

Stakes and pitfalls of the development of the statistical systems in agriculture: the web of sustainable development.*

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“I will conclude with a final observation about the importance of indicators [...] Therefore, by implication, we play a critical role in measuring the effectiveness of public policy and private business decisions that influence national agricultural performance.”

R. Ronald Bosecker

International Interests In Agricultural And Rural Statistics

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The sustainable character of the economic development process ranks among the most critical issues of the statistical system integration into their economic environment. Indeed, the World Summit for Sustainable Development, organised in Johannesburg from 26th August 2002 to 4th September, reaffirms the commitment of the international community for sustainable development and invites in its analysis and statistics action plan¹ to reinforce the national and regional information services which refer to the policies and measurements of sustainable development (§ 129), while encouraging further work on the indicators (§ 130 and 131).

1 The genesis of the sustainable development concept

In the recent history of the theories of economic development, the concept of sustainability is for the first time explicitly associated with that of growth by the economist Walt Whitman Rostow to qualify one of the phases of economic development while speaking about the takeoff towards self-sustained growth². The problems of sustainable development are already embedded in the Club of Rome³ theses about the limits to growth⁴, which will be spread at the end of the Sixties by the Meadows report. During the Seventies, in answer to this radical calling into question of the development idea, taking the environment into account as a critical factor is establishing through the development of strategies of ecological development or “ecodevelopment”⁵.

A concept suggested in 1987 by the United Nations, sustainable development is defined as a type of development likely to ensure the needs for the present generations without compromising the

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¹ cf. <http://www.agora21.org/johannesburg/rapports/plan-action.pdf>, Means of execution, p. 76.

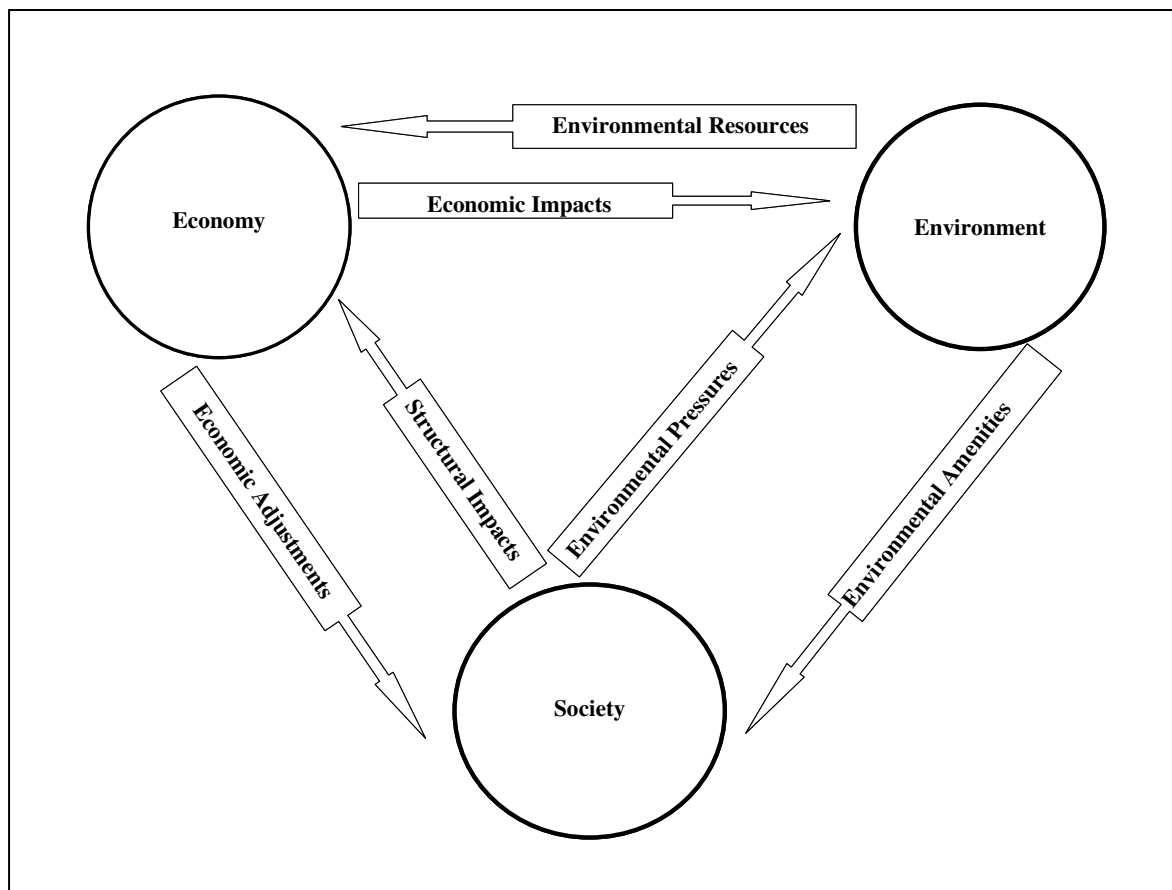
² W.W.Rostow (1956) “The Takeoff into Growth Coil-Sustained”, *Economic Newspaper*, n°66, pp. 25-48.

