FISCAL REFORM IN FISHERIES

2: Resource Rent

DFID Department for International Development

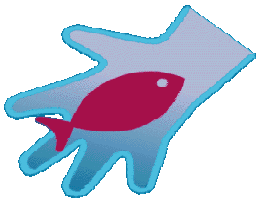
The purpose of these *Key Sheets* is to provide decision-makers with an easy and up-to-date point of reference on issues relating to the provision of support for sustainable livelihoods.

The sheets are designed for those who are managing change and who are concerned to make well-informed implementation decisions. They aim to distil theoretical debate and field experience so that it becomes easily accessible and useful across a range of situations. Their purpose is to assist in the process of decision-making rather than to provide definitive answers.

The sheets address three broad sets of issues:

- Service Delivery
- Resource Management
- Policy Planning and Implementation

A list of contact details for organisations is provided for each sub-series.



Support unit for International Fisheries and Aquatic Research - SIFAR

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This Key Sheet is one of a series on fiscal reform in fisheries[(1)].

Overview of the debate

Resource rent is a key concept in fisheries exploitation and management since, on the one hand, it is the driving force behind the widespread overexploitation of fisheries and, on the other, it determines the potential economic and social benefits that may be derived from well-managed fisheries.

Management systems have typically paid insufficient attention to resource rent, a fact that has been a major reason for the failure of many such systems. Where resource rent is not dealt with explicitly, the incentive for each fisher to attempt to catch fish before others do ensures that such rent is eventually all dissipated - i.e. it is invested in excess fishing capacity leading to overexploitation in both economic and biological terms.

The issue of resource rent is strongly related to access conditions in the fishery. The free and open access nature of many fisheries leads to overexploitation. It raises therefore questions of defining ownership and property and use rights.

Ownership issues in turn lead to problems of who is able to 'charge' for the use of the resource, who bears the costs of use and who reaps the benefits.

Management objectives in a fishery are ultimately of a social and economic character, and their achievement on a sustainable basis requires the explicit consideration of resource rent – its generation and distribution. The achievement of these objectives is subject to constraints, especially ecological sustainability. Because of widespread overexploitation, this latter constraint often features as a policy goal.

Policy decisions must be made about how the wealth from the fishery is collected and how that wealth is distributed.

Key issues in decision making

What is resource rent? This Key Sheet aims to present the fundamental ideas underpinning resource rent and to give some idea of its economic importance. However, the concept of resource rent is not easy to explain simply because it depends on an understanding of some key economic concepts (such as opportunity costs and normal profits). Due to its central role in fisheries exploitation, all fisheries managers need to have some familiarity with these terms. It should be an important part of policy development to ensure a minimum training in economics for fisheries managers.

Fish resources are clearly inherently very valuable but this value is often disguised by their overexploited state. If a single person, or company, were to be given control of a fish resource, he or she would be able to charge people to use the resource, in exactly the same way that people do who own apartments or cars for example. And in the same way that Governments do for the use of many other natural resources such as oil.

The amount that could be charged depends on the implicit resource rent – the amount which is left over when all exploitation costs have been deducted from revenues. In economics, such costs are defined to include a "normal" return to both capital and labour, taking into account risk and entrepreneurship. To complicate matters further, in economics such costs are defined in terms of opportunity costs – the amount that could have been earned if the labour or capital had been employed in its next best alternative. Sometimes opportunity costs are measured well by the market (e.g. wage rates for labour) but not always (e.g. if there is high unemployment). However, although these points may complicate the calculation of resource rent, they should not prevent an understanding of the fundamental ideas.

In summary, costs cover all elements used to produce a given level of exploitation in a fishery including an acceptable level of return on capital, and the resource rent is any revenue received in excess of this amount. Since both costs and prices vary, it will be apparent that resource rent is not some fixed amount but is also variable.

Resource rent does not only vary through time, it also varies with the level of fishing effort as will become clear from the discussion in the section below on generating resource rent.

Key Sheets for Sustainable Livelihoods

DFID experience

- The DFID Workshop and Exchange of Views on Fiscal Reform in Fisheries took place in the context of a wider OECD-DAC ENVIRONET initiative examining issues related to environmental fiscal reform (EFR) for sustainable development and poverty reduction. Outcomes of this initiative will include a joint-agency paper on EFR - Environmental Fiscal Reform.
- DFID has also supported work on EFR in China, India and South Africa.

