FORCE FIELD ANALYSIS

TOWARDS INTEGRATED POLICY ASSESSMENT

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Abstract

The results of fishery management measures may be evaluated in terms of desired and undesired effects. These effects may occur in a number of different >dimensions=: social, economic, technological, etc.

The paper presents a qualitative method for the evaluation of effects of management measures in a six dimensional >force field=. The dimensions are: ecology, culture, economy, policy, technology and space. The paper shows that processes are taking place within these dimensions as well as among them. The dimensions are a manifestation of an integrated dynamic system. The analysis of this >force field= shows that: 1/ appreciation of the complexity of the system may have consequences for solutions to identified problems, and 2/ there exist clear limits to the utility of scientific contribution to the resolution of the problems and beyond those limits political choices are required.

The paper draws upon the experience from several multidisciplinary research projects in which LEI-DLO was involved recently. It is not conclusive. Rather it is meant to stimulate further discussion regarding integrated approaches to policy analysis.

1. Introduction

The need for multidisciplinary approach to issues regarding fisheries and fisheries management has been stressed in many publications. Despite that, in practice this is seldom the case.
The recognition of the fact that various aspects of the fisheries system are relevant and related, creates an impression of a chaotic system which is too complex to deal with in its entirety. Therefore the analysis falls back on the traditional mono-disciplinary or bi-disciplinary (e.g. bio-economics) approaches.

The general objective of this paper is primarily to stimulate thinking about formalized multidisciplinary approaches to the analysis of fisheries issues. One of such possible approaches is the proposed >force field analysis=. It cannot be viewed as a formal technique in itself but much rather as a scheme for asking questions. Formulation of correct and relevant questions is the most important part of executions of relevant research. Identifying the right questions requires to start from an all encompassing point of view. It is precisely the narrow focus of a mono-disciplinary approach which determines research results almost already before a problem has been identified and/or question asked.

The specific objective of the paper is to present a method developed and applied by LEI-DLO in several recent research projects. This method may be called >force field analysis= (FFA). It may well be that this term is used elsewhere for an entirely different purpose.

FFA relates six forces or dimensions of a situation: ecology, culture, economics, policy, technology and space (physical as well as time). First section of the paper presents briefly the logic of such force field, the content of the forces and their relations in general. This section show also why these six >phenomena= are forces as well as dimensions at the same time. The second section elaborates a simple example to show how FFA can be used in practice. Finally, the third section develops upon the possibility to apply FFA to a comprehensive, integrated assessment of fisheries management, be it ex post or ex ante.

The present paper attempts to provide a structure to the multidisciplinary assessment. A rigorous application of the proposed >force field analysis= allows to elaborate a multidisciplinary assessment in a set of matrices. The matrices allow the analyst to follow precisely where he is in the apparently chaotic system. However, the matrices offer only a broad review of the processes which have to be reckoned with. The matrices are not means for straightforward decisions. Such decision can be made only after either scientifically founded selection of major aspects has been carried out or political choices have been made. Value judgements seem inescapable and therefore contribution of >objective science= has its limits.

LEI-DLO has gradually developed FFA in several research projects (1, 2, 3). It was particularly put to practice in a reconnaissance study of the long term research needs for fisheries management (2).

2. Force field model

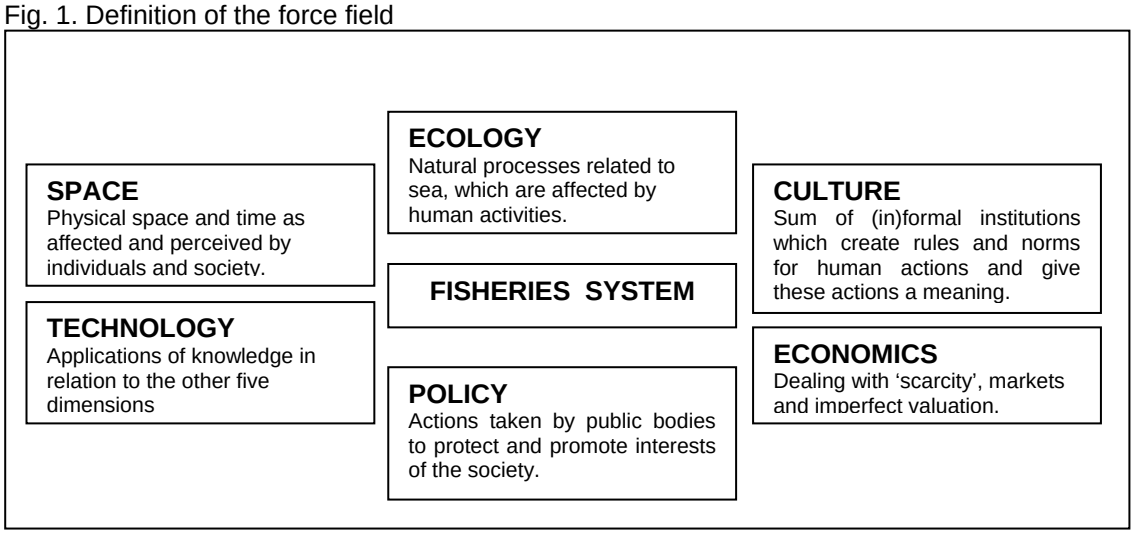
The fisheries system may be placed in a force field. All aspects of the fisheries and fisheries management are affected by this force field and at the same time they are expressed in terms of these forces (or dimensions).