³ The Club of Rome, founded on 1968 April 8, by Aurelio Peccei and Alexander King, is a non-governmental organisation sensitising the governmental leaders with the complex problems of the development (<http://www.clubofrome.org>).

⁴ *The Limits to Growth*. Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William W. Behrens III, Universe Books, New York, 1972.

⁵ Strategies reaffirming the objective of the development in a reorientation of the priorities and methods integrating environmental protection and of the natural resources, cf. Sachs, I. (1974). “Environnement et styles de développement”, *Annales - Economies, Sociétés, Civilisations*, (3), pp. 553-570.

possibilities offered to the future generations. It supposes the coherence of public policies followed by the various geopolitical entities, at the global level (continental block, under-regions, nations) as well as local one (districts, counties). The World Commission Report on the Environment and the Development, chaired by Gro Harlem Brundtland⁶, alerting the General Assembly of the United Nations to the accelerated degradation of natural resources and its negative impact on economic and social development, has led to the A/RES/38/161⁷ resolution recommending the implementation of environmental policies likely to guarantee a sustainable development. Five years later, Agenda 21⁹, a program resulting from the United Nations Conference on Environment and Development held with the Summit of the Earth in Rio de Janeiro in 1992, specifies that the concept of sustainable development defined by the Brundtland report rests on the harmonious integration of the economic, environmental and social spheres.



Graph 1: Interactions between the three spheres of sustainable development (according to OECD).

2 New Deals for the South: the Millennium Development Goals

Issued in 2000 under the aegis of the Program of the United Nations for Development (UNDP), the eight Millennium Development Goals¹⁰ (MDG) from here to 2015 are clearly within the perspective

⁶ *Our Common Future (The Brundtland Report)*, World Commission on Environment and Development, Oxford University Press, 1987.

⁷ A/RES/38/161 - *Process of preparation of the Environmental Perspective to the Year 2000 and Beyond*, General Assembly of the United Nations, 1983, September, 19.

⁹ Action 21, Rio Declaration on environment and development, The United Nations Conference on Environment and Development, the United Nations, New York, 1993.

<http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>.

¹⁰ In 2002, Koffi Annan, General Secretary of the United Nations, charges an independent commission (Millennium Project) with proposing an action plan to achieve the Goals of the Millennium. In 2005, Jeffrey Sachs, chairing the Millennium Project, submits the final report, entitled "Investing in Development: With Practical Plan to Achieve the Millennium Development Goals", cf. <http://www.unmillenniumproject.org/reports>.

of sustainable development, in particular explicitly for the MDG 7 “To ensure a sustainable environment” and MDG 8 “To set up a world partnership for the development”. Bringing up to date and carrying out the synthesis of the specific objectives of the UNDP and the Program of the United Nations for Environment (PNUE), the MDGs were devised with an aim of breaking with the underdevelopment of the southern countries while limiting the perverse effects of an uncontrolled economic development and a too brutal growth: climate change, disappearance of the primary forests, desertification, decline of the bio-diversity.

