Research article

Global Overfishing: A Last Call for Our World Natural Resource

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Abstract Global overfishing has been a severe problem for the last 37 years. The research objectives were to 1) study the situation of global overfishing as our common property 2) examine factors influencing global overfishing and 3) explain the global overfishing policy implementation. Secondary data were collected from the database of Food and Agriculture of the United Nations from 1979 to 2016 as well as additional countries. Descriptive statistics were applied as a tool for data analysis. The inferential statistics were an applied econometric model to examine factors affecting global overfishing. Research results found that 1) for the last 37 years, the situation of global overfishing: according to the FAO database (2016), the world has been faced with overfishing for 37 years, with 3 percent underexploited, 20 percent moderately exploited, 52 percent fully exploited, 17 percent overexploited, and 7 percent depleted; 2) factors affecting global overfishing were comprised of the world amount of fish caught, the world quantity of consumption demand, the world fishery product price, the world population and the fishery technology index; 3) for the global overfishing policy and its implementations: in China, they launched a policy called legal regulations on the price of access-rights to fisheries resources in China. Also, they have resource fishery taxes, which are about 1 to 3 percent of the total production value. In Australia, they applied Individual Transferable Quotas (ITQs) of southern bluefin tuna (SBT) as policy implementation resulting in about 67 percent by average. ITQs reduced the amount of SBT caught. As common property, global overfishing has been, and still is, one of our world problems that everyone in the world should pay attention to. It is a last call for this world natural resource.

Keywords global overfishing, world natural resource

INTRODUCTION

Overfishing is a form of overexploitation where fish stocks are reduced to below acceptable levels. Overfishing can occur in water bodies of any size, such as ponds, rivers, lakes or oceans, and can result in resource depletion, reduced biological growth rates, and low biomass levels. Sustained overfishing can lead to critical dispensation, where the fish population is no longer able to sustain itself. Some forms of overfishing, for example the overfishing of sharks, have led to the imbalance of entire marine ecosystems (Scales, H.2007). The ability of a fishery to recover from overfishing depends on whether the ecosystem's conditions are suitable for the recovery. Dramatic changes in species composition can result in an ecosystem shift, where other equilibrium energy flows involve species compositions different from those that had been present before the depletion of the original fish stock. For example, once trout have been overfished, carp might take over in a way that makes it impossible for the trout to re-establish a breeding population (Gaia Vince, 2016).

Overfishing occurs when more fish are caught than the population can replace through natural reproduction. Gathering as many fish as possible may seem like a profitable practice, but overfishing has serious consequences. The results not only affect the balance of life in the oceans, but also the

social and economic well-being of the coastal communities who depend on fish for their way of life (Gaia Vince, 2016). Overfishing has significantly affected many fisheries around the world. As much as 85% of the world's fisheries may be over-exploited, depleted, fully exploited or in recovery from exploitation (Gaia Vince, 2016). Significant overfishing was also observed in pre-industrial times. In particular, the overfishing of the western Atlantic Ocean from the earliest days of European colonization of the Americas has been well documented (Bolster, W. Jeffery, 2012).

Following World War Two, industrial fishing rapidly expanded with rapid increases in worldwide fishing catches. However, many fisheries have either collapsed or degraded to a point where increased catches are no longer possible. Examples of overfishing exist in areas such as the North Sea, the Grand Banks of Newfoundland, and the East China (Sea Lu Hui, ed, 2006*)*.

According to a 2008 UN report, the world's fishing fleets are losing US$50 billion each year through depleted stocks and poor fisheries management. The report, produced jointly by the World Bank and the UN Food and Agriculture Organization (FAO), asserts that half the world's fishing fleets could be scrapped with no change in catch. In addition, the biomass of global fish stocks have been allowed to run down to the point where it is no longer possible to catch the amount of fish that used to be caught (Black, R, 2008).

There are three recognized types of biological overfishing: growth overfishing, recruit overfishing, and ecosystem overfishing (Fish recruitment, 2013). Economic or bio-economic overfishing additionally considers the cost of fishing when determining acceptable catches. Under this framework, a fishery is considered to be overfished when catches exceed maximum economic yield where resource rent is at its maximum. Fish are being removed from the fishery so quickly that the profitability of the fishery is sub-optimal. A more dynamic definition of economic overfishing also considers the present value of the fishery using a relevant discount rate to maximize the flow of resource rent over all future catches. Overfishing occurs when more fish are caught than the population can replace through natural reproduction. Gathering as many fish as possible may seem like a profitable practice, but overfishing has serious consequences. The results not only affect the balance of life in the oceans, but also the social and economic well-being of the coastal communities who depend on fish for their way of life (Pauly, D.1989).

