FAO/WORLD BANK RENT DRAIN STUDY: CHINA CASE STUDY_FISHERIES IN THE BOHAI SEA & THE YELLOW SEA

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ABSTRACT

This report presents the results of bio-economic assessment studies of the Bohai Sea & the Yellow Sea and the associated fisheries management. The studies, which were facilitated through workshop with the participation of international experts, included fisheries resources rent assessments and causal chain analysis to determine the rent losses in the Bohai Sea & the Yellow Sea and root causes of the World Bank/FAO concern and issue, respectively. Policy options and associated strategic action programs were also identified as to address the root causes of rent loss problem of the region based on Arnason's model (R. Arnason, 2007) and causal chain analysis results.

Keywords: fisheries resources, fisheries management, rent drain, Arnason's model, the Bohai Sea & the Yellow Sea

INTRODUCTION

Fisheries resources can generate benefits to humans through provision of food, recreation and biodiversity. As long as management of fisheries can make that catches are controlled within reproductive range, the utilization of aquatic resources can continue into the future. Resource rent is a key concept in the management of fisheries as it refers to a source of considerable wealth, potentially or actually available to society. Proper management interventions may lead to the optimization of the rents they may generate while free and open access regimes generally lead to over-fishing, over-investment and rent dissipation.

It is necessary to study on estimating the loss of resource rents in the world's fisheries. And the study is seen as a first step in building an economic case for reform of fisheries and subsequently opening dialogue on economic mechanisms for affecting such reforms. In 2006, the task team of the Rent Drain study agreed that a series of case studies at national level is needed in order to build more comprehensive global estimate. China is one of the oldest countries with a recorded history of 5 000 more years, which has made important contribution to fishery civilization of the world. The Bohai Sea and the Yellow Sea have made important contribution to fishery development in North China. The Bohai Sea is a nearly closed interior sea located at the northernmost end of the east part of the Chinese mainland. The Yellow Sea is considered representative of continental shelf systems and semi-enclosed seas. Fishery resources in the Bohai Sea and the Yellow Sea are valuable for supporting the societies and economies of North China, but due to overfishing and environmental disruption, these resources are becoming depleted. So the case study of the fisheries in the Bohai Sea and the Yellow Sea will be a representative example of fishery rent drain which is of special interest for a variety of reasons including its importance for Chinese marine fisheries as well as a typical example for coastal bay fisheries in Asia.

This article sheds light on to estimate the existing and potential resource rent in the fisheries of the Bohai Sea and the Yellow Sea, assesses the potential tradeoff between rent maximization and other management objectives. In the following parts of this paper, Chapter 2 summarizes the fisheries resources, fisheries management, economics studies of the Bohai Sea and the Yellow Sea; Chapter 3 estimates and analyzes rent losses of the Bohai Sea & the Yellow Sea based on Arnason's Model. Chapter 4 focuses on the critical issues of excess fishing effort and large scales of fishing vessels, draws conclusions and suggestions to improve fishery policy management in the Bohai Sea and the Yellow Sea.

SUMMARY OF THE FISHERIES RESOURCES, FISHERIES MANAGEMENT AND ECONOMICS STUDIES OF THE BOHAI SEA & THE YDLLOW SEA

This section presents the utilization and management of the fisheries resources of the Bohai Sea and the Yellow Sea and its economic analysis in the early time and since 90's of 20 Century, in order to analyze existing cost and earning studies and bio-economic model findings, estimates of resource rents, profitability or other indicators of the economic health of the Bohai Sea and the Yellow Sea fisheries.

General Situation

The Bohai Sea, as arm of the Yellow Sea, Locates in middle latitude striding four (37ºN-41ºN), has total area of 77000 km^2 with a mean depth of 18m. It locates to the east of Liaodong Peninsula and the north shore of Penglai diagonal line of Shandong Peninsula, link with the northern part of Yellow Sea. The west coast of the Yellow Sea borders Shandong Peninsula and Northern Jiangsu Campagna, the east borders on Korean Peninsula, the northern extremity is on the verge of the Liaodong Peninsula. It spans from 32ºN to 39.50ºN with the area about 404,000 km² and a mean depth of 44 m. The boundary between the Yellow Sea and the East Sea is the line from Qidong Foreland to the southwest angle of Korean Jizhou Island.