Focusing on the problems facing by the southern countries, the Millennium Development Strategy favour the reduction of hunger and poverty (MDG 1), primary education (MDG 2), the women liberation (MDG 3) and maternal health (MDG 4). Thus, some targets as those of the MDG 6 (malaria) can appear less priority to bestow a sustainable character on human development, in the northern countries. Nevertheless, this divergence between North and South, perfectly legitimate at the development goal level, constitutes an additional source of difficulties for the evaluation, the comparison and the coordination of the government policies between international partners.

3 Structure, relevance and inflation of the indicators of sustainable development

The indicators are tools answering three key objectives: to simplify systemic complexity by integrating information to describe studied systems qualitatively and quantitatively, in order to be able to communicate operational information necessary to decision making by the actors of sustainable development.

3.1 Synthetic indicators of sustainable development

The communication about the objectives of sustainable development towards the citizens requires a selection of indicators understandable by all and likely to gain the support of the majority in order to influence the individual behaviours, thus increasing the effects of the incentive measures.

Synthetic indicators like gross domestic product (GDP) per capita corrected of the depreciation of the natural capital¹¹, are classically used. Other synthetic indicators such as the ‘adjusted clear saving’¹² are used by the World Bank to take better into account some commercial or non-commercial components more or less ignored by the GDP. Alternate indicators, like the ‘ecological footprint’¹³ largely popularised by some non governmental organisations (NGO) or that of the ‘economic well-being’¹⁴ resulting from academic work still present an experimental character, the estimates being available only for some countries sometimes for lack of consensus on the methodology of estimate or reliable statistical data to estimate some components.

In spite of their teaching qualities, these synthetic indicators are too general for a follow-up targeting the specific objectives of the environmental public policies. One then calls upon

¹¹ In 2002, the GDP does not take into account the exhaustion of the natural resources and consumption and environmental pollutions due to the production activities. Moreover, the “defensive” expenditure devoted to environmental protection induces an increase in GDP. In the same way, the restorations even partial of a degraded environment lead to an artificial increase in the GDP. In order to take into account these effects, two corrections of the GDP were proposed: i) GDP reduced by the natural capital depreciation, denominated as “green” GDP; ii) “green” GDP reduced by expenditure restorers and defensives, denominated as “sustainable” GDP.

¹² The ‘adjusted clear saving’ is defined as the clear saving increased of the expenditure of education but decreased by the consumption of fixed assets and the damage in the natural resources (e.g., production of gas with greenhouse effect). This adjustment leads to an estimate being able to represent only half of the monetary saving (Esty D.C., “Toward dated-driven environmentalism: The Environmental Sustainability Index”. *The Environmental Law Reporter* n° 31, pp. 10603 - 10612, 2001).

¹³ The ‘ecological footprint’ measures for an individual or a population surface necessary for the production of the main resources consumed by this population and to the absorption of waste (“Ecological footprints and appropriated carrying capacity: what urban economics leaves out”, William E. Rees, *Environment and Urbanization* n° 4, pp 121-130, 1992).

¹⁴ Osberg, Lars and Andrew Sharpe (2002) « An Index of Economic Well-being for Selected OECD Countries», *Review of Income and Wealth*, Ser. 48, n° 3, pp. 291-316.

composite indicators like those of the ‘human development index’¹⁵ of the Program of the United Nations for the Development (UNDP), or like the index of environmental sustainability (*Esi*)¹⁶ of the Davos Forum.

