Ecoregionality in research for development: French research proposals

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This document was prepared by a work group comprised of French institutes of agricultural research (CIRAD, INRA and ORSTOM), created at the request of the Ministry of Higher Education and Research to generate joint proposals on Ecoregionality. This concept is currently being developed in the Consultative Group for International Agricultural Research (CGIAR) and forms a component in the progress in research on development. Its importance is growing within the CGIAR. French institutes, which already participate in several ecoregional programs, believe that these initiatives can make research on development more effective. The goal of the proposals in this paper is to go even further in this direction by defining the principles of a "second generation" of ecoregional projects that French research will propose to its partners for discussion and implementation.

Research for development and ecoregionality

From a logical standpoint, the efficiency of research for development, in particular in countries of the South, should be measured by its contributions to economic and social development in the countries where it is conducted. We are presently unable to quantify these measures, for the development process is highly complex, much like the functioning of human society. Depending upon the case, research is blamed or praised (and this can have consequences on the level of resources that the community accepts to allocate to it) without the objective proof of its role in successes or failures having really been established.

In spite of this difficulty, agricultural research institutes have a growing awareness of the necessity to meet social demands. More and more rare, however, are

1 The participants in this work group were: (i) for INRA: B. Vissac, C. Albaladejo and A. Sontot; (ii) for ORSTOM: G. Hainnaux, A. Lericollais, and P. Gondard; (iii) for CIRAD: F. Forest, D. Sautier, P. Lhoste and H. Manichon.
researchers who consider that their individual contribution can be the sharing of personally chosen themes. The importance of collaborative organisation (thus less monodisciplinary research) and programming based on the analysis (highly research) has developed considerably over the past years.

The ecoregional approach takes advantage of these developments. It focussed current trends to make the objectives, the problematic and the organisation of research on development more understandable and convincing. This approach has drawn the attention of sponsors who would like to see greater effectiveness in studies of the economic, social and environmental problems of the countries of the South.

For the CGIAR governing bodies which has been developing this approach for the past few years, the “Green Revolution” is a way to face the difficulties encountered in zones with high constraints and now in zones with strong potential, and to focus more attention on environmental problems. To do this, will require extending the field of research beyond the biophysical production basis in order to, at the same time, deal with the technical and human dimensions of the problems (TAC, 1992, 1994).

The first step is to define the geographical zones in which this multi-disciplinary approach is to be conducted. In terms of organisation, the CGIAR has suggested that the continents be divided into “ecoregions” (based on the agro-ecological zones defined by the FAO) and has defined a list of priority actions among them. In some of these ecoregions, different research and development institutions, working together in consortia with CGIAR centres involved, have set up and are conducting joint programs. It is expected that this institutional approach, which is viewed as a renewal of collaborative efforts between North and South, will provide better coherence and greater effectiveness in research actions on development. However, it results in high “transaction costs” which, in a context of budget reductions, can only be acceptable if the hopes riding on this approach are not disappointed.

The importance of developing the ecoregional approach

The current ecoregional programs, some with French participation, are very diverse in nature (which is logical since there are great differences between regions) and in scientific approach. But there is no clear understanding of the reasons for these differences. Only in rare cases do these programs conform to the limits of an ecoregions within which, agricultural and environmental problems are not really similar.

Therefore, it is important to continue to develop this concept. And this has been recognised by the CGIAR governing body which recently set up a work group on
the subject 2. With the same enthusiasm, in December 1994, the Dutch co-operation authorities organised a symposium on this issue for international centres.

An understanding of the scientific content of the ecoregional approach necessarily begins with its very finality—a contribution to the sustainable development of a geographic area. To do this, it is obviously not sufficient to simply set up research projects in an area. Nor is it sufficient that the questions studied be related to the major developmental issues. Lastly, it is not sufficient to perfect the methods of communicating the results of research.

In fact, experience shows that in order for knowledge which is generated to be adopted as an innovation, it must correspond to the needs and strategies of those to whom it is destined, and accommodate the constraints. Moreover, so that the solutions provided for a given problem do not result in the appearance of side effects when implemented, the consequences, both direct or indirect, must be analysed.

Yet, the diversity of the situations in a given geographic area is great, it may be between categories of actors (farmers, herders, etc.) are within a category. Consequently, the idea that it would be efficient to impose (assuming that it could be done) a single solution for a specific problem (for instance, increasing agricultural output, improving product transformation, or managing natural resources) is an illusion. While a single solution may be relevant for some of the actors, it certainly wouldn't be for them all. On the contrary, there is a need for diversified solutions, based on a diagnosis of the region, which highlights not only general problems but also the stakes of the various actors. These solutions must be made available into new practices.

