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Scientific communication and sustainable rural development

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1 Introduction

1. The purpose of this paper[1] is to examine what forms of communication can be established between scientific knowledge and social practices from the viewpoint of sustainable development. The concept of sustainable development is closely dependent on scientific development and doubly so. On the one hand, most of the challenges, which S.D. is intended to meet, were formulated from the development of scientific knowledge and technological instruments of observation and analysis. That is true as far as the climate, biodiversity and many other issues are concerned, such as those related to water management. Such research forms alarm mechanisms. On the other hand, scientific research is also called on to propose elements of solutions, concrete analyses, indicators, strategies and standards. Yet are they capable of indicating aims, methods or strategies for all that? There is an obvious paradox in this situation since a good many causes to which the threats of a lack of sustainability may be ascribed also include direct or indirect creations of science and its technical applications. It might even be said that the poisoner is being called to the sick person's bedside: the issue of what people may expect from science is actually the same as what people may ascribe to it (Stengers)..

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2. Scientific knowledge and sustainable development

2. Scientific method, based on experimentation and laboratory research, involves revealing the properties of beings and processes, which are not accessible to ordinary knowledge. In the reality of human or natural life, all phenomena are continually interfering. The reality of life is made up of many and varied forces, entangled, intermixed, often incommensurable in relation to each other.

3. Science, on the contrary, and the laboratory mechanism is the actual instrument which allows this to be achieved, isolates beings, phenomena and processes. In a controlled environment, science can fix, and actually disregard, a whole series of conditions; a protocol, sequences of movements and operations can be defined. This is going to allow two things: make things do what is expected of them, and so make them talk (Latour, 1999); and, on the other hand, compare states, effects, sequences of processes.

4. The strength of the scientific method lies in its ability to refine phenomena: the gene is a gene and no longer a component of an organism and an individual which has a peculiar history; water is a chemical formula, the properties of which are determined regardless of the environment and it is no longer water that flows, transports, carries down waste and feeds plants and animals. These properties and these beings, which science brings to light, are nonetheless subject to criteria of relevance, whether the scientist is concerned about them or not and their significance is going to depend on all the applications which may be derived from the knowledge produced. The weakness of the scientific method lies precisely in the fact that the gene is not alone and chemically pure water is very rare. In short, all these beings, in the reality that is of uppermost concern to us, are interconnected, attached to each other, constantly interacting, subject to pressures and many changing forces.

5. Without any doubt, the scientific approach also has the ambition to grasp this complexity of reality, to account for organisms and environments, ecosystems and populations, in short a whole series of realities much less pure and simple than laboratory objects. It really endeavours to account for “systems”. In doing so nevertheless, it inevitably comes up against another type of problem different from those encountered in the laboratory. The definition of these systems implies specific operations: a system shall be provided with boundaries and will be characterised by one or more criteria of performance (Thompson, 1995). Boundaries without being arbitrary are fixed nevertheless by what is or can be

taken into account, and indeed criteria of performance implicitly refer to viewpoints or projects. In actual fact, such systems are open onto others.

6. If sustainable development is considered from this point of view, we are increasingly dealing with macrosystems, which have a historical dimension and in which human beings (human activities) play a major role. Heterogeneity, historical character and intervention by man combine to add to the uncertainty of the knowledge that we may derive from these realities.

7. But above all, as Thompson points out (1995), we have to take into account two different orders of knowledge in the knowledge of these systems. One is an exogenous (*etic* according to Thompson) knowledge, which the researcher or the observer can build from these systems and, on the other hand, all the endogenous (or *emic*) knowledge, which belongs to those which are active components of those systems. We distinguish both of these orders of knowledge methodologically but they are often, and increasingly often, interacting insofar as exogenous knowledge can be used and adapted by agents on the one hand, also insofar as endogenous knowledge can be used by the researcher and is sometimes indispensable to him. The knowledge of a farm production system wholly or partly includes the knowledge, skills and requirements that peasants have regarding the environments where they live and work. And such knowledge progresses alongside the systems that it pretends to describe.

8. To talk of sustainability would therefore pose the question of what must be sustainable and consequently the definition of the boundaries and criteria of performance of such systems. It would specially bring up the question of the points of view which may be adopted to define such systems, and the place of points of view and endogenous knowledge in the definition of sustainability. We will put the question of the construction of systems to one side in order to look more directly into forms of communication.