3.2 The development of environmental accountancy

The objective of the international framework of environmental accountancy (SEEA¹⁷) is to provide an integrated and coherent framework of the relations between economy and environment, while bringing closer physical and monetary data and by connecting flows to stocks. In this context, a certain number of tools has been developed according to the countries to try to connect economic activities and environmental pressures, among which figure the development of national accounts increased by environmental accounts, comparing economic data with physical data according to the activity sector. Thus, the NAMEA¹⁸ methodology developed by CSO, the Netherlands Statistical Office, at the end of the Eighties is based on the development of input-output tables from national accounting increased by environmental accounts expressed in physical units. The accountancy of material flows counts the entirety of the material flow entering in and going out of the economy. Close to economic aggregates such as the GDP, the accounts of material flow¹⁹ inform about the productivity of the resources mobilized in running the economy.

3.3 Sustainable development strategies as conceptual frameworks for the development of indicators

The follow-up of the governmental measures in favour of sustainable development with an aim of evaluation of the public policies assumes to decree technical standards on the basis of the posted and scientific knowledge available then to work out batteries of indicators reliable statistics and detailed objectives, usable by the specialists for thorough analyses. In order to claim relevance, the intrinsically multidimensional character of sustainable development (cf. figure 1, multiplicity of the interactions between the three spheres of development) leads necessarily to provide a rather broad range of indicators. One must also face the multiplication and the diversity of the reference systems promulgated by the various sustainability observatories, which they are regional offices, governmental institutes or international programs. From the 45 indicators presented in 2003 by the French Institute for the Environment (*Ifen*), to the 155 indicators proposed in 2005 by the European Union (EU), to the 900 World Bank indicators on development in 2007²⁰, these reference systems have reached a level of complexity that makes difficult any attempt at synthesis.

It is thus necessary to establish conceptual frameworks in order to be able to manage this complexity by organising it so that the selected indicators can be easily put in relation to the objectives of the public policies in order to be exploitable directly by the decision makers in the

¹⁵ Since the first report on human development in 1990, the UNDP proposes a family of composite indicators allowing an evaluation of progress of human development by country: the indicator of human development (HDI), the indicators of human poverty declined in two versions (HPI1 for the developing countries, HPI2 for the developed countries), the indicator measuring the inequality of gender (GDI) and the measure it of women responsibility (GEM), cf. <http://hdr.undp.org/hdr2006/statistics/indices>.

¹⁶ Environmental Sustainability Index (*Esi*), joint initiative of the Yale Centre for Environmental Law and Policy (YCELP) and of the Centre for International Earth Science Information Network (CIESIN) of the Columbia University, evaluates for 146 countries according to 21 criteria “the capacity to protect the environment in the next decades”. In this evaluation, published in the World economic forum 2005 in Davos, the first place goes to Finland and the last to the North Korea.

¹⁷ *System of integrated Environmental and Economic Accounting*

¹⁸ *National Accounting Matrix including Environmental Accounts*

¹⁹ Material Flow Accounts (MFA), cf. Accounts Department environmental and economic integrated. Handbook of the operations. Methodological studies, Series F n°78, the United Nations, 2001 (<http://unstats.un.org/unsd/publication/SeriesF>).

²⁰ *World Development Indicators 2007* (<http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS>)

public sphere concerned. Carried out by OECD, the inventory²¹ of the batteries of sustainable development indicators shows that in order to be able to reconcile legibility and precision, the national and international institutes of statistics structure the battery of indicators in a hierarchy of topics and sub-topics. The existence of theme sets makes it possible to structure work by groups of indicators and induced statistical series.

The national strategies of sustainable development (*SNDD*) have vocation to federate the public policies followed in each sphere of the development in order to make sure of the compatibility between the objectives of economic growth, environmental protection and social wellbeing. Thus, certain countries rely explicitly on their *SNDD* to structure their battery of indicators: it is the case of Austria mobilising 48 indicators to estimate the progress carried out in the achievement of the 20 key objectives stated in its *SNDD*. Other States like Canada or Norway, pioneers on the matter, decline the concept of capital according to various dimensions of the development in as many national credits than it is desirable (financial, but also natural, human, social capital, even by subdividing it in produced credits), which makes it possible to reason in terms of stocks and flow. For example, Norway evaluates its natural capital in renewable terms of resources and ecosystems while the financial capital is evaluated in terms of savings adjusted for petroleum consumption and net income per capita. OECD also adopted this approach for its series of fundamental indicators of sustainable development²², which are organised in environmental credits, active economic and human capital.

