

ECOLOGICAL AND CULTURAL VALUES OF THE ORD AND FITZROY RIVERS: LINKS AND LESSONS

On 6 June 2007, Dr Andrew Storey spoke to the Kimberley Society about the Kimberley's biggest rivers. Andrew is a freshwater ecologist who works as an adjunct senior lecturer in the School of Animal Biology at the University of Western Australia. Before embarking on his PowerPoint presentation, he mentioned that, despite the government-appointed Appleyard Committee's findings, many people still think water should be exported southward from the Fitzroy or the Ord. That thinking reflects an erroneous belief that the water, which comes from wet season (summer) rains, goes to waste by flowing into the sea. Yet, as Andrew showed, the water serves important local functions and forms an integral part of the Indigenous people's culture.

The Fitzroy River is one of the country's few unregulated major river systems. It carries abundant water during the wet season and, at that time, an essential linkage occurs between the river and its floodplain. Without that linkage, the associated biodiversity and ecological balance cannot be maintained.

Surveys have shown that, overall, the riparian (riverside) vegetation of the Fitzroy River valley is in 'relatively good' condition. High livestock impact in some areas has produced patches of extensive weed invasion and areas of bank erosion, but, notwithstanding that, numerous riparian species have survived, including one, *Acacia gloeotricha*, which is on the state government's Declared Rare and Priority List as a Priority Species.

In other surveys, a sampling of aquatic macroinvertebrates (predominantly gastropods, crustacea and larval stages of aquatic insects) has shown that the Fitzroy River is of relatively high ecological 'health'. In that work, which forms part of the 2000 State of the Environment reporting, using the Australian Rivers Assessment Scheme (AUSRIVAS) models, the prevalence and diversity of insects and invertebrates allowed ecologists to classify the river catchment as grade B. The grades are A (good/pristine), B (low disturbance), C (medium disturbance) and D (heavy disturbance).

Thirty-five species of fish have been found in the Fitzroy River, with 18 of those species endemic to the Kimberley. The fish, which come from 21 families, include Freshwater Sawfish (*Pristis microdon*), Dwarf Sawfish (*Pristis clavata*) and Freshwater Whipray (*Himantura chaophraya*). Each of those three species has been listed as vulnerable or endangered by the IUCN, and the critically endangered Northern River Shark has been found in King Sound. That sighting was most

unusual—the first known sighting of the species in the Kimberley waters—with the next closest sightings in coastal Kakadu waters. The system also supports the well known freshwater and estuarine (saltwater) crocodiles and numerous waterbirds.

On the Camballin floodplain, where an earlier attempt to grow irrigated crops failed to produce the expected commercial returns, about 67 different species of waterbirds have been recorded, and the area would qualify for listing under the Ramsar Convention as a wetland of international importance. Such wetlands are named after the town of Ramsar in Iran where the first international conference on the conservation of wetlands and waterfowl was held. In addition, many of the waterbirds at Camballin are listed under the Japan-Australia (JAMBA) and/or the China-Australia (CAMBA) Migratory Birds Agreements. The Western Australian Priority Species found there include the Freckled Duck.

Some of Andrew's research came about in response to a 1998 proposal to dam the Fitzroy River. The Western Australian Department of Water manages and allocates the state's water resources and, in 2000, it funded a qualitative field assessment of the environmental values of the Fitzroy River and its major tributaries. That work, done in conjunction with anthropological work by Sandy Toussaint, Sarah Yu and Patrick Sullivan, involved collaboration with Indigenous groups at Bayulu, Djugerari, Jarlmadangah, Kupungarri, Looma, Mimbi and Yakanarra communities along the river. The two studies assessed water dependent ecological values, associated cultural values, and the links between those two types of values.

Andrew cited anthropological findings to show that water is a major focus of the Indigenous people's culture as well as the basis of many of their Dreamtime stories. He also told how, in accompanying those people to places such as fishing spots, he became conscious of the river providing settings in which they share memories and history and pass their knowledge from one generation to another.

