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Sustainability of German Baltic Sea herring fishery

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Abstract

In a study sustainability of the herring fishery was explored. This includes questions on the fields of ecological (bycatch-rates and ecosystem effects), economical (income and subsidies) and social (e.g. unemployment) sustainability.

Fishermen using static gear are ecological sustainable but do not get a sufficient income. Building up processing capacity in the vicinity during the next years will hopefully lead to a price increase. However, to be economically and socially sustainable it seems that subsidies are necessary. With respect to ecological sustainability these fishermen could ‘be paid’ for ‘ecological work’. But to use the new processing plant to capacity trawl fishery is necessary as well and this fishing technique creates problems with cod by-catch rates and high opportunity costs because of low stocks. In this paper implications for the three different areas of sustainability and problems of subsidisation are outlined.

Keywords: Sustainable fisheries, Subsidisation, Baltic Sea herring fishery

Introduction

The break down of several fish stocks during the last years, e.g. cod stocks of the Grand Banks[1] or herring stocks in the North sea in the mid seventieth, must lead in consequence to different management regimes. For this year catch quotas within the EU ICES gave advice with respect to a precautionary principle. Different Reference Points for stock situation of the fish stocks were defined and then, in opposite to other strategies as MSY, F_{max}, or $F_{0,1}$, most of the stocks within European waters must be declared as out of safe biological limits[2]. This must be the beginning of a new discussion about what sustainable fisheries are and what consequences this new strategy will have for fishermen.

The herring fishery of Germany in the Baltic Sea is in a different situation. The stock of the western Baltic Sea is in a healthy condition but prices are very low. So only around 15% of the catch quota was fished out the last years. The build up of a new processing plant with a capacity of 50.000 t should increase catches and income for the fisherman.
In a study for the World Wildlife Fund for Nature (WWF) a concept for sustainable fisheries was discussed for the herring fishery of the Island of Rügen. Around the coast is the main spawning area of the Western Baltic Sea herring stock.

The goal of the study was to find out whether a sustainable herring fishery is possible when this new processing plant is going to be build up in the next years. This paper includes a short description of a more general approach to sustainable fisheries as well as results for the three areas of sustainability which were pointed out in the study.

Sustainable Fisheries

There are a lot of discussions about what sustainable fisheries are. This year the European Union wants to introduce a new approach to fisheries management. The ICES recommendation for quota management should follow the precautionary principle. A lot of stocks are out of safe biological limits after this new management goal but the cut down of quotas within the European Union is not far enough for this new management approach. But we should see how the negotiations the next years will be. The precautionary principle could be defined as a part of ecological sustainability in fisheries.

Three areas of sustainable fisheries can be outlined:

[1] See Hannesson, R. (1996)
[2] See Ernst, P. (1998), p. 171 ff. or Hanmer, C. (1998), p. 73 ff.

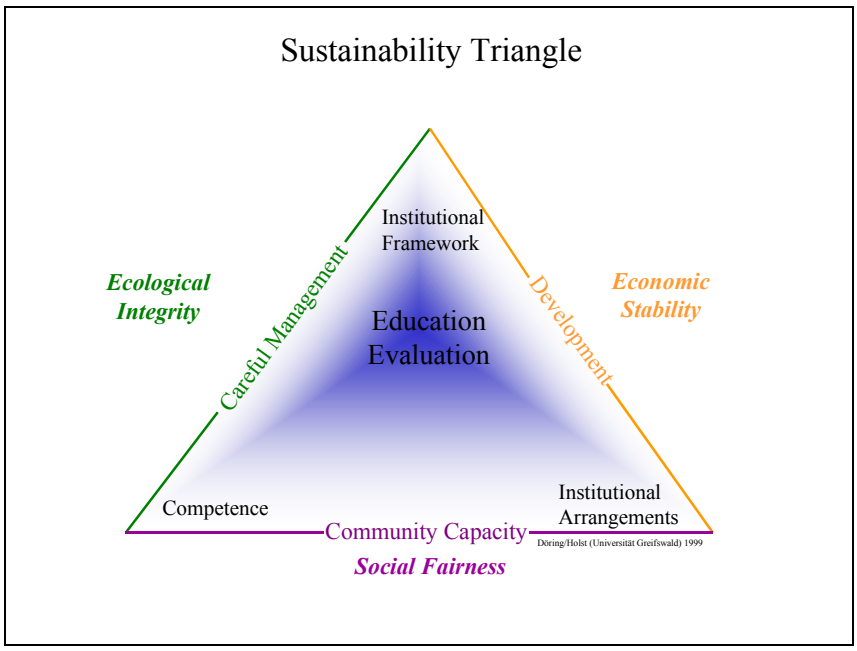

Fig. 1: Sustainability Triangle[3]

The Baltic Sea Fisheries Commission defines Sustainable Fisheries as follows:

"Sustainable fishery is achieved when a high probability of fish stocks being able to replenish themselves over a long period of time within a sound ecosystem is assured, while offering stable economic and social conditions for all those involved in the fishing activity"[4].