The force field is composed of six forces (see below): ecology, culture, economics, policy, technology and space. Together they create an integrated system. The forces are not necessarily fisheries related. It is self-evident that the fisheries system is continuously being affected by general development way beyond fisheries itself.

Conceptually, three types of processes could be distinguished, each affecting the fisheries system in its own way:

1. Internal process within one dimension, e.g. within economics changes in exchange rates will affect the demand for fish and consequently the whole fisheries system.
2. Relation between one force and the fisheries system, e.g. effects of fisheries management measures on ecology.
3. Processes among two or more forces which will in the end influence the fisheries system, e.g. ecological awareness may lead to technological adjustment, which is then implemented in the fisheries system (sorting grids, drift nets, etc.)

Fig. 1. Definition of the force field



Fisheries management may be viewed as a part of the fisheries system. The relations between the six forces and the fisheries system is briefly presented below. (based on 2)

Ecology

Ecology in relation to fisheries may be interpreted as the natural processes related to >sea=, which are affected by human activities.

Fisheries is increasingly being viewed as a part of the ecosystem. General rules which are being applied, like the precautionary approach, will also affect fisheries. The awareness of the society about the human impact on the ecosystem will confront the policy makers as well as the fishing industry with choices between fish for fishermen and fish for birds. Sustainability of fishing communities in the short run will be balanced against ecological soundness of the fishing operations on which these communities rely.

Particularly in the area of ecology, scientific evidence may provide a better understanding of the on-going processes, but this may be in itself largely insufficient for policy decisions.

Culture

Culture is an abstraction, which could be described as a sum of (in)formal institutions which create rules and norms for human actions and give these actions a meaning. The term institutions needs to be interpreted broadly. It may be individuals, groups of individuals but also relations between them.

Culture determines what decisions are taken by individuals as well as by institutions. The perception of the other five forces is often culturally >biased=. In relation to fisheries policy, culture is of eminent importance. The general view of the society as well as the specific approach of fishermen to compliance with rules will determine the effort which the government will have to put into enforcement. Since the political arena may reflect such cultural views, intentions of effective implementation may be weakened by the lack of belief in its feasibility.

Fishermen as well as policy makers are subject to cultural influences of their time. Therefore when assessing the intentions of a fisheries management policy, the question needs to be raised whether form and the content of the policy is consistent with the political and cultural environment in which ii is to be implemented. A specific example is the attempt of CFP for >administrative= regulation of output through TACs and quotas in an otherwise liberal market environment.

Economics

Economics may be defined as a science dealing with choices in situations of scarcity. The scarcity is expressed in terms of market prices. However, the problem is that many markets are not perfect and consequently the price does not reflect the >real= scarcity. This is particularly the case with fisheries, but also with many other environmentally related >goods=.

In the economic dimension, fishermen are just like any other entrepreneurs. They will react to incentives from the market or from policy. They pursue economic and non-economic goals subject to constraints and conditions from the entire force field.

Economics is often considered incompatible with ecology, but this is rather a controversy between short and long run considerations. Economic results will determine technological progress (through investments). But this is a mutual relation as technology determines productivity resp. catch per unit of effort.

Policy

Policy attempts to promote the general interests of the society (today and in the future) when it seems threatened by private interests. However, policy in a certain field (like fisheries) may also have to serve broader (other) interests of the politicians. In such a situation it may be questioned whether the >policy system= is capable of determining >objectively= the interests of the society.

