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Title of paper:
COMPARATIVE DATA FOR FISHERY DEPENDENT AREAS:
A REQUIREMENT FOR A SUSTAINABLE FISHERY MANAGEMENT

Abstract:
The concerted action (CA) 'European Database of indicator Coastal Communities' (Acronym INDICCO) was established in 1999 and was working for a period of four years. Already at the start of the project it was clear that Norway and the Scandinavian countries were far ahead of the rest of Europe when it comes to data on fisheries, employment and social indicators at local community level and municipal level. For Norway, that has worked as the main example for the database, the WEB-framework now presents comparative data on fisheries, other industries, employment figures, social conditions, education, etc. for the total of Norwegian municipalities, all together about 430 municipalities, with or without fisheries. The main practical conclusion from the INDICCO project is rather dramatic. It tells that there is of not much use to initiate more fisheries database projects aiming at providing a comparative fishery management tool for all Europe - without doing something with the statistical routines concerning fishing activity at the micro level. This project has shown that the necessary general socio-economic data exists in most countries, but fishery data are scarce and unreliable. The INDICCO framework with graphs, maps and other indicators demonstrated for Norway should be a strong argument for the need and usefulness of such a data material for the sake of sustainable fishery management in the future.

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COMPARATIVE DATA FOR FISHERY DEPENDENT AREAS: A REQUIREMENT FOR A SUSTAINABLE FISHERY MANAGEMENT

1 Introduction

Looking back at the last decade of development in coastal areas it is obvious that our period of time will be remembered first of all by increased environmental concern. During these years three new political concepts have been introduced world wide: Sustainable management of natural resources, concern for the biological diversity in nature and integrated coastal management. The background for this shift in policies is a global recognition that time has come when there is a serious need to protect nature against negative consequences of human activities. And the coastal areas have been highlighted as one of the most threatened environments.

Fisheries, that used to be the dominating commercial activity in many coastal areas, have been a striking example for the need of such a shift in political signals. In fact, today all countries have experienced that fish resources have been managed in a non-sustainable way, through Klondikes and collapses, with serious consequences both for the biological diversity in coastal and deep sea waters and for the reproduction of the most important fish species. And still, after nearly a decade of global development under the banner of sustainable policies, there is not much improvement. However, there are tendencies that a new management regime is under way, and that we are slowly moving to a situation where fisheries are managed in a more balanced way.

This paper is focussing on *one* of the requirements that need to be met before such a new management regime is established: the need to have *better policy and planning instruments*. If long-term sustainable development of fish resources is to be established world wide we need a system of management that gives an early warning in case the balance in nature is threatened or violated by short-term human exploitation. So far the world has hardly seen one country coming up with such a system.

2 The state of affairs concerning planning instruments

Fishing activities are indeed complex and varied both in time and space. Therefore, compared to agriculture, there is a great challenge to get a reliable overview of the fishing activities. To manage the balance between available fish resources and the resources taken out for human consumption or human use, which is the core content of the idea of sustainable fishing, is surely not a simple task. Much of the fishing activity is directed towards migrating fish species that makes it even more complicated. Many of these cross-border questions are grid-locked in stranded negotiations between fishing nations.

Finally we know that there - also *within* the fishing nations - is a variety of groups in society that pay interest to fishing, not only the registered fishermen. In fact, the old fisheries regimes that were build on the image of a distinct fishing industry and an easily recognisable "fishing sector" does not apply any more. Nowadays even the environmental movement and the tourism industry claim to have a voice concerning the management of fish resources.

Therefore, it seems that the new planning instruments for sustainable fisheries need to comply at least with the following three requirements:
1. We need data of the size and health conditions of various fish species and their distribution in nature (in the various zones proclaimed for fishing activities)
2. We need data of the actual fishing activity (quantity of fish catches and fish landings, independent of which groups are taking out the resources)
3. We need data on the value-added derived from fishing (the value generated in society from fishing activities).

Concerning point 1 there has for years been a lot of biological research on the size and healthiness of various fish species, even though this profession has not yet been entirely successful in their estimates and predictions. However, the introduction of multi-species modelling during the last decades seems to be a great step forwards.

Our concern is more on the two latter points: data of fishing activity and data of value-added created from fishing. To have reliable data of fishing activity (point 2) should be obvious, as we know that there exists a heavy commercial pressure in the direction of over-fishing due to the over-capacity of fishing fleets. If there are no restrictions set for the fishing activity, there is surely nothing that can prevent new catastrophes with extinction of important fish species. And to set reasonable catch restrictions we need reliable data about the actual harvesting of various fish species.

Point 3 is also crucial, as there must be a kind of legitimating of the outtake of resources. If no value-added is created, the fish should better be left in nature to reproduce itself and secure a healthy stock of that particular specie for later.

Also a fourth requirement should be mentioned, even though it is not as obvious as the previous three points:

4. There should be some data about the structure of the fishing communities and their dependency of fishing.

The main reason for the latter point is the fact that we are now in a period of dramatic restructuring of the fishing activities. We are moving from the old productionist regime - when fisheries were seen mainly as a commercial activity that should be developed entirely by professional fishermen, preferably

with the newest technology and almost without any catch limits - to a new regime of sustainable management.

In this period there will naturally be a lot of attention on the social consequences of reduced fishing activities. Someone needs to take the disadvantages of reduced income from this particular natural resource. It should be in the interest of most states that initiate such reductions of fishing activities that the social disadvantages in society should be minimal. As an example, in Europe the European commission has experienced the severe consequences when such interest groups as farmers and fishermen come to the point when they loose confidence in the policy-makers and in the management system. For some "hot" political issues there is nowadays almost impossible to arrange political discussions without the meeting place being disturbed by completely unpredictable political demonstrations. In the fisheries sector events have not yet reached this stage. However, with a policy of reducing fishing activities with 30-40 percent over a period of ten years, as is the case with the European Union, there is not difficult to predict that there will be some opposition from the fishing areas that are most dramatically influenced by catch reductions or other regulations. And the protests in this sector tend to take similar forms as in the agricultural sector.