Ecological Sustainability

Let us now look at the results of the study. Ecological Sustainability was examined for four areas:

1) Bycatch of undersized fishes and other fish species.
2) Bycatch of marine mammals and birds.
3) Level of catch quotas.
4) Consumption of fuel.

[3] after Charles, A.T. (1994), p. 205 with own supplements.
[4] Contribution to "BALTIC 21" Agenda 21 for the Baltic Sea Region of the International Baltic Sea Fisheries Commission, website:
http://www.ee/baltic21/document/sectors/fishery/firep_23.htm

Point 1) At the moment fishermen use mostly gill and trap nets in the herring fishery. This static gear types have very low bycatch rates. The big mesh sizes of gill nets lead to catches of big fishes out of the shoals only (there are mixed shoals in the Baltic Sea) and very few individuals of other species (e.g. perch, pike-perch, cod).

A big problem in other fisheries is the bycatch of unwanted species if they don't survive after the catch[5]. Bycatch out of trap nets survives if it is given back into the sea immediately after the emptying process. Bycatch in trawls mostly does not survive the catch.

Point 2) There is very few bycatch of marine mammals in the Baltic Sea but stocks of mammals are low and this would be a problem if the mammal stocks go up the next decades[6]. Bird bycatches were reported more in the autumn gill net fishery on cod but not very much in the spring herring fishery.

Point 3) The Western Baltic Sea herring stock seems to be in a very good condition. There are no accepted assessment because of mixed stocks in autumn in the Skagerrak but all accepted data show a good condition (see Fig. 2).

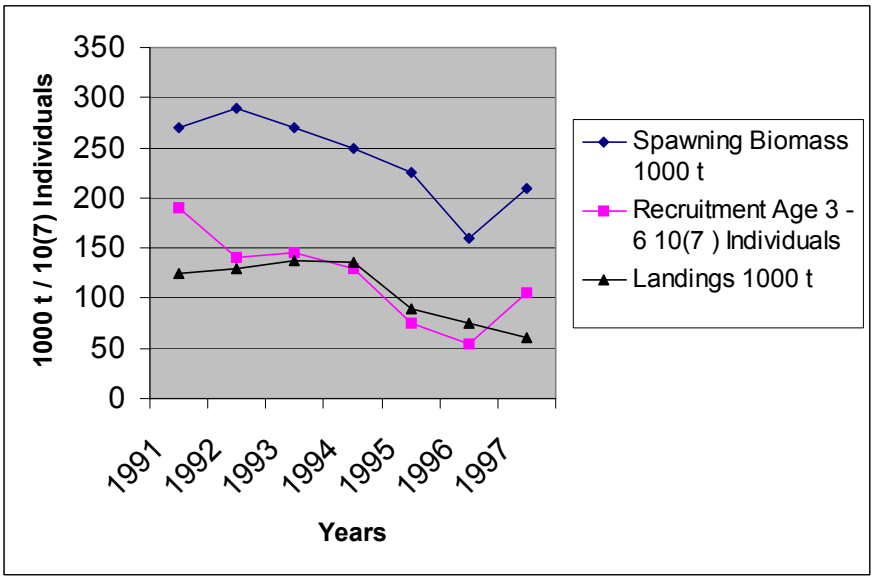

Fig. 2: Stock situation of the Western Baltic Sea herring stock [7]

German fishermen used only around 13% of their catch quota on herring in the recent years. The new processing plant should lead to an increase of catches from now 10.000 t to 50.000 t (2/3 of catch quota at the moment). Biologists who work on an assessment consider this is

[5] see about survival rate of escaped small herrings out of trawls nets: Suuronen, P. (1995)
[6] see Kock, K. H. and Benke, H. (1996)
[7] see Hammer, C. (1998)

normally no big problem for the stock because the GDR fished 50. – 60.000 t every year before 1990. But we must analyse what are the best techniques to catch these 50.000 t. It seems that static gear is better because of lower bycatch, lower fuel costs etc.. It seems possible that 25.000 t could be harvested with passive fishing techniques in the year 2003 and later. One limiting factor is that gill nets only fish the big specimen out of the shoals and therefore catches should not increase over a ecological acceptable limit (because of spawning success). Another one is the possible capacity of the Greifswalder Bodden as fishing area. The remaining part of 25.000 t will have to be caught with trawls and that is a problem because of bycatch of sprat and small cod (as a research fishery shows the last year). In addition there could be a lot of pressure to use the plant to capacity.

