

The Age of Reckoning

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The crisis in the fisheries is analyzed in light of the author's theory of the Ecology of Knowledge, which is concerned with the relation of humans to the body of knowledge seen as an element distinct from humans. Knowledge is an element of culture, which shapes human behaviour and determines the relationship of humans to nature. Knowledge and culture are responsible for the crisis in the fisheries and the present predicament of humanity. The analysis of the crisis in the Fisheries leads not only to an understanding of the causes of this crisis but also to a comprehension of the human condition, i.e. the problems of the future of humanity and the growing need to understand the role of values in knowledge.

The Problem before Us

The present conference is not an ordinary academic meeting, or gathering, of a learned society intent on discussing a theoretical problem. The reason that brings us together is at the same time practical and theoretical. It stems from a concrete, i.e. objective fact resulting from human activity, namely, the critical state of the fisheries caused by over fishing. There are therefore two essential components to the problem before us: nature and human behaviour. Though different, they are intrinsically related. It is because of their relationship that the problem exists and has to be dealt with. The problem in its present form is new and symptomatic of the situation in which humanity presently finds itself. But it has deep roots, extending into the distant past, worth elucidating.

Let us make it clear at the beginning of this paper that we will be dealing with the richest form of life on earth, namely sea life. The sea is host to 43 phyla while on dry land there are only 28 phyla. At the same time, sea life is the least known and the most difficult to study or to manage. The sea also happens to contain the most ancient forms of life. Let us furthermore mention that the problem with the fisheries is a worldwide phenomenon. According to the Canadian researcher Tony Pitcher, "in the last decade, at least 20 major fisheries have collapsed around the world"¹.

The problem of the state of the fisheries primarily concerns fishermen and people in the fish processing

industry. But it would be a serious mistake to believe that it is or should be of concern only to them. Nor can this problem be adequately understood in itself, within its specific limits. In order to be elucidated, it has to be analyzed in a broader context. The question is how wide do we have to cast the conceptual net to come up with a significant catch?

The absence of seafood on our dinner plates teaches us an essential lesson not only about sea life, but also, and most importantly, about ourselves. If we learn how to preserve fish stocks, we will thereby learn how to protect ourselves

Unfortunately, there is no simple, clear answer to this question. We are dealing here with very complex systems in a hierarchy of systems. It is a fact that will preoccupy us throughout this paper.

It would be presumptuous on my part to suggest definitive limits to the problem before us and to pretend to be able to enumerate all its components.

Such a claim would have to involve an adequate knowledge of two very different fields; namely of the earth system and of the consequences of human activity. Who would dare to make such a claim?

One thing is certain. The problem of the ocean food chains is but one aspect of the state of the earth system produced by human activity. Moreover, and perhaps even more importantly, it raises the question of the future of humanity. If this perspective seems too daunting to tackle at our meeting, or at any one meeting for that matter, let us specify that what is of particular interest for us here is the relationship between humans and nature and of humanity's perception of this relationship.

The Cultural Factor

The expression *humanity's perception of nature and of its relationship with nature* may sound simple and easy to understand, but it really is not, because, in the first place, there is no one, universally agreed-on perception.

¹ *Science*, vol. 227, p. 489, 25 July 1997

What exists, are many culturally specific points of view. Let us be clear about this. We Westerners often commit the mistake of considering the Western point of view as the universal one, or, at least, as the right one, disregarding those of other cultures. But such belief is merely a product of cultural hubris proper to our culture, not a reflection of the real situation. On the other hand however, what has to be stressed is the role of the Western *Weltanschauung* and of its consequence of bringing about the current ecological crisis of which the crisis in the fisheries, underlying this conference, is but an aspect.

The above statement may sound perplexing. After all, Westerners are not the only ones depleting fish stocks. True enough, but the fishing technology responsible for the crisis in the Fisheries is a Western product. Even if the trawlers were built in Japan and the mile long drag nets in some other Asiatic country, the technology which made the production of these ships, nets and sonars possible is the result of Western science and technology made possible by Western culture. And even more importantly, the total disregard for nature and ecological balance underlying the thoughtless destruction of marine biota is Western through and through, irrespective of the nationality and cultural background of the fishermen actually involved in this process.

Although, numerically, members of Western culture are rapidly becoming a lesser and lesser percentage of humanity, today's world is shaped by Western culture, therefore, so are its problems. The question of culture may seem far removed from the decline in fish stocks and irrelevant to the search for a solution to this situation. Moreover, it may be utterly foreign to fishermen and people in the fish industry. And yet, the problem of culture is germane to this issue and to the pursuit of a solution. Earlier, we said that there are two basic components of the problem before us: nature and human behaviour. It is because of the latter factor that we have to deal with culture, no matter how unscientific and obscure it may appear.

