A Study on the Biological and Sociological Characteristics of Malaysian Recreational Fisheries and an Economic Assessment of this Fisheries at Selected Fishing Waters

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Introduction

A recreational fishery is one of the four fishery types existing today. This type of fishery is now developing in Malaysia although there is yet no any form of formal administration and management of this fishery by the fisheries governing authority of Malaysia, which in this case is the Fisheries Department of Malaysia. There have also been little or no efforts to accumulate research data on Malaysian recreational fisheries, especially on the sociological and economic components of this fishery . This study was a first attempt to accumulate such data on Malaysian recreational fisheries, which will be needed in formulating formal administrative and management policies for this fishery. In this study, attempts were made to accumulate basic data on three major components of recreational management: biological, sociological and economic. The biological component of the study is focused on researching the biological resources of the fisheries, particularly fish stocks. The sociological component is focused on researching the attitudes and other human dimension aspects associated with the people who participate in recreational fishing, i.e., the recreational fishermen. The economic component is focused on assessing the economic values of recreational fisheries arising from human participation in recreational fishing. A balanced and sound management of recreational fisheries requires that all the 3 components be considered, and data on these components are needed for sound management policies and guidelines (Ditton et al. and Fedler, 1986). In any recreational fisheries management plan, the objectives are to ensure that the enough fish stocks in acceptable quantity and quality are available for recreational fishermen, the maximisation of anglers' satisfaction and the maximisation of the economic values of the fisheries (Schramn et al, 1990). To ensure the availability of fish stocks, data are needed on basic parameters of the fish population as well as the ecological relationship between fish and its environment, which together make up the aquatic ecosystem of which fish is a part of (Sigler et al. and Sigler, 1990). The sociological management of recreational fisheries involves the management of the fishermen who are resource exploiters. Although the objective here was to maximise anglers' satisfaction, it is also necessary to control certain aspects of anglers' behaviour which could be destructive to the resource. Hence, an understanding of anglers' attitudes, expectations and other human attributes are important in recreational fisheries management (Royce, 1976). The maximisation of anglers' satisfaction also has a lot to do with encouraging them to spend money on their activity so that this will generate economic activities beneficial to society (Mitchell et al. and Carson, 1990). In turn, this requires the economic management of the fisheries so that recreational fishery can become an economically viable domain.

Materials and Methods

The biological portion of this study was conducted at the Semenyih Reservoir in Selangor. The reservoir is now one of the most popular fishing sites visited by recreational anglers. The objectives of this biological study were to determine the fish species composition of the reservoir, to determine the abundance of fish within the reservoir, and to determine the feeding habits of various species of fish within the reservoir. Information on these biological parameters of the fish population of the reservoir would contribute to better management of the reservoir's recreational fisheries. This biological study of the Semenyih Reservoir involves monthly sampling of fish from December 1998 to January 1999 using drift nets placed at 3 stations within the reservoir. The sampled fish were identified by species, enumerated, and brought to the laboratory for stomach content analysis. Data obtained would reveal information on abundance of the fish, composition of the fish community by species, and the types of food organisms eaten and preferred by the fish. The sociological portion of the study involved a survey of anglers participated in six major fishing tournaments organised between 1997 to 1998 in Selangor, Pahang, Terengganu and Perak. The survey involved interviewing anglers about their attitudes, experiences and other human attributes related to their fishing activities. The economic portion of this study involved the calculation of anglers' direct expenditures and their willingness-to-pay (WTP) arising from their participation in fishing. The economic study covers the same anglers who participated in the fishing tournaments.

