

Coastal management research: a personal reflection on the conference outcome

Joordens, Joséphine

AIDEnvironment, Donker Curtiusstraat 7-523, 1051 JL Amsterdam, The Netherlands;
Fax +31206866251; E-mail joordens@aidenvironment.antenna.nl

Abstract. Communication between scientific disciplines related to coastal management is difficult but essential. Different views on the role of science in coastal management were key elements of many discussions at the conference. In this personal impression the author looks back and reflects on the arguments which participants with different scientific background exchanged.

Keywords: Holism; Nature; Philosophy; Positivism; Relativism; Sociology; Transdisciplinarity.

Introduction

The goal of the conference on Coastal Management Research was to bridge the gap in knowledge of feedbacks between natural and socio-economic processes and to stimulate trans-disciplinary approaches. Discussion about the different aspects of coastal management research often went in all directions, from one level of abstraction to another, while sometimes touching on truly philosophical questions. One of the conclusions to be drawn is the fact that communication between the disciplines dealing with coastal management research is difficult, but essential. Difficult, because social and natural scientists seem to speak different languages as far as semantics and philosophy are concerned. Essential, because without mutual understanding it will be impossible to make progress in coastal management research.

With this synthesis I aim to elucidate key elements which, through different interpretation by different disciplines, hamper mutual understanding; we may have to retrace our steps back to philosophy and mathematics. Our view of the world in general and science in particular, whether we realize it or not, does influence our approach to coastal management research.

I have selected six interrelated topics which, explicitly or implicitly, turned up repeatedly during the conference and gave rise to heated discussions. For each topic, a general introduction is followed by different interpretations. I have added non-attributed quotes that were gathered during the conference. At the end of each topic the possible implications of the different interpretations for coastal management research are summarized.

About holism and reductionism

Most of us would answer the question “are humans part of nature?” with “yes, of course”. Since Darwin and others linked humans to apes, this seems to be (in most circles) a question with a definite answer. However, in practice this is not so obvious. People tend to look upon humans as literally outstanding beings, because of their exceptional intellectual capabilities and power to influence the world. *Pavel Salz* (this issue) called this dichotomic thinking: man and environment are two different entities. We almost forget that it is not only us affecting nature, but just as much nature affecting us (‘equal rights for parasites!’). To consider ourselves as strangers with regard to nature implies a dualism that does not fit with our passion to understand the world and our roots in it (Prigogine 1996).

Probably, the root of dichotomic thinking is not the conviction that humans are different from nature. Rather it is a kind of arrogance: humans are generally happy with themselves and their achievements and take themselves and their power very seriously. This was, and is, reflected in a rather paternalistic attitude, for instance the idea of domination of nature by man, and nowadays the idea that we have to save our poor nature.

A second explanation may be the human need to reduce or divide the world around us into manageable bits: you do the biology, I’ll take care of economics. Although convenient in many ways, a rigorous separation of the different disciplines makes one forget that there is really no separation between the ecological and economic systems. We are dealing with one system only, but can deal with it in a holistic or in a reductionistic way.

A definition of holism is: the treatment of any subject as a whole integrated system or, in more philosophical terms: a methodological thesis holding that the significance of the parts can only be understood in terms of their contribution to the significance of the whole, and that the latter must therefore be earlier. In contrast, reductionism can be defined as an approach to complex systems by studying them through less complex constituents, or the conviction that a complex idea or system can be completely understood in terms of its simpler components.



Is man part of nature?

According to the first definition, reductionism is a practical approach because it is hard or even impossible to take everything into account at all times. However, reductionism according to the second definition bears the risk that other processes are disregarded, which may result in a plea for a mono-disciplinary approach.

Coastal management research spans a wide field from physics to politics: the fact that representatives of so many different disciplines were present at the conference means that a holistic view is gaining ground. For coastal management research we should employ the philosophical definition of holism: when looking at certain subparts (e.g. economy) of the integrated system (coast), the subpart is not isolated but affected by a continuum of processes.

Such a holistic, integrated approach is more and more applied: examples are the search for a 'greened' gross national product and the monetarization of natural services and resources (Constanza et al. 1997). These studies acknowledge that ecosystem services provide an important portion of the total contribution to (human) welfare on earth, and argue that these services should be adequately weighed in the decision-making process, for instance with regard to coastal zones.