Billions of people rely on fish for protein, and fishing is the principal livelihood for millions of people around the world. For centuries, our seas and oceans have been considered a limitless bounty of food. However, increasing fishing efforts over the last 50 years, as well as unsustainable fishing practices, are pushing many fish stocks to the point of collapse. More than 85 percent of the world's fisheries have been pushed to or beyond their biological limits, and are in need of strict management plans to restore them. Several important commercial fish populations such as Atlantic Bluefin tuna have declined to the point where their survival as a species is threatened. Target fishing of top predators, such as tuna and groupers, is changing marine communities, which leads to an abundance of smaller marine species, such as sardines and anchovies. Many fishermen are aware of the need to safeguard fish populations and the marine environment; however, illegal fishing and other regulatory problems still exist. The World Wildlife Fund works with stakeholders to reform fishery management globally, focusing on sustainable practices that conserve ecosystems, but also sustain livelihoods and ensure food security (https://www.worldwildlife.org/initiatives).

In this research, the researcher tries to explain the situation of global overfishing, examine factors affecting global overfishing, and explain the global overfishing policy implementation in China and Australia, which present both sides of the policy implementation—negative and positive impacts.

OBJECTIVES

In this research, the research objectives were to

1. study the situation of global overfishing as our common property

2. examine factors influencing global overfishing
3. explain the global overfishing policy implementation

METHODOLOGY

Secondary data were collected from the database of Food and Agriculture (FAO) of the United Nations from 1979 to 2016 as well as additional countries. Statistical methodology was applied multiple regression analysis in order to construct a global overfishing model to estimate the factors affecting global overfishing. Statistical methodology was applied as the tool for data analysis with T-test, F-test, Coefficient of Determination (R^2), Durbin Watson (DW).

RESULTS AND DISCUSSION

Following research objectives, the research results would be expressed into 3 parts as follows.

The Situation of Global Overfishing

According to the FAO database (2016), the world has faced with overfishing for 37 years, with 3 percent underexploited, 20 percent moderately exploited, 52 percent fully exploited, 17 percent overexploited, and 7 percent depletion (Table 1, and Fig 1). Obviously, there are more than 50 percent of global fisheries faced with the fully exploited, which potentially led to global overfishing.

Table1 World fishing situation

Global Fishing Situation	Percentage
Underexploited	3
Moderately exploited	20
Fully exploited	52
Overfished	17
Depleted	7

Source: Food and Agriculture Organization of the United Nations (FAO), 2016

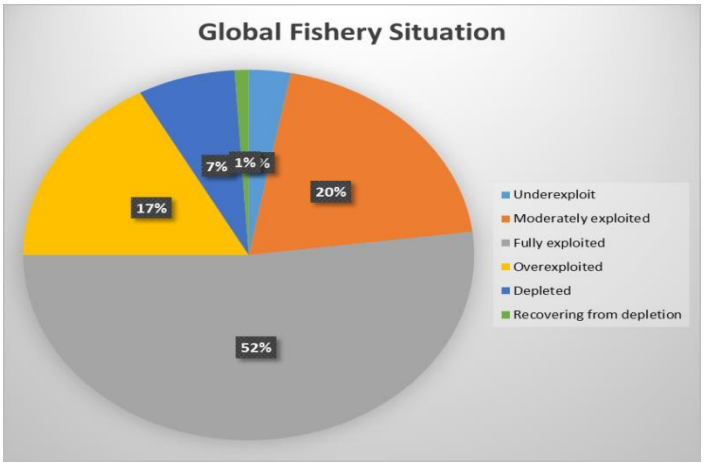

Fig. 1 The global fishery situation

Source: Food and Agriculture Organization of the United Nations (FAO), 2016

Factors Affecting Global Overfishing

The relation could be expressed as the econometric model below:

GOF = -227.750 + 0.025(MFC) + 0.003*(QCD) + 0.0026*(NWP) + 0.124*(FTI) + error term*

*t-value (275.421)** (186.592)** (127.643)*** (89.643)** (212.146)**

R^2 .996
F 226.378**
D.W 1.96

** *Statistical Significance at 99 percent level, the estimated parameters were estimated by stepwise regression*

Where GOP = Global Overfishing (%)
MFC = The World Amount of Fish Caught (%)
QCD = The World Quantity of Consumption Demand (%)
FPP = The World Fishery Product Price (%)
NWP = World Population (%)
FTI = Fishery Technology Index (%)

According to the above equation, it revealed that factors affecting global overfishing were the world amount of fish caught, the world quantity consumption demand, the world fishery product price, the world population, and the fishery technology index. The results expressed that when the world amount of fish caught increased by 1 percent, it would increase global overfishing by 0.025 percent. When the world quantity consumption demand increased by 1 percent, it made global overfishing increase by 0.003 percent. And an increase in world population by 1 percent made global overfishing increase by 0.0026 percent. Also, the fishery technology index was one of factors affecting global overfishing, it obviously expressed that the increase in 1 percent of the fishery technology index raised global overfishing by 0.124 percent. From the research results, it was clear that the fishery technology index had the biggest impact on global overfishing.

