



NEWSLETTER OF LWRRDC'S RIPARIAN LANDS R&D PROGRAM

STREAMBANK

stability: why, what, where and how?

Why is streambank stability important?

We are all familiar with what can happen when land is overcleared, stock grazed without control along streams, gravel extracted from streambeds and watercourses straightened to make navigation easier.

Whilst streams and rivers 'naturally' experience erosion and other channel changes, the impact of activities like those listed above has, since European settlement, accelerated these processes to often unacceptable levels.

Streambank stability is important because a physically unstable stream can cause many problems. Without stable streambanks, infrastructure such as buildings and bridges can be threatened, valuable and productive land lost, stock injured and important habitat lost for native plants and animals.

These financial and environmental costs make streambank stability one of the most important management issues facing landowners and catchment communities across Australia today.

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This publication is managed by the Land and Water Resources Research and Development Corporation (LWRRDC), GPO Box 2182, Canberra ACT 2601.

LWRRDC's mission is to provide national leadership in utilising R&D to improve the long-term productive capacity, sustainable use, management and conservation of Australia's land, water and vegetation resources. The Corporation will establish directed, integrated and focused programs where there is clear justification for additional public funding to expand or enhance the contribution of R&D to sustainable management of natural resources.

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RIParian lands:

WHERE LAND AND WATER MEET



Hello! and welcome to the tenth edition of RipRap. My name is Siwan Lovett and I am the Program Coordinator for the Riparian Lands Research and Development Program.

With my appointment as the new program coordinator, it seemed an appropriate time for RipRap to take on a new look. Each edition of RipRap will now be focused around a particular management issue, and will aim to provide material that is practical, relevant and informative to a wide range of groups and organisations.

The newsletter will maintain the case study segments so that we can see what is happening in the 'real world' of riparian management, as well as providing information about new research findings, upcoming events and a whole lot more...

This edition of RipRap is dealing with the difficult management issue of streambank stability. Potential issues for future RipRaps include: how to define the riparian zone for management purposes, integrating riparian management into farm planning, and how to work out what the critical riparian issues are in your catchment. We welcome your suggestions on future themes.

I hope you find the newsletter useful, and look forward to receiving your comments on the revised format. Happy reading!!

Siwan

STREAMbank stability continued from page 1

What are the processes that cause streambank instability?

Many processes contribute to streambank instability. The important point to remember, however, is that these processes are often triggered by particular land and water management practices. For example, activities such as the over-clearing of land, allowing uncontrolled stock grazing along watercourses, and the straightening of channels, disturb the equilibrium that exists between the flow regime and channel. Disturbing this equilibrium catalyses processes such as erosion and channel widening, which are both key causes of streambank instability.

Erosion occurs as a result of interactions between the streambank, weather and flow. There are three broad categories of bank erosion processes.

These are:

1. Subaerial erosion — this occurs when the bank is exposed to the weather and is subject to a variety of processes eg. rainsplash, stock trampling.
2. Scour — the direct removal of bank material by flowing water.
3. Slumping — a mass movement that occurs when bank material slips or falls into the stream.

Another process that contributes to streambank instability is channel incision. This occurs following activities such as channel straightening, flow regulation and sand and gravel extraction, and can cause large amounts of material to be eroded and deposited downstream.

The immediate impact of the removal of this material is to make the channel deeper, whilst the downstream effect is a build up of sediment that can sometimes reduce light and smother aquatic habitats.

All these processes take place along the length of our streams and rivers. The extent to which they affect streambank stability is, however, dependent upon the composition of the bank, flow regime, channel size and level of human disturbance.



Mass movement.

Photo by Leonard Sands

What can be done?

Any stream system that experiences accelerated erosion processes will have little prospect of long-term stability unless management strategies are developed and then actively implemented.

Increasingly, decisions about how to deal with the problems of streambank instability are being made following input from many different disciplines, for example: ecology, engineering, hydrology and geomorphology. This is because there is growing recognition that management strategies combining a number of different techniques are more likely to result in long-term stream stability and ecological sustainability.

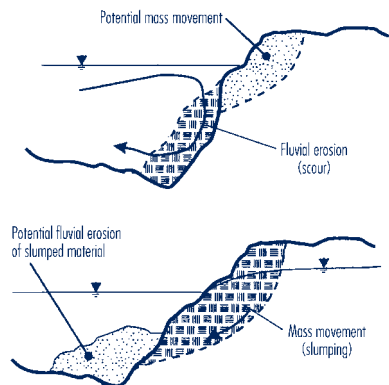
Revegetation: the environmentally friendly option

Streambank erosion is strongly influenced by the density and type of riparian vegetation: in most cases riparian vegetation helps banks to resist erosive forces. Revegetating unstable streambanks is, therefore, a technique that can provide relatively cheap long-term stability, as well as providing a host of other benefits for native riparian plants and animals.

