CHAPTER ELEVEN

Sturt on that first boat-trip saw
the giant cod suspended in clear water; mile by mile
each held its place like a solid fisherman's dream,
so many kilos of fighting flesh
just beyond spear's throw, a cloud in clear water,
its tethered shadow rippling underneath.

AN IMPOVERISHED SYSTEM

Modern residents of the Murray-Darling Basin may not realise just how much their home has changed in the past two centuries. The Basin once supported large populations of bilbies, bettongs, bandicoots, quolls, hare wallabies, stick-nest rats and other mammals. Most are now extinct in the region, and many are lost to the world altogether. Similarly the river's native fish, which formerly helped feed a large Aboriginal population and which supported a sizeable commercial fishery well into the first half of this century, have declined dramatically (Chapter 14). The River Murray, per square kilometre of floodplain, now has the lowest commercial fish yield of any of the world's major rivers. (37) About a third of the Murray's floodplain has been cleared of its original native vegetation (38), and many of the water plants which once grew in inland waterways have vanished.

SINCE EUROPEAN SETTLEMENT

But the decline in native flora and fauna is just one symptom of a river system in crisis. There are many other symptoms — rising salt, blue-green algal blooms, declining water quality, increased sediment loads and erosion, the spread of introduced plants, feral animals and so on. The causes are complex, and are closely interrelated, but the degradation of floodplain wetlands has been a major contributing factor in most of the Basin's modern problems. More than 35 percent of the River Murray's formerly intermittent wetlands are now permanently filled, and an even larger area is almost permanently dry. Other inland rivers, and their floodplains, have suffered similar fates: some are in a better state, some worse. Nationwide, more than half of Australia's wetlands have been converted for other uses — such as urban development and agriculture. Much of the remainder is degraded, or is becoming so. (39)

Exploration and exploitation

The first Europeans to see the River Murray were probably the members of an exploration party led by Hamilton Hume and William Hovell, who came upon the river near present-day Albury on November 16, 1824. Between 1829 and 1836 expeditions led by Charles Sturt and Thomas Mitchell explored the Murrumbidgee, Murray and Darling rivers, opening the way for later settlement. The founding of South Australia in 1836 opened up new grazing land and created a demand in Adelaide for livestock, and in 1838 drovers from New South Wales began using the Murray Valley as a highway for droving sheep and cattle to the new colony. (40)

However, feral cattle were already grazing the floodplains well ahead of the drovers, and perhaps even ahead of the earliest European exploration parties. As early as 1836 a party led by Mitchell stumbled upon well-beaten cattle tracks, as wide and as hard-packed as roads, around billabongs on the Murrumbidgee River. Shortly afterward the explorers found themselves surrounded by "a staring herd of at least 800 head of wild animals" (41). Squatters moving into the 'new' pastoral areas west of the Great Dividing Range sought out river frontage in the 1840s, and began lobbying for river transport. Early overlanders and settlers grazed large numbers of hard-hoofed livestock, especially sheep, on floodplains, causing extensive changes to vegetation and soils.

The year 1853 marked a major turning point: two paddle steamers, the Mary Ann and Lady Augusta, began plying the River Murray, shipping wool from the new inland stations. In the same year, the first sunken snags were removed to improve the river's navigability, and floodplain red gums began to be cut in earnest, for

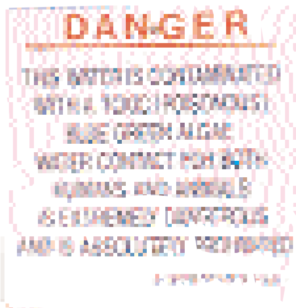
A stockpile of timber to fuel one of the irrigation pumps in the Riverland of South Australia about 1918. This is a typical example of one of the wood stacks maintained for steam-and-gas powered pumps in the Riverland and Sunraysia until the late 1950s.

Photo: ***South Australian Riverland Water Collection***

Below: Clearing land in Traralgon, Victoria in 1910. Photo: ***Silver Reflections Photographic Library***

fuel and for construction. About the same time wire fences began to be constructed on a large-scale to enclose sheep and cattle runs. River trade reached its peak in the 1870s, with more than 200 vessels, while a plague of rabbits swept through the floodplains, and woodcutting and de-snagging continued apace. It was also in the 1860s and 1870s that soil erosion was reported on a huge scale in the recently cleared uplands of the Murrumbidgee and River Murray catchments. Vastly increased loads of sediment washed into the river valleys. There is recent evidence that many of the water plants that dominated some River Murray billabongs vanished around 1870.

