supply of water, but rather the ability to exploit or at least tolerate high levels of soil moisture even if only for part of the year. Drought tolerance and drought avoidance in riparian plants has important implications for site evaluation and species selection in riparian zone rehabilitation.

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The role of charophytes in the rehabilitation of artificial wetlands at Capel, Western Australia

The RGC Wetlands Centre in Capel, Western Australia, is a chain of artificial lakes constructed from mining pits after mineral sands extraction. The wetlands support a diverse range of biota, although productivity in the system is generally low. A study of charophytes (submerged macrophytes) was conducted to determine their role and relative importance in the ecosystem. Three species of charophyte, *Nitella hyalina*, *Chara globularis* and *Chara baueri*, were present in two of the lakes. These water bodies had a lower conductivity than other lakes, and a lower concentration of the mineral ions in the standing water. Charophytes were found to have the capacity to take up high concentrations of the ions in the water column, at levels which would be toxic to most plants. Water clarity was very high in these water bodies. There was a significant correlation between abundance of invertebrates and the density of charophytes present. Charophytes provided an ideal habitat for invertebrates, as they were not affected by summer drawdown like other macrophytes were. They provided a perpetual source of food and shelter for the invertebrates thereby attracting several water birds. Overall, the charophytes were responsible for high primary productivity which subsequently caused an increase in secondary productivity. They were able to tolerate extremes of water chemistry and depth. Trials to rehabilitate other lakes with Charophytes were conducted.

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The use of wetlands to reduce the nutrient load of agriculture drainage in south-western Australia

The eutrophication of the Peel-Harvey Estuary, 100km south of Perth in Western Australia has been a serious problem since the late 1970's. While recently the Dawesville Channel has been created to improve flushing of the estuary to the ocean, this management option, on its own, is insufficient to remedy the problem. Management of nutrient export from the catchment is also required. The Peel Main Drain, which services the southern hinterland of Perth, contributes approximately 15 tonnes of nitrogen (25% inorganic) and 2 tonnes of phosphorus (85% inorganic) to the Peel-Harvey Estuary. The aims of this project are to investigate ways to modify the Peel Main Drain to improve assimilation of nitrogen and phosphorus within the confines of the catchment, to reduce the export of these nutrients to the estuary. Control measures are hampered by the high loads experienced over winter in this Mediterranean climate, and by the diffuse nature of agricultural drainage. Two avenues have shown scope. At the top of the catchment, the Peel Main Drain flows through a large wetland (1km radius) called The Spectacles, resulting in a 60-75% decrease in nitrogen and phosphorus load during passage through this wetland. Attention is focused on how this is achieved, and what are the best management options to optimise both nutrient retention and conservation value of this important wetland. There are also a number of point sources of nutrients in the catchment, which may contribute significantly to the total drain load. The capacity of created wetlands along small stretches of drain receiving point source effluent to reduce nutrient load is being evaluated. By treating "hotspots" of nutrient input to the drain system, hopefully the overall nutrient export of the drain can be reduced.

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Coexistence of *Juncus articulatus* L. and *Glyceria australis* C.E. Hubb in temporary shallow wetlands of northern New South Wales

Juncus articulatus, a species introduced to Australia, is codominant over large areas of Mother of Ducks Lagoon but is rare in other lagoons. Within Mother of Ducks Lagoon, *J. articulatus* is concentrated in lower, wetter areas that are more disturbed by birds and cattle. This suggests that *J. articulatus* might be separated over elevation (and therefore water regime) and/or disturbance gradients from the native grass *Glyceria australis* which is dominant in Mother of Ducks and common in many other lagoons. Experimental evidence on several aspects of the biology of *G. australis* and *J. articulatus* is presented to assess the invasive potential of *J. articulatus* in the lagoons. In a tub experiment, the growth and interaction of the two species under different water regimes showed *J. articulatus* to be the superior competitor in the first year under water regimes where the soil is inundated, but any advantage is partially lost during the second year when *G. australis* is the superior competitor. Other evidence sows *J. articulatus* to be much less tolerate of drought than *G. australis* but *J. articulatus* has a much larger seed bank from which it germinates readily. The management implications of these differences in biology are discussed.