In 1995, the Commission of the United Nations for Sustainable Development has adopted a list of 134 indicators organised in three sections: driving forces, state and answers. The relevance and the feasibility of these indicators were tested in 1998 by a panel of applicant countries (Germany, Austria, Belgium, Finland, France, the United Kingdom) in co-operation with developing countries (Morocco and Tunisia for France). Among the encountered problems, appeared the absence of statistical data for some indicators, the methodological problems of estimation for others, and finally the difficulties of interpretation in the comparisons. By way of example, the rate of households equipped with fixed phone does not have the same significance for a Tunisian or French village. Since, the United Nations gradually gave up proposing universalist indicators. From now on, the 138 basic indicators of the United Nations are gathered around a core of 58 indicators structured according to four chapters subdivided in topics: social (education, equity, housing, population, health, safety); environment (atmosphere, bio-diversity, land water, seas, soils); economy (mode of consumption and production, economic structures); institutions (institutional frame, potentialities of the material and cultural infrastructures). These indicators are implicitly designed in reference to the objectives of the special programs of the United Nations. At the regional level, the EU worked out a pyramidal hierarchy of indicators on the basis of European strategy endeavouring to integrate the strategies of the Member States.

4 Sustainable development and the integration of European statistical systems

Signing the declaration of Rio, the EU subscribed to the commitments stated by Agenda 21, in particular to the development of indicators of sustainable development (chapter 40) in order to be able to coordinate the *SNDD* on the basis of information exchange between States. Thus, the European Council of Gothenburg adopted in June 2001 a European strategy of sustainable development (*SEDD*), explicitly mentioned in article 2 of the Treaty establishing the EU. The *SEDD*, evaluated then renewed by the European Council of June 2006, envisages a battery of indicators to ensure and to determine the follow-up of priorities that are articulated with the strategy

²¹ « Overview of Sustainable Development Indicators Used by National and International Agencies », J. L. Hass, F. Brunvoll et Henning Hoie, *Statistics Working Paper 2002/2*, OCDE, cf. <http://www.oecd.org>.

²² *Développement durable. Les grandes questions*, OECD, 2001.

of Lisbon²³. This battery comprises 155 indicators organised into a pyramidal hierarchy on 3 levels: the first level (topics) is that of the sustainable development strategy, that is to say 12 indicator-keys; the second level (sub-topics) corresponds to the sustainable development policies, that is to say 45 priority indicators; the third level (actions) is associated with the evaluations of the sustainable development policies and with the analysis of their interrelationships, that is to say 98 analytical indicators. In order to integrate the European sector policies within the *SEDD*, the task force European mobilized, in addition to work of UN²⁴ and those of OECD²⁵, the structural indicators of the Lisbon strategy and the specific batteries of indicators, in particular those on the integration of the environmental concerns (*Irena*²⁶) in the common agricultural policy (CAP), but also the European indicators of health (*Echi*), those of ageing (*CPS*²⁷), of poverty and social exclusion (*Laeken*²⁸) and those on the effects of transport on the environment (*Term*²⁹).

The analysis of the pyramidal battery of the European indicators of sustainable development (*IEDD*) shows that social and environmental dimensions are not neglected. For all this, some topics (good governance, total partnership) remain rather little explored by the public statistics because the methodology of investigation remains to be improved if not to be designed for a great part. Thus, the rate of participation in the European elections measures the degree of confidence of the citizen in the EU institutions: the use of tools such as Eurobarometer³⁰ should make it possible to improve this measurement.

