ITTO Project PD 460/07 Rev.3 (F)

Achieving Sustainable Management of Mangrove Forest in China through Local Capacity Building and Community Development

Implementation of Activity 2.1.1

“Preliminary Analysis of Potential Demand for Eco-tourism at Fujian Zhangjiangkou Mangrove Nature Reserve”

BEIJING FORESTRY UNIVERSITY
The Project Executing Agency

Beijing, December 2011
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Acknowledgments

We are sincerely thankful to Prof. Li Junqing of Beijing Forestry University for assigning us, with the prior expressed approval of the International Tropical Timber Organization (ITTO), to carry out Activity 2.1.1 “Preliminary analysis on potential demand for eco-tourism at Fujian ZMNR” of Project PD 460/07 Rev. 3 (F) entitled “Achieving Sustainable Management of Mangrove Forests in China through Local Capacity Building and Community Development”.

We would like also to express our appreciation to the Management of Fujian Zhangjiangkou Mangrove Nature Reserve (ZMNR) for providing part of the needed information on the analysis and assisting in the conduct of the field survey on visitors of ZMNR.

It is our sincere hope that the information presented in this report would be useful for the Management of ZMNR in future development of the reserve and for future works relating to promotion of ZMNR as an eco-tourism destination.

Best regards,
Dr. Hiras P. Sidabutar &
Prof.Wu Shuhong
List of abbreviations

BFU : Beijing Forestry University
CITES : Convention on International Trade in Endangered Species of Wild Fauna and Flora
GPRC : Government of the People’s Republic of China
IC : International Consultant
ITTO : International Tropical Timber Association
LAC : Limits of Acceptable Change
NC : National Consultant
PSC : Project Steering Committee
SFA : State Forestry Administration
SEPA : State Environmental Protection Agency
STA : State Tourism Administration
YPO : Yearly Plan of Operation
ZMNR : Zhangjiangkou Mangrove Nature Reserve
Preliminary Analysis of Demand for Eco-tourism at the Fujian Zangjiangkou Mangrove Nature Reserve (Fujian ZMNR), Fujian Province of China

1. Introduction

1.1 Background information on the activity

The International Tropical Timber Organization (ITTO) and Government of People’s Republic of China (GPRC) have appointed Beijing Forestry University (BFU) to implement Project PD 460/07 Rev. 2 (F) entitled “Achieving Sustainable Management of Mangrove Forests in China through Local Capacity Building and Community Development” in collaboration with Office of ZMNR. Implementation of the Project is governed by the project agreement signed by ITTO, GPRC and BFU as well as the MOU signed by BFU and the Office of ZMNR, taking into account the ITTO rules and procedures applying to ITTO-assisted projects.

The specific objectives of the project are: i) to enhance capacity of local forestry institutions in mangrove management, and ii) to reduce community reliance on mangrove resources through improvement of the design and productivity of existing sources of income and introduction of suitable and sustainable income generating activities. Attainments of these specific objectives are presumed as a significant contribution to sustainable management of mangroves in China.

In order to realize the specific objectives, the Project is to deliver five outputs, namely:

i. Management plan of ZMNR developed and adopted
ii. Managers and staffs of local forestry institutions and government authorities trained on mangrove management skills
iii. Effective policy on mangrove management formulated and decision-support system operational
iv. Suitable income generating activities identified and promoted and productivity of existing sources of income increased
v. Awareness on the importance of mangrove ecosystem raised

Above outputs are to be delivered through execution of 15 relevant activities that had been identified and defined during the project development process. Only five of these activities were included in the first yearly plan operation (YPO 1) for implementation during the January-December 2011 period, one of which is Activity 2.1.1, the subject of this report.

To ensure delivery of Output iv “Suitable income generating activities identified and promoted and productivity of existing sources of income increased”, five pertinent activities had initially been defined, namely:

- To carry out analysis on market-demand for mangrove-based products (Activity 2.1.1);
- To identify sources of income based on market-demand and supply potential of existing mangrove resources (demand-supply matching) (Act. 2.1.2);
- To develop appropriate design for the suitable income generating activities in consultation with local people (Act. 2.1.3);
- To train local people on the suitable income generating activities for improvement of productivity (Act. 2.1.4); and
- To pilot test the suitable activities with selected local people under supervision of the project (Activity 2.1.5).

The activity dealt with in this report is Activity 2.1.1 “to carry out analysis on market demand for mangrove-based products at ZMNR“. An international consultant (IC), Dr. Hiras P. Sidabutar, and a national consultant (NC), Prof. Wu Shuhong, have been appointed by BFU, the Executing Agency, with prior expressed approval of ITTO, to carry out the activity. The tasks of the IC as originally defined were to:

- Develop a sound methodology for studying demand for mangrove related products both for domestic and export markets;
- Collect historical data on consumption of mangrove related products in terms of quantity and price;
- Identify channel of distribution of the products;
- Provide estimate of mid-term demand for individual products;
- Identify priority products for development by local people based on historical data and likely trend of demand; and
- Develop an effective marketing strategy for selected products

Originally defined tasks of the NC were to:
- Assist the IC in the conduct of market analysis;
- Collect data on consumption of mangrove related products in terms of quantity and price;
- Identify channel of distribution of the products;
- Provide estimate on average income of households originating from mangrove related products; and
- Identify sustainable sources of income and suitable activities to be implemented by local people inside the model forest area

1.2 Re-defined activity

The first meeting of the Project Steering Committee (PSC) was held at the BFU on 9 June 2011 which was attended by the representatives of ITTO, Japan Forestry Agency as the main donor of the Project, Ministry of Commerce, State Forestry Administration, Fujian ZMNR authority as the Collaborating Agency, Project Management Team and national as well as international consultants. The main purposes of the meeting were to review progress in implementation after nearly six months of project inception and to assess appropriateness of the project design in light of the changes that might have occurred on the ground since the project was formulated some six years ago.

The progress in implementation was found by the meeting as satisfactorily. The five activities included in the first YPO were well in progress while the inputs applied to carry out the activities were reasonable. However, there was a long and interesting discussion on the appropriateness of the original project design in light of the significant changes that have occurred at the project site, particularly as regards the activities under Output 2.

The Collaborating Agency informed the meeting that the landscape of Fujian ZMNR was a piece of state forest land occupied mainly by degraded mangrove forest, around 2,360 Ha in extent. Mangrove forest was degraded, due to the use of land by local people for aquatic farming, especially on the inner part of the area. Local people cultivated the land with clam, ychen, crab, fish and other aquatic species as the main source of income. After years, the farmers had become
conversant with the production technologies through learning by doing. In fact, the farmers have already had an established production system as evidenced by the facts that:
- The aquatic species to be raised were specific and marketable
- The necessary cultivation skills were mastered by the farmers
- The produce yielded, while seasonal in occurrence for individual species, generated sufficient income for the farmers year round
- Established local market functioned well in facilitating transaction between the farmers and intermediaries

The attempts made by the Fujian ZMNR authority to stop the use of forest land for aquatic farming, in fact, had created a hostile relationship between the authority and the local communities. The authority found that it was nearly impossible to stop local people doing the aquatic farming to support their lives in the absence of alternative livelihood. Beside, the mangroves occupying the inner part of the land, around 1,060 Ha in size, was heavily degraded. Facing such a situation, the Fujian ZMNR authority, with the approval of the local government authorities, had decided to allocate 1,300 Ha of the MNR for forestry use and 1,060 Ha for community development where local people may practice aquatic farming. The border between the forest and the farm lands was clearly marked on the ground using concrete construction that simultaneously serves as the vital transportation path.

