

Sold down the river

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A tiny mountain stream, a handwidth wide, protected in parts by spiky, crouching hakeas, trampled in others by brumbie hooves, wends its way through snow gums and lichened low-leaning trees, across a meadow scattered with tiny flowers, thick with the yellowing grasses of late summer.

It disappears into a landscape almost beyond imagining. Before the River Murray reaches the sea it will travel 2530 kilometres, branching into shallow channels across the wide flat expanse of the riverine plains, winding through the wind-formed landscape of the mallee, into the spectacular limestone gorges past Overland Corner, flowing into the glorious reaches of the Lakes and the Coorong, to mingle at last with the ocean.

As it traces the course it has followed for 60, perhaps 70 million years, the River Murray touches not only those who live, work and holiday along it, but also the many millions who drink its wine and enjoy its fruits. And it will also course through the imaginations of those who have been touched by it.

After two centuries of settlement, scientists are beginning to count the losses of trying to tame the river, to regulate it and make it conform with a European model. As Australia enters the new century, it is on the verge of new vision of the River Murray, a vision that honours not just what can be taken from it, but the very river itself in its many phases, through its meanders, anabranches and billabongs, to form a river like no other on earth.

Terry Hillman says he would die in a ditch for billabongs. But today he is just gently disturbing the crimson azolla, a tiny floating fern, as he wades, net in hand, into Norm's billabong. The River Murray is flowing fast nearby, but it would be a mistake to think it was the site of greater biological activity.

Dr Hillman is Director of the Murray Darling Freshwater Research Centre. "All we have understood (about the river) is what we want out of the far end," he says, "and we've done that. We put the channels in and grown the crops. We've known for a few years that when you flooded a billabong you got this immense burst of productivity but we are only just mapping it out now."

Recent research points to different sources of productivity active at different flow levels: algae in low flows; plants in medium flows; "and with high flows you get the waters sweeping a lot of organic material from the floodplain, recharging the river with stuff that will probably break down over a long period".

In fact floodplain waters harbour at least 100, perhaps 1,000 times more species than the rivers that flow past them. It is the inundation of floodplains that drives river life, the

myriad insects, mussels, yabbies and crayfish, the 34 native fish species, native frogs, tortoises, water rate, platypus, tiny marsupials and the 240 species of birds.

Once the River Murray spread out across the floodplain three or four years in every five. Today the river is regulated with dams, locks and weirs.

"Basically we want to use the river to grow perennial crops on irrigation," Dr Hillman says. "The irrigation water has to turn up in the right amount at the right time, every year. Nine out of 10 is not good enough if you are an orange tree. So we have driven the river into a predictable state. In so doing we tended to cut out many of the extremes. We don't have drought periods on the Murray any more in the sense of no flow. We have taken away a lot of the moderate floods and that has changed the way the system operates."

Water management has reduced the size, frequency and duration of floods. It has reversed the seasonality of flows, and dramatically reduced the volume.

"Not only have we modified the flow pattern, but we have modified the floodplain as well," Hillman says. "In a supply of water for irrigation sense it makes perfect reason to think of a river as a channel of water. If you are looking at it as system that is living and attempting to maintain itself, the floodplain is totally integral.

"We haven't as a nation put very much effort into our big lowland rivers, like the Murray. What we need to do is develop a model so that our concept of a river is one that fits reality instead of dreamtime or the top end of the Thames or something."

Only the high country does the Murray act in a manner familiar to European eyes. There in the rounded hills and gorges that form a series of receding blue shadows, the upland Murray arises. Although the area from the source to Corowa comprises just two per cent of the basin, it contributes nearly 40 per cent of the waters of the River Murray.

The Murray Darling basin is well named: essentially it is huge inwardly draining basin, tilted upwards in the east, where most of its water is collected, becoming more and more arid to the west.

