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by

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Unloading fish as part of the daily arrival of fishing boats on Lake Victoria near Entebbe, Uganda; ©FAO/Roberto Faidutti.

Preparation of this document

This document presents a synthesis of case studies undertaken to assess resource rent losses in the world's marine capture fisheries. The synthesis covers both studies undertaken within the World Bank and FAO Rent Drain Project as well as other case studies. The document also contains a summary of the key findings of the World Bank and FAO study *The Sunken Billions: The Economic Justification for Fisheries Reform*.

Abstract

The World Bank/FAO report, *The Sunken Billions*, argues that the world's capture fishery resources are non-performing assets with rates of return, or yields, not exceeding zero. The cost to the world economy is in the order of US$50 billion per annum in forgone resource rent. Cases studies commissioned by the World Bank and FAO support these conclusions and show that economic overexploitation of capture fishery resources is spread throughout the world, to be found both within developed and developing fishing states regardless of their economic systems.

The question is what needs to be done to reverse the situation and ensure that the world's capture fishery resources come to make their full potential contribution to the world economy. In order for this potential to be realized, there will need to be a programme of massive resource investment in the overexploited fish stocks. As with any such programme, positive investment requires that costs and sacrifices be borne today in the hope of an economic return in the future. Establishing effective resource investment programmes within coastal state exclusive economic zones will be difficult, particularly in the developing world. However, the greatest challenges are likely to be found in establishing such investment programmes for shared stocks in the high seas. That said, some of the case studies provide encouraging lessons with examples of fish stock restorations that are successful in economic, as well as biological, terms.

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Abbreviations and acronyms

DWFS	distant-water fishing state
EEZ	exclusive economic zone
EU	European Union
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Commission for the Exploration of the Sea
IPHC	International Pacific Halibut Commission
IQ	individual quota
ITQ	individual transferable quota
MEY	maximum economic yield
MSY	maximum sustainable yield
PA	principal–agent
PROFISH	Global Program on Fisheries
PV	present value
RFMO	regional fisheries management organization
SSB	spawning stock biomass
TAC	total allowable catch
UNEP	United Nations Environment Programme

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1. Introduction

In 2005, the World Bank published the report *Where is the Wealth of Nations? Measuring Capital for the 21st Century* (World Bank, 2005). The report contains a significant gap in that, owing to the then unavailable data, it has nothing to say on natural capital in the form of fishery resources. In response to this gap, the World Bank, under its Global Program on Fisheries (PROFISH), mounted a workshop in 2006 in cooperation with FAO with the objective of correcting the knowledge deficit (Kelleher and Willmann, 2006).

The workshop recognized the need to focus on, and highlight, the current level of global economic rent loss in marine capture fisheries and to raise awareness on the economic objectives of fisheries management. In so doing, the workshop identified two alternative approaches to the task.

One approach is to estimate the rent and rent loss in each of the world's fisheries, or in a representative sample of them. This is a major undertaking. An alternative simpler approach is to regard the global ocean fishery as one aggregate fishery. This second approach has several advantages. The data requirements are considerably reduced. Many of these global fisheries data are readily available and the model manipulation and calculations are a fraction of those required for a study of a high number of individual fisheries. The aggregate approach, regarding the fisheries as a single fishery, was considered by the workshop to be the only way to obtain, quickly and inexpensively, reasonable estimates of the global fisheries rent loss, and to do so in a transparent and replicable manner.

On this basis, the workshop recommended that two independent studies be prepared on the estimation of the loss of economic rents in global marine fisheries. Each estimate would serve as a cross-check on the other. The first study would estimate the global rent drain (or potential loss of net benefits) through an aggregate model of the global fishery. The second companion study would consist of a set of case studies on economic rents in a representative group of fisheries and endeavour to extrapolate the results of the case studies to the global level.

In essence, *The Sunken Billions: The Economic Justification for Fisheries Reform* (World Bank and FAO, 2009) is a report on the first study. With the case studies not available to its authors, the report has a very limited number of illustrations and examples.