About positivism, determinism and relativism

"The positivism paradigm is still alive, and it is not applicable anymore ... there is another kind of logic needed". Why is this remark important for coastal management research? During the conference several philosophical approaches to science were discussed: (logical) positivism, determinism and relativism. According to logical positivism only those propositions are meaningful that can be analysed by the tools of logic into elementary

propositions that are either tautological (a statement that is always true) or empirically verifiable. Positivism is a form of empiricism holding that experimental investigation and observation are the only sources of substantial knowledge. Determinism is the philosophical doctrine that all events, including human actions and choices, are fully determined by preceding events and state of affairs (cause and effect) and thus that freedom of choice is illusory.

These approaches to science have been very successful: time and again natural laws (e.g. Newton's law and even quantum mechanics) seemed to confirm their 'rightness'. But it is not as simple as that. For instance, the modern scientific theories of instability, chaos and self-organisation are based on non-deterministic hypotheses. And to make things even more complicated: how can we place human creativity or ethics in a deterministic and positivistic world? This question represents a deeply rooted dilemma in our tradition, which at the same time aims at objective knowledge and at a humanistic ideal of responsibility and freedom.

In reaction to this dilemma Kuhn (1997) presented a sociological turn of the traditional scientific approaches in the concept of relativism: truth or moral or aesthetic value is not universal or absolute, but may differ between individuals, groups or cultures. This means that a choice between conflicting hypotheses is not only made on the basis of abstract, logical relationships between hypotheses and proof, but also on the basis of concrete sociological relationships such as the balance of power between scientists or the persuasiveness of a certain scientist. "Objectivity does not exist, and it may be better to accept that". However, extreme relativism is not going to work in coastal management research, since it questions or even denies the existence of *any* form of objectivity or causal relations.



Man takes care of 'poor' nature

We may generalize as follows: many scientists involved in coastal management research are working in a field where a positivistic or deterministic approach is not only tradition, but also perfectly feasible. However, when factors such as self-organizing systems, responsibility, ethics, free choice, politics etc. become part of that field and a more relativistic approach would be appropriate, problems arise. We encountered some of them during the conference: the misunderstandings, the irritations, the feeling that different scientists come from different worlds. This also has to do with normative aspects: what I perceive as a problem, may be no problem at all to you: "To natural scientists, social sciences seem trivial".

So what can be done about that? Should we all adopt one and the same approach (positivistic or relativistic), or should we come up with a new meta-paradigm or theory? These solutions are not very realistic, and maybe not even desirable. A first step would be to acknowledge the influence of a particular approach in our day-to-day scientific work, and to recognize which approach each of us is using. This means we understand each other's basic assumptions, we understand each other's language.

A second important step would be to use these different approaches in our work: for instance, when tackling a problem from a non-deterministic point of view, it may very be helpful to apply a deterministic mathematical model to answer a certain question. When analysing complex coastal management problems, it may be helpful to realize that logical relationships (in the positivistic sense) but also sociological relationships (in the relativist sense) exist, and that ignoring one of these categories will severely hinder your progress. "It is not always the logical answer that is the right answer".

We probably should not ban positivism in favour of another kind of logic. No paradigm is the better or best one at all times, for all purposes. Several paradigms can work simultaneously: we might choose which approach is best suited for our particular (part of the) problem, given a certain delineation in scope, time or space.

About self-interest, cooperation and conflict

One of the characteristics of coastal zones is the strong competition for resources: space, fish, oil, etc. The resource users claim their 'rights' and take what they can get, driven by market forces. As a result the quality of the coastal zone is degraded and threatened, which means that in the long term the resource users will also suffer from the consequences of their actions. How can coastal management research deal with this attitude, is there a way out?

When talking about competition over resources (e.g. intensive fisheries) one is confronted with a basic moral dilemma called the prisoner's dilemma: the conflict between self-interest and common interest. Will people cooperate and stick to their deals if this leads to a mutual gain? Or will they choose for betrayal (overfishing) if this means that their individual gain will be higher, even though they know they risk loss (collapse of fish stocks) if the other also chooses betrayal? Temptation of higher gain, combined with the reasoning that the other will also be tempted, leads to the choice of betrayal. It seems a logical, rational action to betray and put self-interest first. For coastal management this would be bad news.