Figure 1. Bonderies of the Bohai Sea Bohai Sea and the Yellow Sea region
Source: *GIWA, 2005*

The number of species in Bohai Sea is much less than other China's seas, which includes over about 1540 species, including 29 species of prokaryotes, 653 species of polyactis, 57 species of fungi, 96 species of plants and 705 species of animals. Approximately 1,600 species were reported from marine and coastal habitats in the Yellow Sea, including 400 phytoplankton, 300 marine macroalgae, 50 halophytes, 500 marine invertebrates, and some 389 vertebrate species. Major fisheries in the Bohai Sea and the Yellow Sea as are large trawls, large pair trawls, and large purse seines and offshore stow nets. Major target species of this fishery are hairtail, filefish and common squid.

The Bohai Sea and the Yellow Sea is one of the most intensively exploited regions in the world. Evidences of overexploitation of the region's natural resources, particularly its fisheries resources include:

- All major stocks had been heavily fished in the 1960s;
- More fishing effort is required to sustain the same catch because of increased fishing activities since the 1970s, which has depressed fish populations;
- The biomass of fish and invertebrates has declined by 40% from the early 1960s to the early 1980s;
- Cold-water species such as the Pacific cod are now almost extinct (Tang & Jin 1999).

Fisheries Economic Statistics

- Catch, fishing power and CPUE

Table I: Estimation of CPUE of the Bohai Sea & the Yellow Sea

Year	Total Catch of TP & OC	Total Catch of the YS	Total Catch of the BS	Total Fishing Power of TP & OC	Estimation of Fishing Power of the YS	Estimation of Fishing Power of the BS	CPUE of the YS & the BS
	t	t	t	kw	kw	kw	t/kw
1954	532,090	-	-	20,775	-	-	25.61
1960	587,191	-	-	68,129	-	-	8.62
1965	422,982	-	-	99,742	-	-	4.24
1970	568,545	-	-	163,238	-	-	3.48
1975	961,623	-	-	411,333	-	-	2.34
1979	876,193	603,503	322,538	631,758	435,141	468,275	1.39
1980	826,473	515,069	294,314	677,756	422,387	472,252	1.22
1981	791,285	468,178	285,340	702,179	415,457	482,264	1.13
1982	945,425	573,475	286,180	730,256	442,958	471,793	1.29
1983	915,172	623,235	289,378	762,377	519,181	424,929	1.20
1984	994,660	611,282	316,859	811,325	498,611	515,584	1.23
1985	1,045,258	619,040	375,313	908,071	537,793	633,721	1.15
1986	1,125,229	652,975	390,194	1,111,611	645,072	672,396	1.01
1987	1,297,875	772,659	417,917	1,199,263	713,953	701,997	1.08
1988	1,413,568	850,008	456,257	1,334,779	802,631	758,758	1.06
1989	1,523,969	940,033	488,070	1,152,512	710,906	791,253	1.32
1990	1,687,564	1,085,841	515,725	2,489,860	1,602,068	801,516	0.68
1991	1,809,458	1,170,190	587,774	2,939,269	1,900,847	908,872	0.62
1992	2,538,542	1,207,575	810,034	3,067,854	1,459,367	1,702,839	0.83
1993	2,779,292	1,320,235	858,476	3,167,344	1,504,570	1,807,220	0.88
1994	2,977,847	1,486,616	905,315	3,199,021	1,597,032	1,813,440	0.93
1995	3,280,847	1,706,250	954,020	3,608,531	1,876,667	1,834,429	0.91
1996	4,732,251	2,753,320	1,271,860	3,966,334	2,307,694	2,186,001	1.19
1997	5,432,594	3,351,737	1,290,771	4,179,964	2,578,904	2,092,120	1.30
1998	5,971,339	3,425,452	1,618,361	4,536,922	2,602,600	2,821,170	1.32
1999	5,947,643	3,477,667	1,624,517	4,807,175	2,810,820	2,778,313	1.24
2000	5,602,718	3,453,202	1,462,776	5,110,197	3,149,640	2,373,311	1.10
2001	5,271,227	3,215,401	1,374,114	5,402,345	3,295,382	2,252,679	0.98
2002	5,177,560	3,154,883	1,329,807	5,470,430	3,333,340	2,182,381	0.95
2003	5,074,979	3,000,281	1,314,064	5,878,313	3,475,205	2,222,741	0.86
2004	5,131,821	3,171,236	1,251,716	5,580,834	3,448,706	2,025,577	0.92
2005	5,132,809	3,204,389	1,233,328	6,068,047	3,788,254	1,975,552	0.85
2006	4,986,741	3,153,419	1,228,573	5,770,280	3,648,898	1,942,836	0.86