The representatives of ITTO and Japan Forestry Agency as well as the international consultant, whom had paid a visit to the project site prior to attending the PSC Meeting appreciated the information furnished by the Collaborating Agency. They confirmed that the original landscape of the Fujian ZMNR has experienced significant change in terms of land use pattern as evidenced by the presence of the concrete path separating the land for community development and the land for mangrove nature reserve.

In light of the observed changes in land use pattern, the meeting proposed to make adjustments to the activities under Output 2.1. The meeting opined that the project has to shift its attention from mangrove-based or aquatic farming products to mangrove nature products in the form of eco-tourism. While Output 2.1 as originally defined is still valid and justifiable for delivery i.e. concern with identification and promotion of income generating activities, the activities should now be adjusted to deal with the development of eco-tourism, not aquatic farming any longer.

Accordingly, the meeting agreed to re-define the activities on Output 2.1 as follows:
Activity 2.1.1 : To carry out preliminary analysis of demand for eco-tourism at Zhangjiangkou mangrove nature reserve (ZMNR)
Activity 2.1.2 : To develop action program for future development of ZMNR
Activity 2.1.3 : To identify eco-tourism activities suitable for local communities to engage in
Activity 2.1.4 : To train local communities on the necessary skills to carry out selected eco-tourism activities
Activity 2.1.5 : To publish and disseminate technical manuals on eco-tourism related activities

The meeting further revised the terms of reference of the Consultants for conducting Activity 2.1.1 and now reads:

**International Consultant**
- To search for information on eco-tourism development in general with emphasis on development in China
- To gather relevant information on the bio-physical, socio-economic and management aspects of ZMNR
- To conduct field survey on visitation of ZMNR using commonly acceptable methodology
- To carry out analysis on potential demand for eco-tourism at ZMNR based on findings of field survey
- To make recommendations on future development of ZMNR

**National Consultant**
- To assist the International Consultant in accomplishing his tasks
- To assist in conduct of field survey, data gathering and reporting

### 1.3 Organization of the report

Part 2 of the report briefly presents information on the bio-physical and socio-economic aspects of the nature reserve which is the basis for assessing what services could potentially be offered by the site to visitors. Part 3 summarizes the information gathered through literature search covering the various aspects of eco-tourism development in China and the theoretical framework for the analysis of demand for outdoor recreation in general. In part 4, the methodology employed in conducting the analysis on demand for eco-tourism is elaborated. Discussion on findings, weaknesses and strengths of the analysis are presented in Part 5 while Part 6 presents the conclusions drawn and recommendations made.
2. The salient features of Zhangjiangkou Mangrove Nature Reserve (ZMNR)

2.1 Location and historical development

a. Location

Fujian Zhangjiangkou mangrove wetland nature reserve (Fujian ZMNR) is located in Zhangjiang River that flows into the sea, 10 km from Yunxiao Country. It lies between East longitude 117°24′07″-117°30′00″ and North latitude 23°53′45″-23°56′00″, at elevation between 6 and 8 meters. The nature reserve lies in Dongxia Town, mainly in the territory of the two administrative villages, Zhuta and Chuangchang villages, with a total area of 2,360 Ha. Among them, the mangrove area is about 118 Ha and tidal wetland is around 2,142 Ha (Yunxiao County Forestry Bureau, 2005).

Map of ZMNR (adapted from Zhao Feng, 2011)
b. Historical development

Fujian Zhangjiangkou mangrove nature reserve is located in Southern Fujian province where Zhangjiang River flows into the sea, and is a transition area between terrestrial ecosystems and aquatic ecosystems, freshwater ecosystems and marine ecosystems. Within large area and tall mangroves, the dense forests and complexity levels, this nature reserve has the distinct natural attributes and the typical mangrove community characteristics. It was established in 1992 as a county-level nature reserve, which was later approved to be on the list of provincial nature reserves by the Fujian Provincial Government. In 2001, Fujian Zhangjiangkou nature reserve began to apply for a formal declaration to be a state-level reserve; in June 2003 the State Council officially approved it as a National Nature Reserve.

c. Nature reserve development policy

The Chinese government has signed a number of International Conventions relating to conservation and management of mangrove ecosystem including the Convention on Biodiversity, the Ramsar Convention and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). To ensure the implementation of these conventions, the government has formulated a series of policies, laws and regulations at the different levels of government and established eighteen mangrove nature reserves across the provinces occupied by mangrove ecosystem, one of which is this ZMNR.

The Chinese government is also planning to form an integrated management body comprising different authorities to be in charge of the conservation and development principles; the Chinese government is gradually adjusting the existing policies and systems on mangrove conservation and management taking into account the unique roles mangrove ecosystems play in the protection of coastal zones as well as environment, livelihood of local communities and generation of other social benefits.

The State Council has granted the forestry sector the responsibility for adoption of the Ramsar Convention in China and mandated the State Forestry Administration (SFA) to guide and oversee the national mangrove resource management. Subsequently, the SFA has formulated the so called “Program on national wetland protection” wherein six national key projects on the protection and restoration of mangrove ecosystems were listed as the priority for implementation.

The Fujian provincial government has also paid serious attention to the wetland protection and utilization and is currently giving priority to the construction of ecological zones at the province, county and city levels which is elaborated well in the “General Guidelines on the Construction of Ecological Zones in Fujian Province” the document that has been approved by the State Environmental Protection Agency (SEPA).

2.2 Bio-physical features

a. Soil

Soils in the region are coastal soft flat mud and sandy silt mud (more than 2m thick), fine particles, no structure. Mangrove soils are with high salt content, usually in more than 10 ‰. The 'PH level' of the soils are between 3.5 and 7.5. The soils are rich in plant residues and organic
matter, while the soil contains a lot of residual calcium, molluscs residue and lime material caused by ocean tides, typically of marsh and salinity characteristics.

b. Geology and hydrology

The landform in Yunxiao County is the part of Minyue granite hills sub-region. The ridge in the county are south eastward extension of Bopingling Mountains, and the whole terrain descends ladder-like from northwest to southeast, forming U-shaped landform opening to the southeast, higher in east, north, and west, while lower and broader in center and south.

Zhangjiang River is the county's major river, with a total length of 58 km and the watershed areas of 855 km², which is formed by Anhou River, Mapu River, Xahe River, Heping River, Nanxi River and Huotian River. It flows from the northwest to the southeast, then into the sea from the southeast. The runoff is $1.011 \times 10^9$ m³ (including foreign water $1.53 \times 10^8$ m³), and the annual mean runoff of county is $6.35 \times 10^8$ m³.

c. Climate

The Zhangjiangkou Mangrove Forestry National Nature Reserve has a subtropical maritime monsoon climate. According to 1960-1999 statistics of climate, the annual mean temperature is 21.2°C with the extreme temperature of 38.1°C and 0.2°C, and the hottest months of the year are July to September.