A word of explanation about culture is in order. Basically, culture is a structure that structures human life. It is made of some fundamental assumptions expressed mainly in religious beliefs, and a hierarchy of values. Together, they form a worldview, guide human behaviour and make life in society possible.

Each culture is unique, different from others, but one culture is more unique and different than others. This dubious distinction belongs to our Western culture. Its distinctness produces consequences directly relevant to Western man's attitude towards nature, and to its effect,

the crisis in the fisheries. All other cultures have one thing in common. They view humans as being a part of nature. They do not set them apart from nature and they do not assign them a special position above other creatures. On the contrary, they stress nature relatedness and nature dependency. They all, in one sense or another practice nature worship. Far removed from them is any thought of domination of nature.

It is not surprising that no other culture outside our own conceived the idea of radically improving the human condition by exploiting nature, as Francis Bacon did. Western culture embraced Bacon's idea. As a result, it became dominant politically and economically, despite its being ecologically destructive. Other cultures did not develop powerful sciences and technologies that make the exploitation of nature possible. This is why, by and large, other cultures live in ecological equilibrium with nature in contradistinction to our culture. One more point has to be mentioned in the discussion of the consequences of culture relevant to our topic; namely the demographic issue.

The explosive growth of the human species in this century is also caused by Western culture. Strange as it may sound, it is not sex itself that multiplies humans. Sex is thus far a necessary factor, but not a sufficient one to produce a population explosion. Today, humans are not more sexually efficient than in the past. What has changed and what accounts for the expansion of humanity is our ability to bring newborns to the reproductive age. This is the result of medicine, hygiene, the science of government and the economy developed by Western culture, not of sex. Thus, the ever-increasing demand for seafood is a culturally induced phenomenon. Someone may conclude that eliminating Western culture may solve the problem. Easier said than done. Westerners have succeeded in selling to other cultures the idea of improving their living conditions, the mirage of Mercedes, luxurious apparel and continuously more sophisticated gadgets. Even if Westerners disappeared, the legacy of their culture would survive and cause problems.

The Knowledge Factor

Having stressed the role of culture in the present predicament, let us now look at knowledge. Culture, after all, is an intellectual product. Without intellect and intellectual knowledge, there would be no culture. That much is certain. But knowledge is a curious factor. It is the product of the act of knowing, but in itself it is obscure and difficult to know; a source of constant bewilderment for philosophers. Over the centuries, they have come up with various, often-contradictory theories

of knowledge and are still busy at it and as divided as ever in their choice of explanations. One thing is obvious. Intellectual knowledge is power. Francis Bacon said it four centuries ago, and, with the progress of knowledge, it becomes more and more evident. Knowledge is the power to transform the environment and to transform ourselves.

The problem before us is whether the power of knowledge is a good or a bad thing. So formulated, the question may raise some eyebrows. Isn't intellectual knowledge the most perfect of the human products? Aren't we proud of our *science*? The answer is twice yes. Yes, intellectual knowledge is the most perfect human achievement, and yes, we are proud of science. So why is there a problem and where is it? First of all, like any other power, knowledge can be used for good or bad purposes. But there is more to it than that. Knowledge has always been assumed to be a harmonious extension of the human brain, a product increasing human power and facilitating human life. It has never been viewed as an entity distinct from knowers, as a growing element of the human environment, as exercising a causality of its own and as a source of problems.

As long as science had not given us the power to impact significantly on the environment and change drastically the human condition, such an idyllic view of knowledge could have been maintained, but not any longer. On the one hand, the development of knowledge sets humans apart from the rest of the creatures and lifts the rational animal on a pedestal unparalleled in the living kingdom. But it also brings humans face to face with previously unsuspected problems: problems which tax our intelligence and make us question the value of the development which we have so much desired and labored to achieve.

Today, because of the advancement of knowledge, we have to look at knowledge in a very different light. All the great problems afflicting humanity are consequences of the development of knowledge. Suffice it to mention overpopulation, the ecological crisis of which the fisheries issue is but an aspect, the growing inequalities amongst nations, weapons of mass destruction or future shock. Moreover, and more specifically, there is an additional problem resulting from the nature of modern

science. Modern science has been developed on the analytical model of the physical sciences. Underlying this method is the assumption that a complex entity can be adequately studied, and consequently understood by dividing it into its constituent, simpler parts.