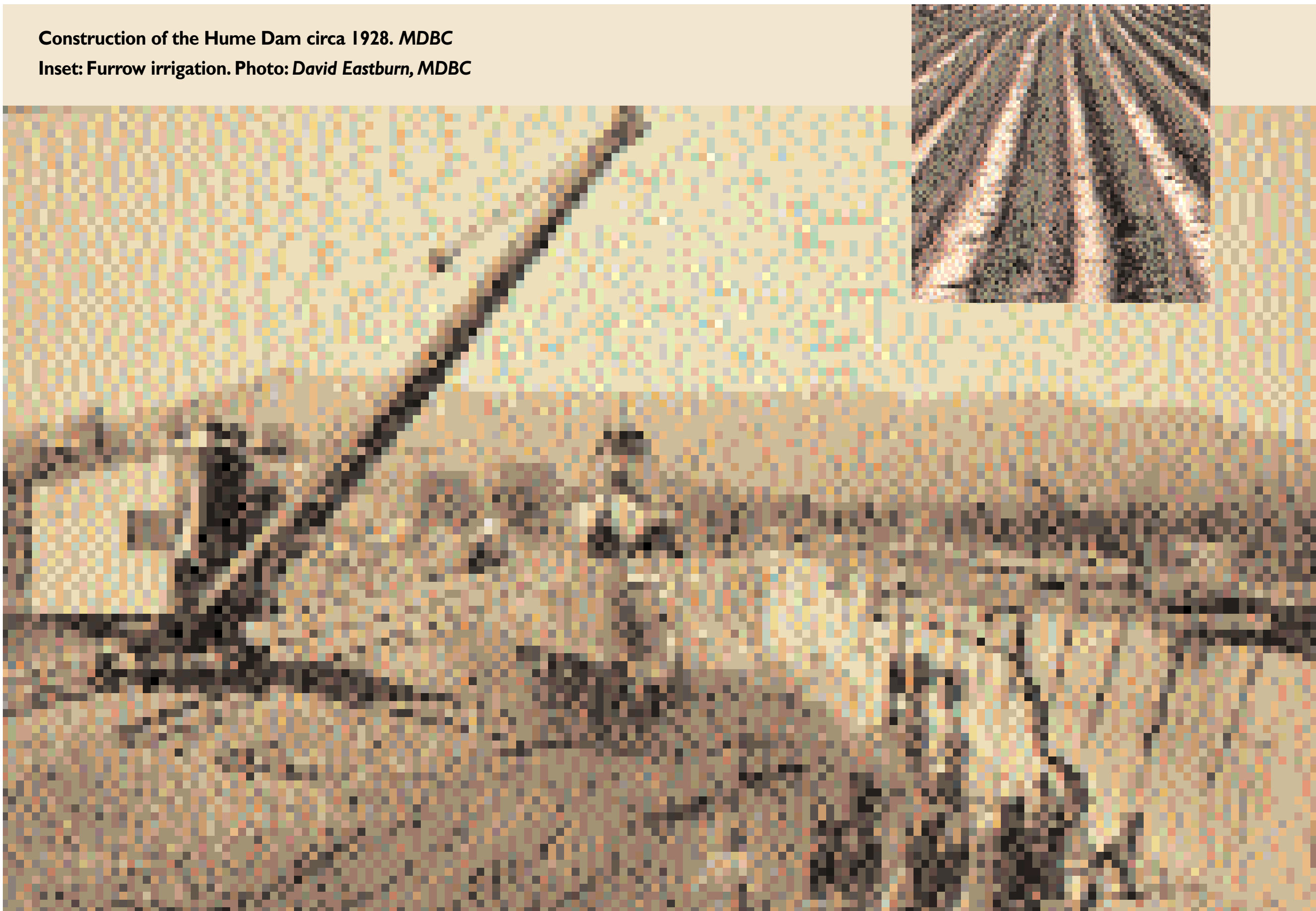
The coming of the railways created a new demand for river red gum, for sleepers and fuel, even as the demand for fuel for paddle steamers began to dwindle. By the 1880s the wetlands of the lower Murray, in South Australia, were being drained for agriculture, and in 1887 — another landmark year in Basin history — the Californian irrigation entrepreneurs, George and William Chaffey, established Australia's first large-scale irrigation settlements at Renmark and Mildura. (42) The coming of irrigation to the Murray-Darling Basin set the scene for a series of major projects in the early 20th century, growing ever-more ambitious, to divert and store water for agriculture. As well as water, the early irrigation industry consumed enormous quantities of red gum timber, burned to fuel the great steam engines that drove the water pumps.