Whether improving food security by increasing output, reducing poverty by raising income, ensuring the sustainable management of natural resources or preserving the environment, it is the role of actors in production and management which is at stake. The solutions provided will only be useful if they enable local actors to make positive changes in their activities: global development is necessarily a product of local actions.

It must therefore be acknowledged that contributions to the development of a geographic area must consider the area's residents and their activities as components of research.

Thus the ecoregional approach to research involves the comprehensive study of an area to determine, the degree of predictable progress and the means to attain it, starting with the current situation.

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2 This group was presided over by Cyrus N'Diritu (Kenya) and included I. Abrol (India), H. Manichon (France), G. Norés (Argentina), and R. Van den Berg (Holland); the secretary was M. Collinson (of the CGIAR secretariat).

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Clearly, these problems are not new. But it must be recognised that they are not often reflected in research programs, even when programs are concerted. In light of this, the following proposals could contribute to defining a "second generation" of ecoregional programs to complement and improve certain existing programs.

**Proposals for a second generation of ecoregional programs**

These proposals are based in particular on the French experience that is rooted in an understanding of the physical and human environments of the South which has been accumulated over time thanks to presence in the field and continued relations with partners from the South. In addition, this experience covers all types of production in this environment—animal and plant, subsistence and cash crops, food and non-food. Lastly, this experience is the result of the long-time application of the systems approach to the local environment, and its perception at different scales (production unit, village, local, agrarian system, region, etc.).

The section that follows is a contribution to the role that research can play in identifying areas of sustainable development—social, economic and ecological—in a given region and how this development can be put into practice. To this end, it suggests that the basis of the ecoregional approach and several principles on its implementation be spelt out. Obviously, this section can not cover the entire issue.

**The contents of the ecoregional approach**

A classical approach would be to successively tackle the following points: (i) the identification of the major development issues of the region and their order of importance; (ii) their translation into scientific questions and the search for answers that have already been given in the same region or elsewhere; (iii) the definition and the implementation of appropriate research methods and protocols to obtain answers if they do not already exist or are inapplicable to the region; (iv) the definition of ways to communicate the results to selected regional actors and have them implemented; and (v) the evaluation of the results obtained.

While this list contains numerous activities that must be dealt with, it cannot form the basis for the organisation and management of a research programme likely to reach the objectives identified above.

Clearly, the issue that must be dealt with first is the identification of regional issues and real research needs and it must be given close attention. Identifying these issues obviously requires gathering expert opinions and summarising avail-

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3 There are several references on these subjects in the bibliography.
4 The meaning of this term will be specified later in the paper.
able information, which is often considerable because of the quantity of work done previously. But to engage a relevant research program in a region, an exploratory phase is insufficient such as this because researchers have a tendency to project their own perceptions on peasants, economic decision-makers and politicians.

To guarantee greater relevance and better effectiveness of these projects, a comprehensive diagnosis of the current functioning of the region must be carried out with the help of various actors in the region who will be directly involved in designing the research project and its institutional setting. This diagnosis, which is not conducted by researchers only, is the result of the comparison and the negotiation between social demand (which must be known) and the supply of research (which must be provided). This negotiation must be conducted from the very beginning of the process.

After having made this diagnosis of the region, it is easier to identify additional research needs and develop consistent protocols to conduct them by combining surveys, experiments and syntheses.

However, it is important to note that as the research progresses, the phase in which knowledge is being generated must not be disconnected from its practical use. That is to say that researchers should not simply content themselves with passing on their findings. On the contrary, several reasons make it clear that it is important that research be simultaneously linked to the implementation of these findings. In fact, the time required to obtain certain results can be quite long while for other subjects existing knowledge is immediately transferable. Research partners would not understand delaying implementation until all the results have been obtained. Moreover, by doing so, the opportunity to test the validity of the results under real conditions would be lost. Yet it is often by applying "solutions," which are thought to be well tested, that their deficiencies are discovered and new research needs are identified. The implementation of findings to generate innovations must therefore involve researchers interacting effectively with those targeted by the work. This implies a need to conduct initiatives which incorporate research and action.

Since it is not always possible to conduct experiments on how to put results into practice, other means must be made available. A necessary tool to progressively integrate findings and simulate the results of their implementation is naturally a model of how the region functions. This model is based on the prerequisite diagnosis.

Obtaining a comprehensive representation of the structure and the current functioning of the region is thus at the heart of the ecoregional approach. It constitutes the foundation of the diagnosis and the identification of needs and enables developments to be simulated.