It is a shape that owes much Australia's stable geological history, and a climate free of the dramatic climate changes, like the glaciers that formed northern Europe. It is so flat that at Mildura the river falls by less than 5 centimetres per kilometre. It has only one exit: the Murray mouth. Its annual average flow is less than one's days flow from the Amazon.

The River Murray defies all European notions. It is no neat, discrete river, confined politely to its banks, but one that in nature's hands spreads out wide across the floodplain in wet periods, then shrinks to a chain of muddy ponds in the dry.

The explorer Captain Charles Sturt reported that the inland rivers were unlike those of England; "the rivers are subject to great and sudden rises, whereas they have scarcely water enough to support a current in ordinary seasons."

The river long known as Indi, Millewa, Milloo, Murrundi amongst other names, was renamed by Sturt for George Murray, Britain's secretary of state for the colonies.

Sturt's first impression was of "a broad and noble river".

"Its banks were sloping and grassy," Sturt wrote, "and were overhung by trees of magnificent size. Indeed, its appearance was so different from the water-worn banks of the sister stream, (the Murrumbidgee) that the men exclaimed, on entering it, that we had got into an English river." Not surprisingly, he found the Murray a well populated area. He was accompanied by Aboriginal men, who passed his group on to neighbouring families and clans.

At Corowa, which calls itself the heart of the Murray, the Riverine floodplains begin.

Corowa's citizens played a significant role in Federation, inhabitants angered by the tolls imposed in crossing from Victoria into New South Wales and back again.

Tensions over the Murray - who controlled it, whether irrigation or navigation had preference in its management - nearly thwarted Federation. NSW insisted on a clause stating a state and its people had 'the right..to the use of waters of rivers for conservation and irrigation'. It is one of the few rights in the Constitution - modified by the South Australians inserting 'reasonable' before 'use'. A century later the dispute continues.

In Corowa's campgrounds families have gathered on a sandbar in the Murray, within sight of the old tollhouse. Children paddle and bask. A small group of boys, their bikes dropped behind them, dive into the water, fine local exponents of the Australian crawl.

Glossy as seals they climb the big old red gum, as boys have done for centuries, daring each other to climb even further up the tree. With a whoop they leap into the water.

About 25,000 years ago, the Cadell uplift blocked the westward flow of the Murray, forcing it south, and leaving the plains to the north wreathed with rivers as well as the widest section of the floodplain, Barmah-Millewa, where Australia's largest river red gum forest now grows.

The river red gum, or *Eucalyptus camaldulensis* (italics for botanical name please) is Australia's most widely distributed eucalypt, yet it takes its botanical name from the Camaldulii, a religious order in Italy which cultivated seedlings of the species.

A fast growing tree, it can top 30 metres, an extraordinary size in Australia's arid regions. It has smooth white or gray bark that peels to reveal strangely opalescent bark, that shines yellow-green, pink or gray-green. The leaves have the classic eucalypt shape.

With plenty of water, red gums have abundant, dense green foliage. When it is dry the crowns thin substantially, the leaves turn yellowish. The red gum is home to a great many birds, animals and insects. It was a source of wood and bark for Aboriginal shields, canoes, coolamons, spears and digging sticks.

River red gum timber is durable, heavy and hard, too dense to float. It was logged so extensively for riverboat fuel - three quarters of a ton were needed to run a boat for an hour - that by the 1880s the major forests of the Murray had been heavily cut within several kilometres of the river.

The river red gum thrives on periodic watering, and drying out. Too much water, like the now permanent lakes at

Mulwala, Lake Victoria, Menindee Lakes will kill the trees, leaving their great gray ghostly reminders, as effectively as too little water.

By the 1950s, the Barmah-Millewa forest was dying, the result of dams and levees upstream. But this has been a magnificent summer, according Keith Ward, a wetland ecologist with the Victorian department of natural resources and environment. The numbers of egrets and ibis had been falling. But this summer they returned, "we had about 150 to 200 egrets nest in the forest this year, which is brilliant". There were 15,000 ibis, 200 marsh terns laid their eggs on lily pads, while cormorants, darters, pacific herons and white-faced herons, nankeen night herons and more all bred. Wetlands were golden with flowering marshworts.

