CHAPTER THIRTEEN

CHAPTER 13

INTRODUCED PLANTS

Over the last couple of centuries Australia has been invaded by wave after wave of new species from foreign lands. Weeds and feral animals thrive best in disturbed ecosystems, and few ecosystems in Australia are as disturbed, both naturally and artificially, as are the floodplains of the Murray-Darling Basin.

About a third of the River Murray floodplain, some 335,000 hectares, has been cleared of its native vegetation since the first days of European settlement, mostly to make room for agriculture. All remnant native vegetation on floodplains is to a greater or lesser extent degraded, much of it severely so. Two native plants that once grew on the Murray floodplain are probably now extinct, and 16 others are nationally endangered. Many other plants are locally threatened, and nearly all native floodplain plants have had their former ranges severely reduced. (47) The vegetation of other river floodplains is less well studied, but has almost certainly suffered a similar fate.

THE GREEN INVASION

In place of the disappearing native plants, introduced weeds have sprung up. No area of floodplain is now weed-free. Across the whole of Australia an estimated 10 percent of all plant species are introduced; on floodplains the proportion is three times that. A recent River Murray floodplain vegetation survey found that weeds made up more than 60 percent of the plant species in some areas, and that even in the least-disturbed areas weeds accounted for nearly 20 percent. Overall, the survey reported, about a third of the 767 plant species found growing on the Murray floodplain were introduced. (48)

Weeds and feral animals tend to invade disturbed ecosystems, and floodplains, by definition, are naturally disturbed environments. This makes them especially vulnerable to weed invasion, even without grazing, changes to flooding cycles and other human impacts that give exotic plants competitive advantages over native ones. Some introduced plants have become so common and familiar that they are now very much a part of the floodplain landscape. Do they really cause damage to the river system? Or are calls to remove such plants prompted more by 'pro-native' aesthetics?

The great willow debate

The most contentious introduced weed in the Murray-Darling Basin is probably the willow tree, which actually includes of a number of different, closely related species. Willows can be either male or female. The 'weeping willows' growing along Australia's riverbanks are females, which have grown from accidental or deliberate cuttings. The recent introduction to Australia of male mates for these single-sex willows has caused great concern: willows spread easily enough along river systems without the help of windborne seeds. In high rainfall areas both sexes of some willow species are present, and the trees are spreading.

But are willows a problem? In the past they have been planted on farms to help stop gully erosion, as windbreaks, and to protect eroding streambanks. Indeed, some people still advocate planting willows for such purposes. Why then have government agencies and community groups recently begun programs to poison and remove streambank willows? Why should such a useful, beautiful tree become a target for those wishing to rehabilitate the environment?

The answer is that willows have different ecological and physical impacts from those of the vegetation they have replaced — chiefly river red gums and native reeds and rushes. Unlike river red

Below: Salvinia is posing a serious threat to Australian freshwater bodies. Introduced from South America, salvinia can very rapidly form dense, thick floating mats, choking out native aquatic plants and affecting aquatic animals. A weevil has been introduced from south-eastern Brazil to control this aquatic weed. Photo: *Surrey Jacobs*

Above: Permanent sandbars and willows have now invaded long stretches of the Snowy River. One of Australia's most celebrated rivers, the Snowy is hardly flowing in places. Photo: *Karen Markwort, CRCFE*

gums, mature willows do not provide hollows, nesting sites, loose bark and other important shelter for native invertebrates, mammals and birds. Also unlike red gums, willows cast dense shadows in summertime, shading out the understorey and aquatic plants that are important habitats for native animals. Fallen willow branches either take root and grow again, or rot away quickly in the water. They do not provide habitats for native fish and other species, as do red gum snags. Dense stands of willow trees choke out native biodiversity on land and in the water. Over time their thick, matted roots alter the shape of streambanks and can even, eventually, change the course of streams.

Also, unlike Australian trees, willows shed their leaves all at once, at the onset of winter. River red gums, by contrast, shed their leaves all year, but mostly in summer. Compared with eucalyptus leaves, willow leaves are soft and nutritious: weight for weight they contain three times more of the nutrient nitrogen, for example, than do native tree leaves. Scientists are divided about how much impact willow leaves have on waterways. Some say the nutritious, easily digestible leaves are too rich a diet for native species; that willow leaves break down too quickly for leaf-shredding invertebrates to make full use of them. Instead, they argue, most willow leaves collect in a nutrient-rich residue, not unlike sewage sludge, on the bottom of rivers. One researcher has reported finding microinvertebrates in submerged River Murray willow leaf deposits which are similar to those found downstream of sewage treatment works. Other scientists maintain that willow leaves have only a negligible impact on aquatic life, and recent research from Tasmanian streams appears to support this view. (49)

Fallen eucalyptus leaves are one of the main engines of river and floodplain ecosystems (Chapter 6). If different leaves are fed into the system at a different time of year, it is possible different creatures will thrive on them — and so on up the food chain. Such a major shift at the bottom of the food chain could have effects on species higher up the trophic ladder (Chapter 4). Native fish, for example, may have more chance against carp if they live in a world fed by eucalyptus leaves instead of by willows. Cyanobacterial (blue-green algal) blooms may be fed partly by nutrients from decomposing willow leaves.