Prior to revegetating, it is important to understand why streambank erosion occurred in the first place. Without this understanding you cannot be confident that the revegetation strategies you select will work. Conducting a river reach survey, or seeking professional advice is an important step in the planning process. Without a planning process work could be undertaken that may not be appropriate or successful. For example, research has demonstrated, that revegetating the toe of the bank should often be the first step in implementing stabilisation strategies.

Although revegetation is a positive option for the environment, in some cases it is not enough to address streambank stability problems. In these instances it may be appropriate to use complementary engineering solutions.

continued over



Interrelation of fluvial bank erosion and mass movement.

STREAM**b**ANK stability

Engineering approaches: when needs must

When erosion is threatening a high value asset (such as a bridge or building), or is occurring in high energy situations (such as gullies) with high, steep streambanks, vegetation may not provide sufficient resistance to protect the asset or control erosion.

In these cases it may be necessary to combine vegetation and engineering approaches. Many structures can be used to stabilise streambanks, for example the pile groynes pictured below.

As with revegetation, it is important to understand the cause of the streambank stability problem prior to establishing any new engineering structures.



Below: Groynes on the Musgrave River, Qld. Above: Pile groynes.



Photo by Richard Pearson

AUDIT announce**m**ent

The National Land and Water Resources Audit WebSite was launched in July. While you're next surfing, check it out at <http://www.nlwra.gov.au>. The Audit Strategic Plan was recently released for comment. Your feedback on the Plan is welcome. Feedback can be returned 'reply paid' using the feedback form in the back of the printed version of the Strategic Plan or, by e-mail to info@nlwra.gov.au

Also available are the Audit brochure and a series of 'Fast Facts' which give an overview and progress of the Audit. All of these are available on the website in the publications area or paper copies can be requested.

To keep up-to-date on the progress of the Audit you can also join our electronic mailing list — 'Audit Info'. Each month regular postings will be made on the progress of the Audit and the release of new publications. Frequently asked questions about the Audit will also be answered.

To join the Audit Info electronic mailing list, send an e-mail message to: majordomo@lists.nlwra.gov.au. Leave the subject line blank. In the message body type: `subscribe auditinfo <your e-mail address>`. For example, if Jane Doe was joining the list, she would type in the message body: `subscribe auditinfo Jane Doe`

How do I find out more?

Read on! There are case studies, research findings and more information about streambank stability in the following pages...

References

Kapitzke, I. et al., 1998. 'Stream stabilisation for Rehabilitation in North-East Queensland'. LWRDC.

LWRDC, 1996. 'Riparian Management Issues Sheet No. 2: Streambank Stability'. LWRDC. (Available free from LWRDC.)

Raine, A. and Gardiner, J., 1995. 'Rivercare for Ecologically Sustainable Management of Rivers and Riparian Vegetation'. Occasional Paper No. 03/95 LWRDC.

These publications are available from the DPIE Shopfront — Edmund Barton Building, Core 2 Entrance (off Blackall Street) Barton 2601. Tel: 1800 020 157.

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HAUGHTON River Mill Farm



Environment

The Haughton River basin is located entirely in the dry tropics zone and, therefore, has lower annual rainfall, runoff volumes and runoff depths than wet tropics streams. Nevertheless, the river is subject to periodic severe flooding from tropical cyclones. The Haughton River has distinct downstream-decreasing channel capacity and experiences major overbank flows that lead to overbank erosion and threats of channel avulsion. Most of the native woodland vegetation on the Haughton River floodplain has been cleared for sugarcane production, leaving thin broken riparian corridors. The river has a sandy bed and non-cohesive bank materials that are susceptible to fluvial erosion.

Case study site

The Haughton River Mill Farm site is located on the Haughton River adjacent to the township of Giru, approximately 15 kilometres upstream of the river mouth. The site is located on a slight bend in the river, where erosion on the outside of the bend has threatened channel avulsion and damage to the adjoining agricultural land, the Invicta sugar mill and Giru township. The river bank receded up to 20 metres in the 40 year period prior to 1991. In 1991, a sequence of major floods caused further erosion of approximately 15 metres (see below).

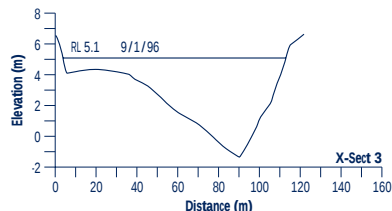
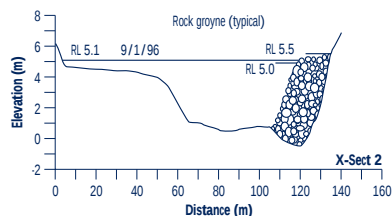
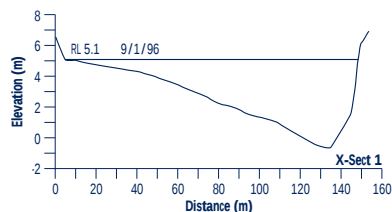


Eroded Stream Bank prior to construction of rock groynes.