Point 4) Coastal fishermen have very low fuel consumption. Around 0,1 kg per kg fish instead of 1 kg per kg fish (and more) in high seas fisheries.

Fishing method	kg fuel/kg fish (gutted with head)
Bottom Trawl	
average distance to fishing places	1,00
Bottom Trawl	
coastal region	0,60
Longlines	
average distance to fishing places	0,30
Longlines	
coastal region	0,20
Coastal fisheries	
Small Scale	0,10

Table 1: Fuel consumption of different fishing techniques[8]

A second point is: higher catches with less environmental damage in coastal waters could reduce imports out of e.g. Scotland or Iceland.

Economical Sustainability and Subsidisation

Economists talk a lot about economical efficiency. But in the past fisheries policy lead to big, high subsidised Trawlers (boats over 12 m in the table) with high opportunity costs:

- ➔ Unemployment in coastal regions
- ➔ High bycatch rates[9] and
- ➔ Destroying of seabeds etc.

[8] after Gabriel, O. (1995)
[9] see about economic perspectives of solving bycatch problems: Smith, T.P. (1995)

So one question for the study was, under what circumstances a less problematic coastal fishery with static gear (boats under 12 m) could survive.

The situation for the fishermen at the moment is very bad. Their low income prevents net investments and a lot of fishermen gave up business in the last years.

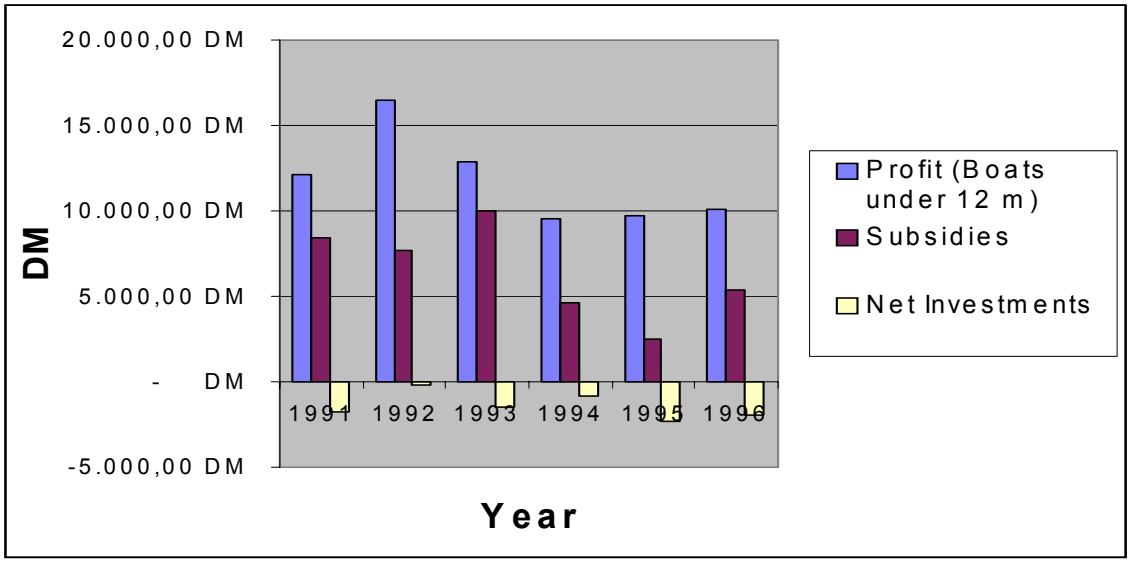

Table 3: Profits, Subsidies and Net Investments for Boats under 12 m[10]

A possible scenario for a better situation in the future is shown in Table 4.

	Boats under 12 m today (all figures in DM)	prognosis (loan with reduced interest rate)
Yield per enterprise	27978	
from it sale of fish	22799	64500
expenditure per enterprise	15416	21910
from it		
deduction or credit repayment	7256	9930
Fuel costs	1031	1031
Labor costs	0	0
Subsidies	*2490*	*5520* (need)
Profits	**9736**	**44843**
Enterprises		70 (each 1 place of work)
Whole necessity of Subsidies		*386400*
Subsidies per place of work		*5520*
Indirect Subsidies for fuel	*2209*	*2209*
Profits without indirect subsidies	**7527**	**42634**

[10] Data from Ministry of Agriculture and Nature Conservation (different years)

Table 4: Income scenario per year for coastal fishermen with static gear[11]

Assumptions:

- ➔ Investment in new techniques let catches increase from 100 to 150 t per year and fisherman;
- ➔ Better prices for better quality because of the new processing plant;
- ➔ Investment with loans with reduced interest rates. State subsidies instead of money for days the fishermen don't fish.