Thus designed, the ecoregional approach can be seen as an iterative process which takes time to set up. Its implementation is the progressive building of a part-
nership project established between researchers on the one hand, and regional actors on the other. This obviously reshapes the generally accepted traditional way of dividing tasks between fundamental research, strategic research and adaptive research as well as between research and development. In short, this is an integrated approach to research on development.

Principles for implementing this approach

This section deals with several issues: the geographic area in which the approach described above can be applied, the components of the diagnosis, and the regional model and its use. Other important issues such as the characteristics of the thematic research programs, communicating results, and evaluation will not be presented here.

The nature of the regional area to be studied

In practice, it is not possible to directly study an “ecoregion” such as it is defined above, that is, a vast transnational area whose contours are fixed by climatic limits which can be somewhat arbitrary. Additionally, it should be noted that while climatic and ecological factors are essential to comprehend the potential performances of animal and plant production and to study certain reasons for which the area is currently being used, they are not sufficient. The diversity of existing situations in the same climatic zone shows that this is not the only factor to take into account and that the weight of cultural, social and political factors in the orientation of systems of production cannot be neglected.

It therefore seems more practical to define smaller areas within the ecoregions, making it possible to simultaneously study all the factors that influence their management. This results in dividing the study of ecoregions into “regions,” each being defined as an area in which men and women live and carry out activities resulting from: (i) from their own objectives and needs, (ii) resources (in particular, natural resources) that can be made available for this purpose, (iii) relations (trade, competition, etc.) which are maintained, and (iv) rules which govern these relations.

Thus defined, a region includes rural areas (in which economic activity revolves mainly around agriculture, herding, and forestry) and urban areas, and, to some degree, the two interact.

It is convenient, at least in an initial analysis, to use the administrative subdivision of the State. In fact, we generally have access to thematic maps (terrains, climates, transport links, types of transportation, energy, etc.) and many statistics on the economic activity of the population which, even though their exactness must be verified, are valuable. Moreover, economic and consumption poles, poles of political decision-making and research partners are clearly and readily identifiable in these areas.
Such a choice can result in regions which include several different climatic zones. This should not be considered as an obstacle but, on the contrary, an advantage especially when the region's activities are complementary and inter-linking.

The verification of existing data and their synthesis using a Geographic Information System (GIS) makes it possible to obtain a spatial view of the region, its diversity and the relationship between the subsets that have been defined. This document, which is progressively enriched, will serve in choosing the sites where some of the research will have to be conducted, and will provide a basis for extrapolating the results.

If one should wish to study the relations and interactions between neighbouring regions within the same ecoregion or between ecoregions, it is necessary to start the analysis process over by taking each region as a whole: the ecoregional system may be comprised of several entities. If these regions are in the same State, the existence of invariant data will allow a certain economy of means. However, it would be contrary to the objectives being pursued to spread these means over several regions such that understanding of how any one of them functions is made impossible and their comparison cannot be made under valid conditions.

The components of the regional diagnosis

An approach is often used which involves identifying the levels of hierarchical organisation (the plot of land, the farm, the village, etc.) and then characterising them. An analysis of the higher level of organisation first requires synthesizing the data of the previous level. Under these conditions, it is somewhat difficult to avoid oversimplifications. In fact, there is a risk of losing sight of the diversity of the rationalities of the actors that intervene at each of the levels of organisation, or ignoring the fact that some actors intervene at several levels simultaneously.

To avoid these pitfalls, it is perhaps best to deal with the regional reality by combining several complementary, partially overlapping "points of view" which show the rationality of the different actors without necessarily linking them to one sole level of organisation.

Thus, we suggest that three points of view be examined which, taken as a whole, will comprise the regional diagnosis.

The food chain forms the first view of the regional picture. By chain, we mean all the functions (production, transformation, marketing, consumption) and actors involved in the process which results in biological material being made into finished goods ready for human consumption. These chains meet (or may not meet) the qualitative and quantitative needs (food, energy, money, work, housing, etc.) of the rural and urban populations of the region being studied. The export sector as well as the local economy are involved since they play a role—which will have to be assessed—in the regional economy. Studying each stage of each major chain makes it possible to identify the critical phases, the strength, and the depl-
ciencies (analysis of the production factors which are implemented and their efficiency).

The area is the second point of view used to analyse the region. Zoning based on the variability of these physical, economic and human characteristics provides a good sample for researchers focused mainly on farms. Studying farms in a selected sample of villages makes it possible to understand the diversity of the ways in which the natural resources are managed (by farmers, herders, forest managers, and communities) and the rationale that they use, whatever it may be (technical, economic, legal, cultural or social). The relationships (be it in competition or in co-operation) between the various actors at the local level (in their villages), their methods of organisation and the pressure that they create on the area must be closely examined to give a global comprehension of its use and the results obtained. On this basis, diagnosis are drawn up on: (i) the cropping and livestock systems farming and the reasons for the gaps observed between current performances and potential levels of performance; (ii) the short- or long-term consequences of human activities on the environment, in natural or cultivated areas; and (iii) the use of resources in the area.