Photo by Ross Kapitzke

Strategies and treatments

Rock groynes were constructed at the site following the 1991 floods, with the objective of protecting the bend, limiting further loss of agricultural land and reducing the likelihood of channel avulsion that may result from bank erosion and lowering of bank level. Four rock groynes were installed, angled downstream to the bank, with a tapered top profile that sloped away from the bank. The groynes were adopted in preference to the rock revetment option, which was more expensive, and more likely to require supplementary rock fill at the toe after flood events. The groynes were also preferred to the revetment as they reclaimed the original stream alignment, thus minimising the likelihood of channel change downstream. Furthermore, they retained the riparian land/ water interface, thus providing for re-establishment of a healthy riparian zone.



Source: Water Resources Apr 12/93
Note: Cross sections looking upstream

Treatment cross-sections.

HAUGHTON River Mill Farm



Rock groynes.

Photo by Mark Crees.

Monitoring and performance

Rock groynes are impermeable structures, that tend to concentrate flows at the toe of the structure and cause turbulence downstream due to overtopping. They may also affect the downstream flow conditions and cause bank erosion immediately adjacent to the structures. Flow velocities and flow patterns are, therefore, important for design of the rock fills as well as in the prediction of sedimentation impacts and alterations to instream habitat between the structures.

Since 1993, a monitoring program has been in place that has focussed on pre- and post-flood bathymetric surveys, the measurement of flow velocities and observation of flow patterns around the groynes. Minor floods in the Haughton River in February 1994 and January 1996, and a more severe event in March 1997, caused no appreciable damage to the site.

Summary

The groynes are more suited to the site than the rock revetment option as they are less expensive and have successfully retained the land/water interface. Revegetation of the site is now required to rehabilitate the riparian and instream habitat. Although only limited information has so far been obtained, the monitoring data has assisted in an understanding of flood streamflow velocities within the groyne field. The success of the rock in withstanding the high flow velocities at the toe of the structure, and the effect of the groynes on downstream erosion are of ongoing interest.

Definitions

- ~ Channel avulsion: occurs when there is an abrupt change in stream course and consequent abandonment of the pre-existing channel.
- ~ Rock/pile groyne: these are structures that (are usually impermeable) project from the streambank. They are designed to increase flow resistance and direct streamflow away from the bank through a preferred channel alignment.
- ~ Rock revetment: this structure provides 'armour' for the streambank against fluvial erosion, as well as providing stabilisation against slumping.
- ~ Bathymetric surveys: surveys of depth and current conducted under water.

Contributing organisations

Haughton River Improvement Trust; McIntyre & Associates Pty Ltd; Department of Primary Industries (Department of Natural Resources) and James Cook University.

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References

- McIntyre & Associates Pty Ltd. 1992. 'Mill Farm Bank Restoration Planning Report', report prepared for Haughton River Improvement Trust.
- Kapitze, I.R. and Sands, L.B. 1996. 'Site Monitoring Report — Physical Component', Research Report No. 5, prepared by James Cook University for the Land and Water Resources Research and Development Corporation.
- Kapitze et al. 1998. 'Stream Stabilisation for Rehabilitation in North-East Queensland'. LWRDRC.

This case study has been taken from the new Stream Stabilisation for Rehabilitation in North-East Queensland Manual. This manual identifies some of the primary problems and causes of river degradation, as well as treatments and management techniques. It recognises that the sustainable use of streams depends on a range of factors such as geology, hydrology, climate, ecology, sociology, culture and economics. If you would like a copy please contact the Department of Primary Industries and Energy Shopfront on 1800 020 157 (cost \$25.00).



TIME to move on: Michael Askey-Doran takes up a new role

After three years involvement with LWRRDC's Riparian Lands R&D Program the time has come to move to new fields. My time with the program has been very beneficial, and I have had a great opportunity to broaden my knowledge in the area of river management and ecology.

My new role involves coordinating a team to deliver botanical and GIS support to community groups and local and state government stakeholders here in Tasmania. This program is funded through the Natural Heritage Trust Bushcare and Rivercare programs and aims to improve the manner in which we manage our native vegetation.

I would like to thank all those involved in the Riparian Program for their support over the last three years, as well as all those readers of RipRap who have contributed articles and positive feedback about the newsletter. As the tenth issue hits the streets, I can be happy in the knowledge that people have gained something positive from the articles we have published. In particular, I would like to thank Sally Berridge who edited all the newsletters I have been involved with, and did a great job.

Finally, I would like to wish Siwan all the best in her new role in the Riparian Lands R&D Program. Siwan has a big challenge ahead of her, but I am sure she will make a great success of it. All the best to everyone for the future.

Michael Askey-Doran

LOCAL government focus

Introducing the new Bushcare Facilitator



Rob Thorman

As part of the NHT Bushcare program, Environment Australia has provided funding for a National Local Government Bushcare Facilitator. Rob Thorman, who is based at LWRRDC in Canberra, has been contracted to undertake this role. The Bushcare program provides assistance for local governments to become more involved in vegetation management. This includes direct grants, technical support and advice. There is a network of regional facilitators to help with regional planning and project development, and a Bushcare support network, administered by Greening Australia and other groups, that

provides technical assistance and training.