The monsoon of this area has changed markedly, Northerly in winter, southerly in spring and summer. The annual mean time wind speed is 2.7m/s, and the time maximum wind speed is 34m/s. According to 1955-1980 statistics of weather, typhoons in the county total 150 times, and the annual mean times are 5.8.

The annual mean rainfall is 1714.5mm with the extreme rainfall of 2493.2 mm and 1348.4mm. The rainfall is mainly in April to September, and the maximum rainfall a day is 260.3mm. The number that the daily rainfall≥0.1mm are 138.5d each year, and the annual mean thunderstorm days are 50.5d with most thunderstorm days of 75d and least of 30d. The annual mean evaporation is 1718.4mm with the relative humidity of 79%. The annual mean sunshine is 2125.1h with the extreme sunshine of 2574h and 777h. The annual mean foggy days are 7.7d with the most foggy days of 16d and the least of 1d. The annual mean frost days are 2.3d with the most of 68d.

d. Marine environment

The mangroves are distributed in the tropical and subtropical intertidal zones, and there are ecological factors that affect the growth of mangrove, such as seawater temperature, salinity, and other hydrological conditions.

The seawater temperature of this area changes greatly with the seasons. Being affected by the rainfall and runoff, there are large changes in salinity. The tide is semidiurnal tide with twice high tide and low tide during one day and night. The mean tidal range is 2.32 m with the maximum of 4.14 m, and the maximum tide level is 7.7 m with the minimum of 3.03m. The pH value ranges from 8.02~8.45. The dissolved oxygen ranges from 0.02~2.54 mg/dm³ with the mean of 7.3 mg/dm³. COD ranges from 0.58~2.31 μmol/dm³ and SS ranges from 1.9~18.32 mg/dm³. The seawater quality is generally good with the middle level of nutrient salts, and most of pollutant contents are below the first class of seawater quality standards.
e. Vegetation and plant

There are 5 Division 6 genera and 6 species of mangrove plants, 16 Division 27 genera 29 species and 1 variety of mangrove plants, 59 Division 152 genera 184 species and 3 varieties of coastal plants (including cultivation) in this mangrove nature reserve. According to “Vegetation of China”, the plants are divided into 3 vegetation types, namely mangrove plant, coastal salt marsh plant and coastal sand plant. Mangroves plant communities, such as Avicennia marina forest, Tung Blossom trees, Avicennia marina and Tung Blossom trees, Kandelia candel forest, candel and Tung Blossom trees, Wood lam forest etc, are found in this nature reserve.

f. Animal resources

There are 154 species of birds belonging to 38 families and 15 orders, which accounts for 28.36% percent of the total bird species in Fujian province. Many bilateral international agreement protected migratory birds are also in the reserve, including 77 species that are listed as bilateral agreements protected migratory birds between the two governments of China and Japan, and 41 species between China and Australia. 4 orders with 9 families and 14 species have been recorded, about 12.73% within Fujian province, mainly some cetaceans distributed in the warm ocean, some rodents and small insectivorous mammals distributed in the fields of residential. There are 3 orders, 11 families and 37 species, which accounts for 32.17%. There are amphibians belonging to 1 order, 5 families 13 species or 29.55% of the total of the species in Fujian province.

g. Aquatic organisms

The mangrove forest region is full of low-quality organic matter, up to 1.92% -3.36%, providing a large amount of food for the survival of meiobenthos. The survey data show that Zhangjiangkou-Dongshan Bay marine intertidal regions have 190 species, including 74 kinds of cross-section of bamboo tower. The total biomass is up to 69.079 g/m², the average density is 363.7 ind/m². Shellfish is the local dominant species; particularly the mud han and mud crabs are widely distributed and have become a well-known and delicious seafood because of its high quality.

(Sources: Fu Jiaoyan, 2007; Lin Peng, 2001; Fang Canbin, 2010)

2.3 Socio-economical features

There are 9 towns/townships within Yunxiao County; the total area of land cover is 105,400 Ha. By the end of 2005, the County had a total population about 416,400 of which 64,400 were urban residents, 352,000 were rural residents which took the proportion of 84.5% of the total. The “Statistical Yearbook in 2006 of Fujian province” shows that GDP in Yunxiao County was 3.113 billion yuan; 1.289 billion, 0.557 billion and 1.267 billion yuan of which was the primary industry, secondary industry and the tertiary industry, respectively. The contribution order rate of growth in Yunxiao County was the first, third, secondary industry, with the rates of 41.41%, 40.7% and 17.88%, respectively. Agriculture is the main source of income for local communities in Yunxiao County because of the large proportion of the primary industry. The share of the second industry is smaller, of which there is much more potential for expansion.
Per capita GDP is close to 7,498 yuan in 2005, which was less than the average level of Zhangzhou (13,402 yuan). The average income for local worker was estimated at 10,559 yuan. The per capita income was less than the average level of Fujian province (18,646 yuan) by 8,087 yuan. But the per capita net income of the famers (4,573 yuan) in Yunxiao County could keep pace with the famers in Zhangzhou City (4,690 yuan). These data further shows that the economic impact of the first industry is still relatively large in Yunxiao County.

In 2005, the total production added value of agriculture, forestry, animal husbandry, side fisheries was 1.28904 billion yuan comprising 499.88 million yuan of agricultural, 30.41 million yuan of forestry, 193.25 million yuan of animal husbandry, 558.85 million yuan of side fisheries, respectively. The contribution of animal husbandry and fishery services was 6.65 million yuan, while the increase in fisheries plays a great role of a proportion, about 43%. Thus, the growth of the primary industry of Yunxiao County relies mainly on the contribution of fisheries.

(Sources: Fujian Province Statistical Yearbook, 2006; Fu Jiaoyan, 2007)
3. Literature search

3.1 Definition of eco-tourism

No attempt was made by the authors to seek for the best or most appropriate definition of eco-tourism. As nicely summarized by Stone (2002), many scholars have defined eco-tourism in different ways but they all emphasize on travel to natural places. Some scholars distinguish eco-tourism from nature-based tourism in that the former should be small-scale tourism with limited negative impact, whereas the latter is not defined by the scale but rather by its focus on nature (Brandon, 1996 in Stone, 2002).

In this report, the definition of eco-tourism by the International Eco-tourism Society is used which reads “a responsible travel to natural areas which conserves the environment and improves the welfare of local people (Western, 1993 in Stone, 2002)”. Therefore, the basic elements of eco-tourism are ecological, economic and empowerment of local community. A eco-tourism undertaking should contribute favourably to nature conservation, generate sustainable income to local people and empower local people in terms of economic and skills in a sustainable manner.