Centres of expertise

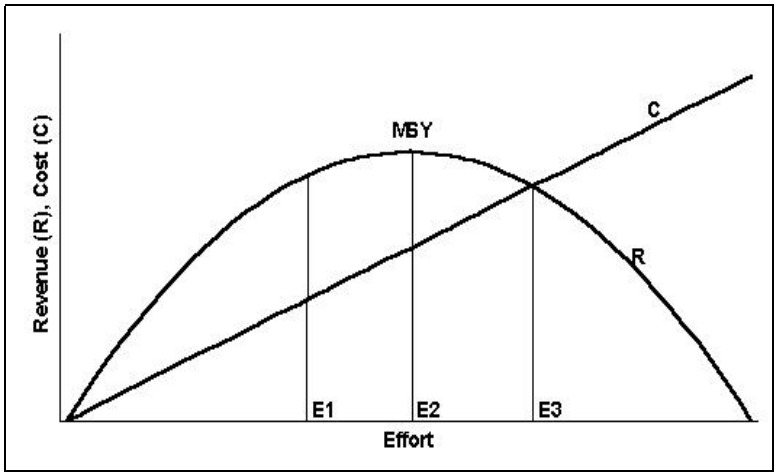
- Australian Bureau of Agricultural and Resource Economics - ABARE
- Department for Environment, Fisheries and Rural Affairs - DEFRA
- Department for International Development - DFID
- European Union - EU:
  - DG VIII Development
  - DG XI Environment
  - DG XIV Fisheries
- Food and Agriculture Organization of the United Nations - FAO UN, Fisheries Department
- German Technical Cooperation Agency - GTZ
- GOPA Consultants
- IDDRA
- Institut de Recherche pour le Développment - IRD
- Integrated Marine Management - IMM
- Marine Resources Assessment Group - MRAG
- National Oceanic and Atmospheric Administration - NOAA Fisheries
- Natural Resources Institute - NRI

Ownership issues - The concept of resource rent was first developed by Ricardo in 1817 in the context of land. One important difference between land and fish is that the former tends to stay where it is whereas the latter are notoriously mobile. It has proven relatively easier to define property and use rights in the case of land than in the case of fish. A big policy challenge in the case of fishing is therefore the future development of property and use right systems. Such systems will have major implications both for the generation of resource rent and for its sharing between different stakeholders.

Fisheries on the high seas outside of 200 mile EEZs - Exclusive Economic Zones - have no effective owner and pose particular difficulties to management. Even within EEZs, although the State is usually the legal "owner", or custodian, of the fish resource, the application of ownership rights in terms of resource rents remains relatively rare, although it is beginning to become more common.

One reason is that access to fishing has long been considered free and open, and the concept of having to pay a rent to use the resource can be hard to implement from a policy perspective. Because of its free and open nature, fishing has often been an activity of last resort. Policy-makers are faced with hard choices. World-wide experience suggests strongly that current policies will simply lead to increasing ecological problems. Moving towards management based on rent generation and restricted access appears to offer the best hope for improved fisheries exploitation in the future, but requires careful policy development given the difficult social welfare issues that are raised.

Generating resource rent - The diagram below presents a simple model of a fishery based on a Schaefer biological growth function. On the assumption that the price of fish is independent of the quantity sold, the parabola shows that as effort increases so does sustainable yield up to a maximum (the maximum sustainable yield - MSY) at effort level E2. Beyond this point, further increases in effort result in reductions in sustainable yield. For many years, and still in many international conventions, MSY was considered the biological optimum[(2)].



Resource rent is the vertical difference between revenue (shown by the parabola marked R) and costs (shown by the straight line from the origin marked C). Resource rent also initially increases as effort increases, reaching a maximum at effort level E1. This level is called the maximum economic yield (MEY). Increases in effort beyond this point reduce the economic return from the fishery. Note that maximum resource rent, or MEY, occurs at an effort level somewhat below MSY and therefore a policy aimed at achieving maximum resource rent (the economic optimum) would be more ecologically friendly than a policy targeting MSY.

Since fishing is usually undertaken in pursuit of profit, it might be thought logical that fishers would use fishing effort so that resource rent is maximised. Recall, however, that the cost line includes "normal" profit. As a result, at levels of effort below that where revenue and cost are equal, fishers will be earning above normal profits. As with any industry, such profits will attract new entrants and, if access is free and open, this process will continue until all resource rent has been dissipated, at effort level E3.

In equilibrium then the fishery will operate at the point where revenue equals cost. Fishers will earn normal profits but the fishery is overexploited both economically and biologically. In practice the situation is likely to be worse than described by the model because of the variability of the key parameters in fishing – biological productivity, prices and costs. Above normal profits can easily emerge in the short run encouraging non-viable increases in effort that are difficult to correct.