Local government has a particular interest in riparian zone management, as they are involved in floodplain management, erosion control and the protection of infrastructure. Local government have traditionally used engineering solutions. However, there is a growing awareness that revegetation in many cases is not only more environmentally friendly, but also a more cost-effective solution.

Rob is compiling a data base of councils that are adopting innovative approaches to vegetation management. If you know of good examples please contact Rob.

Further information

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Editor's note

Local government is an important natural resources manager. In recognition of this, RipRap now has a column specifically allocated for local government news. If you would like the work of your local government agency featured in RipRap please let me know! Siwan

Councils are able to influence riparian vegetation management through:

- ~ strategic planning and zoning;
- ~ provision of incentives, such as rate rebates, to encourage private land holders to manage riparian vegetation on private property;
- ~ management of Council and Crown reserves;
- ~ management of the impacts of infrastructure development such as water and sewerage provision; and
- ~ provision of direct assistance to community landcare groups, through the use of machinery, access to council nurseries and administrative support.

Getting a GRIP

Getting a grip on new research findings and issues is important. This segment of RipRap provides short, sharp research notes that can be practically applied in day-to-day natural resources management.

Protection of tributaries from stock

Most publicity about stream bank degradation and its associated impacts focuses on main streams. However, at least as much interaction between the catchment and the stream occurs along the tributaries.



Background showing recovery of banks in a small tributary following fencing.

Although it may not be feasible to fence all tributaries, simple temporary electric fences can be useful along smaller ones. The best overall strategy is to provide an alternative water supply and shelter away from all streams, including tributaries, thus reducing the time stock spend in these fragile zones. Strategic water supply sites and shelter well away from streams also pay dividends through more even grazing pressure, improved pasture use and drought resistance.



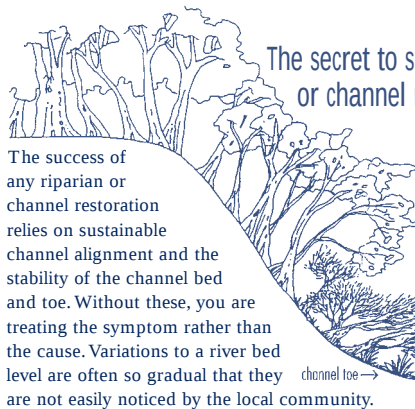
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Stock access to small tributaries
is a common problem.
Photos by Ian Bell.



"Ecoman and Dr Earth
Getting a Grip" by
Morgan Kurrajong
and Ed Radcliffe



The secret to successful riparian or channel restoration

The success of any riparian or channel restoration relies on sustainable channel alignment and the stability of the channel bed and toe. Without these, you are treating the symptom rather than the cause. Variations to a river bed level are often so gradual that they are not easily noticed by the local community.

Revegetation of the riparian area and restoration of the aquatic and terrestrial ecology depends on sustainable channel alignment and a stable channel bed and toe.

For more information

Peter Wern,
details page 16.

↑
channel bed

'ELVERTON' and 'OLD WHISLOCA'

Managing the riparian zone within a total farm system



Clearing willows 1989.

Environment

'Elverton' and 'Old Whisloca' are mixed grazing, cropping and forestry properties totalling 2082 hectares. The properties are about 400 metres above sea level, with an average annual rainfall of 850 millimetres. They are situated on either side of the North Esk River, in the middle flood plain reaches of the catchment. Each property has a proportion of river alluvial soils grading back to slopes and foothills made up of sandy loams and shales.

Case study details

When 'Elverton' was purchased by Ian and Rosemary Dickenson in 1969, it consisted of run down pastures and native forests that were heavily cut-over. Since then it has been developed to significantly increase production, through the application of whole farm planning and farm forestry principles. With these changes has come a vision for sustainable management. The addition of 'Old Whisloca' in 1989, resulted in continued pasture improvement and the implementation of a cell grazing program.



Ian Dickenson

Rehabilitating the riparian zone

In conjunction with the Rivers and Water Supply Commission and other landholders, major river restoration works were undertaken along 12 kilometres of the North Esk River in the 1980s. A key feature of these works was the removal of crack willow from the water-course. Congestion of the river by crack willow was causing exacerbated flooding and diversions of peak flows, leading to extensive erosion and damage to areas of the flood plain.

Apart from damage being done to the farmland, this erosion had a significant impact on downstream users, especially with the North Esk being a major water supply for the City of Launceston. After six years of 'red tape' the River Improvement Scheme finally got under way.

Strategies and treatments

Ian Dickenson was the principal contractor for the project works. In areas where erosion was likely to occur, willows were cut off leaving the stumps to hold the banks. Willows that were growing across, or in the stream, were removed completely. In a few instances the river was straightened, but only where it was considered it would break through if left alone.

