FRENCH ENVIRONMNETAL SOCIOLOGY FACING INTERDISCIPLINARY RESEARCH ACROSS SOCIAL AND NATURAL SCIENCES

Aspe Chantal, Maître de Conférences – HDR - Sociology
Mediterranean Institute of Marine and terrestrial Biodiversity and Ecology,
Aix-Marseilles University / CNRS
Jacque Marie, Maître de Conférences - Sociology
Population Environment Development Laboratory, Aix-Marseilles University / IRD

Abstract:

Interdisciplinary research between social and natural sciences appear both as constitutive of environmental sociology and the main problem for its disciplinary and institutional recognition. Interdisciplinary research programs are widely acknowledged in the environmental field, particularly due to their linkage with social demand. Conversely, researchers embarked in this practice are often perceived as marginal from their discipline's standpoint. Based on the French experience, this paper shows how interdisciplinary research plays a reflexive role for environmental sociology by theorizing the "co-construction" of ecological and social systems. Interdisciplinarity is not a purpose for environmental sociology but a necessary approach to confront its theoretical breakthroughs and the social and political understanding of the environmental issue to the ecological reality.

Key Words: Interdisciplinarity, natural and social sciences, environmental research

Introduction

The interdisciplinary approach makes it possible to challenge findings and theoretical breakthroughs in environmental sociology. Firstly, this occurs through the acknowledgment of the material and ecological dimensions of societies' production. Then, this approach provides a reflexive return on sociology's role and position in both the political and social construction of the environmental issue. The aim of this paper is not to support interdisciplinary work as a purpose for environmental sociology but to show how it contributes to raising questions and advances in the discipline. Interdisciplinarity is a necessary approach to achieve these ends.

The gradual construction of environmental sociology has been supported by sociologists' commitment within interdisciplinary programs and research, even though the disciplinary and institutional recognition of this approach is debated, denied (Mol, 2006) or more often disregarded. However, interdisciplinary research practices have developed to respond to the limitations of disciplinary paradigms that are insufficient in analyzing the complex environmental study object, and have partly redefined the conceptualization of the nature-society relationships. These practices—although still marginal—are inevitable in today's understanding of environmental sociology. To feed this debate, our argumentation will be three-fold. First, we will develop the historical link between the development of an interdisciplinary scientific research field and public orders, which question both the institutional legitimacy of research and the sociologist's impact. Sociologists' commitment to interdisciplinary research has enabled them to reconsider the epistemological dimensions of their scientific practices—particularly by theorizing the "co-construction" of ecological and social systems—and participate in model building. Lastly, we will examine the impact of today's interdisciplinary practices since these lie at a cross-roads between two fields and may generate a critical debate on the environmental issue.

Interdisciplinary research across social and natural sciences: between public orders and scientific relevance

Many French sociologists first embarked on this approach for two main reasons. First, political and public orders begun in the late 1960s under the impetus of the DATAR (land planning' local government) and research programs launched by the DGRST (Directorate general for scientific research) at the national level and UNESCO at the international level have been focusing on the future of marginalized rural areas. Secondly, the sociologists participating in these studies predominantly came from rural sociology; they will respond to the call of natural sciences that started to reintroduce man as an integrated ecosystem component.

Various researchers from both social and natural sciences have met in the 1960s to deal with a spatial-related study object. This period is the time of "reconstruction" and "land management" in France. Consequently, long-term planning becomes the key of the DATAR policy, which will have to "imagine the future" to ensure balanced land management and contribute to economic modernization. Researchers were then approached to analyze the declining farming area's future.

The DATAR's concerns will be supported by various multidisciplinary programs, particularly through many Committees across time named "Biological control" (1968); "Biological balance and control" (1971); "Renewable natural resources management" (1975); "Ecology and rural planning" (1978) of the DGRST; and the "Diversification of rural development models" (1983) of the Ministry of Research. Lastly, the concepts of environment and interdisciplinarity will be first and foremost officially recognized with the creation of the Interdisciplinary Program of environmental research (PIREN) of the CNRS in 1978.

Most interdisciplinary research will focus on "marginal spaces." The major studies are probably those carried out within the research program "Causses-Cevennes" of Interdisciplinary Program of environmental research. This program is aimed at "analyzing the interface between environmental and social factors that characterize marginalized rural areas. This analysis precedes the exploration on how these areas may be provided with ecological dynamics for development (concept of ecological management)" (Jollivet, 1983).