"This year has been amongst the best flooding for two or three decades," Ward said. "It has been large, so a lot of the forest got flooded and it has been underwater for five, six months."

It was both a natural flood, and one reliant on the forest's environmental allocation, used for only the second time. "The forest would have been dry by mid December, right at the time when we had thousands of nesting water birds. The environmental water was able keep the forest flooded to get these birds through.

"It's a real boom cycle," Ward says. "We don't need floods like this every year. As long as we get them a couple of times within the lifespan of these birds, so they can successfully fledge and recruit to the population then we will keep this birds for the future."

The open areas of the forest are lush with moira grass. The elegant white necks of ibis curve serenely about the unearthly green of the grass. The air is full of bird cries, the guttural honk of the ibis, the shriek of the sulphur crested cockatoo, the many twitterings and small cries of unseen birds.

The flooded area is fringed with a thicket of young red gums, as thick as a man's arm, that germinated after the last flood. Crowded, they grow straight up, the leaves fine, pale and abundant as they reach the sky. The water glitters between the trunks like an uneven string of jewels.

Behind in a clearing is the mother tree, six adult arm spans round, its massive trunk branching at head height into two, then higher three, four then five solid trunks, tonnes of timber reaching for the blue Barmah sky, the one tree its own forest.

Beneath its branches is a thick mulch of bark, of fallen leaves muddied and partly decayed after the last waters soaked here. The hardening tidemarks of debris, twigs, leaves, fallen branches washed up in untidy but somehow orderly heaps, mark the last flood.

At Nyah the Murray leaves the golden plains. The land rises, undulates in gentle rolling hills. Mallee, the name given to stunted many-trunked eucalypts, line the roadsides, the open road a corridor through the low trees. The Murray widens, its banks broad and sandy. The Murrumbidgee cuts suddenly into the Murray.

Thirty million years ago this land lay under the Murravian sea. After a period of drying, the area was again invaded by a shallow sea. Between two million and 500,000 years ago this was the shore of Lake Bungunna.

But the Murray Basin's salinity is not all due to these past sea invasions. In fact most of the salt came as rainfall. Millennia of rains falling on the shallow basin, followed by evaporation has left a huge saltload in the groundwaters of the basin.

Since settlement about one third the Murray floodplain has been cleared. Native vegetation that used all the rain that fell was replaced with annual crops that did not. The unused rain, and the water applied as irrigation, percolated through the soil, raising the salty water table, threatening to return the basin to the conditions of 18,000 years ago, when the basin was a salt desert.

Dryland salinity affects 2.5 million hectares of the Murray Darling Basin. The average salinity of the lower River Murray will exceed the threshold for desirable drinking water quality in the next 50 to 100 years.

At a lake near Kerang, they are harvesting the salt, driving a truck across glittering saltflats, scooping up the pink salt in the infernal heat. The shallow water reflects the low surrounding sandhills, the pale blue sky. The salt is crunchy underfoot, the mud beneath deep, black and treacherous.

Chairman of the Sunraysia Rural Water Authority, Eddie Warhurst, says "the Murray is the lifeblood of this place, without water in this area we are rabbit trap and ferret country."

With irrigation, it is vine and citrus country. Olives, pistachios, persimmons, almonds, carrots, and umpteen varieties of lettuce are growing. The big wine companies and private investors are marching kilometre after kilometre of grapevines

up and down the low mallee hills. Irrigated agriculture brings in over \$1 billion annually, and it is a big employer, making Mildura that rare thing: a prospering country town.