From Fisheries Regime Management Bureau of the Bohai Sea and the Yellow Sea (2007)
Note: TP- three provinces (Liaoning, Shandong, Hebei); OC- One city (Tianjin)

- The income of fishermen of the three provinces and one city of Bohai Rim area has grown gradually. Now the per capita income of fishermen was over 7,000 yuan (more than two times of the local farmers income), and the per capita income of fishing labor was over 10,000 yuan.

Table II: Fisheries Income of Three Provinces and One City

year	1990	1995	2000	2001	2002	2003	2004	2005	2006
Total net income of fisherman's family (MY)	Na	233.7	411.6	430.6	429.7	466.5	520.5	547.0	588.3
Total net income of fisheries(MY)	Na	197.8	369.7	388.4	382.7	425.8	569.0	635.9	514.4
Yuan/person	1,537	3,959	5,651	6,130	6,179	6,746	6,711	8,161	8,787
Yuan/labor	3,267	7,962	9,884	10,413	8,265	11,184	12,889	14,539	15,450

From China Fisheries Yearbook (1990-2007)
Note: MY- million Yuan

- In recent years China's imports and exports of seafood have seen a rapid development. The growth has also been driven by growing capability of the fish processing industry, which mostly occurs in provinces along the coast. The majority of China's exports are processed seafood products, consisting of prepared, preserved or frozen product. The leading export products are eel, large yellow croaker, processed or preserved shrimp and cuttlefish. Japan is the major export destination for Chinese aquatic product exports, and other main outlets are America, EU, Korea and Hong Kong.

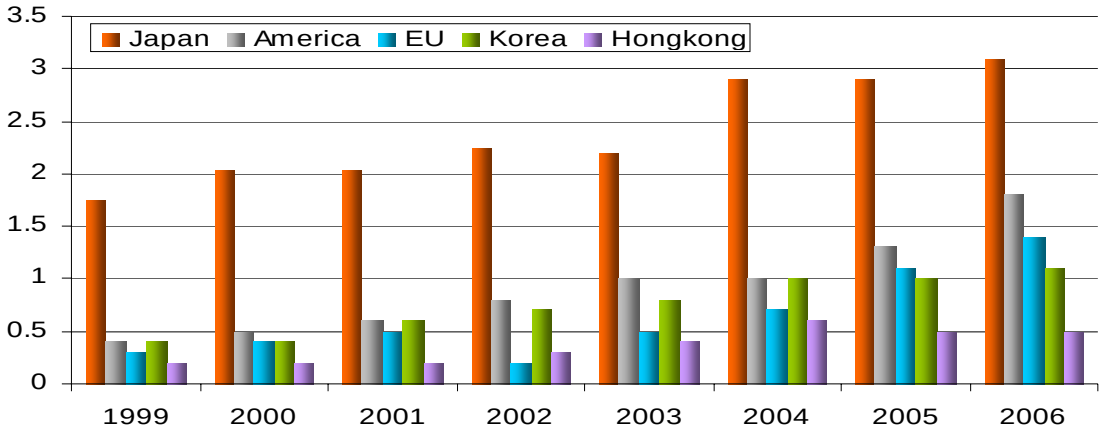

Figure 2. Exports value of aquatic products from China by *destination* (US$ billion)
Source: *China Fisheries Yearbook (2000-2007)*

Current Fisheries Management Regime

In China, Fishery administrations under the people's governments of provinces, autonomous regions and centrally administered municipalities contiguous to the sea, with the exception of those sea areas and fishing grounds with specially designated fishery resources that the State Council has put under direct administration of its fishery department and subordinate fishery superintendence agencies. Since 1979 fisheries regime sectors and fleets were established in each province, city, county and important town of the Bohai Sea and the Yellow Sea marine zones which are managed by the Yellow Sea & the Bohai Sea Fisheries Regime Bureau uniformly (Jin Shixian,2006). It enhanced the fishing monitoring, strengthened organizing and harmonizing ability.

