

Some questions regarding problem definition in coastal management research

Salz, Pavel

Agricultural Economics Research Institute, P.O. Box 29703, 2502 LS The Hague, The Netherlands;
Fax +31703615624; E-mail: p.salz@lei.dlo.nl

Abstract. The aim of this paper is to explore the issue of problem definition in coastal (zone) management, with particular emphasis on social and institutional aspects. Do the existing scientific theories provide the necessary tools for open formulation of questions or problem definition, without preconceived ideas? Or are they rigid frameworks, which lead our curiosity along well-paved trails to predetermined results? Formulation of the right questions is probably the most important step in arriving at relevant answers.

Keywords: Environment; Fisheries; Social science.

Introduction

“A few boxes of undersized herring cannot stand in the way of 500 000 containers.” This quotation illustrates the struggle between the different groups promoting the expansion of the port of Rotterdam and the commune of Goedereede in the southwestern Netherlands, where fisheries are at stake (Fig. 1). A typical conflict of interests. What is the core of this conflict? Which institutional and social considerations need to be taken into account? Who is involved and how? What are the driving forces? Are the processes involved autonomous or steered consciously by human decisions? What can scientific knowledge contribute to the resolution of such a problem? What kind of research is required to generate this knowledge?

Using port development as an example; an environmental scientist will analyse the physical consequences on land, water and air, an economist may assess the financial feasibility or macro-economic effects while an expert in logistics will evaluate the flows of products and identify potential bottlenecks. This example shows that each scientist bringing in his knowledge and tools will identify widely differing problem areas and develop ‘solutions’ accordingly. However, the scientist may not be capable of defining problems in areas which lie beyond his professional horizon. When are partial assessments sufficient and when is there a need for a more integrated analysis?

Man and environment: dichotomic thinking?

The social aspects deal with structure of, and processes in, human society. From the humanity perspective (starting with philosophy) man and his perception of reality are at the beginning of any issue to be studied. Therefore the statement which is in the focus of this conference (2nd session): “An integrated environmental description is the first step towards a fully integrated description” is questionable as it contains a bias towards natural sciences by implying that integration of social and economic aspects is a second step taken afterwards. The assumption is made that such a description is independent of those who make it, e.g. during assessment of commercial fish stocks a marine biologist and an ecologist will look at different indicators and neither will look at the driving forces of fishing patterns or exploitation levels. Does the usual ‘pressure-state-response model’ take the causes of human activities sufficiently into account? Does it provide the necessary analytical framework for a truly pro-active policy? An extreme example may be tourism where consequences are measured in terms of CO₂-emissions, water quality, spatial pressures, etc. (Wieringa 1995). A policy aimed at reducing tourism as such, which is implemented in some natural parks, would prevent all those effects. Instead policies are aimed at containing the problem by asking, for example, travellers to use their towels for several days and promotion of ‘environmental awareness’ through full-colour brochures. Such policies are not pro-active because they do not relate to the driving forces of tourism as such attempting only to mitigate consequences.

Humans affect (and are affected by) many social and natural processes. Therefore, the starting point of a holistic analysis may be arbitrary. Society often seems to consider man and environment as different entities (cf. the ‘integrated environmental description’ to start an analysis). Physical indicators of environmental sustainability are subject to an on-going scientific and political discussion, which shows that they are neither unique nor absolute. It may be just as logical to start the assessment of environmental sustainability with social



Goedereede (left) and Rotterdam (right): Fish versus containers

aspects such as transport, tourism and consumption in general. However, this would create much more controversy than, say, assessment of CO₂-levels, because it refers much more directly to human behaviour.

To perceive the physical and human world as separated may lead to an increase in human pressure on the environment within politically agreed limits, while these limits may be 'temporarily' adjusted to the political and economic needs of the moment.

Research regarding coastal management may face the problem of dichotomic thinking. Environmental degradation is expressed in terms of indicators related to water and land and its causes are sought in human activities. However, the driving forces of those activities are seldom taken into account. Human society and natural environment are considered as separate entities. In research we tend to start with the environment, fisheries being a good example. Marine biology has driven public policies for many decades, because its conclusions suited the political arena better than conclusions which would have been based on economic considerations. Biological analysis has related stock deterioration to high fishing pressure. However, policy-makers do not seem to be interested in the causes of fishing pressure, maybe because this compromises policies which have been pursued, e.g. investment subsidies.