In addition, policies must be analysed as such. This includes policies on prices, credit, trade, land use, physical planning as well as demography and immigration. All this, like the functioning of markets and the organisation of extension, plays a part in determining the behaviour of the actors and their reactions when faced with uncertainties, and creates (or does not create) the conditions to develop activity.

In each of these points of view, the present situation in the region is analysed. But it is also necessary to utilise background data for a better understanding. For instance, this is the case for the pattern of land-use, for demography, crop yields and prices as well as subsidies.

**The regional model and how it is used**

The partial diagnosis drawn up for each of these components of the analysis of the region provides an initial list of questions about the region's development and thus can be used to determine research programs and appropriate ways of communicating results. This is what is called a thematic approach.

Combining the three approaches guarantees that the main actors involved in the region's functioning and development and their interactions are taken into account in preparing the regional diagnosis. This is achieved by identifying the region's subsets and by analysing their functioning, by developing the typology of the actors, and by portraying the spatial representation of global data using GIS. This

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5 The term "farm" is taken here in the broad sense of a center where decisions are made about the use of natural (and other) resources to obtain an output and to meet the needs of a family. It also encompasses entities with some land as well as those without land. In both cases, the diversity of activities of each of the actors is taken into account.

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combination of approaches must be carried out at the levels where production choices and decisions concerning the management of natural resources are made.

A complementary list of questions can thus be identified regarding the relations between the actors and the systems they manage.

This global diagnosis is then used to build a model of the current functioning of the region. This model is used to simulate the development of its functioning when major factors vary such as demography, prices of products and inputs, land use and credit policies, or when technological innovations are introduced.

To conduct these simulations, this model must explain the relations between the actors, the activities that they conduct and their determinants. In particular, it must show the connections between the use of factors and resources and the output obtained, the ways that the area is used and the economic and environmental repercussions, and the behaviour of the actors and their economic, cultural and social environment. To do this, it is necessary to collect data which, even if they cannot be quantified, are nonetheless essential in understanding the regional reality: the regional model must not be reduced to what is quantifiable, otherwise there is a risk of masking the complexity and the diversity of reality.

This tool is progressively enriched as the research progresses. Simulations show that the variability of economic and environmental results correspond to different development schemes. Thus they make it possible to identify new needs, for the future, in knowledge or in modes of social organisation, for example.

Conclusion

The organisation of research in the context of a specific geographic area is not the only approach to finalised research. Using thematic approaches on general topics is also a legitimate method, and their results make solid contributions to regional research.

The value of this research, however, resides in its capacity to integrate all the actors in the analysis (individuals, groups, companies, and institutions) of the area and combine their rationales to contribute to its development. This development can only be real and sustainable if there is a certain measure of consistency between these activities, notably regarding the use of resources available in the area. Research alone cannot provide all the answers for development. However, it is expected that the ecoregional approach will be able to contribute to the definition of what makes up this consistency. It is therefore necessary to understand the diverse uses of natural resources, the diverse conditions under which technical progress is adapted, and the diverse ways in which various actors adapt to an evolving, fluctuating environment. This cannot be achieved if the technical, social, economic, and political data are analysed separately. The geographic area studied
must be considered as a component of research: this is the concept that has been developed in this paper.

It seems clear that developing the ecoregional approach as it is currently being used is necessary to prepare for future issues recently spelled out in the report by Gordon Conway in “Sustainable Agriculture for a Food Secure World”. This report shows that a new “Green Revolution”—agronomic and ecological—is necessary for productive agriculture that respects the environment, especially in regions with many constraints. In the prospect of this “doubly green” revolution, the ecoregional approach has a natural place.

Research institutes in countries of the South and the North and international institutes have obtained results which meet various needs of the countries of the South. But only in few cases have these results been integrated to promote sustainable development at the regional level.

This issue, of concern to most research institutes, requires attention to problems of organisation and content of research on development. The CGIAR, which founded the term of “ecoregions,” research centres and universities in numerous countries in the North and, in the South, regional organisations stemming from the NARSSs (National Agricultural Research Systems) such as CORAF (African Conference of Agricultural Research Organisations) all contribute to developing this concept.

In the face of the urgency, the complexity and the diversity of the problems to be dealt with, it is essential that these different forces be combined to establish the principles and conditions of more effective research, and hence contribute to helping prepare all research on development to better face future issues.

References


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