So-called game theories (see Ridley 1996) formulated by mathematicians and economists and later applied by biologists and political scientists, study the question how and why humans or animals behave in a certain way when confronted with a situation such as the prisoner's dilemma. Experiments with people playing the game seemed to show time and again that self-interest was the rational choice. This led classical economists, rather depressingly, to conclude that cooperation and altruism are unfavourable strategies in the real world. When, during repeated games, it turned out that experimental subjects tended to cooperate, this was ascribed to irrational and non-strategic 'stupid' behaviour.

The theoretical biologist Maynard Smith (1982) used game theories to play a game called Pigeons and Hawks (representing not species, but the characteristics Cooperation and Betrayal), in order to find out why animals do not fight to the death. He found that Hawk easily won from Pigeon, but suffered when he met another Hawk. On the other hand, Pigeon profited when he encountered another Pigeon, but was severely wounded by Hawk. After playing the game many times he found that not Hawk (Betrayal) but Revenge (a Pigeon acting as a Hawk upon meeting a Hawk) was the most successful.

Axelrod, a political scientist, used computer programmes with certain characteristics to play the same game, ultimately simulating a struggle for survival of the fittest form of artificial life. He found that in the beginning the hawk-like programmes won and revenge-like

programmes just survived, but ultimately the most successful programme was one called Tit-for-tat. The reason for its success was a combination of characteristics: cooperative, forgiving, retaliative and clear. The main condition for Tit-for-tat's functioning is a stable and continuous relationship: the more causal and opportunistic the meeting, the better cooperation is established and mutual gain realized. But there is another side: retaliation, triggered by one (unintentional) act of betrayal from a player, can lead to an endless series of mutual reproach or revenge actions.

So Tit-for-tat is no remedy for all ills, but shows that regular reciprocity (mutual exchange of goods or services) in animal or human society is part of an instinct developed during the process of natural selection. The functioning of this instinct allows us to benefit relatively more from life in social groups, compared to an egoistic life. The success of Tit-for-tat also shows that the role of conflict is not only negative and unproductive as seems at first sight. The pure Pigeon, disliking conflict and going for consensus only, does not play the best game from a strategic point of view. A Pigeon with hawk- or revenge-like characteristics, who engages in conflict, does much better. Conflict could therefore also be viewed as a valuable, necessary and productive driving force.

These two conclusions shed a different light on the perceived problems in coastal zones. Game theories indicate that there is a way out of the prisoner's dilemma, that cooperation will be established if the 'players' are given the chance to meet and interact repeatedly so that a relationship of trust and respect can develop. But the game theories also show that retaliation is a vital aspect of successful strategies. The implication for coastal management would be to conclude that pure hawk-like actions (compare the self-interested resource users from the first paragraph) should be quickly and strongly punished, since they frustrate the budding of cooperation and common interest.



The prisoner's dilemma

Retaliation alone is not sufficient, since it would lead to mutual reproach actions instead of cooperation. Hawk-like behaviour is not something that stems from being 'bad'; rather, it is an opportunistic attitude that exists because conditions are such that it pays to be a hawk, and that it is difficult (too expensive) to stop being a hawk once you are one! For coastal management this means that we should stop breeding new hawks, and that we should help the existing hawks to stop being hawks.

An example can be found in intensive fisheries. For years fishermen have been investing huge amounts of money in specialized, very effective fishing ships, lured by profit but also seduced by perverse EU-subsidies (hawk-breeding conditions). Once having these ships, fishermen are forced to act as deadly hawks in order to make profit, or at least pay the bank. Coastal management research could focus on ways of changing the conditions (e.g. subsidy system) so that investment in these ships does not pay, while investment in other ways of fishing is very profitable indeed. The existing obsolete ships could be bought from the fishermen as an accommodation to their transformation.

Who makes decisions?

An essential part of coastal management is decision-making because this determines if, how and which measures are taken to protect, improve or develop coastal zones. Two interesting and contrasting remarks about decision-making were made during the conference: "scientists are part of the power field: stakeholders include scientists and even policy makers!" and "scientists should just deliver the goods in the form of presenting alternatives; it is up to the policy maker to make the decision". So who is ultimately making the decisions in coastal management, what is the position of each of the players in the field?