We can call such subsidies, 'subsidies for ecological services'. In fisheries this instrument could be established to use less destructive gear (see therefore discussion process around the EU-Agenda 2000 about 'ecological services' in agriculture, also a point if other subsidies are forbidden after the next WTO round).

In comparison Table 5 shows the situation for Boats over 12 m (with trawls).

	Boats over 12 m today (all figures in DM)	Prognosis (loan with red. int. Rate)
Yield per enterprise	376671	
from it sale of fish	293983	432000
expenditure per enterprise	306252	398613
from it		
deduction or credit repayment	56488	148849
Fuel costs	27772	27772
Labor costs	97135	97135
Subsidies	55167	82974 (need)
Profits	**46885**	**33387**
Enterprises		21 (each 3 workplaces)
Whole necessity of Subsidies		*1742545*
Subsidies per place of work		*27659*
Indirect Subsidies for fuel (1 DM per l)	*87283*	*87283*
Profits without indirect subsidies	**-40398**	**-53896**

Table. 5: Income scenario for Boats over 12 m[12]

The scenarios show that the income situation could be better for fishermen using static gear with fewer subsidies and this could give them a perspective.

[11] Data from Ministry of Agriculture and Nature Conservation (1998) and own calculations

Social Sustainability

Another big problem in East Germany is the high unemployment rate. In this region it is one of the highest in whole Germany, at the moment over 20%. Fisheries have a long tradition in this region with a lot of workplaces in it. In addition the important tourist sector depends on the image of a coastal region and one part of this are small scale fisheries.

.	Year (or month)	Unemployed People	Unemploy-ment Rate
Mecklenb.-Vorp. (‚Land')	1996	187268	23,00 %
	May 1998	206310	23,20 %
City of Stralsund (incl. Rügen)	Feb. 1998	51056	27,96 %
	May 1998	47329	25,83 %

Table 5: Unemployment situation around the Island of Rügen[13]

The following table shows that more people find work in a coastal fishery than in the bigger trawl fishery.

Szenario	Gear type	Landings per gear type (prognosis)	Landings per workplace (WP) or enterprise	Workplaces in the fishery	Other employees (new processing plant)	Whole work-places
1	Gill net	10.500 t	150 t / WP	70	140	370
	Trap net	14.500 t	150 t / WP	97		
	Trawl fishery	25.000 t	1.200 t / enterprise	63		
2	Trawl fishery (regional fisherman)	50.000 t	1.200 t / enterprise	125	140	265
3	Trawl fishery (other regions)	50.000 t	-	-	140	140

Table 6: Working places in the fishing sector[14]

Scenario 1: Different catch quotas for different gear types (one point in discussions about the Common Fisheries Policy after 2002)

Scenario 2: Landings of regional fisherman with trawls from catches near Rügen

Scenario 3: Transports of raw herring from other regions

[12] Data from: see Table 4

[13] Data from a regional database of the Federal Agency for Employment

[14] own calculations and a statement from the investing enterprise

The stability of fishing communities depends on a better situation in the fishing sector. At the moment a big problem is that no one wants to start a career as fisherman.

Summary and Conclusion

All arguments show that a sustainable herring fishery depends on the use of static gear (see Table 7).

Area of examination	Static fishing gear	Active fishing methods
1) **Consumption of fuel** (in kg per kg Fish) => running costs	Average of 0,04 low	Average of 0,1 to 0,2 in coastal regions, elsewhere 0,5 and more high
2) **Bycatch**		
➢ too small individuals	low	higher
➢ other fish species	low	higher
➢ survival rate after bycatch	high	low
➢ Other species like birds and marine mammals	low	low
3) **Subsidies**[15]		
direct	Ca. 5000,- DM / WP	Ca. 27.600 DM / WP
indirect	Ca. 3000,- DM / WP	Ca. 27.000 DM / WP
4) **Workplaces** (possible in the future)	1 WP / 150 t of herring	1 WP / 400 t of herring

Table 7: Summary of all arguments

Next point in the future is the question whether it is possible to certify the herring fishery in the MSC process to get better market conditions for this product in Germany.

[15] Data from Ministry of Agriculture and Nature Conservation (1998)

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