Results and Discussion

The results from the biological segment of the study were as follows: 1438 individual fish were sampled from 3 stations in Semenyih Reservoir over a 1-year period from December 1998 to January 1999. Ten fish species from 7 families were sampled: *Mystacoleocus marginatus*, ikan sia (Family Cyprinidae), *Cyciocchеilicthys apogon*, ikan merah mata (Family Cyprinidae), *Osteochilus hasseltii*, ikan terbul (Family Cyprinidae), *Hampala macrolepidota*,

ikan sebarau (Family Cyprinidae), *Clarias batrachus*, ikan keli (Family Clariidae), *Oxyleoteris marmoratus*, ikan ketutu (Family Gobiidae), *Notopterus*, ikan belida (Family Notopteridae), *Oreochromis mossambicus*, ikan tilapia (Family Cichlidae), *Pangasius* sp, ikan patin (Family Pangasidae), and *Mystus nemurus*, ikan baung (Family Bagridae). The results indicated that *M. marginatus* (ikan sia) and *H. macrolepidota* (ikan sebarau) were most dominant species in the reservoir in terms of their abundance. *M. marginatus* comprised 63.2% of the sample, making the most dominant and abundant fish species in Semenyih Reservoir, followed by *H.macrolepidota* as the next most dominant species at 25.3% of the sample size. Results from the food habit study showed that the fish in the reservoir eat a variety of food organisms with some fish species showing greater preponderance for certain food items. In general, these fish exhibit an omnivorous feeding habit, feeding on both plant and animals although some tend to be more carnivorous while others were more herbivorous. Food items include insects, mollusks, small fish, plant debris, zooplanktons, and phytoplantons. Species like keli, ketutu, patin, sebarau, and sia tend to be more carnivorous, having more animal foods inside their guts while species like tilapia tend to be more plantivorous, having more plankton in their guts.

The results from the sociological segment of the study were as follows: The results showed that the majority of anglers in the sample were Malays (97.4%) out of a sample of 200 anglers participating in 6 fishing tournaments from 1997 to 1998. Most are male (97.4%), married (77.8%), having a mean family size of 6 persons, and generally young (mean age: 38.7 years), and a mean income of RM 1700.47. Educationally, the vast majority of these anglers had an upper school secondary education level or less. About half (52.8%) completed their education up to the upper secondary school level, with about 25% finishing only up to lower secondary school and primary school levels. Only 22.2% completed diploma and university degree levels of education. Professionally, these anglers come from 3 employment sectors in about comparable proportions: government (36.6%), private sector (36.8%) and self employment (26.3%). In terms of their fishing experience parameters, the following results were obtained: The largest segment of anglers indicated that they had been involved in recreational fishing for more than 20 years (42.1%), followed by those who have been fishing between 6 to 10 years (21.1%), 3 to 5 years (13.2%), and 11 to 15 years (10.5%). About 63.3% of these anglers felt they were experienced fishermen, only 13.2% feel they were inexperienced, while 23.7% had no opinion about their fishing skills. About 34.2% of the anglers indicated that they fish more than 5 times a month, followed by those who fish 3 times a month (28.9%), and twice a month (18.4%). Other categories were very small. The majority of these anglers considered themselves as 'recreational fishermen' (83.8%), i.e., they fish purely for fun or recreation with no subsistent or commercial interests. About 10.4% said they fish primarily for subsistence and 5.4% indicate they fish purely for commerce (income from sale of fish). In terms of their keeping up with fishing information, a vast majority subscribed to Berita Harian newpaper's Malay language weekly fishing magazine 'Joran' (83.9%). About 28.9% indicated that they subscribed to other fishing magazine besides 'Joran'. About 23.5% indicated that they subscribed the English language-fishing magazine 'Rod and Line'. Subscription of other magazines is extremely low among these anglers. A sizeable number of these anglers, however, buy fishing video tapes to enhance their fishing knowledge (41.7%) but only 5.6% were members of the national level Fishing Association of Malaysia although 25.7% indicate they are members of local fishing clubs. Asked about their preferred fishing waters, a vast majority indicated that they preferred both marine and inland waters (89.5%). As for inland waters, most of these anglers indicated their preference for estuarine waters (23.7%), freshwater lakes and reservoirs (21.1%) and a combination of all types of inland waters (18.4%). As for marine waters, most of them indicated preference for open seawaters away from coast (73.0%) as opposed to those who prefer marine coastal waters (18.9%) and those opting for both open sea and coastal waters (8.1%). Asked what they do with their catch, the majority of these anglers indicated that they generally released all small fish but kept all the large fish (78.9%), followed by those who kept all their catch regardless of fish size (15.8%). No anglers indicated a willingness to release all their large fish. Asked about what they do with the kept fish, most indicated that they keep it for their own food (57.9%), 18.4% indicated that they kept the fish both for their own food as well as giving some to others and 18.4% indicated that they give all their fish to others. Asked to express their feelings on certain issues on a scale of 1 (extremely unhappy) to 7 (extremely happy) with a value of 4 indicating neutral or without opinion, angler expressed their feeling on various issues. Values below 4 indicated unhappiness with an issue and those above 5 as happiness with the issue. Anglers were generally not happy with the number of fish they have been catching lately (mean:3.43), the size of fish they have been catching lately (mean: 3.37) and the type of fish they have been catching lately (mean: 3.60), and they were only slightly happy with their overall fishing experience lately (mean: 4.47) although they generally feel that fishing is central to their life (mean: 5.22).