To have reliable and detailed data identifying the fishery dependent areas would be the best guarantee against such unfortunate political clashes with interest groups and stakeholders. Then the policy-makers would be able to localize stakeholders at an early stage and engage in discussions with them of how to overcome problems connected to the restructuring of the fishing activity.

It is surely also a goal for policy-makers to reduce the costs of compensatory measures and unemployment schemes. One way of achieving more targeted compensatory programs is to restrict such measures only to places with no alternative to fishing and avoid paying out to fishing communities with other alternatives. This concern, which might reduce costs dramatically, could be formulated as a fifth requirement:

5. There should be some data about other industries (other job opportunities) and general social conditions at each place.

To comply with this last requirement we need general socio-economic data and more complex data of the composition of employment sectors (industries) at each place.

2.1 The problem for analysis

Based on the five requirements highlighted above the analysis of this paper departs with the following two questions:

1. To what extent does it exist in Europe sufficient data to establish and nurture a good planning instrument for a new management regime based on sustainable management?
2. Do we see from existing practices in fishing nations and from the actual availability of data sources how the new planning instrument should be constructed in order to meet the new requirements?

These questions should be answered mainly based on experiences and empirical data from two former research projects for the European Commission.

2.2 The empirical material

The first material to be used in this analysis is from the ESSFIN project, a concerted action for the European commission in the period 1995-1999 (Symes 1996, Otterstad, Phillipson and Symes 1998, Symes 1998). The second material is from the INDICCO project (Otterstad 2002), also a concerted action for the European Commission in the period 1999-2002). A third material is the EU Regional Socio-economic Studies for Fishery Dependent Areas, a project organised by EU DG14 officers to compile new data on fishery dependent areas in EU member countries in 1999 (Goulding 2000). This study was a follow-up from a similar study from 1991 (Sals, 1991).

In addition to the empirical material compiled by these studies the analysis takes advantage of some materials from Norway (Otterstad 1993) and some materials and analysis from the US (Hamilton and Otterstad 1998). Also data about fisheries compiled by Eurostat (Cross 2001) and by FAO are investigated to analyse the two questions posed above.

3 To what extent the necessary data exists

Both the ESSFIN database group (see Otterstad, Phillipson and Symes 1998) and the INDICCO project (see Otterstad 2002) have drawn the same conclusions about the availability of fisheries data in Europe:

Fisheries data are in general not easily available, and in the Southern European countries it is almost impossible to get such data. Academics and fishery experts from these countries (Spain, Portugal, France, Italy and Greece) excuse themselves for the lack of comparative fisheries data by reference to the 'statistical cultures' in their countries.

This problem appears in full detail when looking at the data compiled in the EU comparative project on regional socio-economic studies of fishery dependent areas (see Goulding 2000).

The EU Regional Socio-Economic Studies for Fishery Dependent Areas had the same aim as INDICCO; to find a number of simple indicators that could distinguish one area from the other and guide policy-makers in questions related to fishing capacity reduction, compensation for loss of fishing activity for a particular area, etc. The indicators that were selected represented an obvious improvement from the former study in 1991 (Sals, 1991). The new project met some problems due to the difficulties with lack of comparative data. Hence the coordination study (see Goulding 2000) could not present comparative maps on fishery dependent areas in Europe using these indicators even on county level (NUTS3). Therefore, the information from the project was not easily applicable as a guide for practical management and policy-making.

However, it was of great importance that research institutes in this study demonstrated their capability to compile data on fisheries activities in each country. In fact, though it is not presented for public use, much more data than needed for the set of indicators were collected, and many of these data were at lower aggregation levels (NUTS4 and NUTS5). As such these data have been extremely important, showing to what extent it is possible to get comparative data on fisheries at low aggregation levels for countries all around Europe.

The general impression after compilation of data from EUROSTAT, FAO and from national statistical offices is that much data is available, and that there have been serious attempts to make these data more comparable. However, most data are more easily available in Northern Europe than in Southern Europe.

The main conclusion is that the main obstacles concerning data availability are connected to four aspects with fisheries data.

3.1 Four problems concerning fisheries data

Firstly fishery activities are usually merged with agriculture, which is the dominant primary industry. Most Southern European countries have problems distinguishing fishery from other primary industries in their national statistical reports.

Secondly the measuring of fishing activity, even when it is done, is registered on special units called "fishery districts" or "fishery zones". These districts are constructed by involving only areas with exclusive fishery settlements. Thus they contribute to an extremely high value for the area on fishery dependency indicators, but as geographical units they are not compatible with any level in the ordinary administrative structure, the NUTS structure, that is used for collection of other statistics.

The map presented below (see figure 1) shows how selected areas in Galicia in Northern Spain add up to the construction of fishery dependent zones with extremely high score on EU fishery dependency indicators.
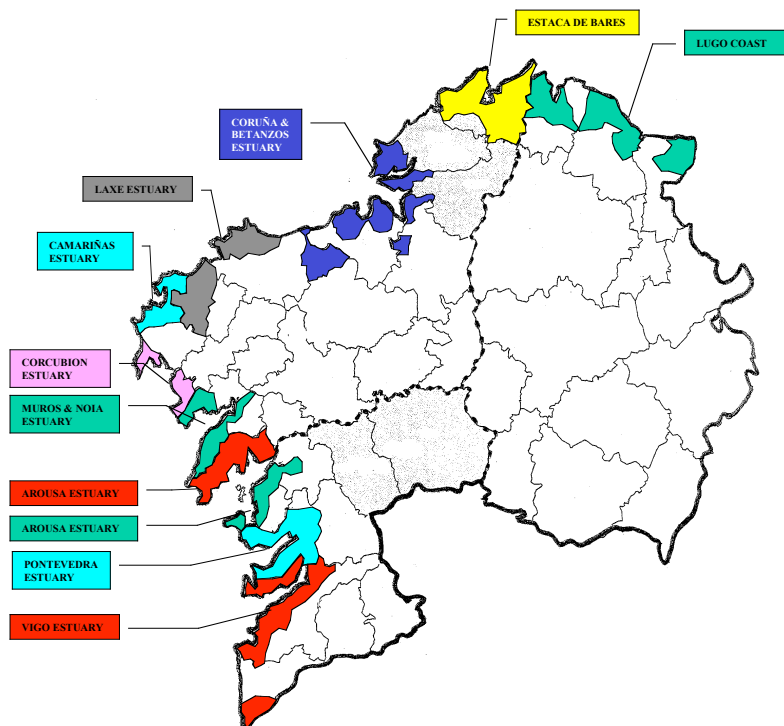