9. This leads us to pose the concept of sustainable development in a certain way that we would like to take a few words to make clear. If sustainable development is called on to play a role, that role is one of a benchmark rather than a statutory framework. To transform it into a statutory framework would actually imply knowledge that could be deducted logically and coherently from standards derived from known limits. Now, in many cases (the most important being climate, biodiversity, food safety), knowledge enables us to indicate risks and threats but is not enough to define unambiguous sustainable practices, meaning that the expected results can be achieved without fail. It

can only be used to underpin normative guidelines, when all is said and done, in limited circumstances, where the necessary knowledge is fully available and not a matter of controversy, to indicate all the consequences, the systemic implications of such risks. We therefore question this approach in order to consider S.D., on the contrary, as a critical horizon, namely a space for reflection and questioning about practices and institutions. In this context, critical horizon means a perspective from which institutionally fixed, systemic performances and divisions are examined. The principle of precaution forms one of the possible crossovers between this critical horizon and social practices and scientific practices. Viewed as such, the place of science changes. Scientific communication is placed in a relationship of knowledge with social and institutional practices. Scientific output can actually be understood and rethought only in the twofold relationship between scientific statements (which construct an object, and describe how it works) and the social practices, which are triggered by such statements (which we call common practice). The interplay in the relations between statements and practices is the crucial factor and it must be analysed more thoroughly by social science.

3. Sustainable development and research communication

10. By research communication we mean the processes by which scientific statements travel around the world and gain strength. We showed, in the past (Mormont, 1995), how the greenhouse effect (hypothesis of a change in the climate) operates as a socio-political fact. Quite a long process, a great deal of scientific but also political work, proved necessary for a set of statements – which were certainly the outcome of a lot of data collection, data processing and complex modelling work – to come and merge and interconnect with political statements and economic arguments, which are going to produce a common sense of the climate. Climatic change only achieves the risk status because a number of consequences are envisaged, which are given weight and importance and which are just as much risks derived (logically speaking) from the political significance of the hypothesis but are actually an integral part of it. The extension, the multiplication of these derived risks, where everyone identifies potential victims and harmful processes, actually constitute processes of social and political mobilisation.

11. Scientific work leads to the identification of a systemic object (the dynamics of the atmosphere) formed of interconnected flows of which sciences give us a model and a simulation. It involves a partitioning of reality, which takes into account a great many

variables and models their relationships. It simulates the evolution of the constituent entities and forecasts changes in states, and assesses to what extent they are reversible. This "system", however does not contain a meaning for the observer. Socio-political mobilisation can only take place because these (hypothetical) states of the system are going to be connected to "states of the world", states of a wider or narrower world as the case may be: the system refers to "users", for the assessment of its states. The system then undergoes a process of fragmentation where multiple states of the world of these users are going to be sketched out. These are characterised by their relationship to compartments of the environment which may be affected by this climatic change, to various degrees: peasants from sub-Saharan Africa threatened by drought, inhabitants of Pacific islands threatened by rising sea levels, citizens of Europe threatened by flows of ecological refugees, or any combination of these effects.

12. To briefly sum up, we are therefore dealing with a simultaneous process of construction of a system as a scientific object and construction, through political and social debate, of a new relational space, made of standards and economic and political relations. We showed (Mormont, 1995) that in these dynamics, the strength of scientific facts is not alone in creating this space, but rather the possibility of arousing commitments from many players. Collective action is therefore the force which seizes hold of scientific statements, questions and reformulates them if necessary, and builds a social or institutional space. How then does collective action link up with knowledge?

Biodiversity

13. There is no longer any doubt about a deterioration of biodiversity (disappearance of species, ecosystems), even if the data on which such a statement is based is open to discussion. This statement is all the more significant since biological diversity is no longer only an aesthetic issue (relating to beauty, the rarity of wildlife) but proves to be a potential resource, owing to the progress of biology. Protecting biodiversity is therefore an essential focal point around which various forces are mobilising and committing themselves. But how are we to move on from this general statement, backed by theories and varied masses of observations, to protection or conservationist practices, at local or regional level? Does it merely involve an approach of popularisation, which will be enough to trigger and organise the action? The object, in this case a systemic macro-object, is certainly endowed with an existence and a recognition by a multitude of players most of whom call for action. But how are sustainable practices to be defined with

regard to biodiversity? The comparison of a few national experiences allows an analysis of the forms which collective action takes in relation with the production of knowledge.

14. Local action actually implies a production of localised knowledge and the definition of new rules and new practices. How is biodiversity to be defined in a specific territory? We can start from currently protected areas by way of wildlife protection / conservation, we can also use lists of protected species as a starting point and extend the measures to new territories or to new practices. In both of these cases, the starting point is relatively stabilised realities (both as knowledge and as standards) and then we try to increase the level of protection. In this case, science is called on to select wildlife objects (species, places of natural interest) and it is supported by existing data as well as by theories providing models for action (for example the ecological network model). It then deduces from this approach involving the selection of territories and actions. But this approach comes up against both cognitive difficulties and social obstacles.