Leontine Visser (this issue) presented another example of dichotomic thinking, in analogy of the observation of *Pavel Salz* (this issue) (about man and his environment being perceived as different entities): social dynamics are often regarded as different and separate from institutional dynamics. In terms of coastal management, this means that a distinction between the local community and the (inter)national or state level implies that we are dealing with an irrational bunch of citizens called 'the stakeholders', and with rational administrative agents called 'the decision-makers'. Furthermore, stakeholders are perceived as following their own interest and acting as NIMBY (Not In My Back Yard), whereas the decision-makers are regarded as neutral representatives of common interest. However, it is clear that they too are governed by economically and politically involved stakeholders who are often (in)directly related to local interest groups.

If we reject dichotomic thinking with regard to humans and nature, we should also question dichotomic thinking with regard to decision-makers and stakeholders. The same holds for the position of scientists with regard to decision-makers and stakeholders. Are scientists neutral objective agents at the sideline, who do their own thing and only come in when delivering the 'goods' (objective results)? Or are scientists part of the power field, with different views and interests (being citizens and stakeholders themselves), using their authority to influence political decisions?

If the latter question is confirmed, this would mean that the familiar ideal model we all have in mind would no longer be valid, namely the model with direct deterministic lines between scientists (presenting objective results) to neutral decision-makers (top of the pyramid, democratically chosen by citizens) who implement the objective results for the benefit of citizens and society as a whole. Stakeholders who disagree with these implementations and try to block them, are perceived as troublemakers with NIMBY-behaviour. Their input will be acknowledged, but generally not be considered in a serious way in the decision-making process.

Which other model could we envisage?

According to political scientists, a major 'crisis' is taking place in western society with implications for the position of the players in the power field. The crisis is manifested in three elements: (1) the shift from an industrial society (based on scarcity of goods) to a risk society (based on control of risks related to modernisation); (2) the shift from a perception of science presenting objective results to a perception of science presenting numerous and different results; (3) the shift of decision-making power concentrated in parliament and party politics, to a diffusion of decision-making power to other players such as non-governmental organisations, scientists and stakeholder groups.

This diffusion of power is called the shift from 'management pyramid' to 'management archipelago'. The model of the management archipelago would not only imply that we are all stakeholders, but also that policy and management measures can no longer be dictated by government or politics alone because society (stakeholders) would not accept this: "policies are not made, but negotiated among stakeholders".

The above-mentioned conclusions shed a new light on the way stakeholders could be approached and how their input could be valued. Instead of a paternalistic approach they should be taken very seriously indeed. Not because it is in fashion to involve stakeholders in the decision-making process, but because they do have

actual power to thwart or hinder implementation of decisions that are dictated without their involvement. Fear of NIMBY-behaviour is not always justified: social scientists have shown that stakeholders are prepared to accept non-optimal situations providing they have been timely and seriously involved in the decision-making process.

The overall conclusion of the EC-funded VAL-COAST project (1994-1997) was that the current paradigm which is characterized by top-down coastal management agenda setting, outcome-oriented policy formulation with little provision for meaningful community participation, and reliance on command-and-control enforcement techniques (compare management pyramid), does not optimize the potential of achieving the sustainable cooperation of stakeholders. Process-oriented (instead of outcome-oriented) and participatory management approaches could offer a way forward. A wide variety of such approaches is currently being developed and operated.

"Public participation: tokenism or real?" It should be noted that it is not enough to apply participatory approaches so that the stakeholders are given the impression of participating in decision-making. Stakeholders should be really listened to, not just confronted with a participatory tool. This means that decision-makers (in the narrow sense of the word) would have to 'let go', to overcome their tendency to control, to be genuinely open and serious towards stakeholders views and to be prepared to adapt, change or even cancel a certain project as a result of stakeholder involvement.

This is not easy. It is very hard for decision-makers to accept that stakeholders exhibit a certain behaviour because they have strong and legitimate feelings about a particular project. An example is the way Dutch decision-makers react to the fact that neighbourhoods near Schiphol Airport (experiencing aircraft noise) have organized themselves to phone regularly to the complaints service. The decision-makers conclude that the stakeholders misuse the service and that the number of phone calls can no longer be used as an indicator of the actual noise nuisance. However, the very fact that neighbourhoods have organized themselves so strongly could be viewed as a serious indicator of noise nuisance. People do not do this for fun: it is a dedication that even money couldn't buy easily.