Regulating the Murray system was a gradual process. Work began at Blanchetown in 1913 on the first of a series of locks, originally intended to improve navigation but quickly co-opted to feed the growing demand for irrigation water. The 15-year construction of the Hume Dam began in 1919. Other impoundments and regulatory structures followed at regular intervals: Torrumbarry Weir was completed in 1924, the Lake Victoria storage in 1928; Yarrawonga Weir in 1939; the Murray Mouth barrages and the Murrumbidgee weirs in 1940; Menindee Lakes in 1968 and Dartmouth Dam in 1979.

In 1949 work began on the largest water project of all, the Snowy Mountains Scheme, which from 1966 began delivering extra water to the Murray. Through the course of the past century most of the other major rivers in the Murray-Darling Basin, and many of its smaller streams, have been similarly dammed and partly or fully regulated. At the same time floodplains have been alienated from their parent rivers by a network of flood-prevention levees, off-river water diversions and other earthworks. Many private landholders introduced their own, small-scale methods of controlling the flow of water on their land. The natural network of connecting channels which criss-cross floodplains, delivering water to lakes, billabongs, marshes, swamps and flooded forest areas, has been regulated by the ingenious use of home-made levees, floodgates and pipes.

In the early days of settlement, the floodplains were extensively grazed by large mobs of sheep, but sheep were progressively replaced in most areas by cattle — particularly in forested areas, where there was concern that sheep would prevent regeneration of the valuable river red gums. In some southern areas of the Basin, such as downstream of Murray Bridge in South Australia and between the Murray and Edward rivers in New South Wales, floodplain soils proved suitable for horticulture or intensive pasture production. They were protected from flooding, sometimes drained, and irrigated. But in most areas



Construction of the Hume Dam circa 1928. ***MDBC***
Inset: Furrow irrigation. Photo: ***David Eastburn, MDBC***

The Murray-Darling is a highly regulated river system with numerous dams, reservoirs, weirs, locks and barrages on all its major and minor rivers. Locks and weirs were first built on the Murray to provide year-round navigation for commercial cargo and passenger steamers. These were soon co-opted by the irrigation industry and today the river supports the most productive agricultural areas in Australia. It has, however, had its price. Increasing land salinisation is one of the more pervasive problems facing communities and water managers throughout the Basin.

of the southern Basin the best soils lay beyond the floodplains, and water was channelled out to new irrigation areas. The locks and weirs turned the lower third of the River Murray into a series of almost-connected permanent pools, while storages upstream also permanently raised water levels. Many areas once subjected to intermittent flooding and drying were permanently inundated; other areas were cut off from water except during extreme floods.

The rivers were progressively de-snagged. Willows and other exotic plants moved in wherever original vegetation was disturbed. Towns, with their accompanying sewage and other wastes, sprang up around new irrigation areas. Many wetlands were filled in, drained, grazed, used as dumps, converted to pumping pools, doused with chemicals and used as sheep dips or otherwise degraded or destroyed. Agricultural fertilisers and chemicals began to find their way into waterways. Floodplain lakes were used first as pasture, and more recently for growing crops on the damp, silty soil left by receding floods.

Erosion and sediment

One of the most striking effects of human interference with Australia's lowland rivers has been the enormous leap in the sedimentation rates measured on floodplains, particularly since the exceptionally wet years of the 1860s. Agricultural clearing and grazing in upland catchments in the mid-19th century opened up large areas to increased erosion. Runoff from the great rains of the 1860s stripped away the unprotected soil, sometimes gouging out huge gullies. Most of the erosion probably happened in just a few storms. The heavier sand filled in many of the deep holes in riverbeds, where it still lies today, while the silt settled on the floodplains. Eroded sediments in floodwater probably helped smother river and floodplain water plants last century, and may be still suppressing them today.