The important fisheries management system includes the regulation of closed area & seasons, fishing vessels number restriction and fishing license. Since 1995, China has carry out the "summer closed"

policy in Yellow Sea, East China Sea and South China Sea. The summer closing duration extend from 2 months in the beginning to 3 months now. In 2007, there are 118 000 boats and millions of fishermen was adopted this policy. This regulation was carried out in 11 provinces and Hong Kong, Macao as well. Each province and city deployed the fishing vessel number of main fishing areas in according to the Fishing Season Arrangement & Management Regulation of Main Fishing Areas of the East China Sea, the Yellow Sea & the Bohai Sea (National Council to Fisheries Ministry, 1998). The measure was restricting the fishing effort instead of catch quantity. The restriction of fishing vessels number was according as MSY. All existing fishing vessels should be registered by management sectors, overfull fishing vessels should cut down or be switched to other manufacture (Fisheries Yearbook, 2003). TAC system has already been adopted to control catches, such as to control Spanish mackerel and Anchovy in the Bohai Sea and the Yellow Sea.

Chinese fisheries property rights are advancing based on Property Rights Law (March 16th, 2007) and Fisheries Law (1986& 2000). It stipulated the rights of culture and fishing, defined the property attributes of culture and fishing; linked to Country Lands Rent Law; defined sea area usufruct problem.

ESTIMATION & ANALYSIS OF RENT LOSESS BASED ON ARNASON'S MODEL

This section provides estimation and analysis of rent loses on Arnason's Model. Estimate and compare the "current rent" generated under the current fisheries management regime to the "potential rent" when the fisheries are managed to give a maximum economic yield. And then analyses of rent losses reason.

Calculating Some Base Data of the Bohai Sea and the Yellow Sea

- Maximum sustainable yield (MSY)

Surplus Output Model is widely used on assessment of fisheries resources as its simpleness and lesser need of data[a]. Four output models are in common use at present: Walters-Hilborn Model (W-H Model), Schnute Model, D-Fox Model[b] and I-Fox Model[c]. The effects of assessment on fisheries biological community under diverse fisheries history are different by diverse model. According to indication of references research, the result of Schnute Model is comparatively ideal for overexploitation fisheries. The error of parameter is less[d]. Since the Bohai Sea and the Yellow Sea have been in overfishing state for many years, Schaefer's Surplus Output Models should be used to estimate MSY, which is as following:

- $dB_t/d_t = rB_t(1-B_t / K)-F_t$

B_t: biomass; dB_t/d_t: increasing rate of biomass; r: intrinsic growth rate of populations; K: virgin stock equilibrium; F_t: fishing death

Schnute (1977) got the dynamic model by one year period quadrature using Schaefer model:

- $\log(U_{t+1}/ U_t) = r-(rq/K)(U_{t+1}+U_t) –(q/2) (E_{t+1}+E_t)$ （Eq.1）

U_t: CPUE in year t; E_t: fishing effort in year t; q: approval fishing coefficient

Equation（Eq.1）can be transferred to normative polyphyletic linear regression:

- $Y = b_0 + b_1X_1 + b_2X_2$ (Eq.2)

Y: cause variable $\log(U_{t+1}/ U_t)$; X_1: independent variable $(U_{t+1}+U_t)$; X_2: independent variable $(E_{t+1}+E_t)$; b_0, b_1 , b_2: regression parameter r, -r /(kq), -q/2

Through linear regression analysis, r (accrual rate), q(capture coefficient) and K(virgin stock) can be worked out:

- MSY = rk / 4 (Eq.3)

According to1954-2006 data and formulas of marine catch of three provinces and one city(Liaoning Province, Shandong Province, Hebei Province and Tianjin City; deducting oceanic fishing and adding north Jiangsu Province fisheries which belongs to the Yellow Sea, quantitively simulated the diversification of fisheries resources in the Bohai Sea and the Yellow Sea. The result is as following:

- Y =0.3437—0.8248 X1—0.0038 X2, Ft=258, r2=0.13

The simulating results passed 5% and 10% t proof-test, 10% F proof-test. The results approved validity and feasibility of the linear model. We obtained quantitive index by above model:

MSY= rk / 4 = 4.711257 m. metric tons

Virgin stock equilibrium (X_{max}) = 54.82987901 m. metric tons

- Landings in year t* (2006)

Landings in year t*=4.381992 m. metric tons, which 140% of MSY, it is obvious that the fisheries resources in the Bohai Sea and the Yellow Sea are faced with austere situation.

- Biomass growth in year t*

According to latest three years investigations of fisheries resources of the Bohai Sea and the Yellow Sea, without obvious affection on calculation precision of fisheries resources rent (*t**=2006), the biomass growth in year t is supposed as 0.

- Landing price in year t*

In 2006 total yield of the Bohai Sea and the Yellow Sea was 4.381992 m. metric tons, increased value of marine catch was 18413.14 million yuan(MUSD2425.645)，if deduct increased value of ocean fisheries the increased value of marine catch in 2006 should be MUSD 89.58332(USD1=RMB7.5). So the mean price of marine catch products in 2006 should be 0.5536 US$/kg. The result doesn't include high value temporary rearing products after landing or high value commercial seafood(These kinds of seafood always are counted as aquaculture products or out of statistics). We should add up the price of this part to the result. Combining the analysis on market investigation and representative cases data of processing added value of marine catch products, we supposed the landing price in 2006 as 0.822 US$/kg.

- Profits in year t*

The gross profits of marine catch of the Bohai Sea and the yellow Sea is figured out 7313.9112 million Yuan in 2006, which is equal to marine catch added value deducting total costs. And total costs are consisted of total fixed costs and total variable costs. Total fixed costs include management costs, distribution costs, financial costs of fishing operation, depreciation, repair costs, official costs, employee's welfare, etc. Total variable costs include direct manpower (fisherman's income), direct material (fuel, other fishing necessaries). Owing to the lack of statistic on total fishing costs of the Bohai Sea and the Yellow Sea, it's difficult to work out total fishing profits of the Bohai Sea and the Yellow Sea. Therefore the indirect arithmetic (income method in GDP calculation) was adopted for the calculation of the total profits of the Bohai Sea and the Yellow Sea. The ideas is: the added value can be disassembled into the income of four manufacture factors including labor, capital, glebe and enterpriser's capacity. That means the added value of the Bohai Sea and the Yellow Sea should be the summation of salary, interest, rent and reward of enterpriser's capacity (profits). Income method basis, in 2006 total fishing profits of the Bohai Sea and the Yellow Sea equal to added value deducting total fisherman's income, interest and rent.

- Total fisherman's income = total population of fisherman × average income =（sum of fisherman+ sum of moonlighting fisherman × rate of moonlighting fisherman × equivalent coefficient of fisherman）× weighted mean of net income of fisheries labor =（306438 +120505×50%×70%）× 21,702 Yuan/labor =7565.80 million Yuan
- Interests = annual capital investment of marine fishing ×annual mean interest rate on market(be replaced of inter-bank offered credit interest rate of China) = (annual input of newly increased assets of marine fishing- annual input of newly increased assets of oceanic fishing) × annual inter-bank interest rate + annual input assets of assistant and service establishments × annual inter-bank interest rate + increased value of marine catch × annual average occupied rate of circulating capital × three months inter-bank interest rate = 850.40 million Yuan × 4.5697% + 15059.59 million Yuan × 10% × 4.5697% + 18413.14 million Yuan × 25% × 4.4195% = 311.1207million Yuan
- Rents(be replaced of summation of taxes) = increased value of marine fishing ×colligate taxes rate = 18413.14 million Yuan ×17.5% = 3222.2995 million Yuan
- Profits in year 2006 = 18413.14 - 7565.8086 - 311.1207 - 3222.2995 = 7313.9112 million Yuan = MUSD 975.1882(USD1=RMB7.5).