Figure 1: Zones of fisheries dependency in Galicia, Spain
(Source: Ikei: EU regional Socio-Economic Studies on Dependence of Fishing, Spain E 1, 1999, p 54)

This map of fishery dependent zones in Galicia illustrates the point in question. In this area we find 11 fishery dependent zones and they are all ranked among the 16 most fishery dependent areas in Europe both in the former study (1991) and IN the last study (1999). Not only are the fishery dependent zones much

smaller than the county (or NUTS 3 level), which in itself gives a better chance of high percentage of dependency, but for some areas the zones appear to have been selected leaving out areas even within the municipal borders. Comparing to the other regions in Spain, it is only this E1 region, comprising of Galicia, Asturias, Cantabria and the Basque country, that did not provide fisheries dependency ratios based on NUTS 3 units, but used the fishery dependent zones instead.

In the table with the source data of fisheries employment and total employment (to construct one such indicator, Ratio 2) we can even see what this simple fact has as a consequence. The fisheries employment figures are equal for the two parts of the table (see table page 43 in the report: firstly the section with fishery dependent zone data and secondly the section with NUTS 3 data). The figure showing the total employment is 851.621 when using the fishery dependent zones and it increases to 2.058.500 if we use NUTS 3 units. For Galicia the difference is between 379 thousand jobs as a total within the fishery dependent zones and it increases to 788 thousand as a total if we use the NUTS 3 region of Galicia.
This shows clearly how the method of fishery dependent zones in this case increased the score of the EU indicator to almost the double.

A *third* problem is the concentration on 'fishing ports', a few places at the coast for which data on landings from fishing vessels from all around is summarised. Without the distinction between the registration place for the fishing vessel and the place for landings, it is hard to say anything on the regional impact of the fishing industry.
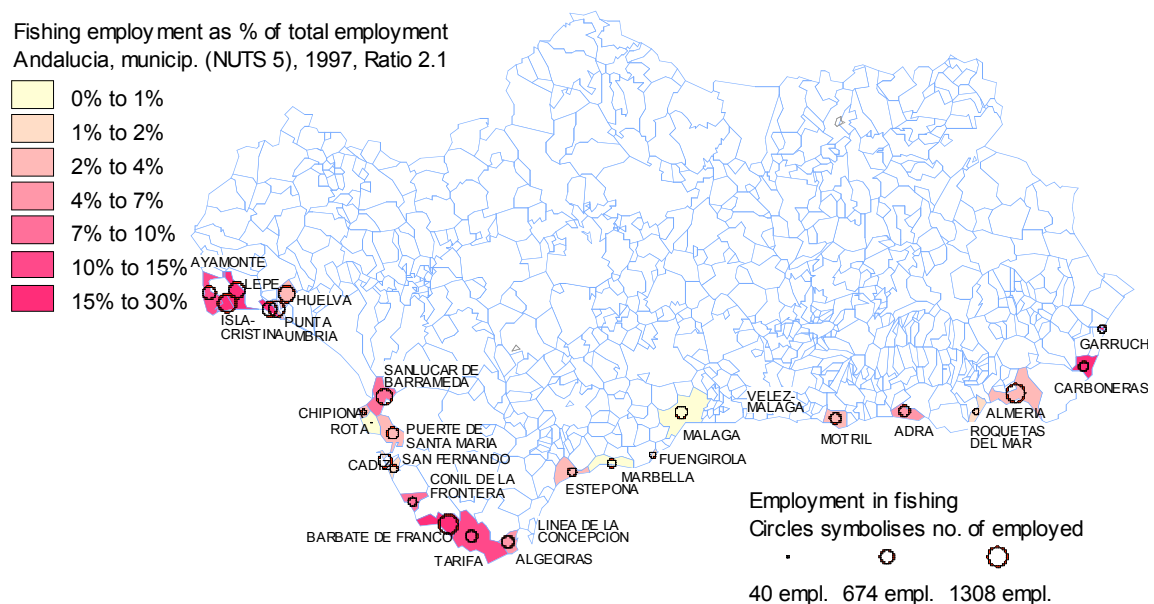

Figure 2: Fishing in Andalusia (Spain) distributed on the municipalities where fishing vessels are registered

This map shows the diversity of fishing activity when we are using the registration place for the fishing vessel, as compared to the simple patterns given when data are just distributed on ports. On this map there would be only five such ports.

A *fourth* obstacle is the problem of weak registration routines of fishing activity in general in some countries. The logistics of fisheries many places in Europe are often organised in direct deliveries from the local fisherman to buyers on the local markets. In this chain of logistics there is usually no reliable system of registration of catches and landings.

The INDICCO project has 'escaped' from these problems by mainly showing the usefulness of the Scandinavian data collection routines and by showing *to what extent it is possible to get similar data* in the rest of Europe. The conclusion is that in order to provide the same types of data from Southern European countries (such as Spain, Italy and Greece); there is obviously a need for a change of a few of the basic routines of data collection concerning fisheries at the first level.