Results from the economic segment of this study were as follows: Anglers' direct expenditures were calculated to determine how much they spend on their fishing trips. On average, an angler spent RM 893.46 to participate in all the 6 fishing tournaments researched in this study, with a range of RM 95.00 to RM 4025.00. Obviously, some anglers were willing to spend a great deal of money to pursue their fishing hobby. Anglers' total expenditures can be broken down into the following items with mean expenditure given in the parentheses: fishing tournament participation fee (RM 105.94), car rental (RM 60.53), boat rental (RM 43.97), petrol for car (RM 58.77), petrol for boat (RM 10.19), car/boat repair associated with fishing (RM 63.33), rent or purchase of fishing equipment (RM 336.18), food and beverages (RM 56.33), and lodging (RM 21.53).

Conclusions

Results from the biological segment of this study indicated that a fishing site such as the Semenyih Reservoir has an acceptable diversity of fish species available for recreational fishermen. The 10 species identified in this study

were popular species for recreational anglers. The results also showed that there is an acceptable diversity of fish food organisms that include phytoplanktons, zooplanktons, insects, small fish, mollusks and plants. There is also an ecological relationship between fish and the other aquatic organisms that serve as foods for fish. Fisheries managers should strive to maintain this ecological balance within the reservoir so that fish stocks could be at satisfactory level to support recreational fisheries at the reservoir. Results from the sociological component of the study indicated that anglers were from various socio-economic backgrounds and having different needs and demands which fisheries managers should try to address. Anglers are generally happy with some issues facing them as well as unhappy with other issues. It is necessary to maximise anglers' fishing satisfaction so that they will continue to be willing to spend money to pursue their fishing hobby. Results from the economic segment of the study indicated that anglers were willing to spend a great deal of money at a fishing site to pursue their fishing leisure. They spend money on various items at a fishing site, and in so doing, they generate economic activities allowing other people to sell services and products needed by anglers which further helps develop recreational fisheries into a viable economic domain.

Benefits from the study

The benefits from this study are in terms of the basic data that it provides which can be used to formulate guidelines and policies in managing recreational fisheries in Malaysia. This study alone will not provide all the needed scientific data but with more research efforts of this nature conducted across Malaysia in the future, perhaps the Malaysian recreational fisheries can be fully advanced as its counterparts in developed countries such as the United States or Western Europe. Recreational fisheries has taken roots in Malaysia but we are still unable to appropriately manage and administer it because of an extensive lack of data in this field compared to decades of data accumulation in the United States. Perhaps, this study is the first and the only research effort in Malaysia that attempted to study recreational fisheries in all its 3 basic components of management. Results from this study will benefit owners and managers of recreational fishing waters in Malaysia, especially the government which is the sole owner of Malaysian public waters most of which are potentially developable for recreational fisheries as the number of recreational anglers in Malaysia is now estimated at 200,000, which is quite large for a population of about 20 million.

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Project Publications in Refereed Journals

None.

Project Publications in Conference Proceedings

None.

Graduate Research

None.

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