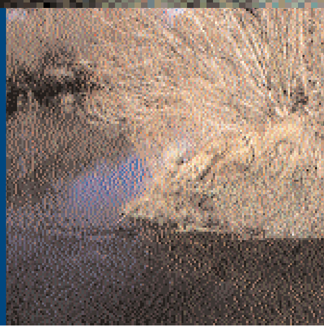
Like carp (Chapter 14), willows are both a symptom of a river's problems, and a cause. They rarely invade intact stands of native vegetation, but they thrive in disturbed areas. Many of the willow stands that now choke access to floodplain rivers were originally planted to stabilise riverbanks threatened by changes to flow. But once individual willows are established, they quickly spread. Few, if any, of the insects which naturally graze on willows appear to have been introduced to Australia with them, giving these 'foreign' trees an edge over native species which are heavily chewed by insects. Willows thrive best where water levels are most constant, such as on the banks of weir pools and along rivers with sustained summer flows. As with so many exotic species, controlled river flow has created an environment more suited to invaders from another part of the world.

Water plants

Evidence remains sketchy, but the rapid expansion of European settlement in the second half of the 19th century appears to have had a dramatic impact on river and floodplain water plants. Recent research has used the hard shells of dead insects preserved in floodplain sediments to trace the history of water plants in billabongs in the south-east of the Murray-Darling Basin. Before European settlement, species of water fleas that live and feed on water plants were much more common, but they suffered a dramatic

Blue-green algae on the Darling River. While blue-green algae most certainly occurred in Australian waterways before the arrival of European settlers, river regulation and other human impacts have increased the occurrence and severity of blooms. Photo *David Eastburn, MDBC*

Above: Alligatorweed originated in South America and has been in Australia for at least 50 years. Its thick dense mats limit the recreational and industrial use of water, clog watercourses and affect water quality in general. Photo: *David Eastburn, MDBC*



Willow roots blocking the flow in a stream. Photo: *Karen Markwort, CRCFE*

collapse around 1870. Probably the water plants the insects depended on suddenly declined about that time, killed by a dramatic increase in sediment washed in from soil erosion in newly cleared upland catchments. Logging and grazing on the floodplains, which were at their peak in the late 19th century, may also have helped render floodplain waters less habitable for water plants.

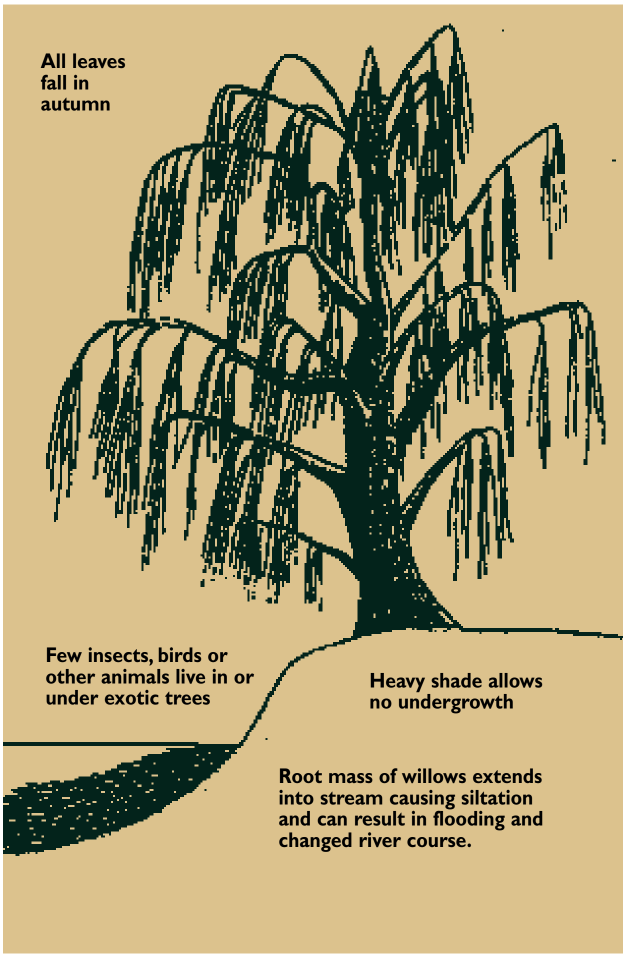
Farming and logging activities on the floodplain have since declined, and catchment erosion has never again reached the dramatic levels of the 1860s. However, water plants have not returned to some billabongs. Researchers guess that the events of last century may have caused some floodplain waterbodies to switch from an historic, stable ecosystem based on water plants to an equally stable, modern ecosystem which is based on algae. Interestingly, precisely that kind of switch, from water plants to planktonic algae, has been documented in shallow lakes in the Northern Hemisphere — and in some cases the switch has been successfully reversed by managers manipulating water levels. If planktonic algae have replaced plants as the billabongs' primary producers, and the new arrangement is stable, it may take more than a return to more natural flooding to bring back the water plants. Some scientists have proposed a careful program of deliberately manipulating water levels in some billabongs to try and switch them back to plant-dominated food chains. (50)