The problem is that the issues which humanity presently faces are of a systemic nature. The analytical method is ill suited to cope with them. What is needed is a systemic approach. This creates a serious difficulty for people accustomed to analysis. And yet, if we want to find a way out of the predicament we are in, we will have to develop an expertise in studying systems as systems. We will have to learn to view systems as being more than the sum of their parts, and to perceive that systems form natural hierarchies. We will have to accept the notions of quality and value as legitimate and essential aspects of reality, and incorporate them in the search for solutions to environmental problems.

The Systemic Perspective

Someone may perhaps wonder why the problems we are facing are systemic, why is it so important to accept the

Ours is indeed a very strange situation. It is the result of the most rapid and massive development in the history of humanity. Humans have never before been so numerous, so knowledgeable and so powerful. At the same time, they have never been so dubious about their future, they have never before questioned their activities so much

systemic approach in dealing with them? The answer is rather simple. We are part of the earth system. This is an objective fact, not a hypothesis. The more we study nature, the more we become aware of the essential interdependence of all the elements of this system. There is no way out of this situation. What is more, the more we know, the more our knowledge is power. This has a twofold effect; namely, it allows us to penetrate deeper and deeper into the inner workings of nature and to

impact on nature ever more powerfully. Thus, we become increasingly more disruptive and, at the same time, formative factors of the earth system.

Evolution is as old as nature. But until recently, evolution was only a natural process. As far as we can tell, it proceeded by trial and error method. It was a slow, haphazard and rather inefficient process producing, in final analysis, ever more perfect forms of existence. It was also a systemic process involving the complex interaction of many, often very diverse elements. We are now aware, for instance, of the interdependence of geological evolution and the evolution of life forms. For

example, without the rubbing together of tectonic plates, i.e. of submarine earthquakes sending chemical compounds into the seas, diatoms, which form the basis of the aquatic food chain and which feed on these compounds, could not exist. Consequently, higher aquatic life forms could not have developed, or if they had developed, could not have continued to exist. All life in the seas would have perished. Strange as it may sound, we can enjoy seafood mainly because of earthquakes.

The newfound knowledge of the interdependence of all elements of the earth system did not come a moment too soon. We are at a critical stage in the development of humanity. Until now, humans have never conceived of the idea of limits to growth. Nature seemed plentiful, a limitless source of resources necessary for satisfying human needs. This view prevailed not only in the physical and life sciences, but in economics as well. Neither Adam Smith nor Karl Marx envisaged any problems resulting from the exploitation of nature. For the former, the wealth of nations resulted from the pursuit of individual good. What Adam Smith did not understand was the fact that the pursuit of individual good occurred at the expense of nature. For Karl Marx, everything that came from nature was free.

Today, the beliefs of these two thinkers, characteristic for their age, strike us as unbelievably naive, a symbol of intellectual innocence based on ignorance. We lost paradise the first time around by eating from the forbidden tree of knowledge, against the explicit warning. Recently, we lost the paradise of blissful ignorance of our dependence on nature. This time, there was no advanced warning. In both cases, intellectual knowledge was the culprit, and the change was irreversible. There is now no return possible *to a status quo ante*, as there was no return possible the first time around. The only difference between the two cases, and this is a fundamental difference, is the fact that now knowledge will have to help us out of our self induced predicament.

Ours is indeed a very strange situation. It is the result of the most rapid and massive development in the history of humanity. Humans have never before been so numerous, so knowledgeable and so powerful. At the same time, they have never been so dubious about their future, they have never before questioned their activities so much, their achievements, as well as their reaction to other living species and nature in general. Their outward expansion and numerical growth has brought them face to face, as we have mentioned, with the problem of limits to growth. Suddenly, they find themselves in an entirely new situation. The rules of the game have changed

dramatically.

The Limits to Growth

The idea of limits to growth introduces a new and, indeed, a revolutionary factor in our perception of development and of our place in nature. We cannot take the future of humanity for granted anymore and have to accept the responsibility for it. The future is a curious notion. It acts on us but it does not exist otherwise than in potency. It is the field of what Aristotle called the final causes, i.e. the sphere of perceived aims and intentions of rational agents. Aims are aims because they are seen as values. They are desired to the extent they appear and appeal to us as desirable, i.e. as goods to attain and to obtain. This is why the future is the realm of choices and of decisions, and of action in light of these choices. Choices always imply value judgements. *The future is therefore the domain of values.* This creates a methodological problem because values as such are not fit for scientific investigation.