    1. Cognitive difficulties are to be found at several levels. On the one hand, the hierarchy of objectives at one (national) level is not necessarily relevant at another (local) level: protected species are often well-known, emblematic species, which have acquired scientific or cultural significance; they may be threatened on a national scale but have good local conditions of survival; the opposite may also be true and represent a problem for local populations. On the other hand, the scientific and planning approach isolates and separates the forms of wildlife under consideration from their actual conditions of existence and mainly from all the human practices associated with them. Lastly, it thereby disregards all the endogenous knowledge which local players possess concerning their territories. In other words, the fact that we consider the loss of biodiversity as a global threat does not indicate that we know how biodiversity has to be preserved within a particular context. Scientific popularisation (pattern of dissemination) is neither enough to convince local players, nor to determine which actions are the most advisable. Intermediary studies are needed taking local practices and knowledge into account in order to pass from one level of mediating concepts to another. Sustainable development therefore supposes new productions of knowledge, but such knowledge is closely related to concrete territories and related to social practices.

    2. Social obstacles are closely related to cognitive problems. The hierarchy of objectives is not often the same for local actors and for planners; conservation strategies often

impose constraints on local practices, even if they sometimes offer opportunities for action or economic enhancement. The crucial issue is the negotiation of the assets and liabilities which protection represents. Now it involves weighing up values difficult to measure and compare between each other. Very often, we are engaged in practices of negotiation between planners, conservationists on one side and local authorities on the other. Now, scientific statements, if they are formulated in an absolute way, may very well be used to justify the balance of power between the parties concerned, for example to rule out certain uses or to restrict access to certain spaces. The requirement of fairness – which is one dimension of sustainable development – is therefore a requirement for preserving the conditions of subsistence of local players.

3. Different practices for managing biodiversity may, on the contrary, be supported by local wildlife practices or knowledge. Biodiversity may form the basis of collective action and practices. That collective action must then be based on existing or new socio-political entities in territories corresponding to social and economic practices defined in relation to natural resources. Production practices, leisure practices, religious practices all include a conceptualisation and a use of nature to a certain extent. They may form the basis of a collective action which is going to focus on the possibilities offered by these uses to ensure the development of the communities concerned. That also implies changing from a comprehensive view of biodiversity as a common heritage to the constitution of local (or regional) heritage of microsystems, which can be apprehended by field study and be the subject of measures of protection and enhancement at one and the same time. The territories, which take shape in these dynamics, are neither inherited territories (from tradition), nor territories produced by "scientific" and wildlife management ambitions. These are territories connected between each other both by social and economic relations and by ecological relations (circulation of species, flow of resources, etc.).

4. The mobilisation of science remains necessary but it then takes another form, that of the production of knowledge, close to practice and turned towards the management of territories and the development of practices of use of space. The biological value of spaces and species may then be addressed as a call addressed to these communities. But that call to take certain wildlife assets into account must itself justify advantages that they represent for broader communities, for categories of interest or for different social and political groups. In this model, disagreements are therefore the starting point for

empirical research, which may produce, knew knowledge as much as original transactions. The production of knowledge, unlike the conventional view of science, follows other channels than the mere analysis of isolated phenomena stripped of all contextual variables. The production of knowledge takes place in direct relationship with local knowledge, the commitments by players to transform and sustain territories.

5. This type of scientific communication takes the form of a co-production of knowledge (Callon, 1998) and itself implies a collective action which transforms local societies, which reconfigures and transforms their links with the social world. This co-production of knowledge proceeds by connecting the objects of knowledge to the identities of those who have to be aware of it and use it. Research is then one of tools of collective action and innovatory collective action. Indeed, it does not mean opposing traditional and local communities to global and modern, social formations. Communities are rebuilt and redefined through these actions, sometimes even created by reorganising their internal relations as much as by developing exchanges, particularly economic ones. Science, in this context, therefore implies a collective action which has its own references and guide marks.

6. Sustainability therefore involves maintaining negotiating relations between the partners in the action. It forms a set of dynamics in which the taking into consideration of wildlife always implies the simultaneous and negotiated taking into account of those who are concerned by the objects of wildlife. It postulates an ongoing questioning of what is to be taken into consideration and who is to be taken into consideration in the action.