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Effect of water level fluctuation on nitrogen removal from constructed wetland mesocosms

Nitrogen removal processes were investigated at three frequencies of water level fluctuation (0, 2 and 6 d^{-1}) in duplicate gravel-bed constructed wetland mesocosms (145 ℓ) with and without plants (*Schoenoplectus validus*). The mesocosms were initially established over a period of ~4 months, with ammonium-rich (~100 g m^{-3} NH_4-N) dairy farm wastewaters batch-fed weekly. Fluctuation treatments

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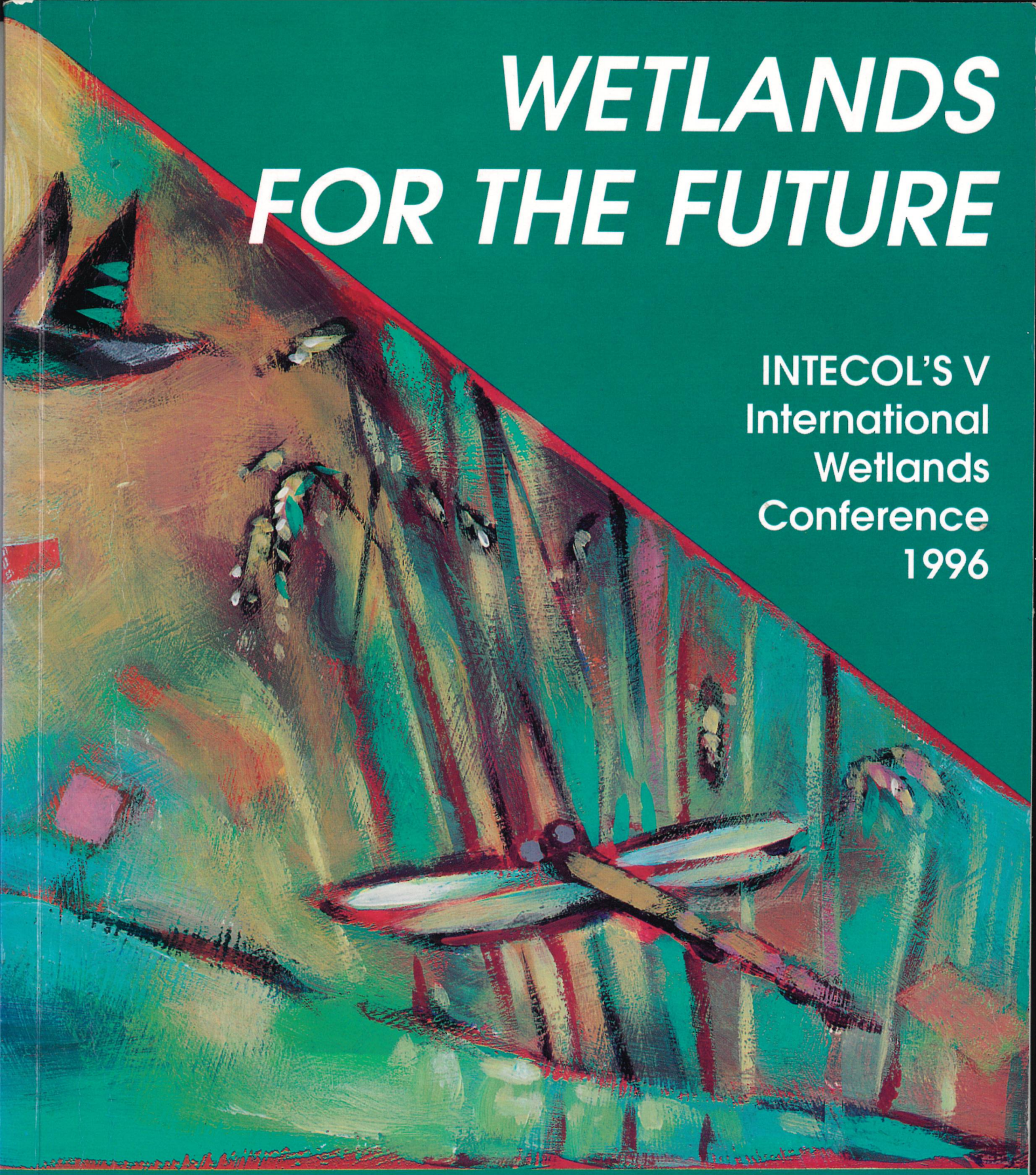

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