A scenic view of Lake Cargelligo, Australia, featuring two black swans swimming in the water amidst dense, brown reeds. The background shows a line of green trees under a clear blue sky. The text 'Lake Cargelligo Community Environmental Management Plan' is overlaid in white on the upper portion of the image.

Lake Cargelligo Community Environmental Management Plan



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Forward

This Environmental Management Plan has been developed in consultation with the Cargelligo Wetlands and Lakes Council and the Lake Cargelligo community, with financial assistance from the Lachlan Catchment Management Authority (CMA).

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Chairman of the Lachlan CMA, Rob Gledhill congratulates all contributors to this collaboration as working together is the key to the success of any project.



Together We're Making a Difference
LACHLAN CATCHMENT
MANAGEMENT AUTHORITY

Overview

Lake Cargelligo is located on the Lachlan River floodplain in the central west of NSW, with a population of 1300 supporting a number of industries and mixed farming enterprises.

Prior to regulation, Lake Cargelligo was originally a natural wetland system, filled by flooding flows which travelled across the floodplain from the Lachlan River. When inundated, the lake supported a large Aboriginal Community through the presence of waterbird and native fish populations.

As it is downstream of all major tributaries in the Lachlan, the operation of filling and releasing water from this storage has a significant impact on flow in the lower Lachlan and benefits downstream water users.

The Lake Cargelligo community values the Lake system as:

- A valuable wetland habitat and drought refuge for many native species;
- A town, stock and domestic water supply; and,
- A recreation and tourism facility.

As the system comprises of a variety of habitat types in a highly variable environment and is one of the few wetland systems in the lower Lachlan Catchment to receive inflows over drought years, it is proving to be an important refuge for native fish and waterbirds. It is also known to support a number of endangered or vulnerable species including the painted snipe, blue-billed duck, Australasian bittern, and freckled duck. The Lake is also known for its significant cultural and heritage values. For these reasons it has been included as a regionally significant wetland in the Lachlan Environmental Water Management Plan.

Purpose

The purpose of the Lake Cargelligo Community Environmental Management Plan (LCCEMP) is to enhance the environmental, cultural and social values attached to this riverine system. This will be achieved through utilising community knowledge and resources.



Objectives

Broad objectives which are relevant to all management units within the LCCEMP include:

- By 2015, increased water security through improved water management and long-term vision;
- By 2015, the Lake Cargelligo community, to gain recognition for Lake Cargelligo as significant and valuable riverine system and drought refuge;
- By 2020, Improve the management and control of carp through carp separation cages and harvesting, reducing carp biomass;
- By 2020, protect 100% of existing waterbird and native fish habitat and increase available habitat by 150ha, through improved land and water management;
- By 2015, appropriate flow regimes that improve wetland and riparian condition in the Lake Cargelligo system and downstream environment in line with the Lachlan Environmental Water Management Plan will be in place;
- By 2020, stabilisation of banks and substrates, through improved grazing and water management, reducing sediment inputs, resulting in a 25% reduction in turbidity and suspended solids within the Lake by 25%;
- By 2020, increased hydrological and habitat connectivity of 25% of the adjacent floodplain by reducing barriers, changing flow regimes and protecting/enhancing native vegetation;
- By 2015, water regulator operation by State Water which places minimum impact upon native fish entering and/or leaving the lake system, reducing native fish mortality;
- By 2020, improved water quality through better land and water management, reducing blue-green algal bloom frequency and severity;
- By 2020, increased knowledge of indigenous history, connection and values relating to Lake Cargelligo through improved community education and increased indigenous involvement in natural resource management and tourism; and,
- By 2015, increased opportunities for environmental education and tourism associated with Lake Cargelligo through greater access and improved facilities to four recreational areas.