Food quality

23. Food quality forms another specific case that may be compared with the management of biodiversity. Whereas biodiversity appears as a fundamental part of nature, an asset to be preserved against modernisation, food refers us, on the contrary, to technical modernity and industrial and commercial processes. The latter are in crisis and are the subject of a powerful process of technical standardisation supposed to restore and guarantee high quality levels. Now food quality cannot be completely defined in an objective way, since it is completely embedded in a complex of cultural values, technical practices and socioeconomic exchange networks. It is moreover the prime cause of a food quality crisis in developed countries. Technical specialisation, the

lengthening and increasing complexity of production and processing circuits, the multiplication of the players involved in food channels, all these factors mean that quality (as a process leading to a particular product) has become opaque for most of the players, including the authorities responsible for monitoring it.

24. Consumer pressure is firstly at the origin of increasing demands. This demand is expressed in many ways. It means demand for safety whenever human health is considered to be in jeopardy. Whenever incidents occur, media coverage of them immediately represents an economic threat for the stability of markets, and a political threat for the credibility of institutions and political systems. Such demand, however, is also a demand for diversity, differentiation of products, tastes, or even a demand for social and cultural identity when food is associated with membership of social categories. All these factors mean that the quality of a product is something composite, where different standards of judgement intermingle. At the same time, all products are not affected in the same way by these tendencies of the ordinary judgement on food. The result is a sort of instability of food policies and a strong tendency to "objectivise" quality through inspection measures which are universal, applicable everywhere and supposed to guarantee maximum safety of food products. Technical standardisation, based on laboratory work, is the simultaneous combination of the outcome of public initiatives, the effect of an opening of markets (for which uniform standards are essential) and the result of a movement of self-standardisation by companies in the food industry. All these actions are based on the idea of a standardised quality and on a paradigm of forecasting and monitoring. The current worldwide discussion about GMO's rightly confirms both the diversity of quality criteria which may be taken into account and the importance of consumer (and producer) confidence in setting up stable circuits on a wide production – marketing scale.

25. Now the quality of food products implies connecting up a sum of completely heterogeneous knowledge ranging from agronomic knowledge, for instance relating to breeding, to industrial knowledge of production engineering including medical knowledge about health. It should also be added that consumer practices and habits are to be taken into account in the same way as those of producers. The gist of the problem is precisely the integration of this different knowledge at three different levels: integration of different disciplines, integration of different kinds of knowledge (scientific knowledge and tacit knowledge of producers), integration of different

demands into production practices. Now this integration – for example of environmental demands (enhancing the recycling of packing or the reuse of waste in animal foodstuffs) and health demands (which lead to opposite conclusions) – supposes that trade practices, storage processes, food techniques, in short the practical contexts (or sphere of action) of producers are taken into consideration.

26. Lastly, quality assessment implies "social postulates" about the behaviour, the values and the commitments of the many actors involved in the long production and marketing circuits. The fact is that final quality – and especially minimising risks – is increasingly based on the actual knowledge and practices of the different partners in the chain. Consequently, the assessment of quality is always an assessment socially conditioned by those practices and finally determined by the commitments of producers. Now the prevailing trend in the food economy as in policies is to develop a monitoring practice based above all on the scientific and technical analysis of quality throughout the chain (traceability), with such monitoring being backed by monitoring or self-monitoring legislation carried out by companies in their trading practices. This prevailing logic has many side effects, more particularly a trend towards standardisation, the threat of eliminating whoever is unable to support the monitoring costs, but always the ever possible risk of accidents simply due to the complexity of the production process.

27. The mobilisation of medical or epidemiological studies tends to create a huge corpus of knowledge moving through society and the media with the content changing daily. That movement feeds itself on the crises that it reveals to public opinion itself. Consequently, the definition of the quality of food products is itself an issue of knowledge, which has socio-political as well as scientific implications. The prevailing definition of quality, which places the emphasis on hygiene and safety since they can be inspected by technical means, selects and isolates characteristics and products open to this type of inspection. It disregards other definitions of quality related to configurations of scientific practices specific to certain regions and cultures, or to certain traditions. It tends to overlook products and preferences (including consumer preferences) which are less accessible to scientific knowledge and to the most universally applicable technical tools.

28. By contrast, we were able to observe to what extent some attempts to develop new systems of production, which comply with health and environmental requirements while meeting consumer demand constitute complex processes. In these processes, scientific

knowledge, practical techniques and methods of communication with consumers intermingle in a dynamic process of co-construction of knowledge. Here, it is no longer question, for example in the development of integrated production methods, to merely standardize practices and then inspect the quality of products. On the contrary, it means finding a satisfactory balance between what matters for the consumer (taste, appearance, shared values) and what is possible through the simultaneous action of producers, insects and environmental conditions.