Floodplain water plants have also suffered other changes. In some areas, rising salinity has favoured salt-tolerant species. Cumbungi, which is more tolerant of prolonged flooding, has replaced common reeds in some former intermittent wetlands that are now permanently inundated. Another probable cause of water plant decline is the introduced carp — which does not feed on living plants, but which disturbs their roots as it 'mumbles' (rummages with its mouth) through the mud, and perhaps also cloaks submerged leaves with a film of the mud it stirs up. (51)

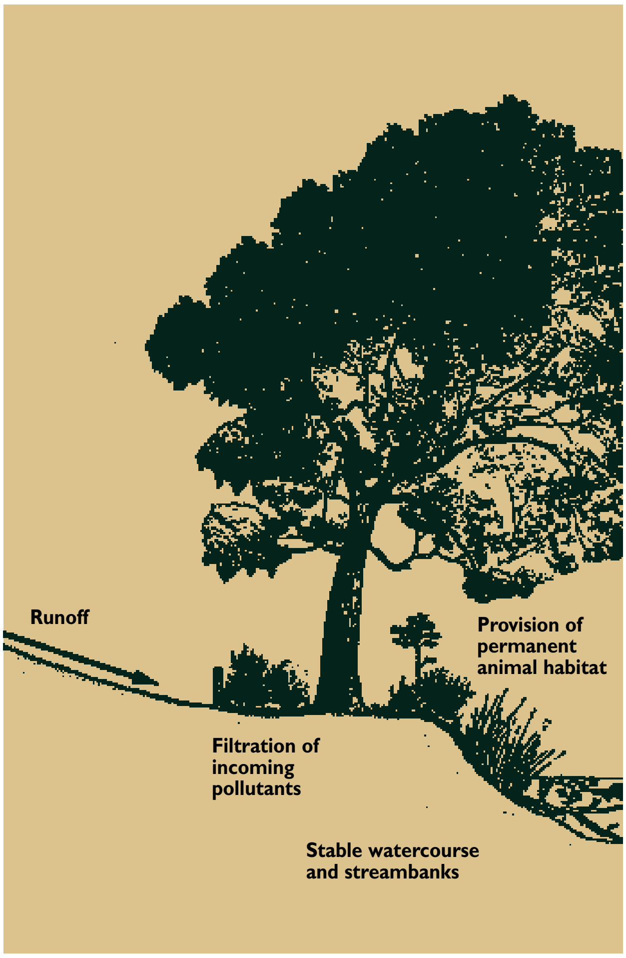
There have been some invasions of exotic waterweeds in the Murray-Darling system, but so far it has been spared major outbreaks. However, three of the world's worst waterweeds — salvinia, alligator weed and water hyacinth — are all present in Australia, and all represent continuing threats. Salvinia has now been largely controlled over much of its range through the deliberate release of a weevil which feeds on it in its native South America (Chapter 2), although the weed remains a major problem in the Northern Territory's Kakadu National Park.

Alligator weed is also from South America, and was probably introduced to Sydney and Newcastle in the ballast water of ships last century. So far it has been mostly restricted to rivers east of the Great Dividing Range, although it was recently found in Barrenbox Swamp near Griffith in New South Wales, where it triggered a major control operation.

Water hyacinth grows in waterways on the NSW central and north coasts, and also in Murray-Darling waterways on that State's north-western plains. As with carp and willows, river regulation has made Australia's floodplain waterbodies more amenable to invasion by such weeds, which can form huge floating mats, choking out aquatic life and causing major ecological and economic damage. Some scientists fear that plant species now being used in flooded pasture regions may emerge in coming years as new waterweed threats (Chapter 19).



Exotic vegetation



Native vegetation

The different impacts of exotic versus native riparian vegetation.

From Water Wise brochure. Mount Lofty Ranges Catchment Program and the Department of Environment and Natural Resources, South Australia