4 An illustration of the new planning instrument

Already at the start of the INDICCO project it was clear that Norway and the Scandinavian countries were far ahead of the rest of Europe when it comes to data on fisheries, employment and social indicators at local community level and municipal level.

Norway was then the most obvious choice for showing an impressive example, as much data was already collected in former projects, and here it was possible by other external funding to make an update of the materials. During the last part of the INDICCO project most of the work has been connected to the organising of the Norwegian prototype for INDICCO and display these data on the WEB-site.

4.1 Understandable indicators

Though the statistical base data in Norway and other Scandinavian countries are organised in a way that makes it possible to develop a tool for better management, in practical management the situation today is not much different there than in other European countries. The reason for that is not the lack of available statistical materials - data exist in huge amounts - but the lack of preparation of statistics into something understandable for ordinary people. Therefore, an important choice concerning the INDICCO framework was that it should provide a way by which large amounts of statistical data should be summarised into something easily understandable for ordinary people.

Today the result is a framework presenting a set of comparative graphs that are linked to units in a hierarchical structure (the ordinary NUTS structure) and to a Geographic Information System (GIS) application. Large amounts of statistics are by this method compressed into a few instructive graphical highlights of each 'indicator community', whether we by community mean a county, a labour district, a municipality or a local community (here mainly local postal units).

4.2 A set of informative graphs

The use of a set of graphs as an indicator for fishery dependency is a step towards providing a more detailed impression of the overall situation in an indicator community. The advantage of using graphs, as compared to the simple ratios developed in the EU Regional Studies, is that they might help us capture both differences in structure for each community and differences in development trends.
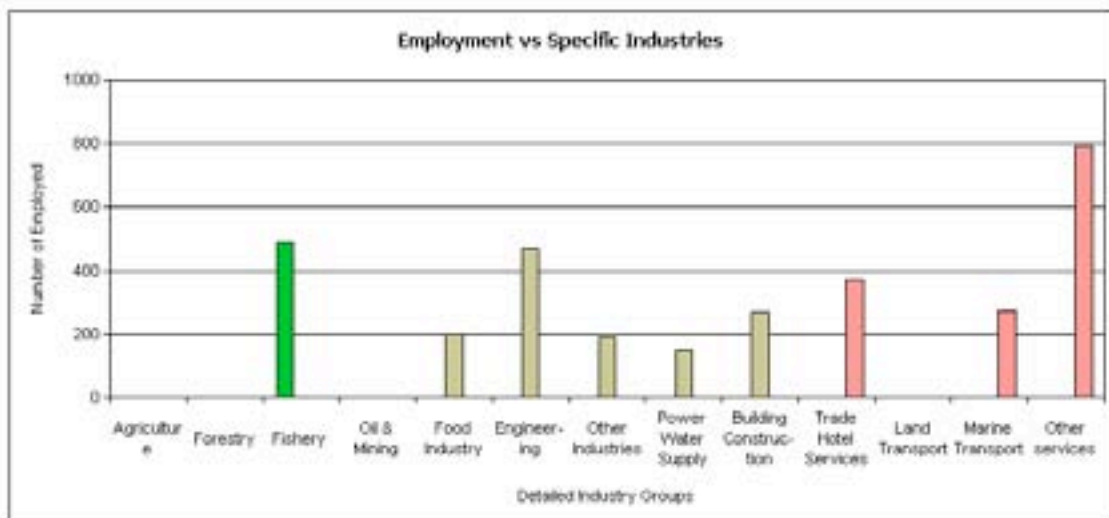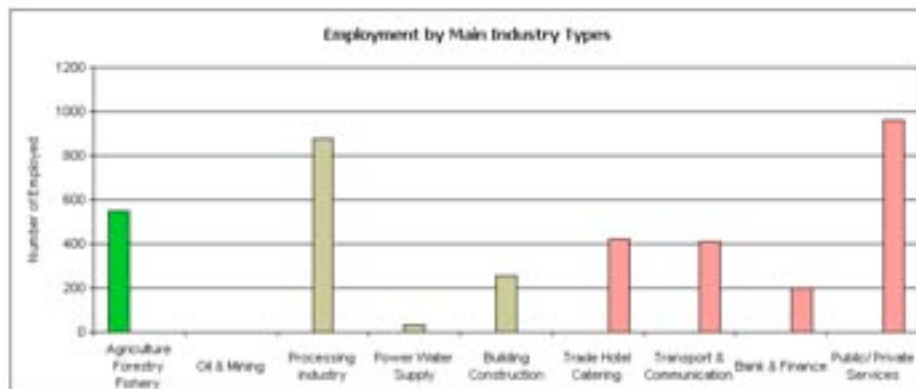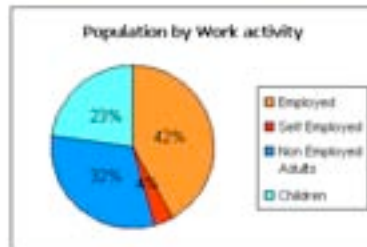
By comparing various graphs (for population development, composition of industries, age and gender structure, fishery trends, unemployment trends and other social indicators) for the same area we are approaching the higher ideal of a more holistic impression of the present situation for the selected area.
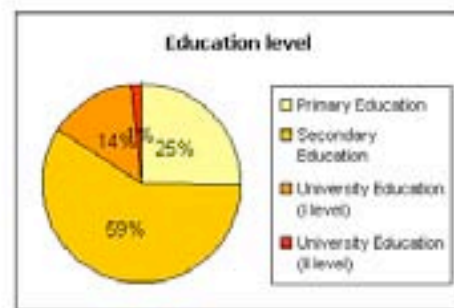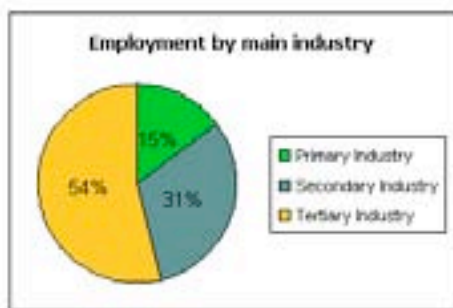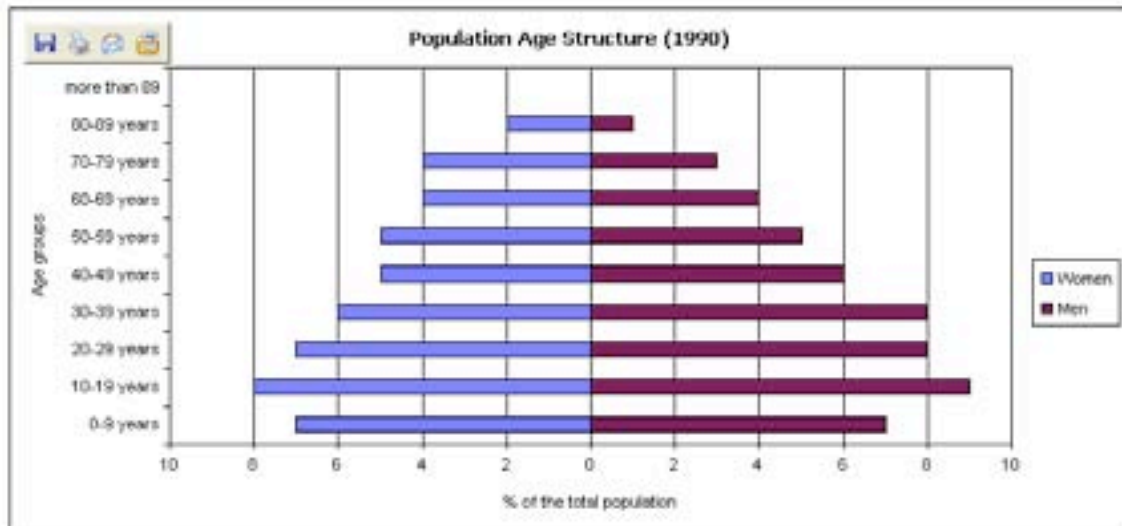
The graphs selected for INDICCO are organised in *static* types, mainly using data from the ten-year censuses, and *dynamic* graphs, using time series data. In the following example the main graphs are shown for one Norwegian municipality, Herøy, one of the most successful Norwegian fishing municipalities. Such a set of graphs are available for all Norwegian municipalities. The same comparative set of graphs is constructed also for county level and national level. All these graphs and maps that we shall present in this section of the paper are constructed on the fly on the WEB-site of INDICCO (se www.indicco.ntnu.no).