If this signal is brushed aside, resistance against expansion of the airport will be generated and aggravated. If, on the other hand, the signal of the neighbourhoods is welcomed, a joint search for solutions can be started. This asks for a new way of looking at communities. "We might learn from the high level of community participation in the US, the so-called smart communities" (where people work together, defining common

goals, while using communication technology in order to have easy access to relevant information).

Smart could also mean self-organizing. One of the topics discussed during the conference is the concept of self-organizing systems, characterized by a certain capacity to stabilize through an adaptive response triggered by external forcing. The feedback system works well, providing certain conditions are fulfilled and the system is not overloaded. An example of such a system is a self-sustaining sandy coastline having sufficient sand, space and free-ranging currents to distribute the material. A smart community could be compared to a self-organizing system; it would be an exciting area of research to find out what conditions need to be fulfilled for communities to develop and function as strong, cooperative and inventive partners in the decision-making processes of coastal management.

About market, master plan and vision

At last the key issue: how can coastal zones be managed in such a way that the system is resilient, with happy, healthy, prosperous inhabitants and ample opportunities for use by future generations? Should market forces take their course, or should a clever master plan be applied? During the conference Ekko van Ierland concluded that market forces have caused most of the problems in coastal zones: the market mechanism is not really appropriate in these areas as it asks for absence of common property resources for adequate functioning. However, this does not mean that the market mechanism should be ruled out completely, on the contrary. As is often said: "the market is a bad master, but a good servant". If market forces can be used as a lever for good management instead of as the root of the problem, then we have a strong tool at hand.

Some examples of market forces serving coastal zone management are certain taxes, subsidies, green investments and the so-called compensation system. The latter means: if for instance 500 ha of nature reserve disappear because of the expansion of an industrial area (the expansion being vital for society) the industry is obliged to compensate the loss by establishing 500 ha of nature reserve somewhere else. This is a widely accepted practice in Holland that will probably even be enforced by law. However, even more interesting and challenging would be the opposite: if for instance an industrial area has to move because of the expansion of a nature reserve (the expansion being vital for society) then the industry should be offered alternative space and facilities at another site. This sounds reasonable and logical. But somehow, there are barriers that make it almost taboo to even suggest the removal of industrial

areas (or harbours, or fishing rights) for the benefit of nature reserves, although the opposite is perceived as perfectly normal. However, now that the importance of nature and natural resources (such as silence and clean air) is more and more acknowledged (see Constanza et al. 1997), the concept of compensation for industry or harbours will gradually become acceptable.

This concept is not unprecedented or new: *Cori* (this issue) explained that in Italy industries were encouraged to move inland in order to leave the coast available for tourism. And they did move! So what was the encouragement, how were they compensated, how did the people involved react? If industries can do it for tourism, they could do it also to make room for nature or housing. This potential management tool deserves further attention from the coastal management research community.

But before we can apply any management tool, we have to have an idea of where we are going: what is the goal? What are we aiming at, striving for, dreaming of? Can the goal (a resilient system, happy people) be reached by imposing a rigorous master plan? Experience has shown that this is not the case. Something different or something extra is needed. I think we need to go back to that seemingly simple question: what do we have in mind when we are speaking of a well-managed coastal zone? What do we see when we close our eyes and visualize a resilient coast with happy people? This is called vision!

Probably, each person, group or economic sector will come up with a different vision for the coastal zone, but that is no problem. Formulating, visualizing and communicating these visions is essential; it may turn out that different groups have more in common than expected so that alliances can be made. Also, through formulating a vision and sharing a dream, unconventional and creative approaches are given the chance to pop up and blossom.

If the goal is clear, the road may be easier to find.

References

- Constanza, R. et al. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387: 253-260.
- Kuhn, H.W. 1997. *Classics in game theory*. Princeton University Press, Princeton, NJ.
- Prigogine, I. 1996. *La fin des certitudes*. Editions Odile Jacob, Paris.
- Ridley, M. 1996. *The origins of virtue*. Viking Penguin, London.
- Maynard Smith, J. 1982. *Evolution and the theory of games*. Cambridge University Press, Cambridge.