FISHERY RESOURCES ACCOUNTING IN THE PHILIPPINES[1]

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Introduction

The System of National Accounts (SNA) summarizes the flows of services, materials and products characterizing a nation's economic activity. It aims to provide information network suitable for analyzing the performance of the economic system. When the Gross National Product (GNP) increases by so much percent, that tells us where we are relative to a reference period.

There are two ways of measuring income. It can be measured in terms of input and output. The input side and the output side must equal. The input side covers the distribution of goods and services produced in a given economy. How much, for example, goes to employees as compensation, how much goes to entrepreneurs in terms of net operating surplus, how much goes to the government in the form of taxes and so on. The GNP includes the compensation of employees and direct taxes, depreciation of produce assets and net operating surplus and transactions with the rest of the world. The Gross Domestic Product (GNP) is GNP net of transactions with the rest of the world. Produced assets are man-made assets such as manufacturing plants, buildings, etc. These assets depreciate and that represents input into the production process. To measure the Net Domestic Product, the amount allotted for depreciation is subtracted from GDP. This is the conventional system of national accounts which measures depreciation for man-made assets.

The conventional system of national accounts does not recognize or include environmental or natural resource as inputs to production such that it responds poorly to changes in environmental and resource conditions. Also, it fails to reflect the efforts to solve environmental problems and efforts to clean up the problem. For example, in polluted cities, having an air-conditioner in one's home is sometimes a luxury. But some people view it as a protection against pollution. Installing cars with an air conditioner is also a means of protection from fumes in traffic jams. These are not really entirely productive use of assets or services but these are meant as protection from pollution. However, these are not separated from the conventional system of national accounts such that the system of national accounts becomes an inadequate measure of economic well being or social welfare.

The fundamental definition of income encompasses the notion of sustainability. In accounting and economic textbooks, income is defined as the maximum amount that the recipient could consume in a given period without reducing the amount of possible consumption

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for the future. So if one spends all his salary now and has nothing for tomorrow, income therefore is not measured by how much is spent today because it leaves nothing for the succeeding periods. In a macro-economy, the income which is reported in the national income accounts may prevent the realization of the same level of income in the future, since the SNA does not account for natural resource and environmental inputs. Somehow, the national income accounts do not provide a good measure of income. The distinction between man-made capital and natural assets in the system of national accounts has been made because of the notion that the latter are not valued since they are abundant and have no marginal value. However, with increasing demands on these resources, they are becoming scarce; in order to satisfy current needs, we are actually sacrificing provision for future needs.

What are then the policy implications of the difference in treatment of natural *and* man-made assets? First, it reinforces the dichotomy between economy and the environment which leads the policy maker to ignore or destroy the latter in the name of economic development. The distinction also confuses the depletion of valuable natural assets with the generation of income. thus, it validates the idea that the rapid rates of economic growth can be achieved and sustained by exploiting the resource base. These are the illusionary gains in income and permanent losses in wealth. The concern has been directed on the present time, but not so much on the future.

A number of countries have recognized the deficiencies of the national income accounts and there are several approaches to modify it. The first is the expansion of the conventional accounts either by direct modifications of these accounts or reclassification of accounting entries. This entails identification and classification of environmental expenditures. Another approach is in the construction of satellite accounts. The satellite accounts measure the flow of resources, materials and pollutants and energy that underlie economic activities. Some of these are primarily physical accounting. Examples of applications are in forest resources wherein there are: opening stock; harvesting; and ending stock. Another is the computation of depreciation of marketed natural resources i.e., resources which are valued in the market. Estimates of depreciation depend on the physical stock of natural resources and on the market values of commodities generated by these stocks. Depreciation in fishery, for example, is calculated in terms of the loss in fisheries and ability to generate marketed product.

Income Accounting Concepts

Natural resources accounting is linked with the use of the environment or natural resources to the national income accounts. There are three areas of adjustment in the income accounts and these are for the specific expenditures, depletion or degradation of the natural resources and for environmental services and damages. The paper "Fishery Resources Accounting in the Philippines: Applications to the Small Pelagics Fishery" (Appendix) is a consulting report for the environment and natural resources accounting project funded by USAID wherein we estimated the depreciation for fishery resources.

The first task is to determine whether fishery resources are considered economic assets. In the national income accounts, fishery resources are not considered assets. When you say an asset is economic, you have exclusive use, you can transfer ownership and you can sell it. The first thing needed is to justify fisheries/fishes as economic assets for the Philippines. In dealing with small pelagic species, since migration pattern is more or less defined for all species, one can expect that they are found during a certain period of the year in Philippine

waters. Thus, they may be considered as Philippine resources which can be controlled or regulated as part of the Law of the Sea and the Exclusive Economic Zone (EEZ). As assets, fishery resources are valued because of the stream of benefits they provide over time.