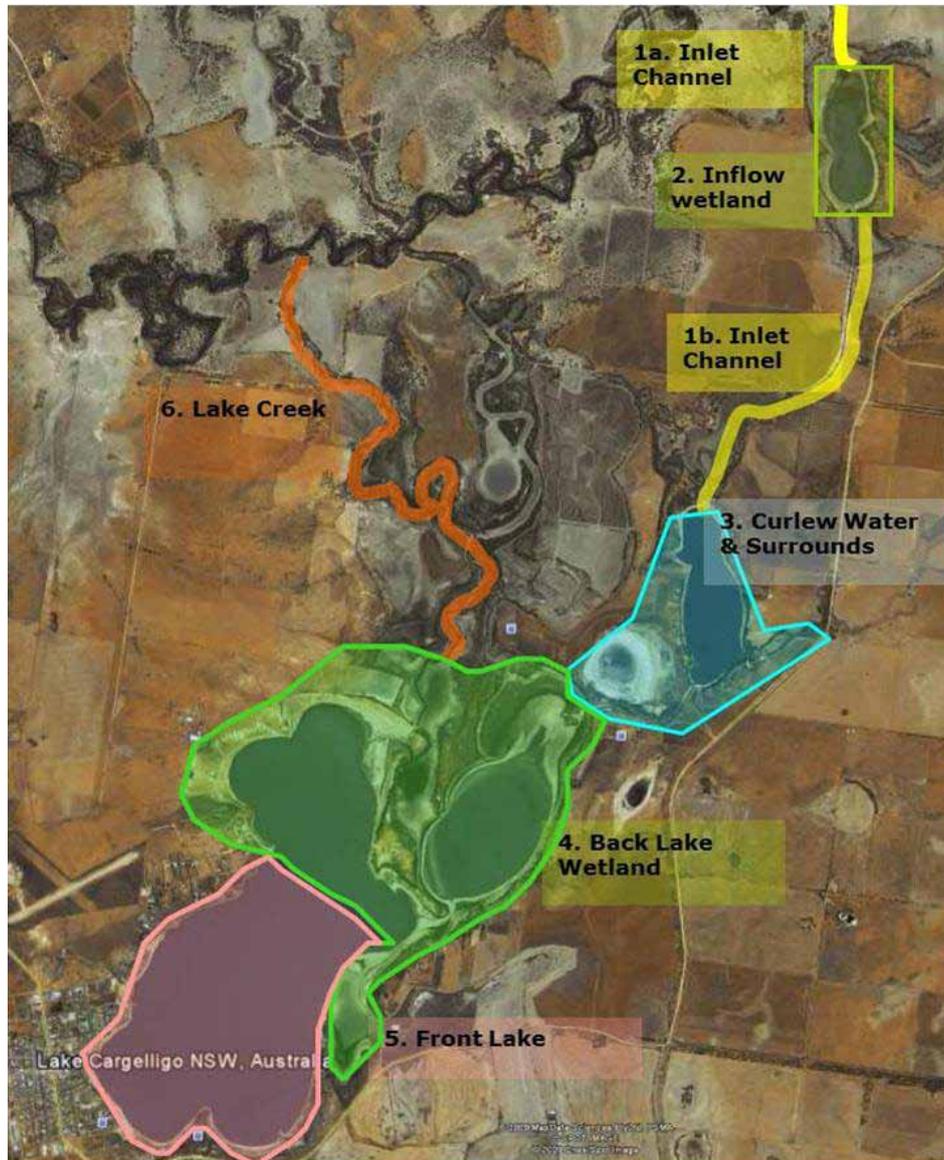
Through meeting these objectives it is hoped that water quality and wetland functions will be improved, connectivity between the river and floodplain and lake system will increase and native plant, fish and bird populations will benefit. However, this Plan must also ensure that the Lachlan River between the Lake Cargelligo inlet and Lake Creek is not adversely affected as a result of LCCEMP management actions.

The LCCEMP relies heavily on community knowledge and involvement. The objectives of this Plan cannot be met without the assistance and acceptance of the local community.