The commissioned set of case studies is now largely complete. The purposes of this synthesis report is to summarize the major findings of *The Sunken Billions* report, and then to supplement and buttress these findings by drawing upon the available case studies. Thus, for example, where *The Sunken Billions* report talks

in general terms of the overexploitation of capture fishery resources, it is now possible to point to specific examples of such overexploitation from both the developed and developing world.

While the case studies commissioned by the World Bank and FAO will provide the basis for most of the supplementary material, the synthesis report will not restrict itself to these studies. Other case studies, and articles, will be drawn upon as deemed appropriate.

2. The rent loss from marine capture fishery resources: an overview

2.1 CAPTURE FISHERY RESOURCES AND NATURAL CAPITAL

The World Bank report *Where is the Wealth of Nations?* (World Bank, 2005) argues that both the current national income and the prospects for future development of any nation rest upon that nation's portfolio of real capital assets. This portfolio is seen to consist of produced, natural and intangible capital assets, with the latter, in turn, to be seen as a mix of human and social capital. Development is to be viewed as a process of real asset portfolio management (World Bank, 2005, pp. 1–5).

The World Bank 2005 report divides natural capital into two components: exhaustible natural resources, such as hydrocarbons and minerals; and living, or renewable, natural resources, such as agricultural land, forests and fisheries. Unlike exhaustible natural resources, renewable natural resources are capable of providing a sustainable flow of net economic benefits into the indefinite future and are, to quote the World Bank, "truly a gift of nature" (World Bank, 2005, p. 7). Marine capture fishery resources constitute a segment of the world's stock of natural capital in the form of renewable natural resources and are thus "truly a gift of nature".

The report *Where is the Wealth of Nations?* points out that natural capital is particularly important in the real capital portfolios of developing nations. According to the report (World Bank, 2005, p. 8) the net economic returns from natural capital, loosely referred to as resource rent, play two key roles in development:

- providing the basis of subsistence, particularly in the poorest nations;
- providing a source of development finance, by furnishing the wherewithal for investment in other forms of capital, e.g. produced and human capital.

2.2 CAPTURE FISHERY RESOURCES AND RESOURCE RENT

The potential significance of the natural capital in the form of capture fishery resources to the world economy can be gauged from the facts that fisheries based upon these resources are yielding annual harvests in the order of 85 million tonnes, which have a "first" gross value of slightly less than US$80 billion. Furthermore, these fisheries provide employment, direct and indirect, to more than 120 million people (World Bank and FAO, 2009). Thus, the significance of world capture fishery resources, actual and potential, to the world economy is not in dispute.

The question that has to be asked of any set of capital assets, produced or natural, is what economic returns, what flow of net economic benefits, the assets are providing to society through time. In the case of capture fishery resources, as with other forms of natural capital, these net economic benefits are referred to as resource rents. Using 2004 as its base year, *The Sunken Billions* report, estimates that, if these capture fishery resources were being managed optimally, they would be yielding approximately US$50 billion per annum more in resource rent than they are currently doing. The cumulative loss to society from this less than optimal resource management in the period 1974–2008, is estimated to be in excess of US$2 trillion (World Bank and FAO, 2009).

The estimated per annum rent loss of US$50 billion demands further investigation. It could be that world capture fisheries are yielding significant resource rent but that, through improved management, the net economic yields, or returns, could be somewhat higher. Thus, for example, the hake fishery, shared by Angola, Namibia and South Africa, and the Iceland cod fishery, both fit the pattern. Both fishery resources are subject to reasonably effective resource management, and the fisheries based on the resources are producing positive resource rents. However, the fishery resources are not realizing their full economic potential.

The Angolan–Namibian–South African hake resource and the Icelandic cod resource were overexploited in the past. In order for the two fisheries to yield their maximum net economic returns through time, a programme of resource investment, i.e. building up the resources, would have to be undertaken (Sumaila and Marsden, 2008; Arnason, 2008).

However, *The Sunken Billions* report is not stating simply that overall world marine capture fisheries are yielding positive resource rents but could do better. Rather, the report is stating that, if optimally managed, these fisheries could be expected to yield resource rents in the order of US$45 billion per year. The resources are, in fact, yielding resource rents in the order of *minus* US$5 billion per year. In other words, overall world capture fisheries are currently making a *negative* contribution to economic development and to the alleviation of poverty (World Bank and FAO, 2009, Table 4.1).