Biological and Economic Concepts

The simplest method to measure sustainable yields is the surplus yield model by Schaefer. When I say benefits, I would qualify that as net benefits, being net of costs. In constructing a yield curve, there should be a time series of data of yield and fishing effort. Fisheries is probably one of the earliest applications of statistics since no one has idea as to how much fish is there in the water. The data gathered are only catches from which conclusions are derived. I choose to do the natural resources accounting exercise on small pelagic fishes basically to extend the work done by Dalzell. I did not conduct any resource accounting of demersal, fishes and this application may be subject of future work. Table 1 of the attached paper shows a series catch of small pelagic by gear and by sector. There are blanks since no date were available during the period. Dalzell has data from 1948 to 1985 which I extended from 1986 to 1991. These date are based from the Philippines Fisheries Statistics. Dalzell said that in 1985, small pelagic species are already overexploited. However, at a glance, fisheries statistics might have shown otherwise. The total horsepower for both municipal and commercial did not increase although the catch is increasing. The relationship was constructed between catch per unit of effort and fishing effort based on the date from 1965 to 1991. I was able to fit a preliminary curve. Partly the preliminary yield curve did not make sense. I argued that the measure of effort is more accurate than the measure of catch since it is easier to count the number of boats than to monitor landings in the country. Catch was adjusted given some measures of fishing effort. I recomputed the date from 1986 to 1991 given the effort and project CPUE. Based on statistics, catch in 1991 was about 740 tons but base on the adjusted catch it's only 570 tons. The actual CPUE reported in the statistics is increasing by more than 0.3 metric tons per horsepower from 1988 to 1989. The adjusted catches are more reasonable than the reported catches, as earlier mentioned. Adjustments were done by reconstructing the data to fit a yield curve. No correction was made on the time series data in the later years since the yield would have been very high and thus, far from the estimated. The Fox Model was used rather than the Schaefer Model because the former gives better fit.

The sustainable revenue-effort curve is derived by multiplying the sustainable yield curve to a given price. Revenue is just equal to price multiplied by yield. The total cost curve was estimated to get the bio-economic model of small pelagic fishery. Any point in the total revenue curve is sustainable, because it is derived from the sustainable yield curve.

Depreciation would be the change in the net benefits derived from one year to another due to changes in fishing effort. The net benefits are not measured over the period (year) only because these are sustainable by which future benefits can be capitalized. In order to value the stream of benefits in the future, the capitalized rent is derived by dividing the present rent with the social rates of discount which is assumed at 15%. The asset value approach looks at the changes in asset value from one year to another.

Fishery Resources Accounting Results

We now interpret the results of the study. Over the reference period, the reported small pelagic catches in the national income accounts are adjusted by depreciation of appreciation of the small pelagic stocks. What are the policy applications of the adjusted output? The answer to this question would have to be related to the level of exploitation of the fishery resources that would maximize the asset value or the rents in fisher. This is actually the maximum Economic Yield (MEY). The MEY is different from the Maximum Sustainable Yield (MSY) which is the biological prescription for fisheries management — the value of net benefits from the fishery is not actually maximized at MSY. Moving away from the MEY point means increasing effort thus, rents are decreasing. Moving further away would result in zero rent. There are points where the total cost is greater than the total revenue which means that rent is negative.

Where rent is negative or zero, we need to decrease effort as it represents overexploitation of resources. Decreasing fishing effort, however, results in appreciation of fishery resources as the rebuilding fish stock would increase net benefits and, hence, rent. I adjusted the value of actual catches of small pelagic species by the amount of appreciation or depreciation. Over the period 1948 to 1991, the annual catches have to be adjusted by as much as 200 million pesos to correct for the overexploitation of the natural resources. The policy implications here is that by maximizing catches now, and that means higher income figures in the national income accounts, we are not actually maximizing the sustainable yields in the fishery as this comes at the expense of lower future harvests.

For practical management implications, I tried to estimate the values of the key fishery indicators at different levels: open-access, MSY and MEY. Open-access is about 537,000 HP. We are now at around 500,000 HP as of 1991. Because of the exit of some fishing vessels in the fishery, we are below the open-access equilibrium. What I should not here is the big difference between fishing effort that corresponds to the open-access, MSY and MEY.

Results here confirmed the findings of Dalzell as well as the continuing overexploitation of the Philippine fishery resources. By continuously overfishing our resources, the national accounts should be adjusted for the negative effects of the overexploitation.

Natural resource depreciation in the environmental or natural resource accounting project was computed for four resources namely forest, fisheries, minerals and soils. The value of the services of air and water was also estimated in our project. Air and water are the final depository of pollution. such value is estimated by measuring the cost of protection, the preventive expenditures and outputs from nature being the damages, the nature services.

There are many approaches right now in adjusting the national income accounts to take account of the use of the environment and natural resources. But the advantage of the framework of ENRAP is that it is preserves the original system of the national accounts. It is just being extended to account for nature and natural resource inputs. With this correction on the system of national accounts, we have a better measure of sustainable national income.