29. The development of (organic farming) further indicates to what extent production – marketing networks can develop not so much on the basis of technical inspection and scientific argumentation, but on the basis of networks of commitment. In such networks, producers and consumers share common values (attention to the environment, priority to health, trust in well-known traditional practices, gradual search for improvement) and communicate in simple ways. Those networks form at the same time sorts of moral as much as political communities and economic exchange networks. These are neither traditional peasant communities, however, nor modern circuits, they are actually new forms of collective action in which values, knowledge and economic assets circulate without there being a clear separation demarcating the scope of action of either of them. It does not involve demodernisation, but it does not mean simple ecological modernisation either where the technology alone would provide control of natural and social processes. The factor characterising this type of action is the existence of a translation system for passing from one area of practices to another, or even from scientific findings to others.

30. Several research communication dynamics interfere in the construction of quality mechanisms. In the relationship of science with decision, three quality construction models can be differentiated. The “dissemination” model makes scientific knowledge the starting point for defining the facts to which value judgements and a hierarchy of priorities may apply: practices must comply with standards. In a second model, it is admitted that knowledge is imperfect and its mobilisation in decision making implies a discussion or a negotiation more particularly to explore the dimensions which are not taken into account by research: that may be the case, for example, for the environmental dimensions of a technology. Lastly, a more pragmatic model considers that players build knowledge from their situations, obligations and values, but the knowledge produced in that way opens new scope of action for new relationships with others, with

the consumers or users of the space. So the identities and priorities of the players change through the progressive construction of new relational “systems” including both relations to wildlife and economic and social relations. These three dynamics of communication between research and social practice are not exclusive of each other and they should be able to be mutually nourishing, through complex mediations.

31. Nevertheless, from a perspective of sustainable development, the pragmatic model, which places emphasis on the co-construction of knowledge, deserves special attention on account of its capacity to make knowledge, commitments and exchange networks progress together. These communication dynamics are in keeping with and contribute to the definition of “communities”. The term “communities”, in this sense, does not refer to the opposition between (traditional) communities and (modern) society, but to the links that are woven between trade associations, local groups, consumers, conservation associations, scientific players to meet the challenges of development and to take account of the multiple interests but also the multiple knowledge and different needs. In this sense, a more appropriate term would probably be "community-building research" rather than “community-based research”. The fact is that these "communities" are under construction and not given by history, composed of scientific knowledge, technologies, connected by standards but also practical knowledge, cultural preferences and various natural realities which should be made to hold together and between which a communication must be established. In this sense, sustainability could be measured against characteristics of these "communities": non-exclusion of certain stakeholders, preservation of the different resources involved, attention to risks, all supposing as many mutual commitments as scientific and technical measures.

Rural sociology

32. Is the definition of rurality as an area of research still meaningful? We have always supported (Mormont, 1989) the idea that rurality was not a sociological concept, but rather a social construction, one dimension of which was representation. It leads to see, through a series of semantic operations (difference, opposition, association) the structuring of a space of relations which is organised around values, socio-economic practices and balance of power in the countryside and with the surrounding social world. Talk about representation does not imply an imaginary reality, but indicates that it is a line of discussion which gives meaning and further contributes to organising collective action. These constructions are

always based on social or political conflicts, where rurality is mobilised as a social force and as a political argument. Is rurality a pertinent category for the discussion about sustainability?

33. We could put forward the hypothesis that rurality can form the basis for a policy of sustainable development if it forms a possible mediation in the translations that must be made between environment, development on the basis of needs and social equity. It can form a territorial grouping model and a way of institutionalising intermediate systems between global challenges and social and economic practices. As far as food is concerned, rurality could form a reference to production and processing systems which, unlike the prevailing approach, try to simultaneously develop a quality of products, a quality of territories and fair relations between the stakeholders of agri-foodstuffs sectors. A basic issue is therefore the distribution and the circulation of knowledge enabling these sectors to development while respecting these objectives. Such a circulation of knowledge may be stimulated and backed by a reference to rurality as support for collective action.

34. In our approach that would involve giving priority to a rural sociology focusing on the forms and modes of production of knowledge which are pertinent. Rurality would then be a specific field of study of the relationship between scientific practice and social practice around issues defined by the question of sustainability. Now increased urbanisation, ever increasing possibilities of communication will always make interpenetration easier and the ascendancy of towns over the countryside, of trade over industry and farming, of large technical systems over resources increasingly possible. These processes are based today on a monopolisation of knowledge by science and technology separated from their conditions of use. Is the alternative to be found in the construction of new relations between knowledge, territory and economic activities?

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