Negative capture fishery resource rents are not just a developed fishing state phenomenon. They are to be found in developing fishery states as well. To take one example, a case study from Malaysia focuses on capture fisheries in the Straits of Malacca (Yew, 2008). There is convincing evidence that both demersal and pelagic fisheries in the northern Straits of Malacca are yielding negative rents, and that the fisheries are thus making a negative contribution towards Malaysia's economic development (Yew, 2008, Table 3.4).

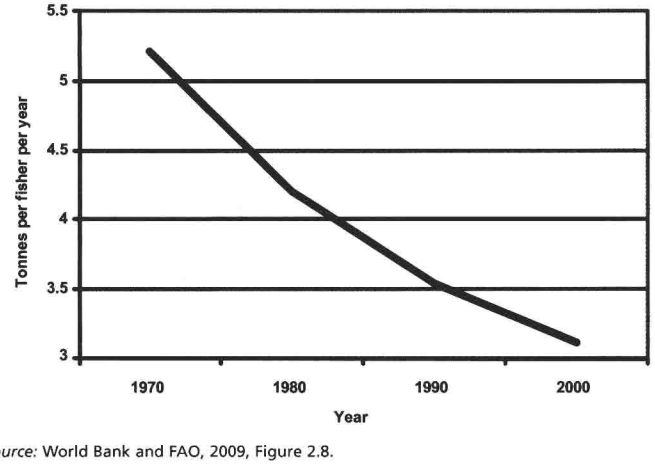
The negative resource rents reported in *The Sunken Billions* report are net of subsidies, which means that they may not be sustainable. However, one is given no assurance that the global rents from marine capture fishery resources will rise above zero.

The negative to zero rents yielded by world capture fishery resources are reflected in the state of the resources themselves. FAO estimates that 25 percent of the capture fishery resources are overexploited, depleted or recovering, from a biological point of view, i.e. the resources are below their maximum sustainable yield (MSY) levels. Another 50 percent are "fully exploited" from a biological standpoint. As *The Sunken Billions* report emphasizes, "fully exploited" from a biological perspective invariably means overexploited from an economic perspective. Thus, from an economic perspective, 75 percent of the capture fishery resources are overexploited (World Bank and FAO, 2009).

The economic overexploitation of world capture fishery resources is not fully reflected in the fish stock levels. It also manifests itself in the fish stock mix. The more valuable species have been exploited to a much greater degree than those of lower value. Indeed, the global harvests from capture fishery resources are concentrated to an ever-increasing degree on the lower valued species (World Bank and FAO, 2009).

The effects of the economic deterioration of world capture fisheries show up dramatically in terms of fisher and vessel productivity (Figure 1).

FIGURE 1
Annual catch (marine and inland) per capture fisher, 1970–2000



Source: World Bank and FAO, 2009, Figure 2.8.

The significance of this decline in average output per fisher has to be seen in the context of the enormous technological developments that have taken place in the world's capture fisheries during this period, including large-scale motorization of traditional small-scale fisheries, the expansion of active fishing techniques such as trawling and purse-seining, the introduction of increasingly sophisticated fish-finding and navigation equipment, and the growing use of modern means of communication. This technological progress has increased labour productivity in many fisheries. However, at the aggregate global level, the resource constraint

in combination with widespread open-access conditions (discussed below) has prevented an increase in average labour productivity in the world's capture fisheries. On the contrary, productivity has declined significantly, a decline caused by a shrinking resource base and a growing number of fishers.