The key policy problem is to design management arrangements that prevent resource rent from being dissipated. Only two broad options present themselves - either management instruments must be developed that enable rents to be capitalised, or rents must be removed through royalty payments (or a combination of the two).

Calculation and importance of resource rent - The calculation of resource rent essentially requires giving values to the diagram above. Key data requirements include the biological productivity function, and costs and earnings associated with the various segments operating in the fishery. Generally speaking bioeconomic models must be constructed for the major fisheries. Such models can be more or less complicated depending upon requirements.

Centres of expertise *cont.*

- Netherlands Institute for Fisheries Research - RIVO
- Organisation for Economic Cooperation and Development, OECD-DAC
- Overseas Development Institute - ODI
- Support unit for International Fisheries and Aquatic Research - SIFAR
- University of British Columbia - UBC, Fisheries Centre
- University of Portsmouth, Centre for the Economics and Management of Aquatic Resources - CEMARE
- World Bank
- WorldFish Center - WFC

A basic formula for calculating resource rent might be:

RR = TR – (IC + CE + CFC + NP)
NP = r x K

Where:
RR is Resource rent
TR is Total revenue
IC is Intermediate consumption
CE is Compensation of employees
CFC is Consumption of fixed capital
NP is Normal profit
r is the opportunity cost of capital
K is the value of fixed capital stock invested in the industry for each fishery

However, each element in the above equation may be treated as a module capable of further development. For instance, revenue from the catch will depend on the price of fish and the quantity caught. Price in turn will depend on the demand for the product which itself depends on a variety of factors. A detailed bioeconomic model might include a demand module, designed to try to predict prices for different levels of catch and different demand parameters (such as consumer incomes). Similarly, quantity caught will depend on the biological situation of the fishery and this also may be modelled.

This approach will need to be supplemented to take into account rent which has already been capitalised, for instance into licence values.

Relatively few estimates of resource rent exist, and one important policy goal must be to develop many more such estimates in the future. Rules of thumb suggest that rents are in the order of 10-60% of gross revenue, usually at the higher end of the range. An interesting study of Namibia is presented by Lange and Motinga (1997). They compare resource rents in mining and fisheries, show how such rents may be calculated and demonstrate the way in which improved fisheries management has enabled the generation of such rents. They estimate that rents increased from around US$ 2 million in 1980 to over US$ 65 million in 1995. The main policy questions were how to improve estimates of rent on a fishery by fishery basis and how to ensure an appropriate sharing of rent between Government and the fishing industry.

Key Sheets for Sustainable Livelihoods

Key Literature

The best place to begin for a discussion of resource rent is one of the standard textbooks, such as:
Anderson, L. (1986) *The economics of fisheries management.* Johns Hopkins rev. and enlarged ed.
Cunningham, S., M. Dunn and D. Whitmarsh (1985) *Fisheries economics: An introduction*. London: Mansell and St Martins.
The paper by Lange and Motinga is also well worth reading:
Lange, G.-M. and D. Motinga (1997) *The contribution of resource rents from minerals and fisheries to sustainable economic development in Namibia.* Namibia: Ministry of Environment and Tourism. Research Discussion Paper 19.
Larkin, P. (1977) An epitaph for the concept of MSY. *Trans. Am. Fish. Soc.* 106(1):1-11.
Sissenwine, M. and P. Mace (2003) Governance for responsible fisheries: An ecosystem approach. In: Sinclair, N. and G. Valdimarsson (eds). *Responsible fisheries in the marine ecosystem*. Rome: FAO.

(1) This special series of Key Sheets on Fiscal Reform in Fisheries disseminate the outputs of a 'Workshop and Exchange of Views on Fiscal Reform in Fisheries - To Promote Growth, Poverty Eradication and Sustainable Management' organised by SIFAR/FAO, Rome in October 2003 and sponsored by DFID. See Fiscal Reform in Fisheries Key Sheet 1: Workshop overview.

(2) Use of MSY as a management goal has long been criticised by both biologists and economists – indeed Peter Larkin wrote its epitaph as long ago as 1977. It has proved difficult to replace however and continues to occupy an important place in fisheries management. More recently, the idea of taking MSY from any one fishery has been criticised and the need for an ecosystem approach to fisheries exploitation and management has been proposed. However, Sissenwine and Mace, in a presentation to the Ecosystems Approach Conference in 2001, argued that although conceptually the ecosystems approach is correct, we are a long way from being able to use it as a practical tool. They argued that the best option is the conservative use of single species models and that this would contribute substantially to achieving ecosystem management goals.

N.B. Text in blue indicates online links.

Key Sheets are available on the Internet at: www.keysheets.org
or through the websites of DFID and the Netherlands Ministry of Foreign Affairs

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