The Chaffey brothers, supported by Alfred Deakin, who was later Prime Minister, brought irrigation to Mildura. They took up a failed pastoral lease, and failed themselves. But the dream lived on. The land was cleared, divided, irrigated, and farmed by the hands of soldier settlers, and other small farmers, sent by government with a vision of greening the desert and populating the inland.

The Authority's area stretches along 700 km of the river, from Nyah through to the SA border. Around 17,000 hectares are irrigated, but Warhurst and his colleagues have a larger vision, the Deakin scheme that would double that area. This new development is underpinned with salinity and environmental studies, being planned with community consultation.

The Authority's CEO, Brent Godkin, points to the Deakin project land, south of the town, below the highway to Renmark. "This is about one quarter of a million hectares of sheep and cropping, beautiful country, windblown sands, red loamy area."

Bruno Moras is developing Treviso Estates, putting 305 hectares under vine at Red Cliffs, within the Deakin area. But Moras has built his own pipeline from the Murray, six kilometres away. "The Murray is down there, all the land is taken up. We have to move the Murray from there into a big holding area. This dam holds not quite 400 megalitres of water (one megalitre is equivalent to an Olympic-sized pool).

Moras bought his water licences from down around Shepparton and Kerang, "I hear down there they can't put a fence post in, because as they dig the hole the hole fills up with water," he says. The grapes are being plant on land once cleared for cropping: the remaining mallee, covering 15 per cent of the property, will be fenced off "I can never touch that".

Moras, who spend his childhood on a farm in northern NSW, and came into grape production through exporting, came to Mildura in 1971. On what he calls the mother block, at Nangiloc Colignan, "we were putting on between 3.5 to four megalitres of water per acre. Now got it back to somewhere between 2.5 to 2.7." He gestures to the new development, "here I believe that we will fine tune it. Depending on the season, it will be somewhere between 2.4 and 2.6 megalitres per acre."

The channels that lost 90 per cent of the water to evaporation are gone. Furrow irrigation has been replaced with overhead sprinklers, those sprinklers in many cases replaced by drippers, some, like those on Moras' property, linked to soil moisture probes and computer systems designed to make the most efficient use of the water.

Back on the mother block, Moras crouches under vines heavy with grapes. He plucks a bunch of Jade Seedless, huge, oval grapes, a new variety for the export market. "This bunch is fit for the Queen," he pronounces, "magnificent, crunchy and very tasty."

After 30 years in irrigation he says "we have learnt to be smarter, and we have learnt to understand the plant more. We didn't have the technology we have today."

The Murray and the Darling meet just outside Wentworth. The waters of the Darling so muddy fingers disappear before the hand is fully immersed. The two rivers flow together, their identities still separate, a distinct line between the milk coffee Darling, the murky green Murray, until they merge, foaming out of the weir.

Joe Cresp, of Bush and Backwaters, cuts the engine of his small boat beneath the ochred cliffs of Headings Cliff, just outside Renmark. "They seem to soak up the light," he murmurs. The cliff, topped with green, glows burnt orange, sienna, paling into putty colour, long rounded columns piled one on another, softening into spills on sand, dwarfing slender pale gums at its base. Cresp points out the dark River Murray growing in the crevices, "it was just about harvested out, it's white ant resistant."

Cresp, Renmark born and bred, has returned to the River with the fervour of the born-again. "I tried to move away. It's not your friends and family you miss, it's this."

He has the knowledge of a local, "that's a cooba or native willow overhanging the river. It attracts lot of bugs. They drip into river and naturally burley the fish." And he has book learning. At the cliffs he says "they are a slice of history, sediments of an ancient sea bed." He is saddened by what has happened to the river, "we don't see value in natural resources. We only see something that needs to be harnessed and exploited". There is no doubting him when he says: "my heart is right here in the river".