This perspective is more acurately defined within the ecotourism context, the emphasis is firmly being placed in the forms of tourism that positively benefit the local environment, society and culture (and tourist experience) in natural areas and that, in particular, represent a fundamental transformation of the power-relations that have long been seen as typifying the international tourism system (Bianchi, 2002; Britton, 1982). Eco-tourism has become an alternative approach for overcoming the problems of traditional tourism with the assumption that there will be minimum negative impacts and maximum benefits for the local people and their environment. People participated in eco-tourism reflects in a higher level of environment commitment and in support for enhancement of sustainability.

3.2 Eco-tourism development in China

In 1998, the China National Tourism Administration estimated that 1,8 million people were directly employed in the tourism industry and another nine million were employed in tourism related activities; tourism has also become one of the main mechanisms of economic development in the inland regions where people have historically lived below the national poverty line; the international arrivals, excluding Hong Kong, Macau and Taiwan, to China had increased from 6,9 million in 1992 to 50,6 million in 1999 (van Dijk, 2006).

One form of tourism that is rapidly gaining popularity in China, and the world, is eco-tourism. The year 1999 was declared the “Year of China's Eco-tour” by the State Tourism Administration (STA) under the theme “touching nature, understanding nature, and protecting nature”. The increasing number of tourists and their demand on protected areas is causing protected area managers to consider eco-tourism as a means of financing sustainable development in and around the parks.

Nature reserves in China are the main destination of ecotourism and many reserves are under-funded, under-staffed, and lack the infrastructure to deal with large volume of visitors; Chinese nature reserves, forest parks, and scenic areas are becoming increasingly popular attractions for eco-tourism both for international and domestic tourists. The number of nature reserves in China had greatly increased from 799 in 1995 to 2,194 in 2004 (SEPA, 2005 in Fritz, 2009) and to 2,588 in 2010 (China Environmental State Bulletin 2010); the nature reserves now cover 148,2 million hectares of land or 14,8 % of total land area of China.
In December 2001 the State Forestry Administration (SFA) implemented the Wildlife Conservation and nature Reserve Construction Project which aims to establish 2,500 nature reserves covering 172.8 million Ha by 2050, 18% of China’s land area (Xu & Melick, 2007). The majority of Chinese protected areas are nature reserves that are managed in accordance with the Regulations on Nature Reserves. Nevertheless, protected areas also include approximately 500 scenic interest areas, often referred to as national parks, which are managed by the Ministry of Construction, and over 1,400 forest parks, which are the responsibility of the SFA. In principle, the State Environmental Protection Administration (SEPA) is responsible for the overall integrated management of conservation zones.

In China, ten different ministries or administrations now are involved in managing protected areas and during the turbulence of recent times the roles and responsibilities of government departments have been constantly redefined. In the last decade, forestry --- a crucial element of conservation in China --- has undergone a transformation from resource acquisition to environmental protection (Xu & Melick, 2006).

Many nature reserves in China have attempted to develop eco-tourism projects, but at least basic understanding of ecology and environmental science is necessary to implement successful eco-tourism projects. As previously defined, ecotourism focus broadly on local environmental and socio-economic needs and more meaningful tourist–host encounters. A survey of nature reserve managers in 1997 revealed that only 16% of managers had received some kind of higher education, not even necessarily environmentally focused (Li & Han, 2001 in Fritz, 2009).

Administration poses another problem on nature reserves management in China. Involvement of 10 different ministries or administrations in the oversight of protected lands, coupled with designation of nature reserves at the county, provincial and national levels, have made the administrative structure truly complicated which makes communication difficult between different agencies at different levels, particularly as departments are already indisposed to deal with each other. Reserves are ordered by higher administrative agencies that do not understand the complex administrative balance that already exists in rural areas, so the formation of a reserve often exacerbates the contentious relationship between local and provincial governments (Harkness, 2000 in Fritz, 2009).

Ecotourism is supposed to contribute to the local livelihood, but if there are high leakages, the community benefits less, the self-financing of nature reserves is greatly improved if economic leakages can be kept at a low level. Low economic leakages often equate to more jobs produced for local residents to fill; in turn, this hopefully increases the awareness level and justification for the conservation of natural areas. Note that “economic leakages” occur when outside services, materials and goods are used in replacement of locally produced services, materials and goods (Stone & Wall, 2003 in van Dijk, 2006).

There are several areas currently being promoted as ecotourism destinations in different provinces of China including Fujian province. There is increasing pressure from the outside communities on the nature reserves and the natural resources therein; further, tourism revenue is not as high as was initially expected, compounding the problems between the nature reserves and the local people. It was found, on Hainan Island (Stone & Wall, 2003 in van Dijk, 2006) that ecotourism is being promoted but is not actually occurring; there is no community participation in the park planning process and that the overall socioeconomic benefits of the park and tourism have been very limited which could be caused by the short length of stay for most visitors or economic leakages.
Over the last twenty-five years, both the supply of and demand for ecotourism have grown significantly. At the same time, ecotourism has, as a particular form of tourism development, become increasingly recognised and legitimised as a means of achieving sustainable development in destination areas. Underpinning this widespread support for eco-tourism is the assumption that tourists themselves are demanding more responsible, environmentally-appropriate forms of tourism. The increase in tourist activities in China necessitates that a system be established to monitor and manage the impacts of tourists. These impacts are especially important to monitor in areas that have been set aside as nature reserves or preserves. Nature reserves are established to protect a resource and can be very effective when managed correctly. One component of protected area management is the use of recreation monitoring system like the LAC (Limits of Acceptable Change). LAC is a framework for establishing acceptable and appropriate resource and social conditions in recreation settings. LAC gives attention to the current conditions that exist in an area and the future conditions desired by management and the public (Stanley et al, 1985 in van Dijk, 2006).

In summary, demand for eco-tourism is increasing as is the demand of tourists for higher quality experiences with greater diversity. One risk of increasing tourism to natural areas is the sacrifice of conservation for economic gain (Fisdeel, 1996 in van Dijk, 2006).

3.3 Analysis of demand for eco-tourism

3.3.1 A simple theoretical model

Consumer choice theory gives us a demand function where the quantity demanded of good A ($Q_{DA}$) by a consumer is a function of the price of the good ($P_A$), the prices of other goods ($P_1, P_2, ..., P_n$) and the consumer’s income ($Y$):

$$Q_{DA} = f(P_A, P_1, P_2, ..., P_n, Y)$$

The first question that arises is how to measure a consumer’s demand for a recreation activity such as eco-tourism. The most common measure is the “participation rate”, the proportion of the population that participates in a given time period which can be easily calculated as the total number recording participation in the activity over the total number of adults responding to the question. The alternative is the engagement per 1,000 adult population per annum wherein aspects of demand, participation and its frequency are taken into account (see Gratton & Taylor, 1985 for details).