Static graphs

Municipality of HEROY

Population Static Data for year 1990

Population by Work activity

- Employed
- Self Employed
- Non Employed Adults
- Children

42%
27%
32%

Employment by Main Industry Types

Employment vs Specific Industries

Population Age Structure (1990)

Employment by main industry


Education level

These graphs are available in comparative versions for the census years 1990 and 2000. In that way they give an understanding of development trends as well, but not in the same ways as the graphs constructed from time series data.

Dynamic graphs

These graphs are based mainly on general socio-economic data, and they benefit from the preparation of such data for time-series analysis that has been done by the Norwegian Statistical office (SSB) and by the Norwegian Social Science Data (NSD).

Population development 1950-2002

Population development 1980-2001
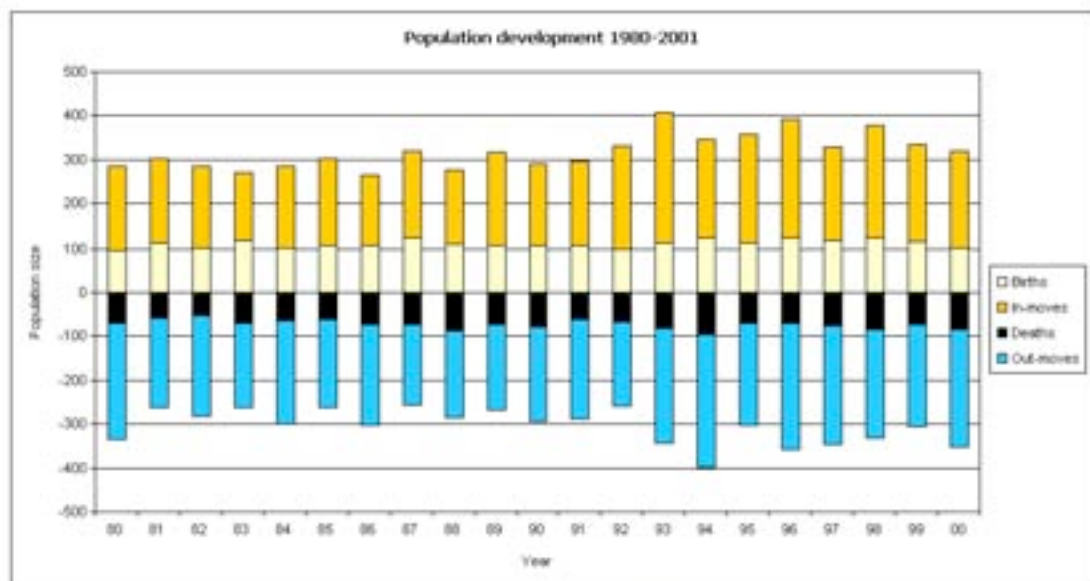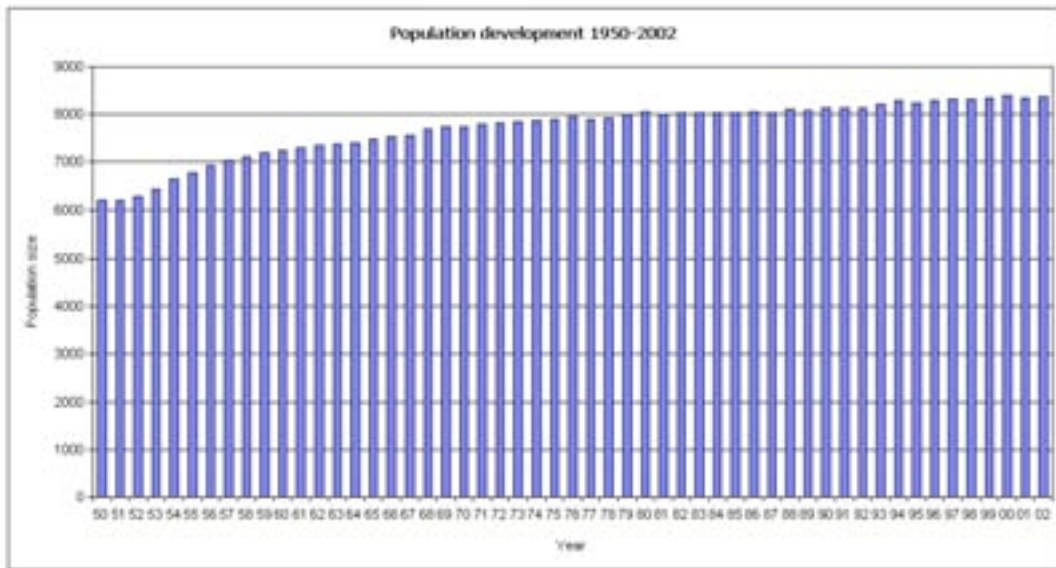
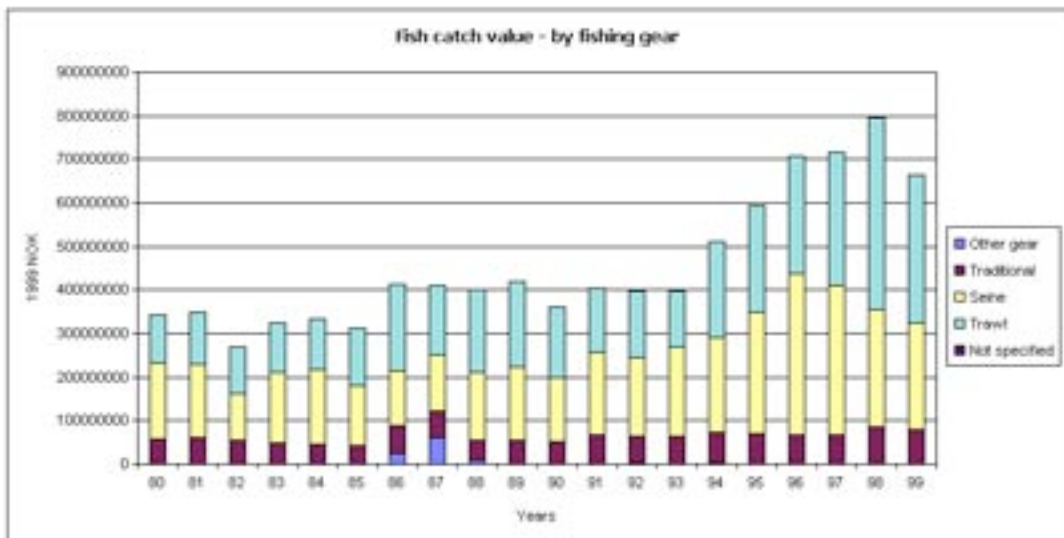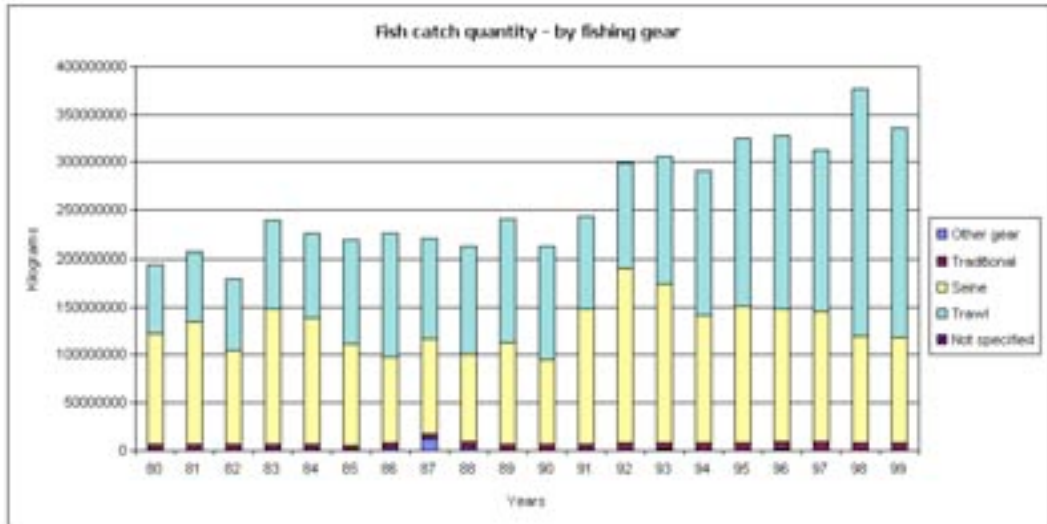## Fishery development graphs

The graphs showing fishing activity is naturally more detailed than for other industries. Here data on catches are presented separate from data on landings, and in both cases the graphs are covering quantity and value.