The problem of values would perhaps not have been of much importance for scientifically minded people, had it not been for the fact that we have to be increasingly concerned with them. The need to think about the future is proportional to the power to act, which in turn is proportional to the power of knowledge. The more knowledge we have, the more we can impact on the environment, change it, and, consequently change our condition and mode of life. If the changes induced by our activity were only positive, there would not be much reason to worry. Unfortunately, the anthropogenic changes may as easily be good as bad. It is because of the possibility of the negative consequences of our activities that we have to consider their near and distant effects. Generally speaking, we may formulate the following relationship:

The need to consider the distant consequences of our behaviour is proportional to our power to act, which is proportional to the power of knowledge.

[Consequently, the more powerful we are, the more we have to think about the future, i.e. to deliberate about choices and choose in their light.] The more we know, the more we have to evaluate, hence to be concerned with values. To make the right choices we will have to be cognizant of values. The problem is that learning to pay more attention to values is only half of the problem. The other half is that we do not have a science of values as equally well developed as that of the science of the quantitative, measurable aspects of reality. Values are a very different object of knowledge from matter. There are no units of measurement for values as there are in extensive properties. Values are not directly quantifiable.

This is why it is difficult to reach a consensus about value judgements. And yet, if we wish humanity to have a future, we will have to learn to do just that. The survival of humanity will have to become the focus of our deliberations. This is an entirely new game to which neither politicians, nor bureaucrats, nor economists are accustomed. The root cause of the problem before us is that the earth system is finite while human appetites grow proportionally to human knowledge.

Survival of The Fittest?

Since the beginning of humanity, and until now, our attitude towards other humans and towards the environment was based on the idea of the survival of the fittest. We believed that might is right and we behaved accordingly. Ecology teaches us today that the greatest chances of survival come not to the most combative of organisms, but to the most compatible and cooperative ones. Synergy, not strife, is the driving force in evolution. Darwin's mistake in accepting the idea of the survival of the fittest as an explanation of evolution is methodologically similar to Ptolemy's mistaking the apparent motion of the sun for the real motion of the sun. Both believed their eyes and drew false conclusions from what they thought they saw.

Animals adapt to the environment; they are shaped by it and live with the environment in an ecological symbiosis. Every species has its niche provided by nature and is dominated by it. Humans do not have a specific niche, or if they had one in the beginning of their species, they have left it or drastically extended its limits. The rational animal is a conscious agent. He impacts on the ambient world, uses it and transforms it to suit his ever increasing needs and desires.

The problem is that, as we said earlier, the earth system is finite while man's intellectual appetites grow proportionally to his knowledge. On the other hand, physical appetites are finite: you can only eat so much, drink so much or make love so much. The development of knowledge has little if any impact on their size. But there is no limit to intellectual appetites. Knowledge presents us with ever newer, ever more numerous and ever more complex objects of desire. Our economic system is based on the ability to invent new such objects, fanning our desires for them and satisfying these desires. The system works fine except for one thing. It is

radically unsustainable and will have to change. Instead of being based on the idea of limitless growth and profit, it will have to be based on the idea of limits to growth, synergy, and the realization that we are not masters of the earth but an integral element of the earth system.

The idea that we are but a part of the earth system and that we cannot prevail against it flies in the face of the famous message in the Book of Genesis: "go forth multiply, fill up the earth and *submit it to your domination.*" This message served as the guiding light for the Judeo-Christian world view. The newly gained knowledge of our ecological conditioning obliges us to radically alter our perception of our relationship with nature. But this is just the beginning. We will have to rethink our economic theory, and alter our economic behaviour. Moreover, we will have to change our governmental administrative structure in such a way as to make it sensitive to existing knowledge, so as to be certain that relevant information reaches the appropriate decision makers. Making good use of existing knowledge does not exhaust government duties towards knowledge. It also has to support the research and development of knowledge which is needed, but is lacking.

Ours is a peculiar situation. At the same time we suffer from an information glut and yet pretend that we do not have enough data to guide environmental policies. We have not yet matured enough to be nature's keepers. We are new at this job and feel overwhelmed by the task. We learn as we go but must not feel overconfident. We have challenged the environment by exploiting it unreasonably. Now the environment challenges us. From the evolutionary point of view, it is a blessing in disguise. It will force us to view ourselves more realistically, and evaluate ourselves with greater humility.

The absence of seafood on our dinner plates teaches us an essential lesson not only about sea life, but also, and most importantly, about ourselves. If we learn how to preserve fish stocks, we will thereby learn how to protect ourselves. It may be a surprising conclusion to our analysis, but when we cast our nets deep enough, we may come up not with fish but with wisdom. May this conference provide us with a bountiful catch.