Dr Pamela Parker explains the putty coloured layer bubbling out of the cliff is in fact salt. She has spent the past eight years at Calperum Station, part of the Bookmark Biosphere Reserve, on the Murray River. "We just have to figure out

how to come to some sort of contract with our base of natural resources so that both we and they are sustainable in the long term. We need another set of cultural values, and I think that is probably what Bookmark is about." Local volunteer land carers work on Calperum, restoring the lakes, caring for the mallee that was once thought hard land to love.

Next door to Calperum is Cooltong, with its evaporation basin. "In this region people must over-irrigate, because they have to flush the salt below the root zone. So that water ends up in this basin." Across the dunes into Calperum is another, unplanned basin, glittering with salt, ringed by purple samphire and graying broken stumps, the air eerily silent. "And you go through three more dunes and there are three more ancillary basin, that same water has gone under the dunes." This, says Parker, is the hidden cost. Locals brought here have wept at the previously unseen sight.

Historian Paul Sinclair says the significance of river regulation as a symbol of national progress cannot be underestimated. "We are better at understanding the science, even though that is really limited, than we are at understanding the cultural tools that we have used to make decisions about the river."

Making the deserts bloom, and turning water into gold are the twin catchcries of the developers of the Murray. "What underlies those two phrases is the belief that what is here has no value," Sinclair argues, "it only has value once it is transformed. European vision sees things like saltbush and black box as meaningless. Mallee was a despised vegetation."

Now, he says, people are more interested in the river, "it is tied into that renaissance of Australians finally finding the words to express their attachment to places, partly linked to reconciliation." But says Sinclair, "I don't think we are really up to making the hard decisions yet."

The Murray cod features in a number of Aboriginal stories as the creator of the Murray. Sinclair says "settler Australians have been particularly attached to Murray cod. They have been the source of metaphors and experiences by which individuals were able to think themselves into the life of the river."

Tom Loffler, from Waikerie, used to be a real keen fisherman. "With weather like this you would get a cod every day. They taste absolutely beautiful. When you cut the meat open its got a real oil sheen through it, a magnificent sheen."

Loffler says it has been years since entrants into the local fishing competitions caught a Murray cod. Commercial catches, however, have been increasing.

After a moratorium on catching cod in SA between 1990 and 1993, catches rose from 2.5 tonnes in 1995 to 19 tonnes in 1999, and a provisional 15.4 tonnes last year.

Commercial fishing of cod is banned in Victoria, and being phased out in NSW.

Loffler argues fishermen are targeting a remnant population. "Unless they get rid of gill nets in a hell of a hurry, they won't be an extinct species but there won't be many left to catch.

"Regardless of whether you want a feed, or you just like to see them there, it's got to be a sustainable resource or everyone loses out," he says.

When John Koehn, from the Victorian NRE travels the Murray in search of cod, he tends to keep quiet about his project. "If people find out you are working on Murray cod, they will want to know what's going on. They will have stories. I believe that Murray cod are part of our cultural heritage, they are a cultural icon. They are also symptomatic of what is happening in our river systems."

He says people are very interested in his opinion about why the number of cod has plummeted over the past 50 years. "The really big issues are changes to water flows, removal of habitat - pulling snags out of rivers in particular - cold water releases from dams, and when there was a commercial fishery (in Victoria) that would have played a part as well."

Murray cod are Australia's largest freshwater fish, weighing up to 113 kg. The oldest Murray cod caught was 1.27 metres long and 47 years old. Baby cod like a habitat with wood debris. Mature cod also love snags. They will swim up to 90 km to spawn, then return to their original location.

BRL Hardy's Banrock Station is a partner in the Bookmark Biosphere reserve, and home to 900 hectares of floodplains and wetland, 600 ha of mallee and 250ha of winegrapes, bounded on three sides by the River Murray.

Banrock Station's Tony Sharley, walks out onto the boardwalk lined by tall bulrushes, stretching into the wetland, through an impenetrable thicket of lignum, a perfect refuge for small animals. "When they talk about wetlands being the filter of the river system, you can see what that means." In the bird hide he whistles like a swan.