Lake Cargelligo Units

As this diverse system is in a highly variable environment, particular care has to be taken to ensure the environmental, economic and social values relating to each habitat type is taken into account in the management plan. This can be achieved through dividing the lake system into specific units.



Lake Cargelligo Units

Each unit has different values and therefore objectives and management of each unit varies.

Unit 1 – The inflow channel has limited habitat value, however management changes can improve water quality and native fish survival, reduce carp biomass and protect banks. This can be achieved by:

- Controlling large-bodied carp through the installation and management of carp separation cages on the inlet channel;
- Changing regulator operation to protect native fish attempting to pass through;
- Protecting channel banks by reducing flow fluctuations within channel, controlling carp numbers and stock access; and,
- Protecting inundated areas associated with the inlet.

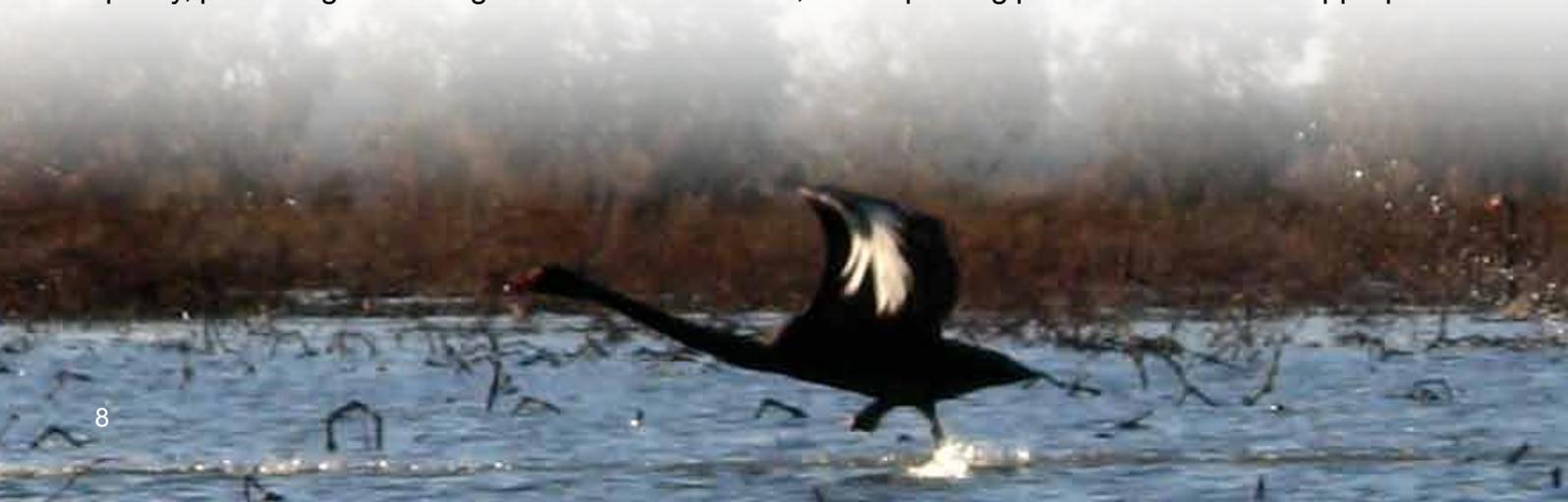
Unit 2 – The inflow wetland (also known as Sheet of Water) contains wetland values particularly for migratory waders. Management changes can improve habitat values and water quality by increasing ground cover and protecting substrates, particularly when inundated. This can be achieved by:

- Ensuring groundcover is in place to protect substrates and weeds are controlled. These changes could be implemented by provided incentives;
- An appropriate wetting and drying regime;
- Providing cues to ensure native fish leave the wetland when drying;
- During times of inundation the wetland is protected from grazing impacts, also achieved through providing advice and incentives; and,
- Promoting the area as a bird-watching facility.

