

Exploring Community Dynamics in Protected Areas: The Case of Dongzhai Nature Reserve in Hainan Province, China

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Abstract

Mangroves are a rich and important environmental resource that is under increasing threat globally and in China. International and national recognition of this has resulted in the recent designation of various mangrove environments as nature reserves. Management initiatives that are developed for these protected areas are often based on a lack of information of the surrounding communities, which largely depend on the protected area's resources. An integrated knowledge base, incorporating both natural and socio-cultural data, is necessary before sustainability of a protected area can be possible. This research explores the human environment and relationships with the Dongzhai Nature Reserve in Hainan Province, China. The objective is to provide a sufficient knowledge base that can be integrated with existing biophysical information upon which future management initiatives can be based.

Introduction

This paper examines aspects of the human environment at Dongzhai Nature Reserve in Hainan Province, China (Figures 1 and 2). A considerable amount of research has been conducted at Dongzhai that focuses on its biophysical components (Wetlands International, 1999). The 1980 establishment of Dongzhai as a reserve has had an impact on the local population, but socio-cultural data are not very well documented. In fact, information on human systems of mangrove dwellings is sparse in many regions of the world (Kunstadter, Bird and Sabhasri, 1986; Saenger, Hegerl and Davie, 1983). The purpose of this research thus was to fill this gap of knowledge so that the system as a whole is better understood. The theoretical basis of this research is that an integrated knowledge base, incorporating both natural and socio-cultural data, is necessary before sustainability of a protected area can be possible (Berkes and Folke, 2000; IUCN, 1997).

Mangrove Environment at Dongzhai

Dongzhai is an ideal location to study the impact of a protected area designation on local communities. It was the first mangrove in China to be included in the list of the world's most important wetlands to be designated as a nature reserve, preceding five subsequent such designations. Internationally, it is a designated RAMSAR site. The natural resources it contains are significant not only for local communities but for its intrinsic value as well.



Figure 1. Location of Hainan, China¹



Figure 2. Location of Dongzhai²

Located in northeastern Hainan within the subtropical zone, it comprises an estuary with inter-tidal sand and mudflats and a mangrove forest zone. The land area of the reserve covers approximately 3,337.6 ha; the open water area, 2,062.4 ha at low tide. Ninety percent of the total number of mangrove species recorded in China has been found here. As well, it is one of the most important stopover sites between Japan and Australia for migrating water birds (Wetlands International, 1999).

Land use within the reserve is quite intensive. More than twelve villages with a total population of more than 21,000 are located on the edge of the reserve. Many of their livelihoods depend on the mangrove resources. Local communities collect marine and estuary resources in most parts of the protected area. Exploitation of the mangrove trees is strictly forbidden and is largely adhered to by local communities. There has been encroachment into mangrove areas for aquaculture purposes, and small-scale encroachment may still occur in some areas (personal communication, 2000).

Co-management and other forms of community involvement has been a recent trend around protected areas in China (He and Si, 2000; Xian, Hang and Wang, 2000; Nyberg and Rozelle, 1999). However, lack of local community involvement is a critical issue at Dongzhai (personal communication, 2000). This paper is based on research that was conducted in 11 of the more than 12 villages surrounding the reserve, and each village was found to be supported through activities associated with the reserve, whether the activity support main or supplementary incomes. These villages can be classified according to dominant types of employment, such as agriculture (5/11 villages), fisheries (4/11), tourism (1/11), and trade/retail (1/11). Even villages that do not derive their main income from the mangrove interact with it for subsistence or other purposes.

Community Relationships with Dongzhai: Understanding the System

In order to develop an understanding of the relationship between local communities and Dongzhai Nature Reserve, it is necessary to understand the basic structure of components both within and external to the system (Figure 3). The system itself is comprised of the tangible components of the reserve and villages. External to the system are the broader realm components of market, government, economy, education and research. Although the situation is clearly more complex than this, these five components have been selected by the author of this paper to highlight major factors for purposes of simplification. Figure 4 illustrates community relationships with the mangrove as influenced by these components. Here the villages are categorized according to main types of employment. Bold arrows indicate a stronger interaction particularly since reserve establishment. Dotted arrows indicate a weaker interaction. Regular arrows indicate no change.

