SMALL PELAGIC FISHERIES INVESTIGATIONS IN THE PHILIPPINES PART I: HISTORY OF THE FISHERY

P. DALZELL
ICLARM
MC P.O. Box 1501
Makati, Metro Manila
Philippines

Introduction

The Philippines is one of the world's major fishing nations. Present landings from both marine and freshwater fisheries amount to about 1.6 x 10^6 tonnes year^{-1} which ranks the Philippines about 12th in the world. Small pelagic fish landings have oscillated between 430,000 t year^{-1} and 550,000 t year^{-1} (Dalzell and Ganaden 1987). Landings of small pelagic fishes account for about 25% of total Philippine fisheries production and 40% of the total marine landings. Less than 1% of the total small pelagic catch is destined for export.

The social and economic importance of Philippine small pelagic fisheries promoted the need for a review of accumulated data on these fisheries and an investigation of their current status. These objectives were the prime directives behind the Small Pelagics Management (SPM) project carried out by ICLARM and the Philippine Bureau of Fisheries and Aquatic Resources (BFAR). This brief paper presents a synthesis of some of the major findings of the reviews of secondary data on Philippine small pelagic fisheries by Dalzell and Ganaden (1987), Dalzell et al. (1987) and other project papers.

Characteristics of Philippine small pelagic fisheries

Philippine small pelagic fisheries are characterized by their diversity of species and the gears used to catch them. Approximately 50 species are included in the small pelagics category but four species groups - roundscads, sardines, anchovies and mackerels - comprise 80% of the landings (Table 1). Both commercial industrial fishing and small-scale fishing make about equal contributions to the small pelagic catches. Catch composition in each sector is quite different as commercial landings are dominated by roundscads and by anchovies and sardines in municipal landings. Over thirty gears have been recorded catching small pelagic fishes but five gear types - bagnets, gill nets, trawls, beach seines and purse seines - account for 80% of total landings (Dalzell and Ganaden 1987).

Fishing for small pelagics in the Philippines, particularly by commercial fishing vessels, is commonly performed around payaos or floating fish aggregating devices. This has became more prevalent in recent years due to the rising costs of fuel which has made fishing on free swimming schools unprofitable.

Time series of catch and fishing effort

Fisheries statistics in the Philippines began to be collected in 1946. Using data published between 1948 to 1986, it was possible to estimate the total annual commercial and small-scale catches for each year. Similarly, estimates of fleet size and total horsepower permitted the determination of an index of fish effort standardized to that of a commercial

Table 1. Mean annual catch of small pelagic fishes in the Philippines between 1982 to 1986

Common name	Family name	[a]Annual small-scale catch (t)	[b]Annual commercial catch (t)	Total catch (t)	Per cent of total
Roundscads	Carangidae	28,664	128,820	157,484	29.9
Sardines	Clupeidae	69,994	42,717	112,711	21.4
Anchovies	Engraulidae	63,384	32,223	95,607	18.1
Mackerels	Scomberidae	30,078	31,242	61,320	11.6
Big-eye scads	Carangidae	18,335	12,692	31,027	5.9
Round herrings	Clupeidae	17,191	9,540	26,731	5.1
Flyingfish	Exocoetidae and Hemiramphidae	19,584	80	19,664	3.7
Fusiliers	Caesionidae	7,822	9,601	17,423	3.3
Halfbeaks	Hemiramphidae	5,087	119	5,206	1.0
Total		260,139	267,034	526,173	100.0

[a]Refers to boats of < 3 gross tons
[b]Refers to boats of 3 gross tons and more

purse seiner. R.J.H. Beverton and S.J. Holt showed that fishing power of North Sea trawlers was related to vessel horsepower. More recently, G. Podesta discussed a technique by which vessel horsepower can be used to standardize relative fishing power. In this instance, the effects on fishing time by carrier vessels was also accounted for as was also the "horsepower equivalent" of the nearly one million Filipinos employed in small-scale fishing.

The 38-year time series of catch, effort and catch per unit effort (C/f) for Philippine small pelagic fisheries is shown in Fig. 1. Fishing effort rose exponentially between the mid-1960s and mid-1980s. Catches of small pelagic fish increased accordingly between 1948 and the early 1970s then leveled out at around 500,000 tonnes despite annual increases in fishing effort. The decline in C/f is clearly evident and over the 38-year time span. When annual catch is plotted against fishing effort, the points can be fitted with a Fox surplus production model (Fig. 2). The conventional model demonstrates its limitations where fishing effort is changing markedly from year to year and the fishery is taking more than the surplus production. In this instance, J.J. Pella and P.K. Tomlinson's generalized stock-production model is probably more appropriate since it can account for the skew caused by the non-equilibrium condition in the fishery.