Unit 3 – Curlew Water contains values as a drought refuge and as a recreational facility. Management changes can improve habitat values by protecting banks and riparian zones, improving water quality, ensuring permanent inundation and controlling carp. This can be achieved by:

- Carp control through professional harvesting and community carp fishing events as part of the Lachlan River Revival;
- Riparian protection and enhancement through land holder partnerships;
- Ensure this area remains a drought storage for TWS; and,
- Some speed restrictions on powered watercraft in certain areas to protect banks and riparian vegetation.

Unit 4 – Back Wetland Area contains many wetland values and has potential for some educational and eco-tourism activities. Management changes can improve habitat values by improving water quality, protecting native vegetation and substrates, and improving public access where appropriate.



This can be achieved by:

- Forming voluntary partnerships with landholders to improve grazing, weed and pest animal management to ensure wetland habitats are protected and enhanced;
- Carp control;
- Improved water management so that water delivery takes into account the requirements of the wetland community;
- Increase opportunities for cultural activities and the creation of an interpretative walk and cultural heritage tours; education and eco-tourism opportunities where appropriate;
- Enforcement of the power boat speed restriction zone;
- Formal recognition of this area as important wetland habitat within the lower Lachlan;

Unit 5 – Front Lake Area provides aesthetic and recreational values for the township and has potential for many educational activities. Management changes can improve these values by improving water quality and access and providing information. This can be achieved by:

- Changes in the flow regime, improved land management and increased carp control;
- The extension of interpretative walks and other facilities such as bird hides;
- The enhancement of a small wetland on the western side of the Lake; and,
- Power craft speed limit zones in sensitive areas of the Lake.

There may be a future requirement to manage aquatic plant growth in the front sections of the lake as historically this proved to be an issue for power-boat users. Prolific aquatic plant growth and associated decay was found to cause odour, access and aesthetic problems.

Unit 6 – Lake Creek is recognised by the community as a valuable wetland habitat, also providing riparian values and maintaining connectivity between the wetland and river. Management changes can improve water quality and wetland habitat, improve native fish survival, reduce carp biomass and protect banks. This can be achieved by:

- Forming voluntary partnerships with landholders to improve grazing, weed and pest animal management to ensure wetland habitats are protected and enhanced;
- Carp control through carp separation cages; and,
- Employing a range of management actions to stabilise banks and reduce sediment and nutrient input into the river.



