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PAPER 5: PROJECT EVALUATION AND ENVIRONMENTAL RISK: EPISTEMIC ISSUES FOR METHODOLOGICAL AND PROCEDURAL REFORMS

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PROJECT EVALUATION AND ENVIRONMENTAL RISK: EPISTEMIC ISSUES FOR METHODOLOGICAL AND PROCEDURAL REFORMS

by *Corrado Poli*

> *"It is hardly possible to overrate the value, in the present low state of human improvement, of placing human beings in contact with persons dissimilar to themselves, and with modes of thought and action unlike those with which they are familiar .... Such communication has always been, and is peculiarly in the present age, one of the primary sources of progress"*, J. S. Mill, *Principles of Political Economy*, Book III, Chapter 17, para. 5

Introduction

In the last decades making public decisions has become more and more difficult. This is particularly true when environmental risk protection is concerned. In this area, besides the usual political obstacles, major epistemic issues are involved. The role assumed by epistemic issues originates both in science politics and in science policy. The way in which epistemic issues are treated depends by independently designed research strategies of the Governments and academic institutions. However, the competition for power among scientific, technical and economic lobbies plays a major role in appropriating funds to alternative projects and when specialists are hired.

In the present article I will suggest a research program aimed at designing new tools which may facilitate just and legitimate decision-making. On the basis of these suggestions, economists, econometricians and risk evaluators might design algorithms and analytical models which are more effective from a methodological and procedural point of view. Moreover, I will propose that the creation of assessment and evaluation models be synchronized with the solution of procedural problems in decision-making.

Concerning methodological improvement, the new models should take into consideration: a) the variety and fragmentation of ethical values expressed by contemporary society; b) the insurmountable ambiguity of any evaluation method and the lack of popular consensus in any actual model; c) the uncertainty of projections in environmental risk assessment.

Regarding improvement in decision-making procedures in risk situations, the following three points are to be considered: a) the political role of negotiation assumed, not only as a consensus facilitator, but also for its heuristic content; b) the application of insurance systems to environmental risk protection; c) the need to study new laws which enable people to express a free and informed consensus to risk assumption.

The article will be based on some historical and methodological considerations on contemporary science policy.

Science policy in contemporary society

Environmental decision-making issues can be treated at two levels: a) at a general level, namely by examining the place of science in contemporary society and politics; b) at a specific level, that is in relation to the adoption of the disciplinary means of economic and social sciences.

a) the role of scientists in decision-making

Modern science, including social science, is to a large extent still based on the Cartesian method. Descartes' method and philosophy, and in general modernity principles, have been strongly questioned in the last decades. *Vis-a-vis* environmental matters criticism of Cartesian scientific method has been convincing, may be more so than in any other domain. *Several social and natural scientists and philosophers of science have proposed different approaches which are generating great interest in some scientific milieu.* Nonetheless, although the most advanced scientific thought has overcome the rigidity of the Cartesian method, virtually all scientific organization is still based on its principles[1].

Thus, it is necessary to study the role of science in society in order to

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1. Briefly, Cartesian and systems theory logic are based on the following conflicting principles [Vallega, 1990; Von Bertalanffy, 1969].

The first principle asserted by Cartesian logic is *evidence*; systemic logic objects to the principle of *pertinence*. According to the principle of evidence, every subject is true if it obviously appears as such. We have to accept only what is clear and well-defined in our mind. Systemic logic proposes a different
concept: every subject is definable only according to the goals of the analyzer, be they explicit or implied. When goals are modified, the observed object also changes. Consequently, we can maintain that to know is the same as to act and that if we change our mind, the world also changes.

The second Cartesian principle is *reductionism*, to which systemic logic replies with the principle of *holism*. According to Descartes, reality must be separated into a number of parts in order to facilitate the solution of a problem. However, according to the principle of holism, we assume that the object must be perceived as a part that actively belongs to a broader situation. The object is to be perceived globally in its relationships with the environment in which it is located without paying too much attention to the problem of defining its internal structure, the existence and uniqueness of which we will never be able to comprehend.

The third Cartesian principle is *causality*; systemic logic opposes with the principle of *teleology*. According to Descartes, knowledge must derive from the simplest objects and ascend to the most elaborate ones, assuming that a logical order also exists among those objects that are not arranged in natural sequences. Systemic logic studies the object on the basis of its behavior, without trying to explain *a priori* such behavior through laws concerning its possible structure. Behavior is to be intended in relation to the goals that the observer assigns to the object.