The two studies showed that the Fitzroy River and its riparian zone offer the Indigenous communities food, medicine and other resources. The aquatic fauna in the river and billabongs—fish, frogs, crocodiles, prawns, turtles, and waterbirds—are obvious food sources but riparian plants, eg the fringing Pandanus Palm (*Pandanus spiralis*), also contribute. The palms yield edible nuts while certain other trees have leaves and bark that provide flavours in cooking. Specific aquatic fauna and riparian plants provide medicinal remedies, eg slowly cooked river mussels produce a milky liquid that alleviates cold symptoms. The Freshwater Mangrove (*Barringtonia acutangula*) has anaesthetic properties and its pulped bark and leaves can be used to capture fish by reducing the oxygen content of water. Other riparian plants yield timber for rafts, bark for containers, lightweight shafts for fishing

spears, and smoke for ritual healings. The seasonal occurrences of flower and fruit on the plants are also important, with their cultural links to the lifecycles of the aquatic fauna providing a guide to the best hunting and collecting times. Those links, as Andrew, Sandy and the others found, form part of 'a strong association between Indigenous culture and the ecology of the river system'.

The permanent pools in the channel of the Fitzroy River are part of what the Indigenous people describe as "living water". In the dry season, the pools allow the aquatic species to survive. In the wet, the surging waters clean the pools and generate a significant exchange of nutrients between the channel and the floodplain. That process also restocks the floodplain billabongs with barramundi (*Lates calcarifer*) and other aquatic fauna. The seasonal floodplain inundation is thus essential for the maintenance of biodiversity and ecological balance in the river valley.

By comparing the Fitzroy River valley and the lower Ord River valley, Andrew showed the type of changes that can occur when the natural flow of a north Australian river is impeded. The Ord River system was modified through the construction of the Kununurra Diversion Dam (1963), the Ord River Dam (1972), and the subsequent raising of the latter dam's spillway to provide greater hydraulic head for a hydroelectric scheme (1996). Those modifications changed the river's hydrology irrevocably but they also contributed to the creation of Ramsar wetlands above the dams (Lakes Kununurra and Argyle). The hydrological changes, reinforced by constant releases of water for irrigation and hydropower generation, include loss of the seasonal inundation of the floodplain as well as simplification and narrowing of the downstream riparian zones. The density of the riparian vegetation has increased greatly, with plants such as Cumbungi (*Typha domingensis*) increasing in density to the point of being a nuisance because they limit access to the riverbanks and reverse the manner in which sediment is deposited. Because the big pre-dam floods no longer occur, the river does not get flushed, and the depth of the river and its tide-affected mouth are decreasing. The dams also form a barrier to the upstream migration of some species of fish and crustaceans, most notably the barramundi. As a result, a suite of species is now missing from Lakes Kununurra and Argyle. However, steps are being taken to restore some scope for fish migration by incorporating a fish-way into the Kununurra Diversion Dam.

The modification of the Ord River, as well as affecting the ecological values, also undermined cultural values. Places of significance were drowned, as were tributaries and pools in which Indigenous people fished. Dry season crossing places

were also lost, thereby affecting people's scope for moving about the country on foot.

The impacts resulting from the regulation of the Ord River provide insight into the possible consequences of damming the Fitzroy River. Some such impacts have been felt already, in connection with the barrage built for the failed Camballin Project. The resulting re-direction of water flows increased inundation on parts of the floodplain, causing erosion as well as ecological change. The barrage itself also interrupted upstream migration of species that include fish and the Cherabin prawn.

On the basis of the work mentioned above, Andrew and others concluded that the Fitzroy River and its floodplain still support substantial ecological and cultural values. They recognised the strength of the linkage between the ecological values (e.g. biodiversity) and the cultural values (e.g. "living waters"), and they noted that many of the cultural values are dependent upon ecological values (e.g. plant and animal species). It follows that, if changes to the hydrology and morphology of the river system affect its ecological values, those changes may also affect cultural values.

Andrew acknowledged that there is still much to be discovered with regard to the biodiversity and ecological processes in the Fitzroy River. He believes, however, that the Fitzroy River should continue to be managed in a way that maintains the natural flow regime of dry periods broken by floods. He also feels, partly because unregulated floodplain rivers are becoming increasingly rare worldwide, that the concept of the "triple bottom line" is particularly applicable to the Fitzroy, ie any new developments need to be economically viable, socially (culturally) acceptable and ecologically sustainable.

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Selected reading

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