In practice, the interests of man almost always come first. How should this be reflected in research? Is effective research on coastal management issues feasible without a conceptual solution to the problem of dichotomic thinking? Interpretation of the human and natural system as one integrated entity, raises another question, namely: Which level of causes should be taken as a starting point for effective management?

Society and institutions

Society is characterized by its culture, defined here as the sum of formal and informal institutions, which create rules and norms for human action. Through institutions people arrange their mutual relationships: family, government or even anarchy. To what extent are society and its institutions the result of autonomous processes of objective-oriented decision-making? The institutions are relationships between entities represented by specific individuals. These relationships can be analysed in many different ways and can be arbitrarily grouped as follows:

- External: balance of power – physical, economic, social status, etc.;
- Mutual: rights and responsibilities and their respect;
- Internal: set of values in which each entity believes.

This can be illustrated using the example of Rotterdam and Goedereede:

- Very unequal balance of power (in most respects);
- Few mutual rights and responsibilities and thus little mutual dependence or respect for each other;
- A very different set of values.

Consequently, the perception of reality of each party cannot be bridged – Rotterdam even stated that Goedereede should stay out of this fight because it is certainly going to lose.

The question arises as to whether, in such conflict situations, a common denominator can be identified which would allow some kind of 'optimum solution'. However, each party involved has a different view of the optimum and in practice 'optimum' is the result of negotiation and compromise.

Each situation in the coastal zone is characterized by a particular social and institutional structure which is subject to gradual change, resulting from internal and

external processes. These processes do not usually cause excessive pressure but occasionally a 'problem' arises. The perception of both the pressure and the problem depends on the precise position of the perceiving entity.

A problem calls for a solution which must, necessarily, come from the existing institutions. However, the institutions are also part of the problem because they are part of the situation. How realistic is it to expect that in such a situation a durable solution can be achieved? Are the institutions piling partial solutions on top of one another? Does this lead to a containment of the underlying processes? Will many partial solutions lead to an overall solution or create more problems?

These questions may seem far-fetched, but many case studies of coastal zones indicate increasing institutional complexity and lack of clarity and unambiguity regarding rights and responsibilities of the various institutional 'actors'. It is easier to create new rules, regulations and institutions (government organizations) than to abolish them.

Long-term sustainability in coastal zones may be achieved only if driving forces behind the apparent problems (pressures) are defined, personified (who is involved) and directly addressed. A complicating factor is that human emotions are just as valid as hard facts and figures. Driving forces in society include pursuit of economic profit (which can be quantified) and social status or power (which can hardly be quantified). Society may prefer a political to a technocratic decision-making process because this can account for such intangibles as status or power. Political decisions arrived at through a democratic process are considered acceptable because society agreed on the process as a guarantee for the quality of these decisions. When it comes to the question of ecological sustainability, most voters depend on the diverging opinions of the 'experts'. Research should, therefore, give more attention to the time scale of policy decisions as compared to dynamics of economic and ecological forces.

The above considerations may contain certain contradictions. Views of political or institutional decision-makers determine the characteristics of an 'optimum' solution for a specific problem. Rotterdam and Goedereede will clearly opt for very different scenarios. The choices or value judgements are (ideally) arrived at through a democratic process. However, such a process itself is characterized by shifting priorities, e.g. in terms of intensity of government involvement, level of centralisation of decision-making, etc. Therefore, what is considered optimal in one given time and place may not be so in another. Truly optimal solutions do not exist. Partial solutions must be viewed, not only in relation to the partial problem which they are addressing but also in relation to the existing situation as a whole.

In an apparently contradictory world where choices are made on the inevitable basis of political value judgements, it is the task of researchers to analyse the proposed solutions. This analysis should take into account explicit and implicit objectives and also side-effects, which may be expected but may not receive sufficient attention. Evaluation of the interests of the proposing 'actors' and the views of 'actors' who were involved previously, as well as the relationship between existing and newly proposed policy measures, should define the level of consistency in pursued policy. In a 'knowledge-intensive' area such as coastal zone management – in this Special Feature also indicated as coastal management – the role and influence of the research itself should be the subject of an assessment based on epistemology (the understanding of the process of arriving at knowledge itself).