With regards to the environmental indicators, it is also difficult to propose a synthetic indicator of the bio-diversity in the current state of knowledge. Thus, the specific bio-diversity is measured by the evaluation of the sole stock in the North Atlantic as a species threatened by over-fishing (priority indicator). The ecosystem biodiversity is evaluated from the evolution of the common bird populations (key indicator)³¹, their rarefaction alerting on imbalances of the ecosystems, which shelter them. Measurement can be indirect: for example for the natural resource management: in order to follow the presence of pollutants of the soil, the system of the *IEDD* is based on the percentage of soil exposed to the risk of contamination, in terms of total area. The dangers of eutrophication³² are announced by an indicator of organic material emission such as a biochemical requirement of oxygen in the rivers.

The impact of the socio-economic activities on the diversity of the European landscapes is measured by two indicators based on the European investigation Lucas³³ of visual observation of geo-referenced points.

²³ The European Council of Lisbon (March 2000) laid down the following strategic objective: to make European Union the “economy of knowledge the most competitive and most dynamic of the world from here at 2010, capable of a durable economic growth accompanied by a quantitative and qualitative improvement of employment and by a greater social cohesion”.

²⁴ *Indicators of Sustainable Development* (<http://www.un.org/esa/sustdev/natlinfo/indicators/isd.htm>), 2006.

²⁵ *Indicateurs clés d'environnement de l'OCDE* (<http://www.oecd.org/dataoecd/33/0/31558903.pdf>), 2004.

²⁶ *Indicator reporting on the integration of environmental concerns into agricultural policy* (<http://www.eea.europa.eu/projects/irena>), 1995-2007.

²⁷ “Committee of social protection”.

²⁸ European indicators on the poverty and social exclusion validated at the Summit of Laeken-Brussels (December 2001). The revised list of the indicators of Laeken includes 11 primary education indicators exploring essential dimensions of poverty (income, employment, education, health) and 9 secondary indicators for the analysis of the social situations and the welfare transfers.

²⁹ Cf. *Towards a transport and environment reporting mechanism for the EU. Part I and II*. European Environment Agency, 1999 for methodology and the reports TERM 2000, 2001 and 2002 (<http://reports.eea.europa.eu>).

³⁰ Eurobarometer standard n°67. The public opinion in the European Union, 2007, April-May. European commission, 2007, June (http://ec.europa.eu/public_opinion/archives/eb).

³¹ Program STOC, temporal follow-up of common birds: larks, sparrows, and other endemic species of birds of the fields.

³² Excessive development of algae stimulated by nitrates resulting from the contributions of nitrate fertilizers.

³³ *Land Use/Cover Area frame Statistical survey*). The implementation of this project is consecutive with the Decision 1445/2000/EC of the European Parliament and the Council of May 22, 2000 on the application of the spatial investigations and the techniques of satellite imagery to the statistics agricultural of 1999 to 2003, prolonged until 2007 per Decision 2066/2003/EC of November 10, 2003 and extended to the ten new Member States by the Decision

The works in progress relates to the necessary integration of the *IEDD* into the common tool of the European statistics, following the requests addressed by the European Council to Eurostat and to the national statistical institutes. Initially, it would be advisable to bring closer these *IEDD* indicators to those worked out for agriculture (*Irena*) and to those for industry (key environmental indicators of OECD). Secondly, the Commission has recommended supplementing the structural indicators of the Lisbon strategy by 34 environmental indicators, following the February 2005 revival. Thus, there is an opportunity to integrate the Lisbon strategy into the *SEDD*. According to the task force report “the principal weakness [note: of the *IEDD* system] lies in the absence of indicators measuring at the same time the social dimension and the environmental dimension”. The adoption in June 2006 by the EU of a new sustainable development strategy implies the revision of the *IEDD* battery at the end of 2007, to take into account the former evaluation and the *SEDD* reformulation.