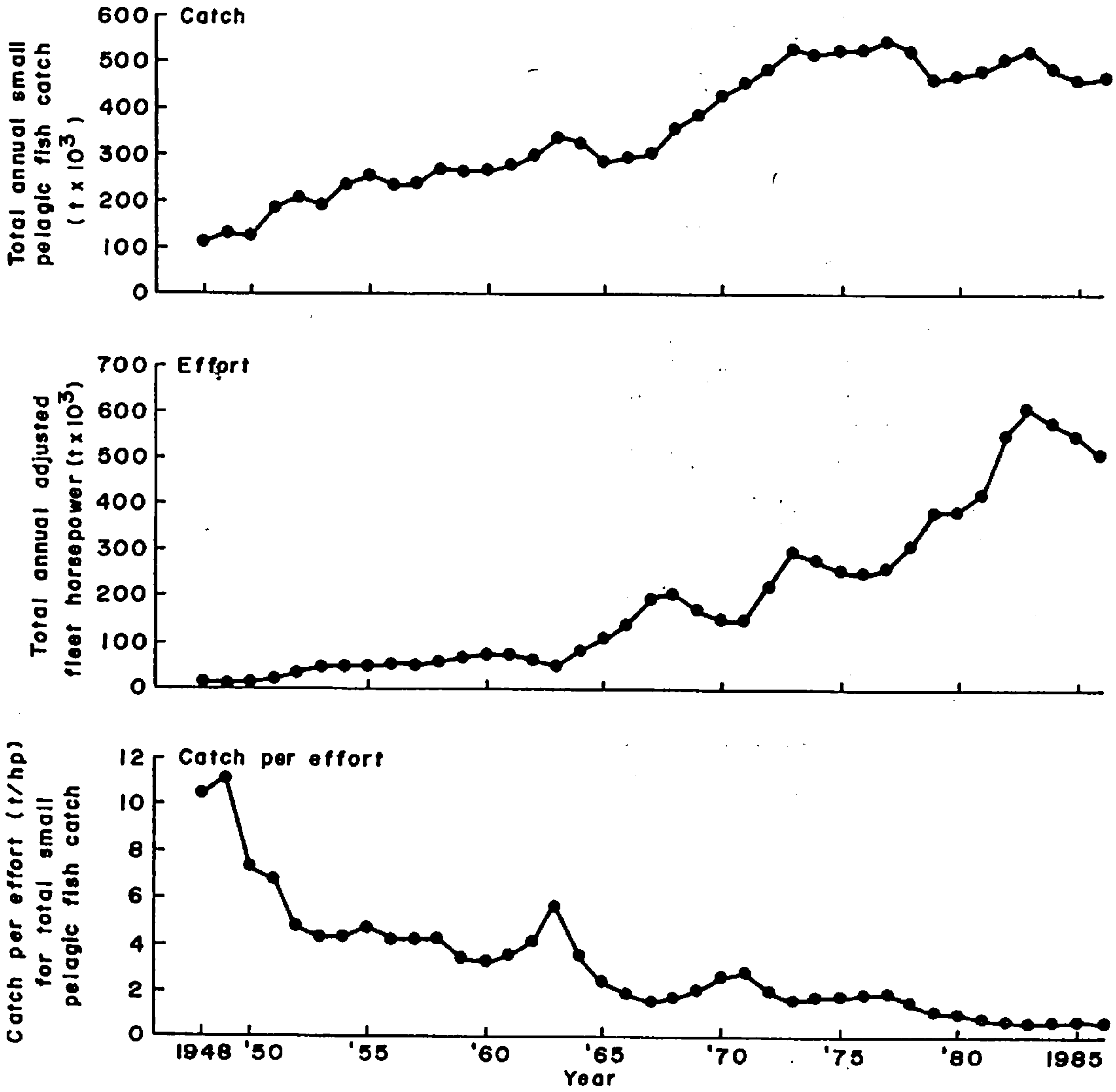

Fig. 1. Time series of total small pelagic catch, fishing effort and catch per effort, 1948 to 1986 (from Dalzell et al. 1987).