Implementation

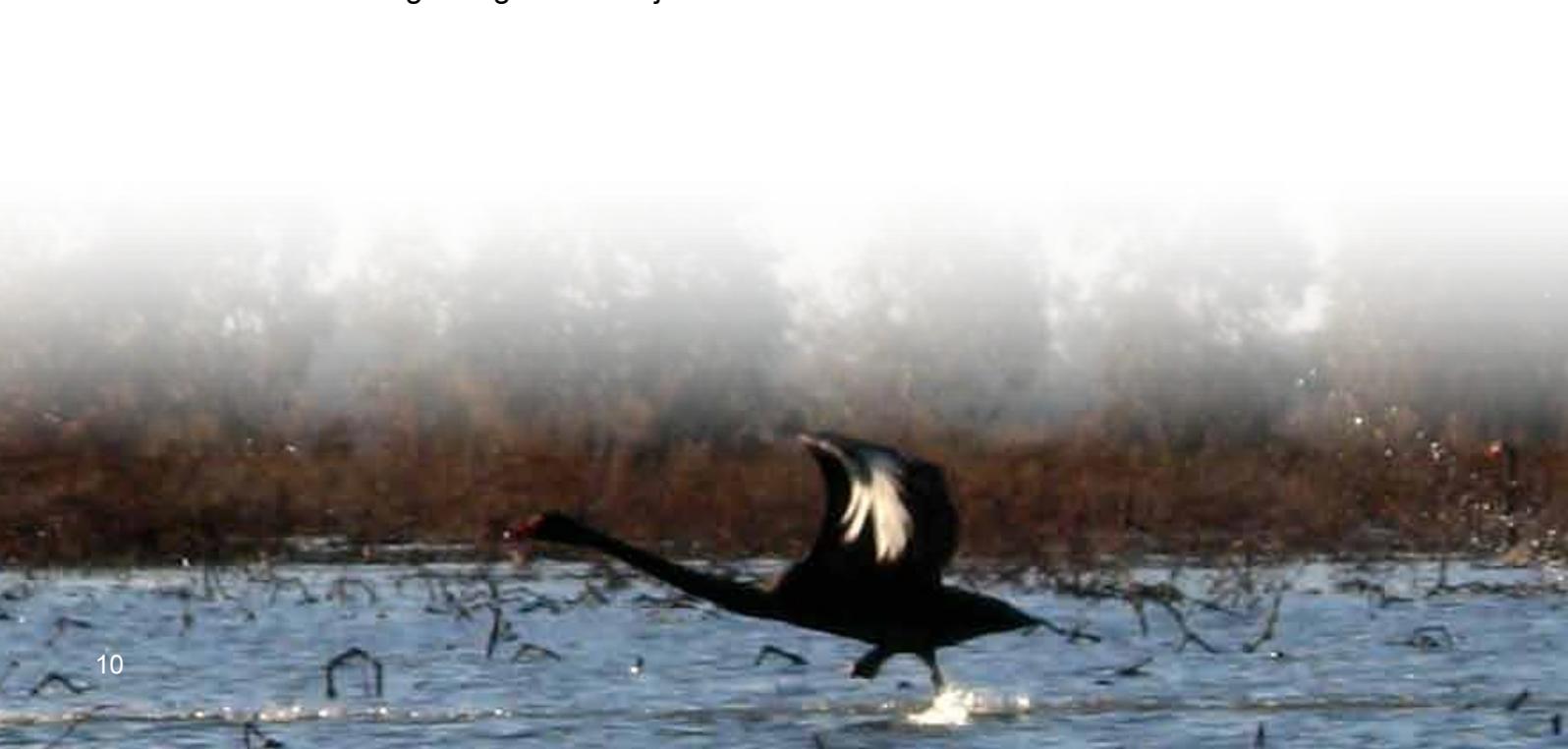
The LCCEMP has been developed by and for the Lake Cargelligo community. The Plan objectives, priorities and management options have been guided by interested Cargelligo community groups. To continue to support the Community and the implementation of the Plan, the Lachlan Catchment Management Authority (Lachlan CMA) have assigned a part-time position to Lake Cargelligo. This position will support the community in funding applications, facilitation and project management. Apart from the Lachlan CMA, other agencies such as Department of Environment, Climate Change and Water, NSW Office of Water, NSW Industry and Investment (Fisheries) and State Water can also provide information and support.

The LCCEMP needs to address the full range of natural resource management issues, including land use, wetland and water management. Wetland protection and management is also a goal and national priority for various Commonwealth and State programs through which natural resource management funding is directed. The Plan should also meet the natural resource planning requirements of the both the State and Commonwealth Governments by providing aspirational targets; resource condition assessment and guidance to conserve and manage wetlands. The most relevant Plans to the LCCEMP are the Lachlan Environmental Water Management Plan (LEWMP), the Lachlan Catchment Action Plan (LCAP) and the Murray-Darling Basin Plan.

The Lachlan CMA leads a number of projects which can complement the LCCEMP, these projects including:

1. Management planning for high conservation wetlands.
2. River Revival – carp management. This project links closely with the Lake Cargelligo Fish Management and Operations Plan which is part of the LCCEMP.
3. River Revival – habitat restoration to promote native fish recruitment to build their resilience from impacts of carp populations.
4. Native fish refuge (Lower Lachlan) - it is generally considered that during no-flow periods, isolated pools function as key refugia for aquatic communities and more information and better management in relation to these pools is required.
5. On-farm irrigation efficiency – a federally funded project designed to generate water savings by improving the efficiency and productivity of on-farm water use and management.

Links to information regarding these Projects can be found on the Lachlan CMA website.