The fourth Cartesian principle is *exhaustiveness*, according to which it is always necessary to produce complete classifications and lists: nothing can be overlooked. Systemic logic proposes the principle of *aggregation*, meaning that every representation of reality is *per se* biased. Consequently it is necessary to define adequate methods for selecting groups of meaningful elements instead of believing in the unprejudiced objectivity of an exhaustive classification which includes all elements worth considering [Morin, 1988].

define the role and reliability of natural and social scientists. Without some argument on these themes, it is not possible to deal with the problem of the relationship between [scientific] analyses and [political] decisions. Such dualism which, at least unconsciously, scientists would overcome, is one of the major barriers in the contemporary environmental studies debate.

On the basis of the principles summarized in note 1, Cartesian scientific method has encouraged the partitioning of knowledge into sealed containers, i.e. scientific disciplines. This approach has brought about significant political consequences. In one respect it has awarded the scientist, and the academy to which he belongs, the glamour of holding an absolute knowledge, although limited to just a well defined field. This may be considered a "positional" good *à la* Hirsch, then something psychologically difficult to renounce, even for the sake of more widespread wisdom. On the other hand, the Cartesian method has limited the political power of the scientist denying both the finality and the globality of his knowledge. In fact, according to the Cartesian method, a global knowledge is only theoretically possible by summing each part.

Notwithstanding the declared limits of his knowledge, the scientist enjoys two advantages in political competition. Primarily, he is a monopolist in his field: only he *knows* and can do something that may be considered crucial to society. What he knows and what is considered crucial may certainly vary in the course of time, but the monopolistic situation tends to generate the typical conservatism of a protected, supply-led market. Namely, in problem-identification and in problem-solving, the traditional organization of science is likely to offer already tested solutions which are possibly more reliable than the new ones. One should also consider that the development of a new scientific paradigm, in Kuhnian terms, might be extremely expensive and consequently not easily viable.

Moreover, a scientist is seen to be independent since he does not declare or does not even know the final goals and/or consequences of his knowledge. Though on one hand this attitude might be considered a deficiency, on the other it confers to the scientist an allure of integrity. He can use this integrity and his monopoly to win political power, that is to be in a position to make extensive decisions. This passage, however, is wrong from the point of view of an ethical correctness of the use of scientific competence. In fact this situation demonstrates the inconsistency of a power which is based on the structure of knowledge and on the roles of social actors, as previously described. The political power that the scientist gains is built on his own power [as a monopolist], not on a superior widespread knowledge, and even less on his wisdom or his extensive culture. The Republic of technicians [specialists] is very different from Plato's Republic of philosophers [sages]. The epistemic weakness draws some scientists to understand decision-making problems only within the limits of their own discipline or as the sole result of political competition. The credibility and prestige a scientist may have obtained in a "falsifiable" discipline, thanks to the application of a well codified method, does not have the same value when falsification is not entirely possible and the method itself is questioned.

In other words, the sum of all piecemeal knowledge which would form global knowledge, is possible neither in theory nor in practice. We cannot attain a knowledge of the complexity by these means, which is the way that the present organization of science still favors. Although the goal of a global knowledge, obtained through the sum of its parts is unachievable, a significant role is left to politics, while science is intended more as a technique than as wisdom. This also implies some benefits, as it makes global knowledge secular and competitive, while before the modern revolution it was considered immutable and the property of clerics. The elimination of value judgement and the fragmentation of knowledge eradicate or lessen notably both ethical concerns - from which secularization descend - and the concentration of power. These values are still crucial in contemporary society hence it may be dangerous to discard them even though they make it difficult to resolve some of today problems. Nonetheless it seems necessary to bridge scientific knowledge and political decision, specifically between economics, political science and political philosophy. Certainly, actual decision-making has always been the outcome of a complex thinking rather than the result of fragmented disciplinary analyses. We claim for a clarification of the relationship between science and politics, whereas we consider it essential to cope with contemporary problems. A finer consciousness of epistemic problems seems necessary to environmental risk assessors in order to effectively utilize the new implications of contemporary philosophy of science.

b) the relationships between economics and the other social sciences

The organization and policies of science heavily influence decision-making processes also when dealing with single disciplines. Science policy problems must be considered in the elaboration of evaluation methods, in analyses and in the construction of algorithms for the quantification of phenomena. On one hand we may [and must] proceed to epistemic criticism of the basis of knowledge and scientific method. However, this is a task which cannot be asked of all economists and scientists. Nevertheless, they should be more aware of the existence of such problems in order to understand the direction and actual consequences of their studies, namely the misleading use that - more or less consciously - can be made of them.