Large logs and stumps were used to stabilise the banks, with care taken to ensure that flooding would not wash them away. To minimise this risk, the logs and stumps were 'knitted' in. They were also back-filled with shingle and, in some cases, rock.



Actively eroding bank.

'ELVERTON' and 'OLD WHISLOCA'

Photos in this article by Ian Dickenson.



Logs and stumps used to rehabilitate banks.

Following this initial phase of willow clearing and bank stabilisation, the riparian zones are now being progressively fenced off in order to better manage stock access. As a result, water contamination and erosion is being minimised. This is a major consideration, as the North Esk is an important catchment for Launceston's water supply. About twenty bridges have been constructed in order to avoid driving stock and machinery through watercourses. The riparian zone and other forested areas are either not grazed, or are only grazed periodically.

Monitoring and performance

An ongoing program of monitoring and maintenance is followed on both properties to ensure that the willow and bank stabilisation problems do not recur. The willow stumps that were originally left are constantly trimmed, with the aim being to leave enough stumps to ensure bank stability, but not so many that trimming becomes too costly. Sheep are also used to control regrowth.

A program of weed management is also in place, with an ongoing gorse reduction effort, and an annual ragwort 'pull'. Around \$1000 is spent each year on preventing fresh incursions of ragwort, which flows down from higher up in the catchment on flood waters. Willow infestations are also being progressively eliminated from the watercourses, with the overall aim to have weed infestation down to 0.1% of the property by the year 2001.



Summary

The management decisions that have been taken by 'Elverton' have been based on the principles of ecologically sustainable development, with the development of a whole farm plan that focuses on integrated resources management. This focus has resulted in the riparian zone becoming managed as an integral, yet different, part of the whole farm system.

In recognition of the work that was undertaken by Elverton Pastoral Company Ltd, Ian and Rosemary Dickenson were awarded the Tasmanian Landcare Award in 1997.

For more information about the work that Ian and other farmers have undertaken see page 11.

LESSON to be learnt

Managing the riparian zone differently does not necessarily mean losing the use of the zone within agricultural enterprises. The riparian zone can contribute to productivity gains. For example, research has shown that building up the riparian zone provides shelter for stock, improved water quality and reduced erosion, all of which benefit the landholder. The lesson to be learnt is that environmental and economic benefits are not mutually exclusive.

Willows regrowing 1998.

WILLOW management

PLAN FIRST: ACT SECOND

The following recommendations should be considered by any individual or group planning to address willow problems:

1. Develop a long-term plan for willow management that draws upon expert advice. It may be that this plan has to be submitted to a relevant government agency for authorisation prior to implementation.
2. Ensure that your plan complies with the relevant legislative provisions in your State or Territory (eg. in NSW approval is required prior to removing vegetation within 20 metres of a waterway).
3. Gain expert advice that provides information about the impact on the waterway and its banks of particular willow management options. (It is important to remember that removing willows can sometimes increase, rather than decrease, erosion problems.)
4. Consider replacing willows with more desirable species, as well as fencing and stock-proofing rehabilitation areas.
5. Ensure that you plan for ongoing monitoring and maintenance of willows, as their management requires long rather than short-term solutions.

References

- Trounce, B. and Cremer, K. 1995. 'Willow Control'. CSIRO Division of Forestry. Canberra (contact Robert Trounce, NSW Agriculture, Locked Bag 21, Orange NSW, 2800).
- Cremer, K. 'Willow Identification for River Management in Australia'. CSIRO Division of Forestry. Canberra (contact the author).

Australian Manual of Stream Restoration — A manual to assist land and water managers, will be available in November 1998. This manual will provide tools and techniques for dealing with problems like willow — look out for more information in the next issue of RipRap.

NFF booklet Hand in Hand



Rural Australia knows that sustainable agriculture is no longer an option.

NFF's publication *Hand in Hand: farming sustainably* illustrates, through a series of case studies, that economic and environmental sustainability go hand in hand. Sustainable agriculture means improving economic efficiency and productivity, along with the equal need for protection and enhancement of environmental values. Today, environmental concerns are an integral part of

every decision that farmers make about what they do on their farms.

NFF has a long term commitment to making the Australian agricultural sector sustainable into the next century. This is why NFF was not only a founding member of the National Landcare Program, but continues to be one of its strongest advocates and supporters.

The bottom line for farming is that it must be both profitable and environmentally sustainable. The two are naturally complementary and neither can exist without the other.

For more information, contact

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For your free copy of *Hand in Hand: farming sustainably*, contact the National Farmers' Federation.

stream corridors

Adaptive Management and Design

Second International Conference on Natural Channel Systems
1–5 March 1999. Sheraton Fallsview, Niagara Falls, Canada

For anyone interested in learning, sharing, promoting and integrating knowledge and experience in various aspects of river and stream systems management. Topics include:

- National, regional and local strategies
- Innovations in stream corridor management
- Interactions and community involvement
- Research and development
- Management issues
- Design
- Case studies
- Monitoring

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It's a WRAP

Keeping up to date with what is happening across Australia in the area of natural resources management is vital. This section of RipRap provides States and Territories with the opportunity to 'wrap up' key activities, research and upcoming events.