5 Characteristics of national systems: the French context

5.1 Genesis and development of the statistics with environmental vocation

In France, if the creation of *Ifen*, the French Institute for the Environment, in 1991³⁴ constituted a decisive stage in the implementation by the public statistical system of the recommendations put forth by the Gruson’s report (1974)³⁵ then Ader’s (1982)³⁶ as regards environmental information, it was necessary to await the law of February 2, 1995 (known as “Barnier’s law”) so that are registered in the national legislation the four principles founding the national strategy of sustainable development: prevention at the source; polluter-payer; participation and precaution. The principle of prevention at the source implies that the whole of the departmental statistical services (*SSM*) can be seized of specific information request in the investigations coordinated by the National council of statistical data (*Cnis*³⁷). Formulated by OECD since 1972, the polluter pays principle has led to the creation of a satellite account relating to the environmental economics and the introduction of an Audit Committee for environmental economics. The taking into account of the environmental costs is carried out by way of the impact studies in the evaluations of public policies, the law of orientation, installation and sustainable development of the territory (known as “Voynet’s law”) having imposed it in June 1999, in particular at the local level, by an implementation under the aegis of the Councils of development for rural and urban areas. The principle of participation supposes that the access to information is facilitated for each citizen. The convention of Aarhus, writing this principle within the framework of the Economic Conference of the United Nations for Europe, was ratified by France in October 2002, and was transformed into Community legislation by the Directive issued on 28 January 2003. Lastly, the precautionary principle forces the

786/2004/EC of April 21, 2004. In 2001, Lucas covered 13 Member States of the EU. Because of the foot-and-mouth disease, Lucas was differed in 2002 in the United Kingdom and Ireland like in Estonia, Hungary and Slovenia.

The investigation was renewed in 2003 in all the Member States of the EU with 15 like in Hungary, allowing at constant methodology the comparison of the changes occurred in the occupation of the soils between 2003 and 2001. Some statistical problems related to the quality of the estimates arose from editions 2001 and 2003 so much because of the adopted methodology of survey (impossibility of using a suitable stratification) that comparability of the collected environmental parameters, even, need for improving the cost ratio/effectiveness of the investigations and for reaching the date of appropriateness of mid-July to provide the statistical data.

³⁴ Created by the decree n° 91-1177 of November 18, 1991, the French Institute of the environment then received the statute of public corporation of the State in administrative matter, placed under the supervision of the ministry in charge of the environment. On January 1, 2005, Ifen became a service with national competence, attached directly to the Minister for Ecology (decree n° 2004-936 of August 30, 2004).

³⁵ *Rapport d'activité du Groupe Interministériel d'Évaluation de l'Environnement*, Claude Gruson, La Documentation française, Paris, 1974, July.

³⁶ *Les statistiques de l'environnement, Rapport de mission au ministre de l'Environnement*, Gérard Ader, Insee, Paris, 1982, 239 p.

³⁷ Created by the decree 84-628 of 1984, July 17, Cnis coordinates the statistical surveys of the public services in order to guarantee the economic and social relevance of it, ensuring the dialogue between producers and users of the public statistics with regards to the modified law 51-711 of 1951, June 7 “about the obligation, coordination and the secrecy as regards statistics”.

continuation of research in natural and social science to lead to a better statistical knowledge of the environmental state.

As a statistical service with national competence of the Ministry for Ecology, Sustainable Development and Environmental Planning, *Ifen* in charge of producing and disseminating environmental information in France, is the French correspondent of the European Agency for environment (AEE). The work of *Ifen* on the environment is articulated according to three dimensions: the state and evolution of the natural environments and the biodiversity; pressures exerted on the environment by the economic and human activities; impacts of the environment on the economy and the society. On a primarily pragmatic basis (statistical sources available, needs for information for the citizen and international comparisons), the ad-hoc interdepartmental work group controlled by the General Planning Committee retained 45 national indicators³⁸ including 12 leading indicators finally selected in November 2006³⁹ as much as possible to approach level 1 of the *IEDD*.