We can wonder why these first national interdisciplinary programs have focused on these marginalized areas. These territories—places of interest of "community utopias" (Léger, 1979) — were also used as observatories by researchers, who consider them just like the social movement as areas free of nearly any human impact. These lands could become study areas for sociologists since the analysis of a society's rejections, waste and margins makes it possible to underscore its marks, values and norms. A part of the land empties while another one fills up. But what occurs in the empty space may also reveal what happens in the full one. Assessing lands that temporarily have no economic value and that are in a way "economically in reserve" reveals the spatial ethical representation favored by a society. Since there was not even "one" evaluation criterion, these "reserves" had to be explored in all their dimensions: ecological, geological, geographical, cultural, historical, linguistic, etc.

This approach for a shared study object—the space—that was first delineated at the local level, and enabled researchers from various disciplines but also local actors and scientists to meet. From the outset, interdisciplinarity between social and natural sciences faced two major barriers. To meet the challenges of interdisciplinarity, researchers first need to be open minded to scientific cultures other than their own. Secondly, there is the problem of direct confrontation with local actors. Exchanging on a shared issue and focusing on a common territory and a scale understood by various disciplines, akin to a form of "*bricolage*", has made it possible to raise some questions that would not have arisen otherwise. Interdisciplinarity became a scientific challenge as soon as the interdisciplinary research program on environment (PIREN) was developed by the CNRS. The 1960s "*bricolage*" was out of the question then, and the terminology changed while complexity became the key concept. Interdisciplinarity must be theorized, be given a scientific basis and a better-known set of knowledge.

This program was the figurehead of social and natural sciences interdisciplinarity in France due to its legitimacy gained by the CNRS name and to CNRS funds promoting the integration of social sciences into environmental research programs. Pioneer researchers from the first stage or working as "free riders" (with regard to their affiliated institution or laboratories) will henceforth speak in a more visible manner and with increased recognition from the scientific community.

Nevertheless, these researchers—mainly sociologists—remain in the minority. This obstacle will turn out to be a relative asset, such as an investment similar to those made by "Crusaders". A core set of shared knowledge will gradually be built, enabling ideas to circulate, researchers to be demarginalized and interdisciplinarity to stand officially within the scientific circle. All these factors will lead to a gradual shift from secret confinement to an exposed openness.

Research programs' prompting to develop a new approach will indirectly generate contradictory breakthroughs for sociology. On a theoretical level, it enabled the reintroduction of the "natural environment" variable into the social construction and on the pragmatic level, to tackle the challenge of responding to "social demand".

Theorization and research practices

Although interdisciplinary practices between the social and natural sciences appear marginal or even marginalized in sociology, they provide a framework for reflection and reflexivity for environmental sociology and more broadly for various disciplines using this approach. In this line of thought, M. Jollivet and M. Legay have distinguished an interdisciplinarity "of proximity" from an "extended" one that reintroduces the link with social actors. They set interdisciplinarity back into a "normal" process of scientific production that characterizes the link between science and society. The issue is to clarify the interdisciplinary approach whose difficulty is mostly based on "*the structural duality of problems that it has to deal with*" (Jollivet, Legay, 2005).

The historical analysis has taught us that most sciences are based on the redefinition of gained knowledge, methods and conceptualization of other disciplines. Therefore, this is also the case for the two disciplines concerned in this paper: sociology and ecology. Nothing will come from "ex nihilo", and even less for sciences. Thus, new disciplines will emerge from the direct encounter of other distinct disciplines, such as molecular biology (biology and chemistry) or by a more complex pathway, borrowing some reflection and analysis components here and there, such as geography, botany, cybernetics, thermodynamics, etc. for ecology. North American sociology seems to follow this pathway today to tackle environment-society interactions when it uses the following labels "ecosociology" (Vaillancourt, 1992), "environmental sociology" or "ecological sociology" (Dunlap and Catton, 1979, 1996). The epistemological broadening necessary for the production of integrating concepts refers to the transformation of the thinking in the social sciences, particularly sociology. Shouldn't there be a connection between the development of innovative paradigms in sociology on the nature-society relationship and the increasing number of studies on the environmental issue? *"Social process and nature's dynamics continually cross the great divide, and hence it is counterproductive for the social science to remain solely on one side. (…) The analytical starting point of this expansion is an reconceptualization of what is meant by "action" in the social sciences so that it can capture the interaction between social constructions and nature's constructions"* (Murphy, 2009).

Above all, interdisciplinarity between social sciences and natural sciences in France was an approach or a practice that must take into account specific questions, methods and theoretical stances raised by different disciplines, and which actually needs open-minded researchers Although openness has unanimous support among the "interdisciplinarity circle", opinions are divided regarding the form of the interdisciplinary approach. Would it be better that the common research object be constructed at the start, or should researchers first progress in its understanding before reformulating it as each one advances in his knowledge? Does each discipline need to follow its own rationale and share results towards an "interdisciplinary takeover"—with shared knowledge to be distinguished from disciplinary knowledge? May a researcher practice "interdisciplinarity" alone by collecting other scholars' findings and building an integrated analysis? Does a discipline have to play the conductor's role to make everyone play the same part? All these questions underscore the richness of the debate and we believe that there is no need to take sides since each stance is useful and research-specific—institutional demand, comprehensibility of the prior research object, existing data—but also depends on the charisma of some researchers.