Fish catch quantity - by fishing gear

Fish catch value - by fishing gear

The comparison between the trends of catch quantity and catch value is instructive indeed for the trajectory of fisheries at each place. The distribution on fishing gear is giving additional information about which vessels contribute to the different fisheries. Here we see a relative increase in catch quantities and catch values for the years after 1993, but there is an interesting and complex connection between catch quantity and catch value. Such an observation would be interesting for more in-depth studies and interviews with the persons involved, and this is a typical example how such data gives a natural situation for communication with the stakeholder groups.

The fisheries data for Norway – and the graphs provided are much more detailed than this. The same sets of time-series graphs are constructed also

showing the distribution by fish species (mainly pelagic/migrating, demersal/ground, shellfish/crustaceans and other species), by fishing areas (distant waters, ocean, coastal) and by fishing vessel length. And similar data set exist for landings as for catches. This material is unique for Norway, but the same way of organizing data can easily be made also for many other countries in Northern Europe and – with some enforcement by the EU of statistical routines of fishery registration at ground level – also in the Southern European countries.

Graphs on fishery employment (in harvesting, fish processing and aquaculture) are to some extent available in time series for Norway, but here it would be advisable to have some adjustments of standards internationally before such data are compiled for time-series analysis.

The same is the case with the heading "other social indicators". There is a variety of such data available (on education, income, employment, unemployment and crime, just to mention the few that are selected for the INDICCO WEB-site). To prepare good time-series for analysis (the same way as we have for fisheries) we need a more standardized form for data compilation. Today we risk that official routines of collection of such data are changed almost without notice.

Another advantage by standardising a set of graphs is that we might shift from one aggregation level to another if data at that level is not available. Usually there is a lot of data at national and county levels that are not available at municipal and local community levels. In such cases an overview on a higher aggregation level might give the appropriate information. In other cases the data on high aggregation level gives a 'watered out' impression where the local variety of fishery dependency disappears.

Comparison of areas by the use of GIS

Another feature included in the INDICCO WEB-framework is the ability to present dependency maps constructed on the fly based on statistical information in the databases. By this module it is possible to take one step up from the selected community and see the patterns of all surrounding communities. In fact, dependency maps like this represented the most popularised version of indicators in the EU Regional Socio-Economic Studies of Fishery Dependent Areas when it was published in year 2000. The achievements since then are that the INDICCO dependency maps are created on the fly on Internet, that they use additional indicator variables (other aspects of social life and variables constructed to show trends of development), that they exist also for municipal level and that they are linked with graphs, interviews, photos and other types of information.

Here is one example from an area in mid-Norway.
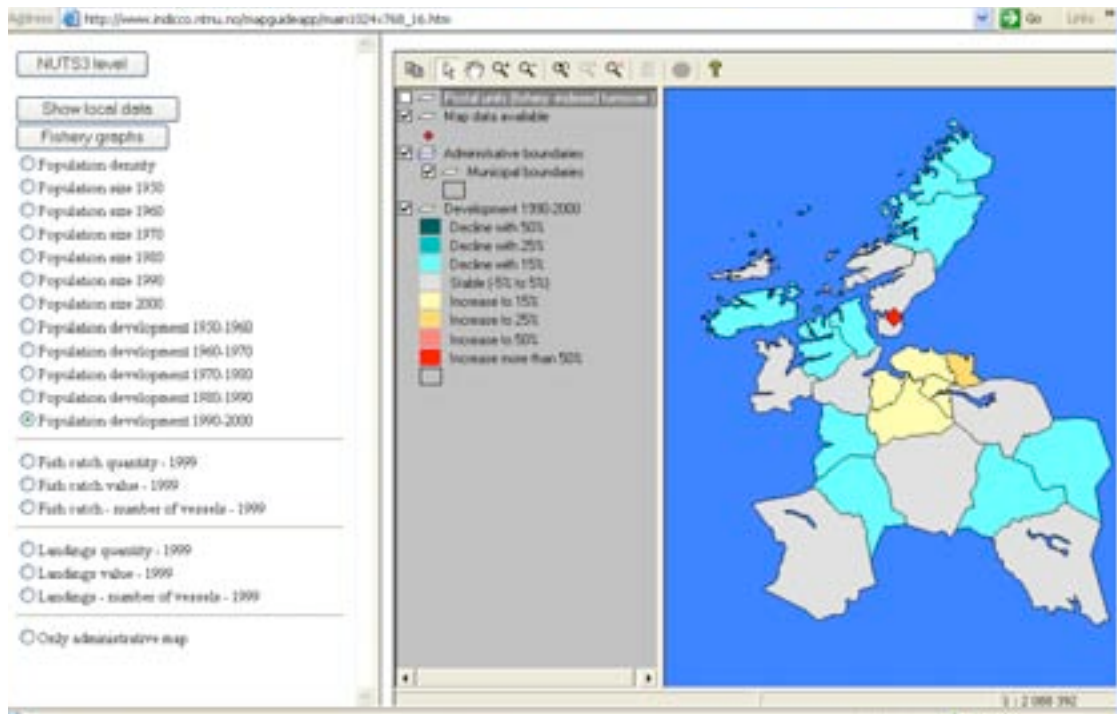
The INDICCO framework covers NUTS5 and not only fishing areas

For Norway the WEB-framework now presents comparative data on fisheries, other industries, employment figures, social conditions, education, etc. for the total of Norwegian municipalities, all together about 430 municipalities, with or without fisheries. Also for other countries, although many datasets are missing, we have chosen to include all areas and all administrative units.