The feasibility of an effective policy is determined by cultural, economic and technological factors. Cultural perception of legitimacy will influence the level of >grass roots= support. The economic forces may make the gains of not playing by the rule exceed the losses of punishment. The controlling agency requires appropriate technology to carry out its tasks in a cost effective manner.

The fisheries management policy has desired as well as undesired consequences, which demonstrate themselves in all six dimensions, incl. the policy one itself.

Technology

Technologies used in fisheries are applications of principles developed in other areas. Technology determines partly the efficiency of production processes as well as fisheries management. Fascination with technology is a major driving force in itself.

Space

Spatial consideration relate to regions (on shore and on land) but also to the time dimension (now or later). Both aspects play an important role in fisheries management.

CFP has attempted to save fish stocks in specific areas and to protect fishing communities in selected coastal regions (e.g. PESCA programme). Such >regional= policies are faced with an internal controversy. When small, well specified and seemingly manageable, regions are chosen as target, these regions are also subject to increasing influences from the outside. E.g. investment and/or employment opportunities in a small area are largely influenced by the situation in its surroundings. Consequently major effort is required to off-set these outside forces. On the other hand, aiming at a large area may put the policy out of focus and may benefit groups which were not the target groups originally.

The time dimension is one of the major topics in fisheries management: maintaining sustainable fish stocks in the long run so that also the future generations may enjoy the >stream of benefits= (5). In view of the dynamics of the force field and its components, the a realistic policy is faced with the question: >At which time scale can the policy be effective?=. Influencing short run fluctuations may not

be very realistic, because of the volatility of some indicators, e.g. recruitment of fish stocks. However, can it be expected that long term trends can be influenced, in view of the rising uncertainties about future developments with extending time horizon?

These considerations may put fisheries management in a new perspective. At which spatial scale (regional and time) can a policy produce visible results?

Relations between the forces

It is barely possible to discuss even briefly the multitude of relations between the six forces. Appendix 1. shows, as an example, how a review of such relations may be developed. It is also very difficult to generalize. The relations between two or more forces are characterized by mutual influences. There is no clear cause-effect relation, but rather there is a continuous process of action and reaction.

An example may be the relations between culture, economics, technology and ecology. The culture determines how people look at the other three forces. At the same time the perception of ecology depends inter alia on economics (level of welfare) and technological possibilities to deal with ecological degradation.

Such relations are also relevant when it comes to fisheries management. An example are the attempts to contain the discarding. Discarding is a culturally accepted phenomenon, similar to waste in many other areas. The ecological consequences of discarding are assessed on the basis of a number of partial indicators, which say more about our perception of environment than about our understanding of it. At the same time the economic and technological >possibilities= to restrict discarding are given (culturally) such an importance that conclusive management to avoid discarding could not yet be developed and implemented.

The awareness of interdependencies is a general phenomenon in the society. It is not only limited to fisheries.

Forces and dimensions

The described force field represent both >driving forces= as well as >dimension= in terms of which developments can be described. E.g. economics as well as spatial considerations may give impulse to specific fishery management measures. At the same time, the consequences of these measures may manifest themselves in any of the six distinguished dimensions.

3. Simple application

Introduction of a minimum mesh size in a specific fishery may be taken as a simple example to illustrate how the force field analysis may be used. The objective of such a measure may be to prevent catching juvenile fish

>Force field analysis= presents a framework for asking questions regarding various aspects of the foreseen measure as well as influences to be reckoned with. These questions have to be gradually more and more specified so that in the end the policy analysis is concentrated on the core issues and does not waste effort on topics which are in fact of marginal importance only. However, this process is not illustrated below.

Ecology

- How important is protection of juveniles in relation to other biological or environmental aspects?
- Will the juveniles really survive alive?

Culture

- Will the measure be accepted and supported by the fishermen?
- Can the fishing sector develop its own measures, with a comparable effect?

Economics

- How important are the juveniles economically for the vessels concerned?
- Which other part of the catch will be lost with larger mesh size?
- What are the medium term (3-5 years) benefits of the measure?
- How will the measure alter competitive position of affected groups?

Policy
- Can the measure be effectively implemented, through control and prohibitive prosecution?
- Is there policy commitment to go against the fishermen if necessary?
- What are the weakest links in the policy implementation process?
- How can the infraction be punished? (Level of possible)

Technology
- What effect does the measure have on the used technology?
- What are the costs of adjustments for concerned fishermen?
- Are there appropriate technological means for monitoring compliance?