Economists and social scientists should enter more courageously into the no man's land which lies between economics and politics and/or between political economy and political science. This was the suggestion of Albert Hirschman who has written several interesting essays on this issue. Almost all Hirschman's writings adopt this approach. However in *Exit, Voice and Loyalty* [1970], he treats these themes more systematically [See also Sachs, 1984 and Hirschman, 1971]. Hirschman began these studies in relation to the problem of underdeveloped countries and then extended some of those considerations to affluent societies. Although very much appreciated in international cultural milieu - Hirschman has long been attached to the prestigious *Institute for Advanced Study*, Princeton, and is a collaborator to the most influential American and international journals - his writings have not been frequently applied in real cases nor have they found a secure place in scientific Academies. In other words Hirschman and those who haunt the no man's land

between political and economic science, can not find a place in recognized scientific disciplines and as a result their prestige is just a personal matter which has no consequence in the reorganization of disciplines.

Why has this situation occurred? The fragmentation of science and knowledge into disciplines does not only concern the domain of the scientific community. Specialization implies a long lasting distribution of power which is the result of the harsh confrontation foregoing the general assertion of modern principles. The final agreement between the so called traditional world and the new [modern] ideas established the assignment to scientists of technical duties in well defined fields where they could have power, money and prestige. But those who retain political power have always tried to keep scientists apart by precluding them, and claiming for themselves, the prerogative of complex thought. Occasionally scientists are coopted by those who hold political power, but at this moment they lose the qualification of scientist, a sort of certificate of integrity. They retain their prestige as long as they speak as specialists, but their recommendations are no more influential than those of the layperson when they suggest general thought. And, from many points of views, this is a blessing! We do not exactly need infallible priests who preserve the Truth [Hirschman, 1976]. This structural and institutionalized conflict implies a profound distrust between the two parties the result of which is the determination of each to keep his activities as separate as possible.

How to solve this problem? With the following proposals I do not aim at a new assault on the "Power fortress" claiming for scientists the right to think globally and teleologically. Rather I mean, more conservatively, improving the scientific and political system and keeping the traditional division, without renouncing confrontation in decision making problems.

History may be the most appropriate discipline to explore the no man's land between economy and political science. More precisely what we need is an idiographic approach and the study of institutions[2]. To adopt an idiographic approach means to focus on the uniqueness of the object observed and on the features distinguishing it from others. The opposite of this approach is the nomothetic approach, that is the study of what a category of objects has in common. The adoption of a single analytical model and the hypothesis that a single analytical model can be applied to a group of phenomena, is based on a nomothetic approach. We cannot renounce the merits of this approach which allows for the design of simplified models which are, however, applicable to a number of situations being based on regularities. Nonetheless it is important to stress the limited predictive power of such models, which are intrinsically deterministic. To avoid the implicit determinism of the models we may introduce stochastic variables, but they are a part of the structural logic of the model. Instead, the problem of the models' determinist bias can be overcome by integrating this kind of knowledge with criticism of the rationality paradigms themselves. In other words, discussing the *a priori*'s on

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2. The social scientist looks for regularities in human behavior. The historian studies how in different periods, regions, and situations, the actual decisions have been made, choosing among various possibilities. Vineis [1990] suggests a historical approach in health risk assessment.

which the model is based.

This procedure apparently does not simplify the decision-making process. Indeed it is even likely to complicate it. This epistemic position - i.e. the attempt to analyze the decision-making problem with institutional and case by case studies - was proposed by some scholars in development studies in the sixties and seventies [Myrdal, 1968; Gerschenkron, 1962; Hirschman, 1967]. Coping with the problem of economic development in backward countries, economists were trying out models and rationality paradigms conceived in and for western societies. After several failures - both from the development interpretation perspective and from the strategies adopted - development strategies concerning the Third World were increasingly inspired by principles of the incommensurability of cultures and of the relative values of economic rationality principles as they were elaborated in western societies[3].

A similar situation occurs in environmental decision-making. The contradictory social values which have to be taken into consideration in the decision-making process cannot be slipped into a model, or quantified by an algorithm without losing significance. This is truer today than in the past, because the cultural milieu is full of contrasting, though legitimate, opinions on the mainstreams that environmental protection should follow. Nor does it seem a conclusive solution to propose systemic models as a substitute for reductionist ones.