FOCUS ON RIVERCARE

Commonwealth contribution



National Rivercare Program — tailoring projects to problems

If you belong to a community group, the National Rivercare Program, funded through the Natural Heritage Trust (NHT), can help you repair your local creek, river or stream. Rivercare funding is potentially available for a range of activities aimed at reversing or preventing degradation in riverine environments, including riparian areas, river beds and banks. Examples could include community groups fencing off a stretch of river to exclude stock and improve vegetation, with consequent water quality benefits; as well as activities designed to improve in-stream habitat, manage erosion and stabilise river banks and beds.

The funding guidelines for the National Rivercare Program are flexible. They are designed to allow most local problems to be addressed within a set of broad principles. The Program encourages groups to tailor their activities to particular issues or problems, thereby

recognising the value of local knowledge and experience in developing practical solutions. In all cases, projects submitted for National Rivercare Program funding will need to be clear about the problem they are addressing, how activities will target the causes of the problem, and the benefits that will result. Project proponents also need to take account of other activities that could effect the success of the project. The best way to do this is through a catchment plan which integrates land, water and vegetation management issues. Above all, it is important that projects are feasible, cost-effective and technically sound, including in an ecological sense.

As well as funding on-ground projects, Rivercare aims to raise community awareness and monitoring through the Waterwatch Australia Program, and to coordinate research and development through the National River Health Program.

A Natural Heritage Trust project application guide is produced each year to assist project proponents develop an eligible application for possible funding, including under the National Rivercare Program. The guidelines for next year's NHT round (1999–2000) are expected to be released in September.

LWRRDC has a number of publications on ecologically sustainable management of rivers and riparian vegetation that may be useful in planning potential Rivercare projects. State/Territory natural resource management agencies are another useful source of information and advice.

The National Rivercare Program operates outside the Murray-Darling Basin. A separate program, Murray-Darling 2001, focuses on Basin areas. In 1997–98, the first full year of funding, the Commonwealth provided just over \$6 million for projects associated with “on-ground” or implementation activities under Rivercare. This amount will almost triple in 1998–99 and increase further in the last two years of the program.

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The importance of planning

The establishment of the Natural Heritage Trust Fund in 1997 has led to an increased focus on river management issues in Tasmania. Much of this attention has come from community groups situated in rural regions, with close involvement by local and state government agencies. Willow management and removal has been the driving issue behind most Rivercare activities in Tasmania, and with this type of activity is the need to protect or rehabilitate the stream channel

and revegetate cleared areas. Many groups are also looking at fencing out stock from sections of their river to protect native vegetation and streambanks from stock damage.

Those projects focusing on willows have resulted in some significant on-ground works and disturbance in the initial phase. The difficulty with these projects has been the need to balance environmental issues such as aquatic and riparian ecology, water quality and channel

Cartoon by Morgan Kurrajong and Ed Radcliffe



Rivercare in Tasmania

stability, with the economic and time constraints associated with the use of large machinery in and around rivers. For many groups, the focus has been on willow removal and stabilisation of the channel, with the next phase of providing long-term solutions through controlling stock access and revegetating cleared areas, paid less attention. Whilst groups do appreciate the importance of controlling stock and revegetating along rivers, it often becomes too difficult within the limited funding period to tackle large revegetation projects. Groups are now being encouraged to develop new projects that would enable work such as revegetation and stock management to be carried out.

In order to increase the opportunities for good outcomes, groups carrying out onground works such as willow removal and channel works are required to develop a Rivercare Plan. Guidelines have been produced to help groups develop their Rivercare Plans. The plans must detail the long term vision which the groups have for their river, and set out how they may achieve all, or part of, this vision through their works. As part of the Rivercare plan, the groups seek advice from appropriate experts on riparian and aquatic ecology, water quality, and engineering and hydrology. Recommendations are provided back to the groups and can be included in the Rivercare Plan.

Rivercare plans contain information about the activities a group seeks to undertake. For many projects, these activities occur in two phases: initial on-ground works such as willow removal, and in-stream works such as constructing riffles; and a second phase involving revegetation, stock control and ongoing maintenance. The groups are required to clearly detail the methods they will use for willow removal, including how much is to be

removed and over what period of time. It is also important that in-stream works are well documented, so that the nature of the works and their extent can be clearly understood by those assessing the project. In the second phase, priorities can be set for fencing and revegetating areas of the river. Groups may also decide to target areas that are most susceptible to erosion or affected by stock access. An important component of this second phase is the need to establish a formal maintenance agreement, so that the effectiveness of the riverworks does not decline over time.



Field days are an important mechanism for providing information on Best Management Practices, Meander River, Tasmania.

It is hoped that with a greater recognition of the need to provide technical support to community groups Rivercare plans will result in good environmental outcomes, whilst maintaining the productive nature of the adjacent land.

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Photo by Michael Askey-Doran.