This land was flooded between 1925, when the lock was built, and 1992 when the wetland was finally allowed to dry out,

and 60 tonnes of (introduced) carp were stranded and died.

This year the wetland is ringed with a flush of pale green, young river red gums, and dark green box trees on higher ground, "We create a spring flood out there every year, which is just what the Murray used to do before we started removing 80 per cent of the flow down the Murray."

What is killing the lower Murray slowly, according to Sharley, is the reduction in small and medium floods. "The whole floodplain, not just the Murray mouth, is experiencing prolonged drought and habitats that were developed with plants that liked to experience flooding every second year are now getting it every ten years."

Sharley would like to those floods occurring more frequently. He readily acknowledges it would be a hard decision to make, needing a series of reforms to water management, and perhaps even the dedication of 20 per cent of the River Murray's water to the environment.

"Some people have said the only reason you are doing this (the wetland) is because you are a big company and you can afford to," Sharley says. "I have to say, we can't afford not to. This is fantastic for business, it's good from a marketing point of view, and the changes in water management in the vineyard are fantastic for the quality of the grapes as well."

Banrock Station's environmental credentials have been a selling point overseas.

"It is going to be a huge way for Australia to market its primary produce by saying that it is produced in a basin that is sustainable, clean and green, not one that is basically dying as a result of salt, reduced flow and is heavily polluted by nutrients."

At nearby Overland Corner, the river cuts deep into the limestone. From the road it could be just another depression, a dip between low hills. Up close it presents a magnificent cliff face, a wetland busy with pelicans and ducks below. The river becomes narrower, more closely defined. Naturally salty aquifers flood into the river: over half the salt in the Murray comes from the South Australian stretch.

Swan Reach was where Lake Bungunna breached and formed a channel to the sea. The muddy river swoops in a wide arc against the curve of the stunning limestone cliff. The giant red gums below look like toys, the jarringly-green irrigated pasture could have been coloured-in by a childish hand.

When Ngarrindjeri woman, Ellen Trevorrow, was a child her grandmother, Ellen Brown, wove baskets and mats for trading, and use at home. Twenty years ago, Mrs Trevorrow learnt basketweaving, "I am not going to put my mat on the floor for people to wipe their feet on," she laughs. Instead her works - sister baskets, fishtraps and mats - are exhibited, and she passes on the skills at Camp Coorong.

But the rushes she prefers, the three-pronged cyperus, is getting harder and harder to find. In an old photo she stands among high rushes. At the same spot now, they grow smaller. "Our rushes aren't growing like they used to, because of the salt table rising. To get a rush that is six foot tall, you are smiling. I have to be satisfied with the little ones."

Once the lakes and the Coorong formed a huge esturine system, but barrages now

separate the lakes from the Coorong, retaining fresh water in the lakes.

Under natural conditions, low flows due to drought occurred at the mouth one year in 20. By 1994 so much water was being extracted for irrigation that low flows occurred in three out of five years. It looked likely to rise to three years in four until the Murray-Darling Basin Ministerial Council capped water diversions at 1994 levels. For the first time since settlement, the health of the Murray itself figured in its water management.

The long spit of the Coorong is covered with vegetation: bushes with beaded jewel-bright stems; succulent rosettes bearing tiny arches of paper crisp flowers, some purple, others faded to white; miniature pink-petalled flowers; grass soft as a fantasy; rushes that loom frighteningly overhead.

Walking along the Coorong you hear the roar of the ocean, feel the welcome damp salt air, the tug that pulls Australians inevitably to the sea. Who could see in the wild, wonderful vista of the Murray's mouth its long winding journey back, who can see in the oceans roar the tiny cold stream where it began. Who can hear her countless stories?

River comes from the verb, to rive, to pull asunder, and Australians have proven that all too true. We have tried to make her fit our many, often contradictory, dreams. When will we realise that we, too, must change if we want to save the river.

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