- Fixed cost ratio in year t*

Fixed cost ratio in year 2006 should be 0.07 in according to the calculation by Administration of Fishery and Fishing Harbour Supervision of the Bohai Sea and the Yellow Sea.

- The schooling parameter

According to the investigation data of the resources of the Bohai Sea and the Yellow Sea from Administration of Fishery and Fishing Harbour Supervision of the Bohai Sea and the Yellow Sea, Aquatic Products Academy of Liaoning Province and Aquatic Products Academy of Hebei Province, the experts of marine resources of the Bohai Sea and the Yellow Sea suggested that schooling parameter could be supposed as 0.87.

- Fishing effort (fleet) in year t*

Fishing effort (fleet) in year t*=1.0697 m. GRT

The Analysis of Current Rent & Potential Rent Based on Arnason's Model

Arnason's Model is estimating rents loss in fisheries simple EXCEL worksheet calculations which based on a simple bioeconomic model are as following:

- $Y(e,x) = q \cdot e \cdot x^b$ (Harvesting function)
- $C(e) = c \cdot e + fk$ (Cost function)
- Biomass growth functions:
  - $G(x) = \alpha \cdot x - \beta \cdot x^2$ (Logistic biomass growth functions)
  - $G(x) = \alpha \cdot x - \beta \cdot ln(x) \cdot x$ (Fox biomass growth functions)

In the Harvesting function, the five variables of this model, i.e. *x*, *y*, *e*, *q* and *b* represent biomass, harvest, fishing effort, the catchability coefficient and degree of schooling behavior of the species in question, respectively. The cost function is linearly increasing in effort with marginal effort costs being equal to the constant, *c*. This reflects the assumption that the fisheries inputs can be obtained at fixed costs — an economically reasonable assumption especially for a cost function supposed to apply in biological equilibrium. The fixed costs, *fk*, are included for generality. They will surely disappear in the long run.

And as can be readily seen, the Fox growth function consists of a slight modification of the second term of the logistic function. This leads to a biomass growth function and a sustainable yield functions which, unlike the corresponding functions for the logistic, are skewed to the left.

There are four steps of analysis on rents status and potential of the Bohai Sea and the Yellow Sea based on Arnason's Model (the EXCEL spreadsheet program).

- Step 1, data inputs: We consider the Bohai Sea and the Yellow Sea fishery in the year 2006 (t*=2006). Based on 3.1 section, our input data concerning this fishery are listed in Table III.

Table Ⅲ: Input Data of the Bohai Sea and the Yellow Sea fishery in the year 2006

	Values	Units
Maximum sustainable yield	4.7113	m. metric tonnes
Virgin stock equilibrium	54.8299	m. metric tonnes
Biomass growth in year *t**	0	m. metric tonnes
Landings in year *t**	4.381992	m. metric tonnes
Price of landings in year *t**	0.822	US$/kg
Fishing effort (fleet) in year *t**	1.0697	m. gross tonnes
Profits in year *t**	0.9751882	b. US$
Fixed cost ratio in year *t**	0.07	Ratio (no units)
The schooling parameter	0.87	Elasticity (no units)

- Step 2, select biomass growth model: we adopt two alternatives natural biomass growth function. (i) the logistic function and (ii) the Fox (1970) growth function. Based on the two functions and table Ⅲ, estimate the biological parameters α and β, the current biomass(x), catchability(q), cost function parameters(c), which are worked out by Excel spreadsheet program (Arnason 2007).
- Step 3, determine current biomass and profits maximizing biomass: Given the data in Table III, the following model coefficients can be derived the Excel spreadsheet program (Arnason 2007). And the implied coefficients and quantities are listed in Table IVand Table V. And then, we'll do a sensitivity study of the results for differing values of these coefficients.