River Restoration Workshop

During May 1998, the Water and Rivers Commission held a very successful week-long River Restoration workshop at Fairbridge, Pinjarra. The workshop was a training program for people from community catchment groups, local government and Landcare District Committees. Workshop participants studied practical river restoration techniques and river ecology on the South Dandalup and Serpentine rivers.

The workshop was an opportunity for those involved in river management to learn how to tackle the erosion and sedimentation problems common throughout the waterways of Western Australia. A mix of theory and fieldwork was used to equip practitioners with the skills and knowledge to combat these problems on the ground. Lecture topics included stream hydrology, channel stabilisation design, revegetation techniques and Aboriginal heritage issues. Participants conducted channel surveys

and foreshore assessments, analysed their results, and produced a rehabilitation design for their allocated reach.

It is currently planned to hold two further workshops as part of the South West River Restoration, Training and Demonstration Program. The Program is jointly funded by the Water and Rivers Commission and the Natural Heritage Trust.

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These workshops are based and modelled on the work of Dr Bob Newbury, a stream hydrologist from British Columbia, Canada. He visited Australia and conducted LWRRDC-funded workshops in Victoria and Queensland in 1996, and in Tasmania in 1997 (see issue 9 of RipRap) available from LWRRDC.

Queensland



Dates for your diary

The Second Managing and Growing Trees Training Conference is on between 19–21 October 1998.

This conference is a great opportunity for those involved in managing and growing trees and other vegetation to exchange information and research results, participate in training workshops, and catch up on the latest developments in farm forestry and vegetation management.

For details

<http://www.dnr.qld.gov.au/fiqweb/news/news.htm>

MODSS '99 International Conference

The Department of Natural Resources will host the Second International Conference on Multiple Objective Decision Support Systems for land, water and environmental management. The conference will run from 1–5 August 1999.

For details

<http://www.dnr.qld.gov.au/events/modss99/index.htm>

News grab

Queensland is also amending legislation to tighten up rules governing the allocation and approval of sand and gravel extraction from rivers and streams. These changes seek to better coordinate the legislative requirements of the various state and local government agencies involved in such approval processes.

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Issue

The effects of large dams on tributary streams entering a river downstream of a storage can incur very expensive remedial works. In the case of Pindari Dam, on the Severn River near Ashford in northern NSW, the effects on the Oakey Creek tributary have been particularly severe, damaging property and roads, as well as having a significant impact on mainstream sedimentation.

Background

The Pindari Dam has, since its construction in 1969, stored most of the small floods occurring in the catchment. The result of this has been that flows downstream of the storage after small floods have been very low. The effect of this on Oakey Creek, which joins the river below the dam, is that during flood events the usual backwater from the main stream no longer occurs, with the tributary flows descending rapidly near the confluence. These faster flows are causing erosion of the stream bed, with some of the banks along Oakey Creek collapsing, and severe undermining of the roadway taking place. A further complication, or compounding effect, has been the construction of a new roadway culvert crossing. During flood events, the culvert becomes blocked with debris, resulting in a cascading waterfall across the road.

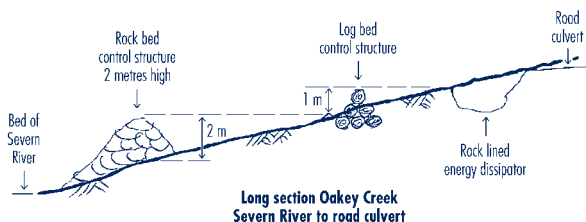
Strategies and treatments

The treatment designed to address this problem has been to reduce the slope of the tributary stream bed by raising the creek bed near the confluence. This involved constructing a rock bed control structure two metres high. This was insufficient to protect the roadway, so a further log structure one metre high was placed between the road and the river to further reduce the grade. The final works to protect the roadway used rockwork to protect the stream banks and form an energy dissipator.

Over the next few months, the tributary stream will be fenced and the banks planted out with indigenous vegetation. The figure below shows a cross section of Oakey Creek which demonstrates the relative levels of the structures. These works are now being monitored to see whether they are successful in addressing the erosion and related problems.

For further information

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Australian Capital Territory

Catchment Health Indicators — A pilot study in the Upper Murrumbidgee Catchment

A three year pilot study is being conducted within the Upper Murrumbidgee Catchment to investigate the application by community groups of catchment health indicators. The focus of the project is on biophysical indicators, however, social and economic indicators will also be explored.

The project aims to develop a method that can be used by community groups to measure and monitor trends in the health of their local catchments.

In the first year, the project will be trialed in six sub-catchments, drawn from rural, urban and nature conservation areas across the Upper Murrumbidgee Catchment.

This pilot project will:

- ~ bring together scientists and community groups to test and evaluate existing catchment health indicators;
- ~ facilitate the transfer of scientific information to the wider community;
- ~ test the usefulness of catchment health indicators to direct community action; and,
- ~ prepare and explore community responses to the use of catchment health indicators in environmental management.



The challenge of rehabilitating Australia's streams!