The villages at Dongzhai, although each possessing unique attributes in relation to one another, may be described in general terms for the purposes of this paper. The household, the residence of the basic social unit, uses labour to produce land or sea harvest, or to raise animals. The harvest occurs in their own village or at the reserve, and the food is used either for sale on the market (commercial), as feed for animals, or as food for themselves (subsistence). The animals are raised in the village and are used to produce by-products (e.g. milk, eggs), are put up for sale on the market (commercial), or eaten as food by those who raise them (subsistence).

There are a number of components that emanate from outside the system that have impacts both on the system and on each other. In turn, elements within the system may have a reciprocal effect, impacting external components. Once these components are understood, impacts on each other and flows between components become evident.

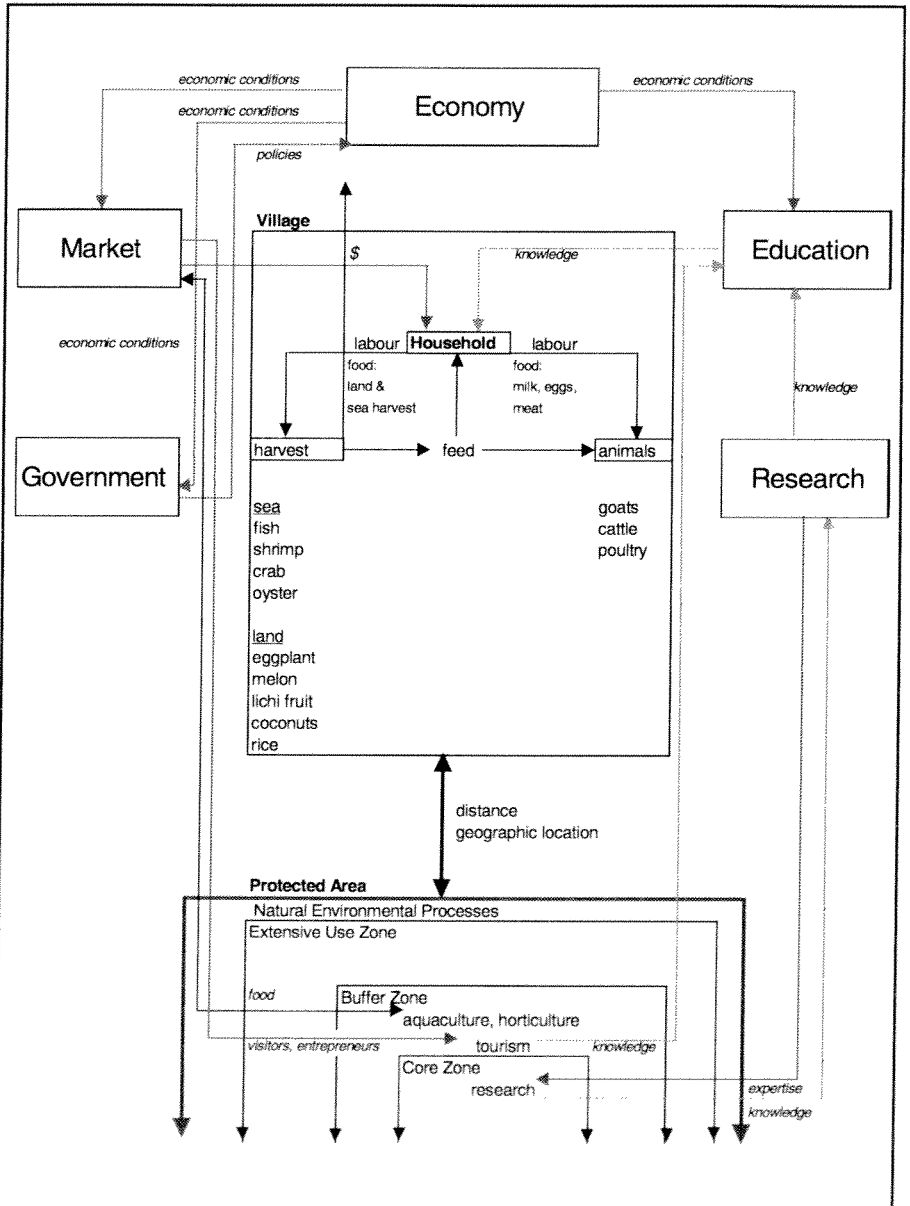


Figure 3 Structure and basic flows of the Dongzhai System

The *market* that affects Dongzhai is mostly local, though with some international influence. All resources harvested from Dongzhai are sold on the local market, while some seafood is sold in Haikou, Sanya, Hong Kong, Thailand, and Singapore. As well, in 1997, companies from Spain and Japan developed aquaculture ponds in Sanjiang Farm, the region south and adjacent to the reserve. Most of the market outside of this local population is in the provincial capital of Haikou (one hour away) and the city of Qiongzhan (thirty minutes away) (personal communication, 2000).

Government has an influence on the system from a local to international level, though most of the authority lies with the former. Unfortunately, government cut-backs in recent years have resulted in a decreased level of funding to the reserve. This is a severe problem according to reserve management, since it is not possible to implement the objectives of the Management Plan (1999) without the necessary capital (personal communication, 2000). They currently lack the necessary resources to manage the reserve and to construct adequate infrastructure. This reflects a common hindrance in the effective management of nature reserves in China (Nyberg and Rozelle, 1999; Chen, 1996; personal communication, 2000).