The most common determinants of demand considered in the studies of demand for outdoor recreation are:

i. Price of the activity

For most goods, identifying the price presents no problem. For a recreational activity like eco-tourism, data on price is not obtainable easily since the cost of participation is a composite item involving entrance charges, the rental value of any equipment used, travel costs, and time costs. In much of recreational demand analysis, the underlying assumption has been that travel costs, or a combination of travel and time costs, are the major elements of cost.
The average cost of participation, taking into account all aspects of cost (equipment, entrance charges, travel and time costs) is the major influence on the participation decision. The higher the average cost, other things being equal, the lower the participation rate. Overall estimates of the price elasticity of demand for specific recreational activities are not available, mainly because of the problems of estimating the true composite price.

ii. Income

Another important factor that influences “participation rate” is real income of consumers. As disposable income increases, the proportion of money available to spend on recreation pursuit increases. While income must first be applied to meet basic needs, after a point its uses are discretionary, and a rise in real income implies a rise in discretionary income; most people use more of their available discretionary income in recreation activities. Most commentators on recreation demand make the implicit, or explicit, assumption that recreation, like eco-tourism, is a luxury good; that is, the income elasticity for most recreation is greater than one. Especially for the local ecotourist, take a great part of the total number of ecotourist, ecotourism plays the role of developing local economy and increasing income.

iii. Prices of other goods

Probably, the most interesting question when looking at the demand for a particular recreational activity is which activity would be a substitute, and which complementary, to the given activity. Without information on the cross-price elasticity of demand for recreation activities, it is not possible to answer this question, due mainly to the inability to include information on the prices of substitute and complementary activities in the specification of the demand function. The demand for ecotourism is supply led, that the increase in the availability of eco-tourism ‘products’ has inevitably given rise to increasing number of ecotourists wishing to experience such products. The substitute good of ZMNR is the competitive advantage of other nature reserves around that can offer while the complementary good refers to the infrastructure built to support tourism, the service of the tour company, modes of transport and so on.

iv. Tastes and preferences

In fact, the most variable factor in the study of consumer demand for recreation is the tastes of the consumers. Early studies of participation patterns identified certain key socioeconomic variables that were important in determining people’s preferences for active recreation, these were primarily age and sex.

- Age
  Numerous studies have shown a consistent negative correlation between age and participation in virtually every sporting activity. Age is probably the most important variable in explaining variation in those sports that require physical contact and strength. But even in many less strenuous sports, like eco-tourism activities in general, participation normally drops off steadily with age.

- Sex
  A similar argument also relates to sex differences in recreation participation. Many surveys have shown that men have higher participation rates than women. Studies documenting the lower participation rates in many activities among girls explained these differences as due to the fact that, during childhood and adolescence, females are more constrained in exposure to, and opportunities for, active sport; or more sport illiterate.
than boys. However, recent evidence shows that these sex related differences are diminishing rapidly.

Although age and sex may have been good proxies for tastes in the past, the problem is that tastes are rapidly changing and established differences between the activities of different age groups and sexes may not continue into the future. This only serves to make the analysis of demand that much more complicated.

Information on visitor expectation and activity participation can be important in the development of management strategies or actions to deal with environmental impacts and economic returns. To explore the tastes and preferences is aimed to identify the preferred activities and patterns of demand for eco-tourism.

It is important to establish the commonly accepted determinants of ecotourism demand as a basis for assessing the consumer behaviour of ecotourists and, hence, the viability of the ecotourism concept itself; all tourist experiences, as the final output of the tourism production process (Smith, 1994), are dependent upon the input of tourists and, thus, the character of tourism development is directly influenced by the manner in which tourists experiences are consumed.

3.3.2. The Clawson travel-cost method

The following information is excerpt from Gratton & Taylor (1985) that summarizes the salient features of the Clawson travel cost method as follows:

- Despite the fact that use of the method has been almost entirely restricted to a narrow range of large resource based, recreation outlets, and studies using it have been largely academic as opposed to practical planning exercises, the most common forecasting technique for a specific site is still the Clawson demand curve also known as the Clawson-Knetsch or Clawson-Kenetsch-Hotelling method.

- It is a technique commonly associated with benefit estimation in recreation cost-benefit analysis, is primarily a method which identifies present demand and forecasts future demand, usually where little or no direct price is paid by participants.

- The method uses information on travel costs to generate a final demand curve for a recreation outlet; it is most appropriate for those outlets where travel cost is a major component of total visit costs—typically, free countryside outlets. The only information required by the method is the number of visitors attending a site in a specific time period and the distance they travel which is assumed closely related to the cost of travel.

- Having identified the distances travelled, this information is grouped into distance zones around the site; the nearer the zone is to the site, the cheaper the travel cost.

- The total population of each zone will be known from existing census data, and hence for each zone; thus a visit rate may be calculated, for example, one visit per year per 1,000 population.

- For each zone, a visit rate is associated with an average distance travelled; this distance can be converted to a visit cost by multiplying by the average travel cost per mile; hence,
One will arrive at a relationship for each zone between the visit rate and the visit cost which allows estimation of a demand curve.

The Clawson travel cost method of estimating the value of outdoor recreation services has been widely applied by researcher, and is accepted for use in official benefit cost analysis of federal water-resource projects in the USA. However, as outlined by Randall (1981), there are some unresolved difficulties in the use of the technique, and some limitations on its applicability as highlighted below.

- A major unresolved difficulty concern the time cost of travel. Since the traveller invests both time and income in order to enjoy the services provided by a recreation site, his or her expenses alone will provide and underestimate of the total sacrifice made in order to use the site and, therefore of his or her willingness to pay to use it. Unfortunately, since travel costs and travel time are highly correlated with each other, it has proven very difficult to obtain reliable statistical estimates that separate the influences of travel time and travel costs on use of the site. Solutions that simply add to the travel cost a “time cost” equal to travel time multiplied by a, usually small, fraction of the visitor’s hourly wage are not entirely satisfactory.

- The applicability of the method is limited by the assumption that all expenditures during the trip maybe regarded as paid specifically for the purpose of using the site. This assumption is violated when the trip itself is a source of utility, and when the trip involves visits to many different sites. The assumption that travel expenditures are an indicator of willingness to pay to use a site is violated when travel expenses themselves are small, and presumably an insignificant portion of the total sacrifices made by site users. This problem limits the use of the travel cost method for valuing services provided by recreation sites in or near large urban areas.

The travel-cost method is useable whenever travel cost is a significant determinant of use of a recreation site for which a number of assumptions have to be made and accepted, including (Sinden & Worrell, 1979):

a. All users obtain the same total benefit, and this is equal to the travel cost of the marginal (most distant) user
b. The consumer’s surplus of the marginal user is zero
c. Travel cost is a reliable proxy for price; this in turn, rests on an assumption that the disutility of overcoming distance derives from monetary cost alone
d. People in all distance zones would consume the same quantities of the activity at given monetary costs—the demand curve for all distance zones have the same slope

Assumption d) is a feature of all cross-sectional demand studies. Its validity is measured by the coefficient of determination of the pooled regression of quantity against travel cost for people in all zones. If the coefficient is high, the assumption can be accepted as generally being true.
4. Methodology and approach

4.1 The empirical model

The travel-cost method outlined in the previous section is the method intended to be employed in the preliminary analysis of demand for eco-tourism at the ZMNR. While the method was originally developed to assist in making policies about outdoor recreation, its central theme is that the cost of travelling to a recreation site influences the number of visits made to it. An eco-tourism activity is basically an outdoor recreational activity performed in a natural area. Therefore, the travel-cost method is applicable to study the relationship between cost of travelling to ZMNR and the number of visitors to the site.