Current Lake Cargelligo Projects

Lake Cargelligo Urban Wetland

The construction of a small wetland (<2ha), located on the western side of Lake Cargelligo had been identified in the LCCEMP as an important educational tool. The construction of a small wetland on the edge of the main Lake where stormwater runoff enters the system, also supports a number of other LCCEMP objectives, including the reduction of sediments and nutrient inputs, improved riparian condition, improved water quality and opportunities for environmental education.

The site already has a walkway and small foot-bridge which provides access and an opportunity to inform the community, through signage, of the importance of wetlands. The site also provides an opportunity to intercept stormwater before it enters the Lake and, after the establishment of appropriate wetland plants, may reduce sediment and nutrients contained within the runoff.

In time it is hoped the site will support a wide range of native aquatic plants, frogs and invertebrates and, on a small scale, some wetland bird species. It is also envisaged that the presence of aquatic plants will stabilise substrates, reduce runoff velocity and increasing retention time, thereby reducing suspended sediment and nutrients transported into the Lake through stormwater.

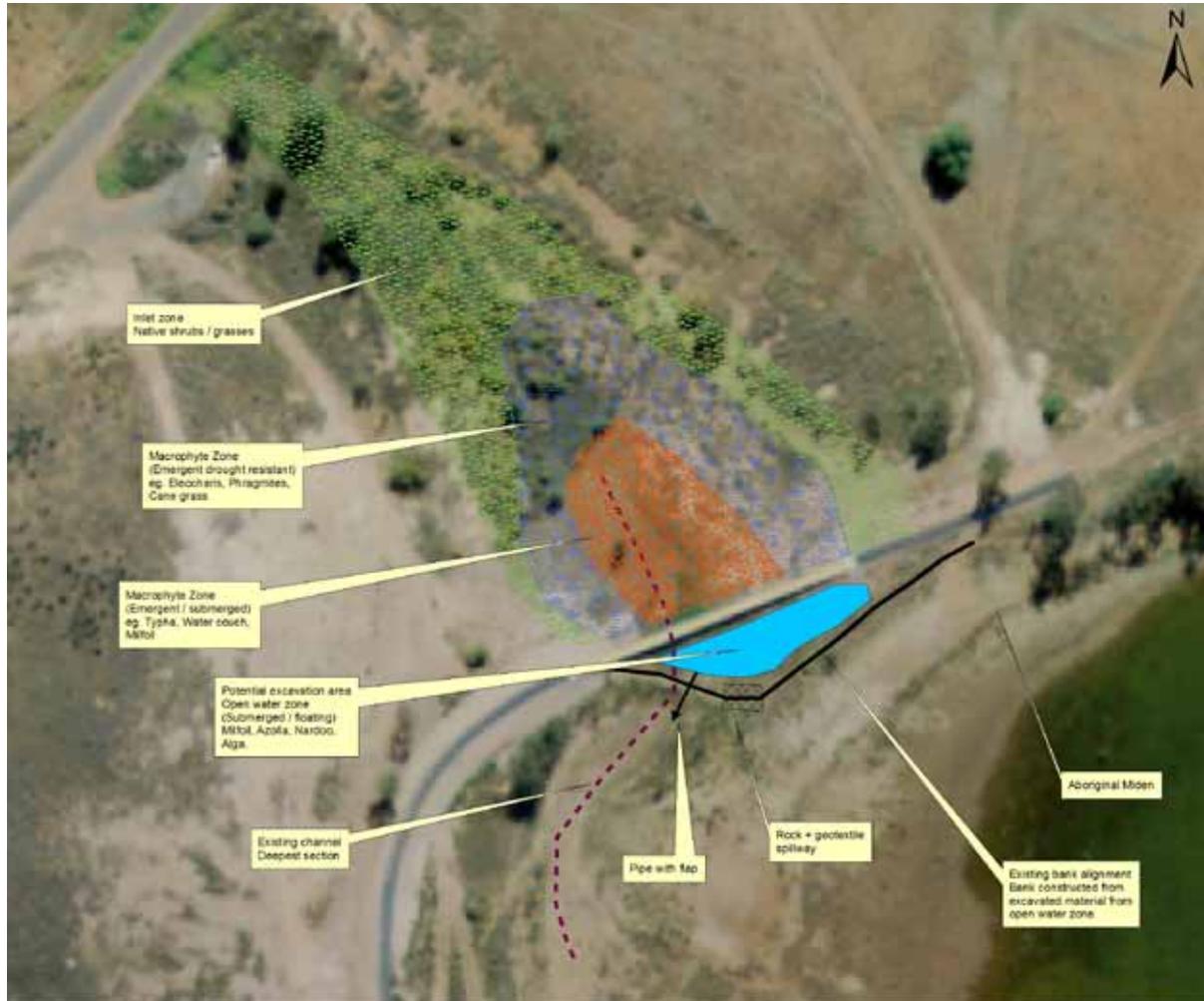
Aboriginal middens are also located nearby and can add to the educational and cultural benefits of rehabilitating this site.