Over the past 130 or so years, catchment erosion has continued at a higher-than-natural rate, although probably never so dramatically as in those first few years. Many of the ugly, tell-tale erosion gullies which still scar the farm landscape on the western slopes of New South Wales are historic, and have not been active for many decades. But widespread catchment clearing continued in fits and starts until the late 1960s and beyond, with each new wave triggering a new load of sediment. Changes in river flow have also led to increased erosion of river channels, and the sediment load in some sections comes more from eroded banks than from catchment erosion.

In the Barmah red gum forest, the rate at which silt accumulates has leapt dramatically since European settlement, from about half a millimetre a century to as much as two centimetres a year — stark evidence that what happens in river catchments has direct effects on floodplains. Sedimentation rates in floodplain billabongs have also increased, although less dramatically, from about half a millimetre a year to about five millimetres a year.

The early ecological impacts of high sediment loads may have been almost immediate. Floodwaters were murkier, and everything underwater was coated with a thick film of fine clay particles. The murky waters and cloying clay film would have barred sunlight from submerged plants. At high levels it may have also clogged fish gills, disadvantaged animals which relied on eyesight for finding food, and helped put pressure on other river species.

Fierce arguments still rage among scientists and river users about the natural level of murkiness — or turbidity — of river water. Some claim inland waters were much clearer before the coming of the mud-mumbling carp; others that Australia's rivers have always been murky, even before European settlement. Probably the true picture, as with so many other things, is that natural turbidity varies enormously in different years and in different river systems. But there is no doubt that across large areas of the floodplain sediment has built up much faster in the past 130 or so years than it did before European settlement. In the long term, extra sediment means billabongs, marshes, swamps, lakes and other flood-filled depressions are filling-in much faster than before. The slow process of shuffling sediment and sand from the highlands to the sea has accelerated enormously. Ecosystems adapted over many thousands of years to a slow rate of change now are being forced to adapt to a much faster rate.

Altered river flows, combined with increased sediment loads, have also accelerated the rates of bank and streambed erosion in river channels. Again there are widely differing views about the magnitude of these changes, and about the short-, medium- and long-term impacts they may have on the river habitat and water quality. Even if they were halted today, the accelerated rates of catchment and channel erosion have released slugs of sediment that will take many decades, and perhaps centuries, to work through the Murray-Darling system.

Construction details of MDBC-controlled structures

Structure Name	Constructing State	Year Completed	Storage* Capacity (GL)	Upper Level (mAHD)
Lock & Weir 1 Blanchetown	SA	1922	64	3.3
Lock & Weir 26 Torrumbarry	Vic	1924	38	86.2
Lock & Weir 3 Overland Corner	SA	1925	52	9.8
Lock & Weir 9 Kuline	SA	1926	32	27.4
Lock & Weir 11 Mildura	Vic	1927	37	34.4
Lock & Weir 5 Renmark	SA	1927	39	16.3
Lock & Weir 2 Waikerie	SA	1928	43	6.1
Lake Victoria	SA	1928	680	27
Lock & Weir 4 Bookpurnong	SA	1929	31	13.2
Lock & Weir 10 Wentworth	NSW	1929	47	30.8
Lock & Weir 6 Murtho	SA	1930	35	19.2
Lock & Weir 7 Rufus River	SA	1934	13	22.1
Lock & Weir 8 Wangumma	SA	1935	24	24.6
Stevens Weir**	NSW	1935	9	84.8
Lock & Weir Hume Dam	NSW/Vic enlarged	1936 1961	1520 3040	182.9 192.0
Lock & Weir 15 Euston	NSW	1937	38	47.6
Yarrawonga Weir	Vic	1939	120	124.9
Barrages (5)	SA	1940	2020	0.8
Maude Weir	NSW	1940	5	74.4
Redbank Weir	NSW	1940	6	68.1
Menindee Lakes ** Lake Menindee Lake Cawndilla Lake Pamamaroo Lake Wetherell	NSW	1968	1680†	 59.8 59.8 60.4 61.7
Dartmouth Dam	Vic	1979	4000	486.0

Storage capacity for all Locks and Weirs are approximate only, as they depend on flow in the river. ** Structure funded by NSW.
† May be surcharged to 2300GL. mAHD =metres above Australian Height Datum.