General *economic conditions* have an influence on all components, both within and external to the system. Most notably, good economic conditions result in more government funding to the reserve as well as a higher level of expendable income of potential visitors. As well, the 1990 designation of Hainan as a Special Economic Zone resulted in increased attention to and investment into the province. Development of the coastal economy that may result from this increases the mangrove's vulnerability to disturbance (Lin and Fan, 1990). On the other hand, cutbacks in recent years have slowed this investment due to a declining economy and a redirection of investments into other regions of China, such as Pudong district of Shanghai (He, J., 2000).

Education occurs in the reserve itself by means of posted signs and ecotours through the mangrove. The students, tourists, and local communities who become educated may transmit this newly acquired knowledge outside of the system. In fact, 100% of the interviewees revealed a heightened awareness of the importance of mangroves since the establishment of Dongzhai reserve and the corresponding development of environmental education (personal communication, 2000). However, a heightened environmental awareness cannot be attributed to these reserve activities alone. Rather, these activities may enhance an awareness of the environment that had already existed, a trend that has occurred globally.

Most of the *research* that has occurred to date at Dongzhai has focussed on such biophysical aspects as soils, plant morphology, mangrove management, and ecosystem biodiversity (Wetlands International, 1999). This research, in turn, supplements environmental education in the media, schools, and other such academic institutions through an expanding database of scientific information. This increased

level of research may be partially attributed to the recognition of Dongzhai as an ecologically significant environment on a global level.

Figure 4 illustrates the general geographic location of the villages based on employment type. Tourism and fisheries-based villages, dependent on the mangrove and its resources are located within 150 m of the mangrove. Agricultural-based villages rely on the mangrove to a lesser extent. Land further away tends to be less susceptible to salt-water intrusion, thus making it more suitable for agriculture. Similar to this are villages close to urban centres, such as Houshan, which provides more employment opportunities to the residents.