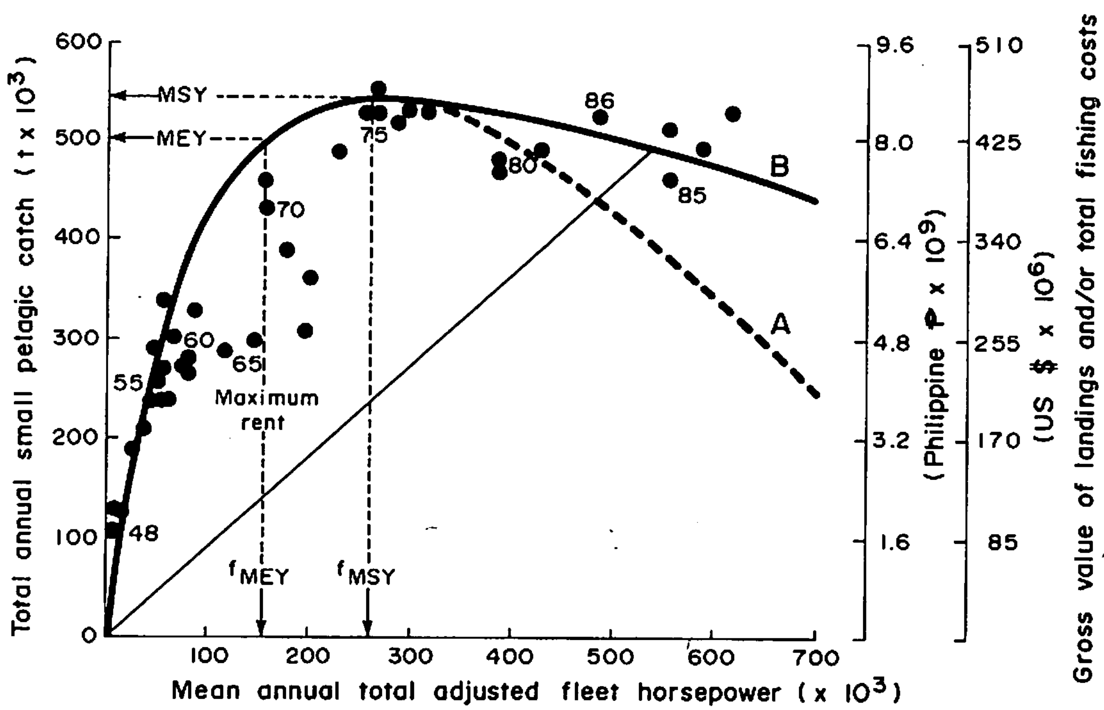

Fig. 2. Total annual small pelagic catch versus mean annual fleet horsepower. Curve A is the Fox surplus production model fitted by conventional means; Curve B was fitted by eye. The f_{MEY} and MEY are based on the assumption that the fishery achieved economic equilibrium between 1981 to 1985. Equation of the line fitted to the 1948 to 1985 points: $y = x\ e^{1.751-389310\text{-}6x}$. The 1986 data point was added without recalculating the curve (adapted from Dalzell et al. 1987).

The maximum sustainable yield for the Philippine small pelagic fisheries is 544,000 tonnes at a level of fishing effort at about half of that which generates present landings. The catch data were also converted to economic value using price data and it was assumed that economic equilibrium (i.e., returns from fishing = all costs) was achieved in the early 1980s. This permitted the estimation of a simple linear cost function which showed that maximum economic yield (MEY) or pure profit above all costs in the Philippine small pelagic fisheries occurs at about 60% of the effort generating MSY and 35% of the present effort level.

Discussion

Based on the review of historic data, Philippine small pelagic fisheries appear grossly overfished. This is a common problem in Southeast Asia where overfishing has occurred with demersal fisheries in the Philippines, the Gulf of Thailand, the Sunda Shelf of Indonesia and the demersal and pelagic fisheries of Western Malaysia. In the last mentioned instance, it was shown that a 50 to 65% effort reduction was necessary to generate MEY. A further objective of this contribution was to demonstrate that routinely collected fisheries statistics can be used in such a way as to generate important management information. More detailed aspects on biology, fisheries dynamics and economic aspects of the Philippine small pelagic fisheries required detailed sampling and survey data. A brief summary of these results will be presented in the second and final part of this contribution in the next issue of Fishbyte.

References

Dalzell, P. and R. Ganaden. 1987. A review of the fisheries for small pelagic fishes in Philippine waters. Bureau of Fisheries and Aquatic Resources Tech. Pap. Ser. Vol. X(1):1-58.

Dalzell, P., P. Corpuz, R. Ganaden and D. Pauly. 1987. Estimation of maximum sustainable yield and maximum economic rent from the Philippine small pelagic fisheries. Bureau of Fisheries and Aquatic Resources Tech. Pap. Ser. Vol. X(3):1-23.