

A publication of the Coast and Wetlands Society  
P.O. Box A225  
Sydney South NSW 2000

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ISSN 0725-0312

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Acknowledgement:

We would like to thank Joan Ratcliffe for her skill in  
preparing the camera ready copy.

Front Cover: Inhabitants of seagrass beds.

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## A SHORT WALK THROUGH SOME CHINESE MANGROVES

C.D. FIELD

School of Biological and Biomedical Sciences  
NSW Institute of Technology  
Broadway NSW 2007

In February this year, Dr Margaret Burchett, Dr Peter Saenger and myself were invited by the Australian Development Assistance Bureau to visit China to discuss with Chinese scientists the feasibility of a Sino-Australian research programme on the mangrove ecosystem in China. Our journey commenced in Guangzhou, better known as Canton, where our Chinese hosts briefed us on their plans for us to become acquainted with their mangrove forests. Guangzhou is not noted for mangroves but is famous for its cuisine and we were quickly introduced to some of its more exotic culinary delights.

From Guangzhou we travelled to the far south of China to a tropical island on the edge of the Gulf of Tongking, known as Hainan. In the days of Imperial China, the island was known as the 'edge of the world' and it was considered to be the place where civilisation ended. It also served, as such places often do, as a penal colony for dissidents. Today, Hainan is known to the Chinese as the 'Treasure Isle' because of its iron ore, off-shore oil reserves and, the scourge of wetland areas, tourist potential.

We arrived in Hainan at the military airbase as the civil airport was closed — an event to which we were to become accustomed — and our first impression of Hainan Island was of fully armed fighter planes landing in parallel with our small Russian Antonov 24. We learnt later that the Sino-Vietnam border was experiencing one of its periodic bursts of activity. Our second impression as we drove from the military base to Haikou, the main city of Hainan, was that we had entered the twelfth century. The villages along the way appeared as though nothing had changed for centuries and we saw no signs that they had ever been touched by any industrial revolution. The timeless nature of the rural communities in juxtaposition with the threatening war machinery of the late twentieth century created the impression of a time warp that would have pleased the most creative of science fiction writers.

Still somewhat dazed from the culture shock, we were introduced to the mangroves of Hainan. The island boasts a diverse collection of mangroves and there are twenty-nine different species recorded of which only two do not occur in Australia. These are *Kandelia candel* and *Sonneratia hainanensis*.

Until the 1950s, all the coastal counties of Hainan had substantial mangrove communities that are estimated to have occupied some 10,000 ha of intertidal land. In April 1950, the Kwangsi Nationalist troops that had retreated to Hainan surrendered to the Red Army. Almost immediately the social turmoil commenced that led to the collectivization of agriculture in the Great Leap Forward of the mid-fifties and the overwhelming anarchy of the Cultural Revolution that lasted from the early sixties to the late seventies. The social turmoil continues today in the post Gang of Four era and we were startled when our guides explained that one of the new objectives was, "to cast off the shackles of egalitarianism".

As a result of the uncontrolled exploitation, reclamation and clearing of the tidal forests that accompanied the political upheavals of the past three decades there are now only about 5,000 ha of mangroves left on Hainan. In some of the cleared areas, earthen dykes were constructed and in the mud flats behind were planted rice or other crops in an effort to boost national food production. It soon became apparent that the yields from the reclaimed water-logged salty soils were only about half of that of the traditionally irrigated land.

In our discussions with local officials, foresters and villagers dwelling close to the mangroves, we were impressed by the history and depth of concern that existed for the preservation of the mangroves. In the middle of one small village situated on the fringe of a large mangrove area we were shown, in a still used shrine, a tablet erected in 1870 by the then provincial council that proclaimed that the prosperity of the village depended on the conservation and controlled use of the mangrove system. The tablet also listed the rewards and penalties

associated with the husbandry and abuse of the mangroves. As always, there is an appropriate Chinese saying, "Where the mangroves are the crabs will walk into the street".