It was a hot discussion within the ESSFIN database group about the ambition level in terms of data at low spatial resolution (Symes 1996). The result was a kind of compromise where a set of Norwegian graphs was attached to the final working group report, showing an impressive example. The chosen general strategy on this issue, however, was to give priority to NUTS3 level data (mainly county data) and exclude counties without fishing activity. This strategy never became a problem for ESSFIN as not much statistical data was collected. However, it became a problem in the later EU Regional Socio-Economic Studies of Fishery Dependent Areas (FDAs), when a similar strategy was chosen in a project that had the aim of collecting huge amounts of statistical data. In the progress of this project it was decided not to exclude data from non-fisheries areas. It was also concluded that if the results should be useful for fishery management purposes it was a need for data on lower spatial resolution than county level (see Salez 1999).

Maintaining the 'old' strategy from ESSFIN on this issue would have brought the INDICCO project into a troublesome and pragmatic selection of fishing areas as distinct from other areas. By such a choice valuable data sets on general socio-economic data, if they were collected or compiled, would have

been destroyed for all other use. In practice most socio-economic data would be useful also for the purpose of managing other industries and for a general understanding of the social situation in various areas. Also, if fisheries activities by time should spread to new geographical areas, such a solution would produce definitional difficulties and disturb the procedures of maintaining comparative time series data.

Bridging over to Integrated Coastal Management

Measured in academic products (references in Social Science Citation Index) during the time span of the INDICCO project it has been a tendency of decline in the academic interest for fishery management. At the same time it has been an increasing attention for Integrated Coastal Management (ICM). The INDICCO project was already in the title focussing on the term 'coastal communities' and not only 'fishing communities'. Nevertheless, it was decided that to be selected as an indicator community for INDICCO it should be required that the place had some fishing activity.

Still there is some work to be done before it has integrated the most popular methods and perspectives of ICM. At this moment detailed local maps is provided only for one municipality in Norway as an example (see Rissa municipality) and there is a possibility to construct main watershed regions for all Europe from the terrain maps included in the GIS module. Such perspectives are useful both for fisheries management and integrated coastal management, because they include questions about pollutants, environmental impact assessments, integrated environmental assessments, etc. For the purpose of INDICCO underwater terrain maps and fishing area maps should be useful. So far the GIS framework contains a land territory map with high resolution for all Europe available through Internet by the means of Autodesk MapGuide. It would not be a problem to integrate more features to this mapping tool without slowing down the performance.

In fact, as it is organised, the WEB-site of INDICCO could provide assistance to many industries and much broader interests than the fishing industry and fishery management.

A survey material to approach stakeholders

Also in connection with the INDICCO survey (see WEB-site Survey 2) other interests than the fishing industry was involved. The intentions with the survey were the following:

a) It should give some contact between the project and 'user groups' in selected indicator communities
b) It should control if the indicator graphs make sense from the point of view of local inhabitants in the selected communities

c) It should explore the opinions among local people from different interest groups about strategic questions for the future of the community, and

d) It should test the local opinions about mostly all aspects of the local fishing activity.

The survey was conducted for a total of about 20 indicator communities in Norway, Spain, Denmark and Italy. Each place had at least five interviews. The questionnaire and the responses were entirely organised as output from and input to the WEB-site and the results were presented instantly by the WEB-framework.

The results of the survey prove that the state of affairs identified by the indicator graphs corresponds quite well with the opinions of the local inhabitants. And some interesting comparative differences in between countries have been observed from the interviews. So far we have not drawn any strong conclusions from the results of the survey, but the results will eventually be integrated into the summary graphs concluding the presentation of each indicator community. Here the discussion about a typology of fishing communities might be brought to a higher level. The idea is that it should be possible to construct a set of indicators that could be integrated into a 'radar' graph. Communities with similar conditions could then be grouped together and given a characteristic as a type of community.

5 Conclusion

The analysis departed from the following two questions:

1. To what extent does it exist in Europe sufficient data to establish and nurture a good planning instrument for a new management regime based on sustainable management?

2. Do we see from existing practices in fishing nations and from the actual availability of data sources how the new planning instrument should be constructed in order to meet the new requirements?

The answer to question one is simple:
- It has been shown that the necessary general socio-economic data exists in most countries, but fishery data are scarce and unreliable, especially in Southern Europe.

It tells that there is of not much use to initiate more fisheries database projects aiming at providing a comparative fishery management tool for all Europe - without doing something with the statistical routines concerning fishing activity at the micro level. In other words, if the European Commission and other national authorities do not enforce a more reliable and standardised registration system for individual catches and landings of fish in the countries

where such a system is missing today, the idea about a comparative fishery management database in Europe remains a nice illusion.

Concerning question 2, the in-depth presentation of a progressive example (Norway) the analysis has showed something more optimistic. It is possible – based on available data to construct a much more informative system concerning fishery dependent areas and sustainable fisheries than what is the case on average today.

Today, after more than three years of work of the INDICCO project - data and other materials about coastal communities and fishing communities in Europe, data that were never available even for researchers and experts, are accessible by everyone who has a computer and Internet access. And the information is presented in a simple and popularised way based on a framework developed by experts from all around Europe.

Therefore, despite some shortcomings, the INDICCO framework with graphs, maps and other indicators demonstrated for Norway should be a strong argument for the need and usefulness of such a data material for the sake of sustainable fishery management in the future.

The natural suggestion – if such a supportive data base for sustainable management of fisheries in Europe really is prioritized - is that the fishing nations in Europe, for instance through the fishery statistics group in Eurostat, could agree about some common basic routines for registration of fishing activities and socio-economic data. The implementation of such a system – either by enforcement by law, or by motivation through positive measures (as was in the first round the case in Norway), would after short time give good pay-back in terms of a valuable data for management and other analysis. We would not have complete time series data in the first phase, but even the cross-sectional data represents a great improvement compared to the situation today.

It is not the objective for this paper to consider the political 'transaction costs' of such a political decision at European level. However, it should be stated here that the experiences with the implementation of the present system for data collection for fisheries in Scandinavia indicate that the result is better both in terms of control and management of the fishing activity, in state revenues derived from fishing and in a higher public awareness of the economic importance of the fishing industry in society.

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