Table IV: Implied model coefficients

	Logistic	Fox
Biomass growth parameter, α	0.334	0.935
Biomass growth parameter, β	0.006	0.234
Catchability, q	0.300	0.437
Schooling parameter, b	0.870	0.870
Fish price, p	0.822	0.822
Marginal costs, c	7.574	5.207
Fixed costs, fk	0.183	0.183

Table V: Implied quantities in base year

	Logistic	Fox	Units
Biomass, *x*(2006)	20.1	13.1	m. metric tonnes
Sustainable yield (at base year biomass)	4.7113	4.7113	m. metric tonnes
Effort (fleet)	1.0697	1.0697	m. gross tonnes
Profits	0.9752	0.9752	b. US$
Rents	1.158	1.158	b. US$

- Step 4, estimation of Rents and rents loss: Table V summarizes the main results for the two biomass growth functions and the basic empirical assumptions listed in Table 1. As reported there,

the rents loss is estimated to be between 0.918 and 1.185billion US$ depending on whether the underlying biomass growth function is taken to be the logistic one or the Fox one.

Table VI: Main Results

		Current		Optimal		Difference	
	Units	Logistic	Fox	Logistic	Fox	Logistic	Fox
Biomass	m.mt	20.1	13.1	34.1	27.8	14	14.7
Harvest	m.mt	4.4	4.4	4.4	4.4	0	0
Effort	m.GRT	1.1	1.1	0.7	0.6	-0.4	-0.5
Profits	b.US$	0.975	0.975	1.893	2.16	0.918	1.185
Rents	b.US$	1.158	1.158	2.076	2.344	**0.918**	**1.185**

If the models used are reasonable and the data of the Bohai Sea and the Yellow Sea fall within the intervals specified, there can be a great deal of confidence that its rents loss in fisheries estimated on a sustainable basis lies between 0.918 and 1.185billion US$ annually. Though we didn't do the sensitivity study, a reasonable point estimate lies in the middle of this interval at about 1 billion US$.

The estimations ignored the effect of taxes, subsides and charges to rents and rents loss of the Bohai Sea and the Yellow Sea. Combining the investigation on taxes and subsides of the regions and consultation results from experts, according to fishing increased value, we confirm colligate taxes rate of the area is 17.5%, which in this way the sum of taxes and charges should be 3222.2995 million Yuan in 2006. And there are four kinds of fisheries subsides in the regions, which was not big and difficult to make certain that the transfer bankroll was reliably used as fisheries subsidies or something else[e]. So that we are able to ignore the effect of subsides in rents estimate process. And we didn't do the sensitivity study. Otherwise the analysis to a more complete stochastic framework which will provide us with the probability distribution and a confidence interval for the true rents loss of the Bohai Sea and the Yellow Sea.

The Analysis of Rent Losses Reason

The first is over increase of fishing effort which has exceeded resources rebirth ability. In 1950s fishing effort was on the small side with preferable base of fisheries resources. The yield increased rapidly along with more fishing gears adopted. After 1960s, the exploitation of fisheries resources was enhanced along with development of trawl fisheries, gradually advanced technologies, obvious amendment of fishing vessel and net. It damaged commercial species and fish larvae seriously. Fisheries resources declined gradually. Entering into 1980s, annual output didn't increase with the continuous growth of fishing vessels and gears, but declined year by year.

Secondly, the regulations of reproduction protection are not effectively implemented. Laws and regulations concerning to protection of reproduction were established one by one without effective check and monitoring measure. Usually fisheries administrations pay more attention to current fisheries manufacture, fisheries regime and improvement of fisherman's life quality, ignore and relax reproduction protection and resources quality. As a result it's more difficult to execute the management and check towards capture standard and fish larvae proportion. Furthermore, there are conflicts between different sections, different areas. The exploitation and utilization of the sea areas concern to industry, traffic, fisheries, cultivation, salt industry, environment protection, national defence, etc. Conflicts emerge frequently when these sections exploitate the same sea area at the same time.

Another important reason is environment change because of less flux of major rivers and pollution. The pollution and human's exploitation behavior worsened the environment of the coastal regions and mouths of rivers, heavily damaged and poisoned fisheries resources of the Bohai Sea and the Yellow Sea. The effect to fisheries is still awaited for more study.

CONCLUSION & SUGGESTION

Based on the analysis of the historic data in the period of 1950 to 2006, the conclusions of fishery rent and its drain were drawn. The policy options were presented in conserving sea hydrophily biology resources of the Yellow Sea and the Bohai Sea and reasonable using fishery resources. And discussions on the study of fishery rent of the Yellow Sea and the Bohai Sea in the Advisory Group-"The Forum on Chinese Fishery Economy Experts", which some experts present four suggestions.