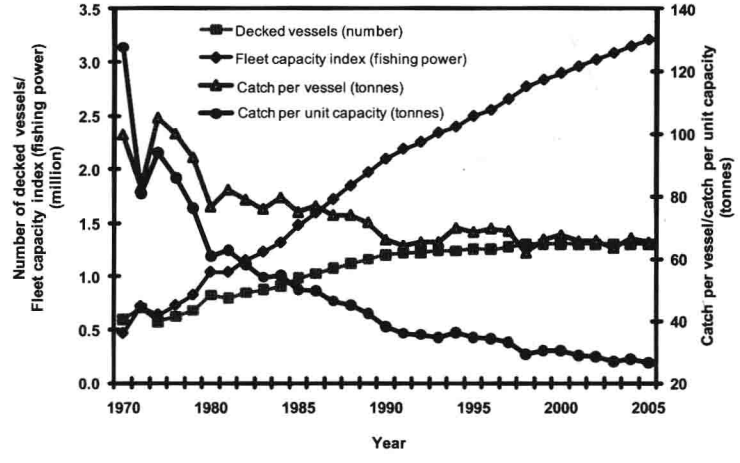
As the number of fishing vessels has also increased significantly in recent decades, by 75 percent in numerical terms in the past 30 years (World Bank and FAO, 2009), at the global level the productivity-enhancing investments in capture fisheries have on average yielded small returns and have stymied growth in labour productivity and incomes in the sector.

With regard to vessel productivity, it can be noted to begin with that fishing capacity is the amount of fishing effort that can be produced in a given time by a fishing vessel or fleet under full utilization for a given fishery resource condition (FAO, 2000).

Both the increase in vessel numbers and in vessel technology have enhanced the capacity of the global fleet and facilitated access to an expanding range of marine fishery resources and more efficient use of these resources.

Fitzpatrick (1996) estimated that the technological coefficient, a parameter of vessel capacity, had grown at a rate of 4.3 percent per annum. Assuming that this trend has continued, growth in technological efficiency coupled with growth in the number of vessels suggests a steeply rising global fleet capacity. The capacity index shown in Figure 2 is a multiple of the total number of decked vessels and the technological coefficient. The trend line of the catch/capacity index demonstrates that the global harvesting productivity has on average declined by a factor of six.

FIGURE 2
Fleet productivity development (total decked vessels)



Source: World Bank and FAO, 2009, Figure 2.11.

The exploitation of a growing number of marginal fish stocks partly explains this decline, but the buildup of fishing overcapacity is clearly a major contributing

factor. Thus, the gains from technological progress have generally not been realized because the fish stocks limits call for a concomitant reduction in the number of vessels in order to allow for improved vessel productivity.

The decline in physical productivity is compounded by a decreasing spread between average harvesting costs and average ex-vessel fish prices, causing depressed profit margins and reinvestment. Although this has a dampening effect on growth in fleet capacity, depressed fleet reinvestment may retard a shift to more energy-efficient harvesting technologies and a reduction in the carbon footprint of the fishing industry.

Many countries have adopted policies to limit the growth of national fishing capacity, both to protect the aquatic resources and to make fishing more economically viable for the harvesting enterprises (FAO, 2007). This has proved difficult and costly to implement in many instances. Even where numbers of vessels have been successfully reduced (Curtis and Squires 2007), the reduction in fishing effort has been considerably less than proportional. This is because it is the less efficient vessels that tend to exit the fishery and expansion in technical efficiency counters the reduction in vessel numbers.

The global fleet has attempted to maintain its profitability in several ways: by reducing real labour costs; by fleet modernization; and by introducing fuel-efficient technologies and practices, particularly in developed countries. Vessels are also reported to remain in harbour for increasingly longer periods of the year, focusing harvesting on peak fishing seasons.

The receipt of government financial support has also assisted both vessel operators and crews, for example, through income compensation for crews. Subsidies in the world's marine fisheries have received growing attention in recent years because of their generally destructive effects, and they are further discussed later in this report.

Thus, when one talks of the significance of world capture fishery resources to the world economy, the emphasis must be on the word *potential.* There are capture fishery resources in the world that are yielding significant positive net economic returns. However, overall, the world marine capture fishery resources have to be categorized as non-performing capital assets.

Two questions arise. The first is how the estimates of resource rent loss were determined. Are these estimates, in fact, alarmist? It will be argued that, if the estimates are open to criticism, it is because they are probably too conservative. It is likely that the estimates understate the true rent loss, and that they do so by a considerable margin.

The second question to be addressed is how this dismaying state of affairs arose. Without an answer to this second question, it is not possible to explore and investigate means of correcting the state of affairs and ensuring that this fisheries component of the world's portfolio of natural capital assets begins to realize its economic potential by making a contribution, exceeding zero, to world economic development and to the alleviation of world poverty. The two questions are to be addressed in turn.