This wetland will be designed to visually blend with the surrounding public open space and will be an environmental feature along the Lake walking track. Interpretative signage will explain its role in treating stormwater and other benefits relating to wetlands.

The simple wetland design below, demonstrates the use of emergent macrophytes on the shallow fringes of the wetland to trap sediment and nutrients. The deeper sections of the wetland would support a variety of submerged and floating macrophytes, which would utilise available nutrients. The structural variety provided by the different types of macrophytes would also add to habitat diversity and provide a useful education tool showing the different zones within wetlands and the functions these provide.



Preliminary constructed wetland design



Adaptive Management

To measure the outcomes achieved through implementing this Plan, it is necessary to monitor and evaluate responses to management. This information is then able to inform of the success of the Plan and provides an adaptive management tool.

An important part of adaptively managing the Lake and its assets will depend upon the effective use of different sources and types of information. This includes researchers, managers/operator and the community. While we need to recognize the many gaps in our existing knowledge of the Lake and best management approaches, it is important that apply the information we currently have and continue the information gaps as we manage and monitor.

This can be achieved through strong links and effective communication between researchers, managers and policy makers. A research/monitoring/evaluation/reporting plan will be developed as part of the Plan's implementation program. This will need to address the priorities for research and ensure that all monitoring and reporting requirements are met.

The monitoring program also needs to measure the effectiveness of management against the Plan objectives in terms of restoring critical ecological functions and habitats. This could include:

- Changes in the extent of semi-permanent wetland vegetation;
- The proportions of healthy and stressed semi-permanent wetland vegetation;
- The diversity and density of aquatic invertebrates; and
- The diversity and density of waterbird species.

Research and monitoring activities also need to be evaluated, including uptake of information into management actions.

Community monitoring can also greatly assist in filling information gaps and also educate and motivate those involved. Annual events such as the Lake Cargelligo fishing competition could be used to supply information to improve management. This could be added to with other events such as bird counts, carp catching events and school involvement in the newly created urban wetland on the shores of Lake Cargelligo.

Annual reporting of Plan activities and achievements should be undertaken. Reporting relating to



Adaptive Management continued

the progress towards longer-term targets should occur every 5 years. There will also be reporting requirements associated with funding.

Evaluation outcomes are used to support decision-making and adaptive management. Outcomes can be used to improve any methods relevant to the LCCEMP.

- Monitoring and evaluation provides information regarding opportunities to improve the Plan and delivery of management actions. Some examples where the outcomes from monitoring and evaluation are considered include:
- The appropriateness of targets, are they achievable
- Accounting for and improving the management of land and water;
- Determining the need for further investment and on-ground actions in order to achieve objectives. This includes the identification of priority areas and appropriate actions; and,
- Assessment of interactions with and between the all aspects of the LCCEMP.





Lake Cargelligo at sunset