The only information required by the Clawson travel-cost method is the number of visitors attending ZMNR in a specific time period and the distance they travel which is assumed closely related to the cost of travel. Therefore, a demand curve will be estimated using the number of visitors as the dependent variable and travel cost as the explanatory variable or simply:

\[ NV = f (TC) \]

Number of visitors or NV is the number of people actually visiting the ZMNR during the period of observation; travel cost (TC) is defined as the total cost of travel including transport fare, purchase of equipment, meals, gasoline for car and any toll road fees paid for. The period of observation is limited only to nine weeks starting 4 July 2011 due mainly to availability of resource especially time and money.

4.2 Needed data and sources

The primary data needed are the number of visitors and their costs of travel. However, other data that may influence demand for travel are also useful for explaining variation in the number of visitors. In the absence of data on visitors, there was a need to conduct field survey to directly collect the information through interviews. Income of visitors can not be used as the explanatory variable as the period of observation is less than one year while income statistics is normally available in yearly basis.

4.3 Design and conduct of the field survey

Individual visitors were interviewed by appointed interviewers in order to obtain as much relevant information as possible. Thirteen questions were asked to individual visitors as shown in Annex A. These include visitor identities, place of origin, distance from ZMNR, means of travel, mode of travelling (alone or in group), payees of the travel cost, estimate of travel cost, places visited on in-coming and returning trips, expected and actual experiences and source of information on ZMNR. The field survey conducted at ZMNR is surely preliminary in nature, not a deep research on eco-tourism at coastal area. It does not capture the dynamics of eco-tourism of coastal area which requires a further thorough investigation.

The interview was planned to be conducted for nine weeks starting 4 July 2011; it was carried out by ZMNR staffs and students of Beijing Forestry University under the supervision of the ZMNR Manager. In practice, however, observation of visitors could be made for seven weeks only due to the damage of bridge that connects the ZMNR with outside world.
5. Results and discussions

5.1 Number of visitors by age and sex

Table 1. Number of visitors by age and sex

<table>
<thead>
<tr>
<th>Age (year)</th>
<th># of visitor</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>21</td>
<td>8</td>
<td>38.10</td>
</tr>
<tr>
<td>20-29</td>
<td>71</td>
<td>25</td>
<td>35.21</td>
</tr>
<tr>
<td>30-39</td>
<td>64</td>
<td>21</td>
<td>32.81</td>
</tr>
<tr>
<td>40-49</td>
<td>79</td>
<td>30</td>
<td>37.97</td>
</tr>
<tr>
<td>50-59</td>
<td>18</td>
<td>7</td>
<td>38.89</td>
</tr>
<tr>
<td>&gt;60</td>
<td>1</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>254</td>
<td>91</td>
<td>35.83</td>
</tr>
</tbody>
</table>

The total number of visitor during the 43 days of observation was 254 persons or 5.91 persons per day, comprising 91 women (35.83 %) and 163 men (64.17%). Most of the visitors, 214 persons or 84.25% were 20 to 49 years of age of which 138 persons or 64.49% were men.

Logically it can be expected that visit to such outdoor recreation places requiring physical strength as the MNR is likely biased in favour of those more physically capable, and with more social drive to participate-younger groups. All age groups between 20 to 49 years are physically stronger than those aging younger or older. Younger people are under-represented for various reasons which may include: i) too young to engage in outdoor recreation activities on physical or psychological grounds; ii) young people normally prefer modernized, in-town recreation activities to natural ones; and iii) limited knowledge on the requirements for nature recreational activities. In fact, when the visitors arrive at the MNR they would find that physical strength is not the prime requirement for participation. However, those people had perceived that they would have to have physical ability to go around and enjoy their visit at the ZMNR. This perception itself is logical but has served as a limiting factor in making decision on travel destination.

Older people on the other hand, for physical ability reason, are more likely to go on informal recreation trips or use other local facilities, for example community centers or city parks. This is one of the reasons why recreational facilities for the elderly are growing rapidly in many developed countries.

Out of the 254 visitors, only 91 or 35.83% were female i.e. women were under-represented. As argued by Gratton & Taylor (1985), this under-representation is a lot worse for mothers with young children, a fact that is widely recognized but rarely countered with meaningful measures. Not only is there under-representation, but female demand is also confined to a few outdoor activities based on the physical and security considerations. If this finding is conclusive, the MNR manager is facing a dilemma. Either the imbalance can be accepted as a proper reflection of demand for recreation at the MNR, or it can be seen as symptomatic of a social problem which the manager is obliged to try to correct by offering incentives for women to visit in its future development program. But identifying appropriate incentives is not an easy task for the manager.
It is critical to note the general perception, socially and psychologically, that travelling to nature recreation sites is normally difficult and risky due to heavy topography and presence of such wild animals as snakes and bears thus is more appropriate for men only. This perception, if growing among the populations residing around the MNR, is in itself a limiting factor to introduce effective measures in its future development program for attracting greater number of women to visit the MNR.

5.2 Travel distance and means of transport

Table 2. Travel distance, means of transport and places of origin

<table>
<thead>
<tr>
<th>Travel distance</th>
<th>Means of transport</th>
<th>Places of origin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Car</td>
</tr>
<tr>
<td>&lt;100km</td>
<td>#44</td>
<td>2</td>
</tr>
<tr>
<td>(17.32%)</td>
<td>%100.00</td>
<td>4.55</td>
</tr>
<tr>
<td>100-199 km</td>
<td>#135</td>
<td>67</td>
</tr>
<tr>
<td>(53.15%)</td>
<td>%100.00</td>
<td>49.63</td>
</tr>
<tr>
<td>200-299 km</td>
<td>#20</td>
<td>13</td>
</tr>
<tr>
<td>(7.87%)</td>
<td>%100.00</td>
<td>65.00</td>
</tr>
<tr>
<td>300-399 km</td>
<td>#5</td>
<td>5</td>
</tr>
<tr>
<td>(1.97%)</td>
<td>%100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>400-499 km</td>
<td>#2</td>
<td>-</td>
</tr>
<tr>
<td>(0.79%)</td>
<td>%100.00</td>
<td>-</td>
</tr>
<tr>
<td>≥500 km</td>
<td>#48</td>
<td>-</td>
</tr>
<tr>
<td>(18.90%)</td>
<td>%100.00</td>
<td>-</td>
</tr>
<tr>
<td>Total visitors</td>
<td>#254</td>
<td>87</td>
</tr>
<tr>
<td>(100.00%)</td>
<td>%100.00</td>
<td>34.25</td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are percentage of visitors travelled within the zone, out of total visitors.

Out of 254 visitors, 179 persons or 70.47% travelled at distance less than 200 km from the counties and cities surrounding the MNR as listed in Table 2 riding car (38.55%) or bus (61.45%). For travel distance less than 400 km, only car and bus were used by the visitors; train and bus or plane and bus combined were used only for travel distance over 400 km. Use of plane and bus combined or train and bus was confined only to travel distance over 500 km, mostly by visitors from Beijing, Shanghai and overseas.