Gaining a better understanding of how our streams work, and providing some answers to restoring the nation's waterways, will be the key aims of the Second Australian Stream Management Conference, to be held in Adelaide, 8–11 February 1999.

The conference is being presented by the Department of Environment, Heritage and Aboriginal Affairs, the CRC for Catchment Hydrology, the River Basin Management Society and the CRC for Freshwater Ecology.

During the past decade, there has been enormous enthusiasm for returning many of the natural values to our Australian streams. This is being supported by hundreds of millions of dollars from many quarters: the Commonwealth Government's Natural Heritage Trust, State Government Agencies, local government, urban and rural river management authorities, plus community groups and individual landholders.

Some people argue that we know all we need to know in order to rehabilitate our streams — it's just a matter of getting on with it!!!

But do we really know enough and what more do we need to know? What are the remaining barriers to implementation — technical, political or social? What can we achieve in the next five years? The next 25 years? What can we learn from experiences overseas?

The conference will explore the technical/scientific, institutional and community aspects of stream restoration. A series of field trips will enable conference delegates to visit an array of urban/rural stream restoration projects, all located within one hour from Adelaide. You can also expect a most unorthodox work shop session that will cut to the core of what this conference is all about.

The venue, the Hotel Adelaide International, is located five minutes from the CBD, on the 'happening strip' of O'Connell Street. The strip has a great selection of restaurants and cafes, all within five minutes walk of the venue. Accommodation at the Hotel Adelaide will be on a first come/first served basis. Budget accommodation will be available from \$32 per night.

The registration fee for the conference will not exceed \$430, with concessions available for students, landholders, community leaders and members of the River Basin Management Society.



For further information

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This collaborative project between Environment ACT, CSIRO, CRC for Freshwater Ecology and the Upper Murrumbidgee Catchment Co-ordinating Committee is being funded by a Natural Heritage Trust grant.

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WEB Sites

Streamline on the Web

Australia's natural resources data base is now on the web
<http://www.infoscan.com.au>

Riparian bibliography

Information about riparian communities and related topics
<http://www.npsc.nbs.gov.resource/literatr/riparian/riparian.htm>



Integrating land and water management

Victoria has recently established nine Catchment Management Authorities (CMAs) in rural regions to take a lead role in integrated land and water management.

The CMAs provide integrated planning for land and water management, as well as providing services in floodplain management, rural drainage, coordination/management of water quality and management of Heritage Rivers outside of National Parks.

With their establishment Victoria has, for the first time, authorities that provide an integrated focus on river management. They are essentially a 'custodian' of river health in their area. As part of this role they are developing integrated waterway health plans.

In addition, the CMAs will take a lead role in Victoria's Stressed Rivers Program. CMAs are to develop, within two years, river restoration plans to improve the condition of those priority stressed rivers identified in their region. The river restoration plans developed by the CMAs will specify objectives to improve river health, as well as provide information about a range of mechanisms to achieve these objectives. The plans will include mechanisms to enhance the environmental flow regime and improve instream habitat. It is hoped that the implementation of these plans will result in river rehabilitation and streamside revegetation.

For further information

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Publications from Victoria

Other recent Victorian initiatives in waterway management include the publications of:

- ~ the *Index of Stream Condition: Reference Manual, User's Manual and Trial Applications*
The index (ISC) provides an integrated assessment of river condition which incorporates assessment of five components of streams, namely, hydrology, water

quality, physical form, streamside vegetation and macroinvertebrates. The assessment produces an indicator value for each of these five components; the sum of the indicators is the Index of Stream Condition. Trials showed that the ISC is a useful tool for guiding management actions and benchmarking and assess the environmental condition of streams.

- ~ *Rapid appraisal of the economic benefits of river management: guidelines and examples*

This two volume report describes economic evaluation approaches which can be applied to waterway management strategies and programs for setting priorities for investment of scarce resources.

- ~ *Victoria's Environmental Flow Program: a key component of integrated river management*

This brochure outlines Victoria's approach to improving the environmental health of waterways. The two stage program focuses initially on defining and capping existing rights to water, and where possible, improving environmental flows. Stage 2 involves identifying stressed rivers, setting priorities for action and the development and implementation of comprehensive work programs to restore their environmental health.

- ~ *Rural Drainage in Victoria: a scoping study*

This study collated information on the current extent of different types of rural drainage in Victoria and the impacts of this drainage on waterways as well as assessing statutory and administrative mechanisms to control drainage.

- ~ *Willows Along Victorian Waterways: towards a willow management strategy*

This report provides a clear understanding of the issues surrounding willows and a focus for management into the future.

To obtain copies of these publications

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Do you want riparian facts fast?

Due to popular demand, the Riparian Management Issues Sheets are being reprinted. These Sheets cover a range of topics including stock management, bank stability, water quality and snag management. If you would like to place an order for a set of these issues sheets please fill in the coupon below.



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NEWSLETTER OF LWRRDC'S RIPARIAN LANDS R&D PROGRAM