Research for coastal management

What can be the role of researchers in coastal management? Where does their input fit within the variety of existing institutions? Should research offer only facts and figures (necessarily partial by their nature) or can it guide a process towards a better understanding, i.e. an improved common perception of the situation? What kind of knowledge is required for lasting solutions or initiation of sustainable processes?

Answers to these questions may depend on another question: does the manager really manage, i.e. consciously steer the development of certain processes in a desired direction or is he/she simply a link in the chain, steered by influences exerted by others?

Scientists are not external to either their research or the structures and processes under analysis. In fact they may be quite influential. Therefore, scientific objectivity may need to be redefined. Such redefinition may be just as urgent in social as in natural sciences. If researchers are to contribute to the resolution of coastal issues they cannot be isolated from any of the problems under investigation.

The way in which an issue is approached, be it in the area of social or natural sciences, depends on choices made by the researchers involved. This may concern choices in hypotheses, theories, assumptions, etc. In social, as well as natural, sciences it is becoming increasingly apparent that epistemology is an integral part of research and cannot be replaced simply by specifying which choices have been made.

Finally, there is the question of methods and how to generate the required knowledge. Is modelling an appropriate method for holistic approaches and are existing theories relevant? Modelling stems from natural sciences, based on the Cartesian assumption that the whole

can be understood from the properties of its individual parts. However, in a holistic approach this logic fails. There the parts can only be understood from the operation of the whole (Capra 1992).

Models are necessarily exclusive. They exclude most of (the perception of) reality. Modelling social or institutional processes may not be an optimum approach because it is derived from a different scientific world (i.e. natural sciences), where laboratory testing is possible under constant and controlled conditions.

Holistic methods must be open, inclusive, not necessarily repetitive and exploratory. Since the final decisions are made on a political level, quantification is not a *conditio sine qua non*. It may be more relevant that the analysis contains a proper feeling for subtleties of a specific situation, rather than that it attempts to quantify a few quite arbitrary indicators. Such qualitative methods exist potentially in concept: brain storming (e.g. De Bono 1987a), Delphi (Cline 1998), Lateral Thinking (De Bono 1987b), scenario building (Schwartz 1991) etc. These methods are approaches to expert systems and will need major development. Still, they may better reflect the needs of practical coastal management, which often cannot wait long enough for research results, which may be ultimately inconclusive. In complex situations exploratory, qualitative methods may offer an excellent starting point for development of a holistic vision.

Returning to the example of Rotterdam and Goedereede: How does the economic outlook and quality of life in a small community compare to the development of one of the largest ports in the world, which is of major importance to the national economy? It seems that such an issue should first be approached in a general holistic manner, trying to explore the totality of the various aspects and considerations. On the basis of this general overview, priorities can be set and more detailed studies of specific aspects can be elaborated, possibly with the aid of quantitative models. The results of the partial studies can then be interpreted again within the total spectrum of identified aspects. A holistic approach does not replace partial detailed analysis, but rather it is complementary to it.

In a holistic approach, the researcher is an active part of the process he studies because he plays an important role in defining the perception of reality of the involved actors or stakeholders. The crux is to achieve a proper balance between 'objective observation' and 'active participation'. The first is required to maintain a steady analytical approach whereas active participation allows the researcher to appreciate the multidimensional nature of the issues with which he is dealing and to look critically at the appropriateness of the scientific techniques and / or impact of produced results.

Conclusions

The questions raised in this paper and applied to coastal zone management, have not received answers. They were put forward in order to stress the importance of firstly formulating the correct questions and searching for possible answers later. Although this seems self-evident, in practice too little attention is given to the first step, which in fact determines what kind of answers will be developed later. The main questions raised are the following:

- What information is needed?
- How should the needs be prioritized?
- Are the available research tools appropriate to satisfy the information needs?
- What is the role of perceptions of society on the environment? What values are attributed to it?
- To what extent are coastal zones 'manageable' or are the coastal developments driven by autonomous processes?
- Are there optimum solutions and to what extent are the characteristics of an optimum dependent on sets of values at a given place and time?
- How do 'actors' (institutions) and policies relate to each other and to what extent can these relationships lead to a consistent and effective policy?
- What is the role of scientific research? Does epistemology matter or is there objective science?
- Where is the proper balance between general holistic and detailed partial analysis?

The need for integration of various scientific fields (intradisciplinary) implies that new research methods may have to be developed. This, in itself, is a major challenge for scientific methodologies in general and in relation to coastal zone management in particular.

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