. Freshwater fish, frogs, crayfish and shrimps can be taken from nearby creeks and placed in the new living stream. Approvals from the Fisheries Department and the Department of Conservation and Land Management (CALM) will be required before any such re-introductions can be conducted.



CARING FOR LIVING STREAMS

To a large extent, living streams will take care of themselves, but a certain amount of maintenance will be necessary to prevent a slow degradation of the system.

War against weeds and vermin

Once the native vegetation has become established and disturbance is minimal, most weed species will not replace the native plants. However, some large introduced weeds gain the upper hand in moist environments. They include pampas grass, edible fig, fountain grass, bamboo,

caster oil bush, blackberries, Japanese pepper, silver poplar, and the vines blue periwinkle, morning glory, Japanese honeysuckle, dolichos pea and lantana. Only constant vigilance and quick eradication will control infestations of these species.

Vegetated streamlines will provide habitat for rabbits and foxes, particularly in rural areas. Their numbers may have to be controlled by periodic baiting.

Fire management

The vegetation along streamlines can present a fire hazard, and will require management. Simple fire breaks, fuel reduction exercises and periodic controlled fires (about once every ten years) will suffice. It should be noted that the perennial trees and shrubs of the living stream are less of a fire hazard than the annual grasses which often grow along the upper embankments.

Maintaining drainage function

The important function of drainage cannot be forgotten, especially in urban areas where drains must be allowed to flow unimpeded. The main channel of the drainage line will have to be cleared every so often. Vegetation may have to be cut back and fallen branches removed. Most of all, any obstruction which is likely to catch debris and cause a dam to form must be removed at the earliest opportunity. Where serious flooding and damage to property could occur, check for obstructions prior to the break of winter.



Habitat monitoring

Natural losses may mean that follow-up plantings are needed to prevent weeds from once again dominating in certain areas. Regular inspections of the plantings should be carried out to assess their condition and identify areas needing attention.

It is a sad fact, but in urban areas, living streams may be subjected to littering, vandalism and arson. Trees may be hacked down, birds attacked, vegetation damaged by vehicles, including motorbikes and four wheel drives, and fires lit. The only way this sort of violence can be controlled is through the presence of local people and by community education, for example by articles in local newspapers and sign-posting to make it evident that the streamline is valued by the local community.

Control of herbicide and pesticide use

Some animals, particularly frogs, are very sensitive to herbicides and other pesticides. Even with a moderate contamination of the food chain they soon die out. If frogs are to be encouraged to return to a streamline, the use of these chemicals will have to be kept to a minimum anywhere within the catchment of the stream.



SHARING EXPERIENCE

For many years, building living streams will be a learning process. Success will be achieved, mistakes will be made, and a wealth of knowledge will be gained. Recording this knowledge will help to improve the materials and methods used. Some methods will be relevant to particular regions or environments, while others will be applicable over a wide range of environments.

Anyone embarking on their first living stream project would benefit immensely from a store of knowledge passed from one group to another. If you have just completed a successful stream restoration project, or have revegetated part of your local drain, please write down what you did, noting times, areas worked, quantities of materials, methods, successes and failures. If you are happy to share this information, please send your records to the Waterways Commission.

WIDER PERSPECTIVES

Linking habitats

If many native species of plants and animals are to survive in Australia, they will do so because of remnant habitats present in conservation reserves, Crown Land, state and local government reserves and private land. The viability of these conservation areas can be increased by connecting them via ecological corridors. It is vital to conserve and create ecological corridors wherever possible. The protection and rehabilitation of native vegetation on road reserves is one example of this. Stream reserves vegetated with native plants offer another avenue for the creation of corridors which can connect road reserves, National Parks, fauna and flora reserves, the native bush in farmland and even the trees in suburban back yards.

Water sensitive design

Drain and waterway rehabilitation are only a part of managing the total water cycle in urban or rural areas. An understanding of the whole catchment water balance is needed so that excess water from rainfall or shallow groundwater can be managed. It is preferable to use water within catchments rather than to "dispose" of it to watercourses. For example, directing runoff into the soil via landscaped areas on site, and increasing water use through tree planting, help to reduce the impact on natural creeks and wetlands. Irrigating gardens, parks and ovals without wasting water and landscaping with native plants save water and reduce environmental impacts.

Education

Living streams can provide a window on the ecology of running waters which can be used by local schools, TAFE colleges and Universities. They are all the more useful if they demonstrate how to build a fully functioning stream ecosystem. Living streams also provide local opportunities to research the behaviour of the plants and animals which live side by side with humans, and the impact of land uses on water quality and ecology.

Heritage

The plants, animals, geology, geomorphology and landscape of living streams are parts of our heritage. Eroded, polluted and infested with weeds, they are like dilapidated old buildings, but restored and rejuvenated they are an expression of the uniqueness of this country and its many various regions.

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A list of further references on revegetation is available from Greening Western Australia.



ACKNOWLEDGEMENTS

Written by Luke Pen, Albany Waterways Management Authority. Edited and produced by Karen Majer, Waterways Commission. Typing by Lynne Bailey. Layout by Paula Giolitto, The Design Room. Illustrations by Ann Riney.

Special thanks to:

Jan Knight, WA Department of Agriculture
 Wendy Boddington, Water Authority of WA
 Carolyn Switzer, Office of Catchment Management
 Lynda Nottle, Greening Western Australia
 Angus Morrison-Saunders, WA Municipal Association
 Keith Bradby, Pinjarra Community Catchment Centre
 Andrew Cribb, Fisheries Department
 Tom Rose, Peel Inlet Management Authority
 Mike Kerr, Albany Waterways Management Authority
 Gordon Wyre, Department of Conservation and Land Management



For more information

National Landcare Australia Awards (Information and entry forms):

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Waterways management:

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Phone: (09) 327 9777

Swan River Trust
Phone: (09) 327 9700

Peel Inlet Management Authority
Phone: (09) 535 3411

Leschenault Inlet Management Authority
Phone: (097) 211 875

Albany Waterways Management Authority
Phone: (098) 414 988

Catchment management:

Pinjarra Community Catchment Centre
Phone: (09) 531 1954

Office of Catchment Management
Phone: (09) 221 3840

Emergency pollution response:

Swan River Trust
Phone: (09) 327 9700
after hours: 016 982027
or your local council.

Drainage functions:

Water Authority of Western Australia
Phone: (09) 420 2420

Water Authority Regional Offices
(check your telephone directory)

Local Councils
(check your telephone directory)

Revegetation using native species:

Greening Western Australia
Phone: (09) 481 2144

APACE Revegetation Nursery
Phone: Greg Reid (09) 336 1262

**Bayswater Integrated Catchment
Management Group**
Phone: Kirsten Tullis (09) 271 3549 or
Val Humphrey (09) 279 7081

Workpower
Phone: Tony Soteriou (09) 221 5088

Wildflower Society of Western Australia
Phone: (09) 383 7979
Tuesday, Wednesday, Thursday,
9.30am - 2.00pm

Foreshore rehabilitation:

Greenworks
Phone: Linda Taman: (09) 271 9832

Introduction of fish and other aquatic animals:

Fisheries Department
Phone: (09) 220 5333

**Department of Conservation and Land
Management**
Phone: (09) 334 0333
or any region or district office

Controlling feral animals:

Agriculture Protection Board
Phone: (09) 368 3333