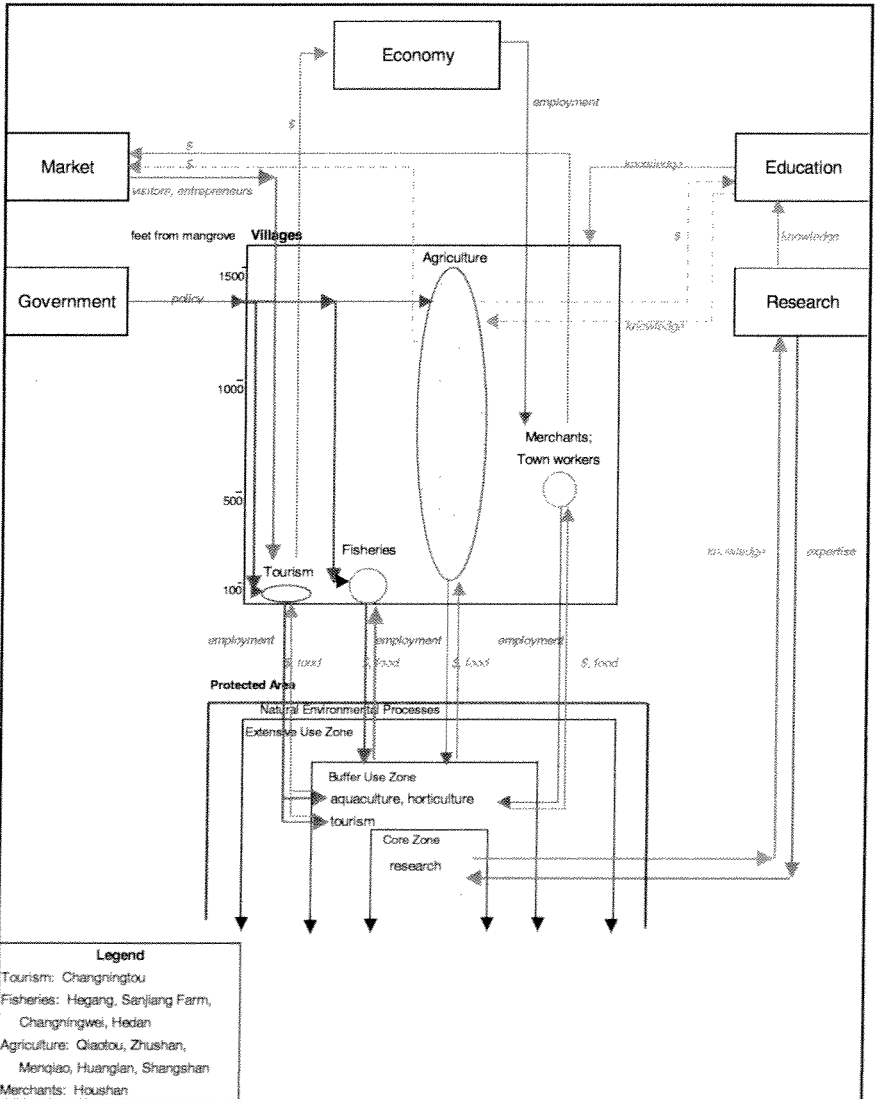


Figure 4. Community Interactions with the Reserve

Conclusions

Through the analysis of components, both within and external to the system at Dongzhai, some final conclusions can be made that may serve as a basis *for future research opportunities*. These components are determined to be major influences on the system, based on field research conducted by the author of this paper in the summer of 2000.

While the interview responses varied, some significant trends may be identified. Perhaps one of the most notable findings is that each village has its own distinct characteristics, much of which is influenced by location and proximity to the reserve. For example, Changningtou, the village adjacent to the reserve headquarters and water channels, as well as the only village to have access rights to develop tourism, derives the majority of its income from tourism and fisheries. In addition, the issues they cited as the most pressing are related to these two activities: lack of tourism, and pollution and depletion of resources. Conversely, Huanglan, located far from fishery resources, is the poorest of the villages researched. It is a predominantly agricultural village with little diversification of employment. Hence, it is not surprising that they perceive poverty and lack of alternative ways of making a living as the two most significant issues affecting their way of life.

Although 55% of respondents perceived lack of tourism as a major issue (versus 10% citing lack of alternative ways of making a living), the villages that lacked a diverse employment base were the ones to appear the most poverty stricken. Although there are cases of tourism increasing the standard of living in many developing regions of the world (Hamilton and Snedaker, 1984), this might not necessarily be the solution in the case at Dongzhai. Revenues from tourism are an important source of income to many protected areas, but too high a dependence on these revenues could result in a bias away from protection and toward development and high levels of usage (Butler and Hinch, 1996; Salm and Clark, 1984; West and Brechin, 1991). This matter should be investigated further, but it may be possible to improve the standard of living by increasing the numbers of opportunities presented to these communities. By continuing a study of the Dongzhai region, working with the locals and key informants and other stakeholders, the situation at Dongzhai, both the villages and the reserve itself, may be improved.

Notes

¹ source of China image <http://www.worldatlas.com/webimage/countrys/asia/ciamaps/cn.htm>

² source of Hainan image <http://www.maps-of-china.com/hainan-s-ow.shtml>

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