The interdisciplinary debate between social and natural sciences is renewed through model-building. There are high expectations that modeling will force researchers to agree on the key issues or make them give up some others if necessary. "*Its formal requirements urge to precisely state the terms of the questions, work on well-defined data, and follow the rules for analysis that are adapted to the variables, and take them completely into account. It is likely to be a rigorous guide in the*

confrontation between disciplines. [*This is true] to the point of observing that it must be used ultimately*." (Jollivet, 2009). Several types of models are developed, particularly those that aid the decision-making process: Adaptive management (Holling, 1978), patrimonial approach (developed by Ollagon, 1989), multi-agent systems (Barreteau, 1998; Collectif ComMod, 2005), strategic analysis and role-playing games (Mermet, 2005). All these approaches seek to take into account not only the researchers' data and questions but also all the stakeholders in an interactive manner. In this perspective, scientific data has to be modeled to make it possible to proceed to decision-making while including the decision-makers' issues.

These various endeavors that are worthy of being engaged in a civic-minded action of science may challenge social sciences on their actual epistemological effectiveness. The stance of social sciences, particularly sociology, remains a problem. First, social sciences have a small tradition in modeling their data and even less in forecasting. They prefer using past and present observations and analyses and are careful not to predict social dynamics that are somewhat unpredictable.

The contemporary use of the resilience concept—from physics, used in psychoanalysis and then in ecology—reaches the sphere of social sciences today. It makes it possible to rethink the ecosystem dynamics, while considering its capacities to resist disturbances and those for finding an unstable equilibrium again, which has "learned the lessons" of previous disorganizations. This concept has begun to be used in social sciences to adapt to social or environmental changes through relevant social organizations (Adger, 2000). Therefore, social and natural sciences are recognized in the dynamic approach of ecosystems and social systems. However, can there be other perspectives than following these dynamics, if not in real-time but at least according to scales adapted to these two systems?

The practice of interdisciplinarity does not seem confined to the margins of the scientific approach but its challenge is still present. Three issues currently appear as fundamental for the practice and theorization of interdisciplinarity. This approach allows the incorporation of considerations on each discipline's specific concepts and terminology in the heart of a debate regarding the forms of diffusion and appropriation within scientific discourse. The complex social and natural reality may emerge from a conceptual clarification observed through the analysis of reciprocal dynamics. This last element encounters the problem of overcoming different research positions between distant disciplines for the benefit of a shared methodology. The systemic approach of reality as well as resorting to models may form a common pathway (Jollivet, Legay 2005). The rigorous methodology probably insures an equal representativity of disciplines involved in the research projects, since interdisciplinary programs are often controlled by a discipline, particularly by natural sciences (Leroy, 1995, 2004). The challenge to build an interdisciplinary approach is not only scientific but also social and political. This complex approach not only aims at responding to a social demand, but sheds light on new issues and social and political questions.

Opening up to other analyses and discourses and the integration of the environment-society interface have helped to rethink reductionism principles, but have also set the limits of the efficiency of the system concept and the boundaries of the analysis object. Following L. Von Bertalanffy (1973), many authors have tried to suggest a standard language to provide a universal approach to the evolution and functioning of systems. However, just like a catalyst, the use of the system concept turns out to be both essential and relatively ineffective. It was used as an abstract model facilitating the collaboration of disciplines to think about reality in its complexity, but seldom as an operational methodology. Nevertheless, the systemic approach will enable natural sciences to question sociologists on the functioning of social systems to understand the social conditions of ecosystem reproduction; it will also allow sociologists to relativize the social determinism and reconsider the interaction between the environment and social behaviors in a different way.

These questions focus not only on operationalisation but even more on understanding interrelationships between environmental changes and social practices. The integration of complexity, which has partly questioned the causal explanation or resulted in the emergence of the multiplicity of effects and causes, has led to a debate between researchers involved in interdisciplinary programs. As a result of studies on environment, disciplines tackled discipline-specific objects with a new stand, enhanced by the knowledge from other disciplines, methods and know-how, and thus question their object with this fresh point of view.

The research field first influenced the disciplines, which in return have yielded new types of questions on the reality. The systemic approach plays a key role in the construction of the representations of reality and the frame of reference of social realities (relationships between individuals), but also in the construction of the relationships between nature and society.