Space
- When can effects of improved catches be expected? (Time scale)
- Will the measure effect specific communities? If so how much? (Regions)

Mutual relations
- What is the relative strength of policy versus economic incentives?
- What are the economic consequences of a new technology?
- Are the ecological time and space scales comparable to those in policy or economics?

The above arbitrary review of questions has only illustrative purpose. Once a specific issues is taken up in a specific situation, the content and scope of the questions becomes quickly clearer to those involved. By asking open questions, it should be theoretically possible to determine the common ground among the various vested interests and from there develop a acceptable options for compromise. Indeed, the role of >science= and >research= becomes than a different one to what is usually accepted. However, such research does serve its principle objective, mainly to provide relevant knowledge where it was not available previously.

4. Integrated policy assessment

Success or failure of a policy may be evaluated by comparing the original objectives to the extent to which they have been achieved. At the same time there may have been other (positive or negative, foreseen or unforeseen) consequences. A broader evaluation, beyond the original objectives, may be relevant particularly if the objectives have been formulated relatively >long time ago=.

The above comparison is in fact a static one. It compares two situations, without allowing to look at the dynamic processes which lead to the change. An interesting technique to represent such comparison is benchmarking, where various criterions are brought to one (relative) scale and represented graphically in one picture. By grouping the criterions differently further generalisations can be developed: e.g. economic performance (on the basis of size and number of companies, profits, investments, etc.); social development (employment, demographic indicators, etc.).

Force field analysis ads to this static comparison a dynamic component. By putting the relations within and between the different forces in the forefront. FFA may help to understand the processes behind the identified changes. It may show what is the relative strength of the different forces under specific conditions. It may contribute to a more solid policy preparation, because of its holistic and open approach.

FFA confronts the policy evaluator with a broad variety of issues and it is up to him to decide which are relevant and which are not. In this sense FFA may be applied in expert systems along with for example the Delphi or other brain storming or communication techniques.

5. Conclusion

Fridjof Capra formulates the shift from old to new paradigm thinking in science as:
In the old paradigm it was believed that in any complex system the dynamics of the whole could be understood from the properties of the parts. ....In the new paradigm the relation between the parts and the whole is reversed. The properties of the parts can be understood only from the dynamics of the whole. ...

Applied to fisheries management, the question seems justified: Is it the fishermen, fisheries managers, etc. who determine the operation of the fisheries systems? Or are their actions in fact determined by the system?

Answers to these questions may have interesting implications for policy assessment and related research. It is precisely this question which the described force field analysis attempts to address.

References

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Appendix 1. Matrix to review the six forces and their relations, (as relevant to fisheries management)

Forces being affected	Forces exerting influence					
	Ecology	**Culture**	**Economics**	**Policy**	**Technology**	**Space**
Ecology	* Characteristics of individual species (recruitment, growth) * Multispecies relations	* Valuation of >nature= * Ethics of exploitation of fish stocks	* Value of fish stocks is related to economic utility * Market price determines exploitation rate	* >Race for fish= at international policy level (Council) * Choices between fish and fishermen	* Protects and threatens (mesh sizes - drift nets)	* Regional distribution of stocks * Annual recruiment cycle
Culture	* Ecological awareness * Fishing opportunities dermine cultural heritage	* General trends in society affect culture in fishing communities (continuation as fishermen)	* Commercial relations threaten traditional solidarity	* Introducing co-management principles	* Fishing vessel as a status symbol	* Limited space leads to crowding and cultural adjustment
Economics	* Structure of regional economy is affect by available fish resources	* Culture determines work ethos and allows economic rationality	* Perception of scarcity * Fishermen fish to pay the bank	* Sets conditions on economic activities * Free market liberalism	* Allows increase in productivity: less fishermen can produce more fish * Maintains welfare growth	* Restrction in fishing activities in certain regions may lead to intnsification elsewhere
Policy	* Ecological considerations are of increasing importance	* Culture imposes constraints on feasibility of policy * Role of lobby groups	* Economic intersts affect political decisions in favour of short term advantega	* General political climate affects fisheries policy * CFP as part of environmental poliicy	* Increasing productivity forces to ever more restricitve measures	* More space means less restrictions * Policy adjustment requires time
Technology	* Ecological threats and opportunities lead to specific technologies	* Ethical limits * Level of education	* Competition stimulates technological progress	* May stimulate or restrict certain technological changes	* Technology in fisheries is determined by developments in other sectors	* Technloigcal development requires time
Space	*	*	* Competition makes space scarce	* Catalyst between various uses of space and conflicts of interest		