The Global Overfishing Policy and Its Implementation

The Food and Agriculture Organization (FAO) of the United Nations encourages the member countries to buy back fishing vessels older than 20 years. In this research, the researcher presented 2 different countries, China and Australia.

China is one fishery that produces and trades in the world market. There is a Marine Fishery policy in China called the Fishing License System. By using this, fishermen can apply for a fishing license issued by the minister of agriculture of China. They also launched the policy called Legal Regulations on the Price of Access-rights to Fisheries Resources in China. Moreover, they have resource fishery taxes which are about 1 to 3 percent of the total production value. A fishing moratorium on catches both inland and to a 200 nautical mile extent was initiated for fishing resources from late 1970. The impact of the resource tax or tax per value of fisheries in China led the Chinese government to collect the taxes as revenues. In contrast, the number of new entrants in the fishing industry increased more than 50 percent. The size of fleet grew along with advanced technology (compared with the old vessels.) The increased size of the fleet in the Chinese fishery industry forced Chinese fishermen to operate beyond 200 nautical miles. Nowadays, China has the biggest size fleet in the world and is the biggest producer.

Australia is one of the countries that applied Individual Transferable Quotas (ITQs) of southern bluefin tuna as a policy implementation. By 1983, the southern bluefin tuna (SBT) fishery was in a severe state of decline. Catch rate and the recruitment to parent stock were going down. A group of biologists from the major bluefin tuna fishing nations concluded that the total SBT catch should not exceed its estimated 1980 level, which was 21,000 tons. In 1983, the Australian government responded

to biologists' recommendations by implementation of a total allowable catch limit of 21,000 tons in the Australian SBT fishery. In 1984, the Australian government reduced the total allowable catch from 21,000 tons to 16,000 tons. In 1985, the ITQs were introduced with a catch quota of 14,500 tons. ITQs caused a 50 percent reduction in fleet size because of the reduction in allowable catch limits. Australian fishermen can sell their quotas and exit the industry, or buy quotas from others, which led to a majority (over 50 percent) of Australian fishermen selling their quotas and leaving the industry. Fishermen who bought up quotas from others improved their technology and fishing capacity by about 67 percent on average. ITQs reduced the amount of SBT caught and the efficiency of the fishery increased as older boats left, and also because fishermen increased the technology of the remaining boats. It required 10 years, from 1984 to 1994, for the parent stock to recover and stabilize. Nowadays, ITQs of 11,750 tons of SBT are issued for Japanese, Australian, and New Zealand fleets. In sum, the impact of ITQs of SBT in Australia brought about 1) reduction in the size of fleet and number of fishermen, 2) increased and improved fishing technology (it was about 67 percent on average), 3) the total amount of ITQs dropped the annual catch by almost 50 percent from the pre-quota level, and 4) it took almost 10 years for the parental stock of southern bluefin tuna to recover.

CONCLUSION

Global overfishing is the now a severe problem for our world natural resource. Obviously, 17 percent of our world fishery is overexploited with 7 percent already depleted. According to the data, 52 percent is now fully exploited—this means that there is a high chance of increasing to overfishing. Over the last 37 years, global fishing has increased year by year. Factors affecting global overfishing were the world amount of fish caught, the world quantity consumption demand, the world fishery product price, the world population, and the fishery technology index which had the biggest impact on global overfishing. In order to relieve global overfishing, we should reduce all factors that affect all global overfishing, especially the fishery technology index. Moreover, it should be our function to provide relief for our world fishery natural resource to keep it with us. Nowadays, the FAO still encourages all country members to apply a fishery policy to relieve global overfishing and protect us from its return. Some countries have been successful with policy implementation, but others have not. Furthermore, it has brought up other problems. Global overfishing could be declared as our world natural resource problem, and we should save our world natural resource. Food Agriculture Organization of the United Nations as a key global organization would have concrete policy and its implementation to restrain global overfishing. Moreover; everyone in the world would have attention and cooperation with global overfishing in order to restrain our would severe problem since it is our world common property.

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