If collaboration has increased between disciplines since the 1990s, it is also due to a changing relationship to time. Changes that were thought about over very long-time periods for many disciplines now appear as though they may be impending and mostly relatively unpredictable due to the complexity of the causes and effects. While "small" was "beautiful" (Schumacher, 1978) in the 1970s, it is viewed today as having considerable consequences on global phenomena and participating in the emergence of brutal transitions. The "small", the "singular" or the "local" are not only epiphenomenons compared with the "global" and facing global uncertainties. Thus, they have resumed their full place within research, particularly in the contemporary approach to development. Henceforth, problems are addressed on a changing scale and this constitutes a new challenge for sociological research.

Reflexivity of interdisciplinarity: towards a co-construction of ecological and social systems

The changing vision of reality provided by the interdisciplinary approaches has also had an impact on the development of the disciplines in question, particularly ecology and sociology (Aspe, Jacqué, 2012).

The breakthroughs leading to another sociological stance must not conceal the epistemological problems still raised for the sociologist, despite a tendency to open up to other disciplinary approaches. The current possible multidisciplinary mixing has caused effects that were unforeseen by research programs: scholars and their divergent discourses have become a study object for sociologists. The following question is then raised: how can a partnership be organized when the analysis definitely needs distance? In other words, how can researcher's knowledge be enhanced by other disciplines to understand the social realm, while setting it as a social product underlying actors' strategies?

In addition, the sociology's analytical approach and the necessary hindsight to its study object make it hard to meet the increasing demand of political decision-makers, to provide short- and long-term solutions to immediate environmental issues, and to develop different management for the future. Whereas most French sociologists remain skeptical about possibilities for collaboration with other disciplines, some scholars such as physicists, chemists, geneticists, and naturalists raise questions on the limits of their fields, and underscore the need of the natural sciences' viewpoint on their object, methods and results.

As far as natural sciences are concerned, they have also relativized their disciplinary approaches by dropping some concepts that are unable to show the dynamic interactions between nature and society. For instance, the gradual renouncing of the concepts of "climax" or 'natural equilibrium" for a dynamic and contextualized approach of ecosystems attests to the new stance of ecologists who prefer using the paradigm termed "co-adaptation", "which requires emphasis on the adaptation processes through change" (Blandin, 2009). Incorporating human and social dimensions to comprehend the environmental issues makes it possible to go beyond the Manichean opposition between the destructive man and a nature that is unavoidably threatened, and thus complying with the constructed-based dimension of nature (Lévêque, 2008).

These considerations echo our interdisciplinary research results about water management in Provence. The social dynamic occurring while uses and conflict on farm water are changing has ecological consequences. The sociologist seeks to integrate this new ecological dimension to understand strategies in terms of natural resources management and appropriation while replacing social conflicts and relationships into territorial logics (Aspe, 2012).

Looking back on Durkheim's work, many sociologists have often suspected natural sciences to deflect social sciences from their true objective leading them to the dangerous "social biologism", where mechanisms and laws observed on natural objects would be tacked onto human behavior in society. This debate is doubtlessly open but must not conceal what the scientific community and perhaps more specifically sociology, is asked to do today.

This request is perhaps the "price of fame. " The scientific explanation of the world, followed up by "experts" through media, has increasingly prevailed over the pragmatic and religious explanation. Scientists—some of them without knowing—were faced with their involvement as a

social actor (debate between fundamental and finalized research) but also as decision-maker and "advisor to the Prince." International conferences bring together side-by-side politicians and leaders of non-governmental and scientific institutions. Called upon to arbitrate the debate and decisions, the scientific community plays a double role, while asserting on the one hand that it can only provide assumptions and on the other hand that its opinion cannot be ignored.

Conclusion

Two major questions lie at the root of these debates. First, don't humans cause irreversible actions ? Then, what prospective sustainable model can be made to perpetuate humanity in the future? Sociologists are not left indifferent to these questions since these refer to ethics and social organization facing human societies' future.

Likewise, sociologists are concerned with life sciences and their sudden growth, particularly in genetics. The impacts of these discoveries have a direct social implication whether they give rise to fears ("mad cow disease crisis," transgenesis, etc.) or hopes (positive medical outcomes, increased of life expectancy, and reduced hunger). Indirectly, life sciences question the limits of living beings, in this case humans who are also characterized as a social being. Will the increase in the human being's life expectancy, the resistance to diseases, and genetic changes affect humans' life within society? To what extent will the changes in biological beings have impacts on the social beings? It is difficult today to answer to these questions. However, they seem to lie at the core of scientific and societal debate. The sociologist should realize the scope of changes caused by the transformation of knowledge in the other disciplines, tackle the complex interference between biological and social construction of human beings, and maintain the rightful place in an overall exploration of the future of societies.

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