In total, the means of transport used by the visitors were bus (46.06%), car (34.25%), plane and bus combined (12.60%), and train & bus combined (7.09%), respectively. Bus is the most preferred means of transport by students and employees mainly due to its flexible route of service and inexpensive fare compared to other transport modes. Car is the next preferred mode
of transport especially by groups of family members and friends due to the growth of car use in Chinese family and its flexible time.

Travel demand has commonly perceived as having a consistent inverse relationship with distance travelled; the farther away from a destination, the lower the visit numbers. Figures in Table 2 indicate that number of visitors was first increasing up to distance of 199 km then decreasing when distance increased to 499 km for which the most preferred means of transport was bus or car; increasing for distance over 500 km but with different means of transport. That is to say that the figures in Table 2 do not reject nor accept the hypothesis on the inverse relationship between distances of travel with visit numbers. However, assuming that bus and car were the only means of transport available, number of visits would be decreasing as travel distance was increasing.

Despite its close association with travel cost and distance, this variable of demand for recreation is worth singling out as representative of ease of access on short and long recreation trips. For rural recreation the importance of car is self-evident as compared to urban trips where public transportation is usually available. Obviously, dependency on cars will vary according to the geographical location of the tourist site and associated factors like socio-economic make-up, population density and transportation provision. The fact that around one-third of the ZMNR visitors are dependent on cars for access does highlight the cause of the minority who have no private transport. That is to say that future development of the ZMNR should not be bias in favor of car users since this bias discriminates against the poors.

It is interesting to note the importance of car for access to ZMNR on short and long recreation trips keeping in mind that car ownership is not indicator of wealth of the society thus it is not a good explanatory variable of visitation. For future promotion of ZMNR, availability of public transportation service might be more influential to visitation of ZMNR compared to car ownership itself.

5.3 Visitors grouping

Table 3. MNR visitors by group

<table>
<thead>
<tr>
<th>Group base</th>
<th># of group</th>
<th>%</th>
<th>Total visitor</th>
<th>Average of visitor</th>
<th>Range # of visitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>1</td>
<td>0.40</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Student</td>
<td>3</td>
<td>9.45</td>
<td>24</td>
<td>8.0</td>
<td>4-15</td>
</tr>
<tr>
<td>Family</td>
<td>18</td>
<td>24.80</td>
<td>63</td>
<td>3.5</td>
<td>2-8</td>
</tr>
<tr>
<td>Occupation</td>
<td>8</td>
<td>20.47</td>
<td>52</td>
<td>6.5</td>
<td>3-17</td>
</tr>
<tr>
<td>Friendship</td>
<td>34</td>
<td>44.88</td>
<td>114</td>
<td>3.4</td>
<td>2-7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>64</strong></td>
<td><strong>100.00</strong></td>
<td><strong>254</strong></td>
<td><strong>4.0</strong></td>
<td><strong>1-17</strong></td>
</tr>
</tbody>
</table>

Figures in Table 3 indicate that out of 254 visitors interviewed, only one person travelled alone; 253 visitors were travelled in groups. The largest group was composed by personal friends, 114 in number or 44.88% of total visitors; followed by family group, 63 in number or 24.80% of total; the rest were employee and student groups. The fact that most visitors travelled in groups is not surprising. Primarily for safety reason, travel to natural sites is preferably made in company or group; travelling alone to such places is not common for psychological reason.
The groups travelled with different modes of transport depending on the size of group and distance of travel. For short distance, friendship group opted to use bus or car, bus for big and car for small groups. Family groups preferred to travel by car apparently for reason of practicality and cost efficiency; three groups found travelling by bus or plane and bus combined were the families coming from long distance places.

Groups of employees travelled with different means of transport including bus, car, plane and bus combined, depending on distance, size of the group and the cost. Small size groups travelling at short distance had always used car, larger size groups travelling at short distance opted to using bus. Student group had always travelled by bus for evident reason: cost efficiency. Only one group used train and bus combined while one other group used plane and bus combined; both groups came from Beijing.

5.4 Expectation of visitors

Table 4 summarizes the expectation of visitors when they planned to visit the MNR. The visitors expected to experience a variety of activities at the MNR site including bird watching, scenery seeing, learning about MNR, travelling and boating, individually or in combination.

Table 4. The activities the visitors expected to experience or MNR

<table>
<thead>
<tr>
<th>Activities</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird watching &amp; scenery seeing</td>
<td>31</td>
<td>12.20</td>
</tr>
<tr>
<td>Bird watching &amp; learning about MNR</td>
<td>21</td>
<td>8.27</td>
</tr>
<tr>
<td>Bird watching &amp; trailing</td>
<td>37</td>
<td>14.57</td>
</tr>
<tr>
<td>Bird watching</td>
<td>28</td>
<td>11.02</td>
</tr>
<tr>
<td>Scenery seeing</td>
<td>45</td>
<td>17.72</td>
</tr>
<tr>
<td>Learning about MNR</td>
<td>62</td>
<td>24.41</td>
</tr>
<tr>
<td>Trailing</td>
<td>22</td>
<td>8.66</td>
</tr>
<tr>
<td>Boating</td>
<td>8</td>
<td>3.15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>254</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Surprisingly, 62 visitors or 24.41% had expected to learn about MNR which might include the conservation program and activities under implementation, flora and fauna occupying the reserve in terms of species and features. Such interest in nature conservation is encouraging and needs to be accommodated by MNR manager in future development of the reserve. Scenery seeing was expected by 45 (17.71%) and bird watching was by 28 visitors (11.02%), respectively. Indeed, these two activities are probably among the most valuable asset of the MNR to offer, as this asset is available in practically unlimited amount in nature. The MNR management should focus on the provision of needed equipment and instrument to help visitors enjoy the scenery and birds in a convenient and practical manner.

Trailing is a common nature recreation activity and was expected by 22 or 8.66% visitors to enjoy. Indeed, around one km of trail already exists at the MNR but confines only to a small portion of the MNR. There is an ample opportunity for the MNR management to expand the trail in the future to allow visitors to wonder around the entire site. Indeed, expansion of the trial should take into account the bio-psychical characteristics of the reserve so that the trail is developed on the right length and routes.
As regards expectation for boating, it is not surprising. The reserve is situated at the estuary of a river that flows to the sea and experiences sea tides. Boating is therefore a reasonable expectation when visiting such a recreation site. It is one activity that MNR management has to consider accommodating in its future development program.

5.5 Source of information

Information on the MNR was obtained by visitors from three sources, namely friends by 112 visitors (44.10%), internet by 98 visitors (38.58%), and advertisement by 44 visitors (17.32%), respectively. It is highly advisable for MNR manager to enhance its website that is publicly and easily accessible. While dissemination of information through direct talking between friends is a common and free-of-charge dissemination channel, advertising is costly. In this light, use of a website is probably the most effective means for promotion of the MNR existence thus needs enhancing in terms of its access easiness and information content.