The mangrove ecosystem in Hainan has been, and continues to be, of great importance in the traditional, near-subsistence, mixed farming and fishing economy of the coastal villages. The mangrove ecosystem is an extensively utilised resource. First, mangroves provide protection from typhoons for the rice fields, farmlands and villages that lie on their landward boundaries. In some villages the houses are built in the mangrove stands themselves. The protective function is perceived as very important by the local people. From ancient times, the Chinese common name for mangrove has been 'sea pacifier'. Second, a range of plant and animal products obtained directly from the mangrove forests are important to the villagers. Mangroves are often used for fire-wood and charcoal, while larger trees are used for housing construction, furniture and ship building. Local artists have traditionally used mangrove timber for carving. The foliage of some mangroves is used as supplementary fodder for domestic farm animals, such as goats and pigs and in the case of *Avicennia marina*, as mulch for growing sweet potatoes. Fruits of mangroves species such as *Nypa fruticans*, *Sonneratia caseolaris* and *Kandelia candel* are used directly for food production. Dried fronds of the mangrove fern *Acrostichum aureum* are used for cooking fires. Mangroves are also considered as good medicinal herbs in Chinese medicine. *Ceriops tagal* and *Acanthus ilicifolius* have been used as medicine for centuries. Mangroves are also useful in bee-keeping, fish net dyeing and tannin production.

Fish, prawns and eels make extensive use of mangroves as breeding and habitat areas. Crab traps are set in the forks of trees and moulded into the mud of the forest floor. Worms, oysters and various other shellfish are collected for food, and in some cases cultivated on stones laid out in the mud. Temporary prawn and fish dams are constructed on each tide. In some villages permanent family-owned fishponds are maintained most productively. Traditionally, algae have been gathered for food, and a visit was made to a village factory engaged in the commercial production of agar and alginates. In certain areas, commercial scale fish, eel and prawn farms are being established. Eels, prawns and fish are netted in fixed-frame intertidal nets and from hundreds of small craft operating in and near the mangroves. The catch is used both for family consumption and for the markets in nearby townships.

A practical demonstration of the importance of the mangrove ecosystem in the food chain was provided by Mr Fu, the Mayor of Wen Chang County. He presented us with a banquet at which it seemed the whole biota of the mangroves was placed before us in the form of endless steaming dishes. The one that lingers in the memory is 'sipunculid (peanut worm) in aspic'.

Over the last four or five years strenuous local and central government efforts have been made to halt the previous depredation, and to regenerate and extend the remaining mangrove areas. The surviving stands are virtually entirely comprised of secondary scrub and woodland communities, having only fairly recently regrown after previous partial destruction. In a determined attempt to conserve the tidal forests, three mangrove reserves and 'research stations' have been established on Hainan Island since 1980. They are the Dong Zhai provincial reserve, the Wen Chang county reserve and Lin Gao county reserve. In all, there are some 4,500 ha of mangrove forest within the protection of a reserve. At the same time a scheme of rewards and penalties was introduced once more by the Provincial Government for the protection of the mangroves. It is the primary function of the mangrove research stations to provide patrols of rangers to administer the regulations, and to encourage villagers in the protection and maintenance of the ecosystem. In Dong Zhai reserve, some very limited planting trials for replanting programmes have also been carried out. No fundamental research, and no data collection on weather, tides, plant growth or fishery harvests are at present being undertaken.

The scale of the conservation measures is very significant as an indicator of the seriousness with which the proper regeneration, preservation and continued utilisation of these ecosystems are viewed by the local population and the provincial and central administrations. The establishment of these stations provides a physical and social basis for future programmes of scientific research into the mangrove ecosystems of Hainan Island.

It was made clear to us that the Chinese Government and the people in the mangrove areas were deeply aware of the significance of the mangrove forests to the well-being of the local communities, and that conservation and rehabilitation of the mangrove areas had been given a high priority amongst the many problems facing the people of Hainan Island. The need for help in understanding the mangrove ecosystem and in managing it in a productive fashion was explained to us by people from vastly different social and economic perspectives.

As Hainan changes in accordance with government plans for the commercial and industrial development of the island, more pressures will impinge on all remaining mangrove areas. Urban development of estuaries, alterations of landform, land usage, water catchment and drainage, and the growth of tourist and recreational facilities,

are all likely to affect the mangrove ecosystem, even if at a considerable distance from an actual stand. It is vital to the people in the coastal areas, and almost certainly for the inshore commercial fishing industry as a whole, that mangrove management plans be initiated as soon as possible, before irreversible changes have taken place.

As we were leaving Hainan, our interpreter Mr Lin Jian Zhong, who incidently is an authority on Mark Twain, commented that we should be aware of the Chinese saying that points out the dangers of "appreciating flowers from horseback". I am sure that we all hope that we shall have an opportunity to look more closely at the mangroves of Hainan Island in the future.



Visiting the Hainan Mangroves.