The Conclusions of Fisheries Rent Drain

From the analysis of the historic data in the period of 1950 to 2006, it found that the fishery rent of the Yellow Sea and the Bohai Sea drained strictly. The current fishery capture intensity is much more than regeneration capacity of fishery resources of the regions. The quantity of capture per unit still kept low level. The structure of utilization of colony is very irrational because of long term using unselected fishing gear. Further more, with the rapidly development of marine aquaculture, those small mixed fishes captured out of line was also sold to the market, it turned out that the resources of the economy fish was declined rapidly. The conclusions of fishery rent and drain include four aspects:

- The fishing effort of the Yellow Sea and the Bohai Sea was high. In recent years, the actual input of increasing the numbers and power of the fishery vessels has been keeping a historic high level. Therefore, the capture capacity of the Yellow Sea and the Bohai Sea is increasing rapidly.
- The Structure of capture exercise is not reasonable. In some case the type of fishing gear used and law applied for capture are not good at environment protection, such as dragnet has been forbidden entirely.
- More and more cheap labor forces from middle and west of China come to engage in the fishing activities of the Yellow Sea and the Bohai Sea, which has further increased the pressure of capture of this area and hardly control the capture scale.
- The pollution of fishery water area ecology, environment and damaging of fishery resources prevent the fisheries of the Yellow Sea and the Bohai Sea from the sustainable development. The inhabit environment of spawn farm, pastry farm, the farm living through the winter and swim back channel for fish, shrimp, crab and seashell is deteriorated even disappeared. It has greatly damaged the fishery resources.

The Suggestions on Conserving and Utilization of Fisheries Resources

From the historic experiences in China, it has found that adopting the management manner of combining the controlling fishery input products and controlling fishery output can have a result of half doing and double success. Establishing a set of fishery management manner of the Bohai Sea and the Yellow Sea according to Chinese situation is the key approach.

Some suggestions are as following: i) Study on effective approach of quota system of fishery capture of the Yellow Sea and the Bohai Sea, such as confirmation and improvement of double controlling measures of marine capture vessels, establishment system of no fishing in hot season and forbidden fishing zone, keeping zero increase of marine capture, taking management measures of conservation of fishery resources, etc. ii) Evaluation the degree of resources rent and drain, strengthening and classifying the

controlling measures of fishery input. iii) Subjoining and classifying the controlling measures of fishery output, insisting on combination of fishery input and controlling output. iv)Strengthening the construction of capacity of fishery administration and management of the Yellow Sea and the Bohai Sea, enhancing the level of executing the law. v) Strengthening the basic research, increasing scientific level of fishery resources management. We should acknowledge that the study on fishery resources is a commonweal work, therefore, should increase government input. vi) Paying attention to the issue of "Three Main Concerns in the Fishery", promoting harmonious environment of being together human and nature. The actions include pushing civilization construction of social economy and fishery water area ecology, seeking after the fishery management new model under the market economy system, improving fish farmer's income, etc.

Discussions on the Study of Fisheries Rent of the Bohai Sea and the Yellow Sea

In order to have deep study on fishery rent and drain of the Yellow Sea and the Bohai Sea, at the beginning of December 2007, the research team has organized four fishery economy experts from the forum science committee and three officials from the Fishery Administration Bureau of the Yellow Sea and the Bohai Sea region to have some discussions and consultations. They think that:

- The study on conservation and utilization of fishery resources in the point of fishery resources rent is novelty. It could combine with fishery resources and aquaculture market to analyze the fishery development of the Yellow Sea and the Bohai Sea.
- The study on the reason of continuance high capture production of the Yellow Sea and the Bohai Sea is correct.
- The study on fishery resources development and its economy analysis by setting off two periods (early study and since 90's of 20 century) is suitable. However, it will be more integrity if renew economy research result of enhancement and releasing from Chinese mainland to the Yellow Sea and the Bohai Sea.
- The study is focus on identifying manners in which any rent losses are dissipated with particular reference to dissipation of resource rent due to excess fishing effort and sizes of fishing fleets, which is very necessary.

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