A research program

To cope with the problems described I suggest the following research program:

[a] As regards the epistemic issues, we need to substitute the old paradigms which are unable to solve current environmental decision-making problems since they have been conceived in order to manage other situations such as economic development, profit maximization without burdens and so forth. There is already a rich literature in criticism of economic science paradigms in relation to the environmental question. These themes are very broad and require long and detailed researches.

[b] From the methodological point of view it is necessary to imagine the models as relative in order to render them more suitable to assimilate different opinions.

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3. A re-examination of the literature of development economy, that flourished in the fifties and sixties, would prove very interesting in the described perspective [Sachs, 1984]. Of course there are already critical surveys about this literature [See Streeten, 1979]. However a study relating the cultural relativism internal to contemporary Western societies to the cultural conflict which occurred between Western societies and the Third World in those years would be promising.

Risk-Cost-Benefit-Analysis [RCBA] is one of the most popular methods for public decision evaluation. The most definitive criticism of RCBA is that it is an evaluation system adequate only if utilitarian principles are assumed. Consequently it cannot take into consideration the distribution of risks, costs and benefits among the various members of the population, nor can it take into consideration some social obligations and citizens' rights. In the past decades - say the fifties and sixties - it was perhaps acceptable to adopt a utilitarian approach, because there was a large consensus on the values implicit in the method. But this is not the case in present times.

RCBA can be ameliorated introducing a scheme of ethical weighing. This proposal has already been suggested by Kneese, Ben-David and Schulze [1982], but rarely adopted in practice. In the case that there is a consensus problem about a risk, in the calculation of risks, costs and benefits we should add a negative weighing to those risks that require popular consensus. Moreover, if the problem is the presence of a number of risks whose combination is likely to engender an inadmissible risk superior to the sum of the single risk evaluations, then, also in this case, we should add a negative weighing to these risks. Another example concerns the degree of safety of a certain product: if the risk is more serious for the consumer [who fears for his health] than for the producer [who fears losing market share when the product is declared illegal] the costs may be weighted in one way or the other, depending on if we want to favor the consumer or the producer.

Of course, nobody can tell us the amount of weighing. However this solution allows clarification of ethical values existing in society. Since there can be several evaluations and different ethical principles, there can also be different RCBA, prepared by different interest groups. Among the experts who prepare RCBA it is then crucial to include moral philosophers and representatives from these interest groups. The final decision will be made by the citizens or their representatives, but, following this procedure, many of the society's hidden values can be made explicit [Shrader-Frechette, 1991].

[c] From the procedural point of view, it is necessary to study: (1) the role and value of quantitative analyses in the negotiation processes; (2) the consensus formation process; (3) the political mechanisms which permit protest and avoiding public decisions and evading the jurisdiction that enacted them [Hirschman, 1970]. The aftermath of these studies is the enactment of legislation which favors the expression of a free and informed consensus and protection from possible damages including those which cannot be proven according to the cause and effect paradigm, through mandatory insurance liability systems, [Rhode, 1991; Vineis, 1990].

Conclusion

This research program is partly already developed, and partly in progress. The rationale of it consists in easing the decision-making process and in making it more fair. The solution to many environmental problems can be found in improved rationality in collective behavior and in attitudes which are

contrary to the common good. Rejecting the development of rational analytical models may mean missing the opportunity to save ourselves and the environment. However, we need to extend the rational approach from the single scientific discipline to the interrelation between quantitative assessment and political behavior.

To accomplish this task we should also act on the education of new scientists and technicians. Admittedly, the structure of scientific organization has led to the impoverishment of basic philosophical education of future scientists. Instead of scientists - who are able to seize the limits of the explicative power of their means and may even question the goals of their knowledge - we are training mere technicians. Though highly skilled and prepared for specialized tasks, technicians are not required to be conscious of the world outside their discipline. An effective interdisciplinary approach to the solution of environmental problems requires teams directed by scientists who can converse with each other and can correctly use technicians' abilities. A basic knowledge of epistemology, scientific methodology and ethics is then necessary for the ones who want to be appointed as directors of Cost, Risk and Benefit evaluation teams. New situations, as are most of the environmental problems, demand imaginative solutions, but science conservatism inhibits both their formulation and their application.

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