5.6 Travel cost vs distance of travel

Table 5. Average travel cost for different zones of travel distance

<table>
<thead>
<tr>
<th>Zone</th>
<th># visitor</th>
<th>Cost/visitor</th>
<th>Means of travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100 km</td>
<td>44</td>
<td>77</td>
<td>Car 13 groups, bus 1 group</td>
</tr>
<tr>
<td>100-199 km</td>
<td>135</td>
<td>371</td>
<td>Car 18 groups, bus 10 groups</td>
</tr>
<tr>
<td>200-299 km</td>
<td>20</td>
<td>435</td>
<td>Car 5 groups, bus 2 groups</td>
</tr>
<tr>
<td>300-399 km</td>
<td>5</td>
<td>200</td>
<td>Car 1 group</td>
</tr>
<tr>
<td>400-499 km</td>
<td>2</td>
<td>300</td>
<td>Train &amp; bus 1 group</td>
</tr>
<tr>
<td>≥500 km</td>
<td>48</td>
<td>3,610</td>
<td>Train &amp; bus 4 groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plane &amp; bus 9 groups</td>
</tr>
<tr>
<td>Total</td>
<td>254</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Close examination of the figures on travel cost as presented in Table 5 raised doubt on reliability of the data and their use in demand estimation:

- The travel costs for comparable distances using the same means of transport significantly different among groups; this is especially true for family groups travelling with car. For instance, for travel distance around 150 km using car, the travel cost ranged from 300 to 1,000 RMB. Apparently, definition of travel cost was understood differently by individual interviewees.

- The travel costs for comparable distances using bus varied from 50 to 200 RMB. Even if travel cost was defined the same by individual visitors, difference in cost still could occur due to the different routes taken by different busses.

- Average travel cost per person for the distance below 100 km was 77 RMB; the cost increased to 371 RMB for distance zone of 100-199 km and further increased to 435 RMB for distance zone of 200-299 km. Since the modes of transport used for the three zones were the same, i.e. bus and car, the increasing cost is reasonable as distance getting farther.

- The average travel costs for distance zones of 300-399 km and 400-499 km which were 200 RMB and 300 RMB, respectively, much lower than the preceding two zones with shorter distance. As the visitors consisted only one group for each zone with 5 and 2 members,
respectively, representativeness is obviously poor and use of the information, number of
visitor and travel cost, may lead to incorrect conclusion.

- For travel zone larger than 500 km in distance, number of visitors was 48 and the average
  travel cost was 3,610 RMB. It is difficult to assess accuracy of this travel cost because the
distance range is very wide, from 500 to over 2,000 km; besides, it is not clear how travel
cost was perceived by individual travellers in terms of its coverage.

Considering the quality of data on travel cost as outlined above, it was decided by the
authors to not use the information in further analysis of demand for eco-tourism at the MNR.
Therefore, no attempt was made to construct a demand function using number of visitor as the
dependent variable and travel cost, representing price, as the explanatory variable. Indeed, this is
one of the weaknesses of this particular work that needs to be overcome in future studies on
demand for ecotourism at the MNR.

5.7 Weaknesses of the analysis

The analysis of demand for eco-tourism at ZMNR was based on the data collected through a
seven-week field survey and suffered of weaknesses including:

- The data on visitors obtained certainly do not capture seasonal variation. The field survey
  was conducted only during summer, from early July to end of August 2011. Generally
  speaking, number of people travelling during summer is larger than any other seasons. It
  might be the case that the number of visitors obtained through this survey is greater than
  seasonal average. There is a need to conduct field survey on visitation that covers different
  seasons.

- The project design was inadequately developed, very likely due to the lack of communication
  between the Consultants, project management and field investigators. In particular, the
  travel cost was not clearly defined in the survey design. Hence, individual interviewers and
  interviewees alike might have understood the travel cost differently in terms of its scope and
  components and resulted in poor quality of data collected as elaborated in the previous
  section.

- Realizing the inferior data quality, employment of any statistics analytical technique was
  thought unnecessary and inappropriate as it may lead to undesirable outcome. Indeed, this is
  one major weakness of this work.

- Even if the data on travel cost were reliable and useful for estimation of a demand function
  showing its relationship with number of visitors, the function would not be useful for
  purpose of forecasting demand since the data used in the estimation of the function were at
  best weekly data.

Any future works on analysis of demand for eco-tourism at ZMNR should be free of above
weaknesses.
6. Conclusions and recommendations

6.1 Conclusions

Based on the findings of the field survey on visitors, the following conclusions can be drawn:

a. The total number of visitors during the 43 days of field survey was 254 persons or 5.91 persons per day comprising 91 women (35.8%) and 163 men (64.2%); 241 visitors (84%) were of 20 to 49 years of age.

b. Out of the 254 visitors, 179 persons (70.5%) travelled at distance less than 200 km, 61.5% travelled by bus and 38.5% by car. For all distance zones, the means of transport used by the visitors were bus (46.1%), car (34.2%), plan and bus combined (12.6%) and train and bus combined (7.1%), respectively.

c. The visitors were travelled in groups of peers or friends (44.9%), families (24.8%), employees (20.5%) and students (9.5%), respectively; only one visitor travelled alone.

d. Prior to arriving at ZMNR, the most expected activities by the visitors were to learn about ZMNR (24.4%), scenery seeing (17.7%), bird watching & trailing (14.6%), bird watching & scenery seeing (12.2%) and bird watching (11.0%), respectively.

e. Sources of information on ZMNR used by the visitors were direct personal contact (44.1%), internet (38.6%) and advertisement (17.3%), respectively.

f. Due to inadequate field survey design especially in defining the travel cost, the figures on travel cost obtained from the survey were of poor quality thus might be misleading when used in the estimation of demand function.

6.2 Recommendations

For future development of ZMNR in view of increasing the number of visitors, the actions recommended based on the results of the survey on visitors are:

a. To strengthen supply capacity of ZMNR by optimally utilizing the existing natural assets, e.g. scenery, mangroves, birds life and by adding required facilities, e.g. field laboratory and library, binoculars, etc. Extending the trail will allow visitors to enjoy the entire area of the reserve; providing binoculars will help visitors in bird watching; introducing activity on boating is justifiable in light of the natural setting of ZMNR.

b. To identify incentives for women to visit ZMNR through dissemination of relevant information on the activities at ZMNR that are not harmful or injurious for women.

c. As significant number of visitors expected to learn more about ZMNR, there is a need to provide field laboratory or demonstration plot where the dynamics of mangrove ecosystem can be easily exposed to visitors and to equip the reserve with a library of mangrove ecosystem.

d. For effective dissemination of information on ZMNR and advertisement of the reserve, especially its potential natural activities, the use of website that is publicly and easily accessible is highly recommended.
e. To sustain the ZMNR, collaboration with local people in its management is imperative. There is a need to identify activities relating to eco-tourism wherein interested local people can be trained on to allow their mutually benefiting participation in the management of the reserve.

f. Future analysis of demand for eco-tourism at ZMNR should take into account the influence of season on visitation and travel cost must be adequately defined when Clawson travel-cost method is employed for estimation of demand curve.
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