5.2 Tools of observation of the territory

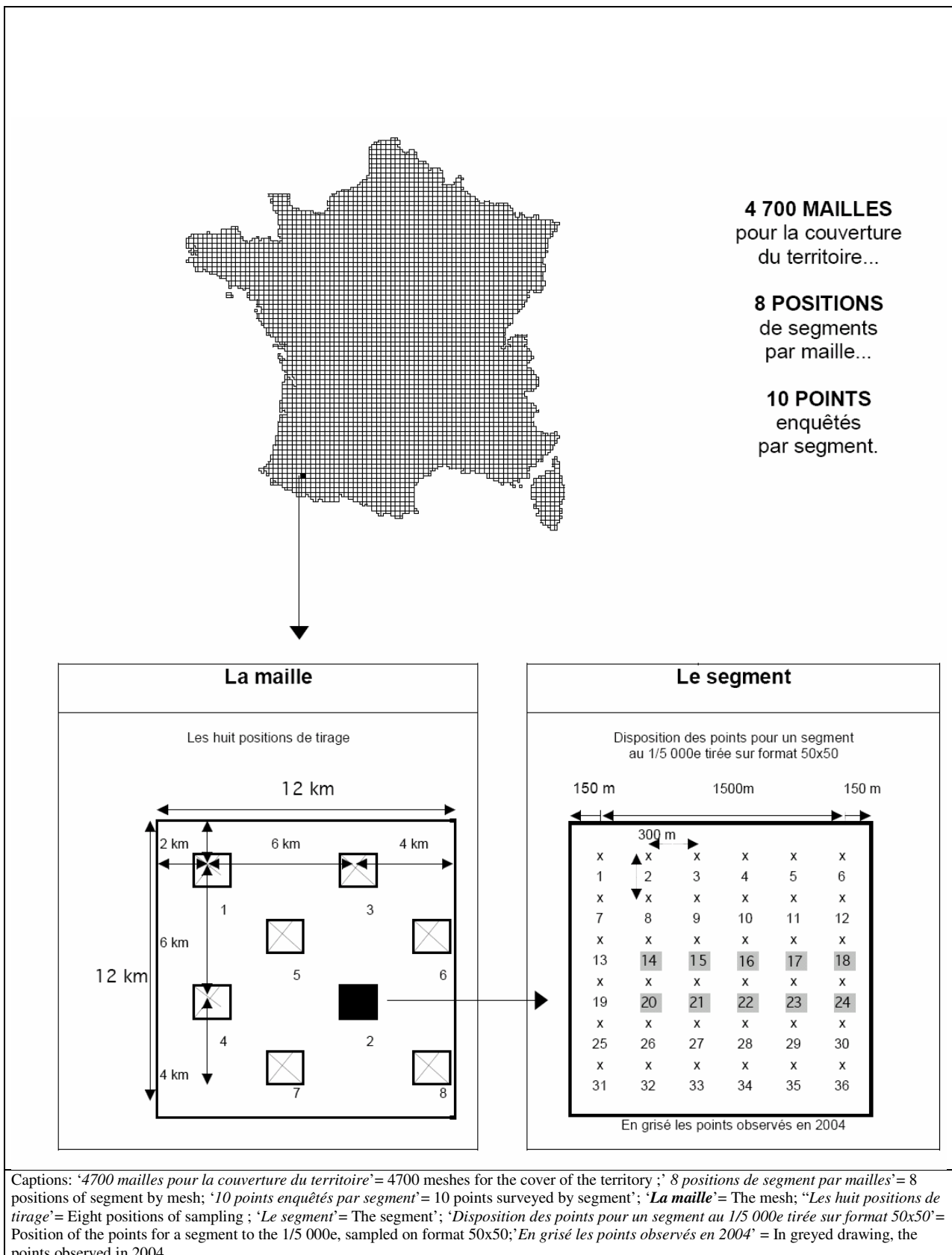
In order to be able to measure the artificiality⁴⁰ of natural space from the point of view of sustainable planning of the territory, France has acquired two tools of observation on complementary scales of resolution. The annual inquiry *Teruti* (Use of the territory), realised by SCEES⁴¹, the statistical service of the ministry for Agriculture and Fishing, makes it possible to know and monitor the distribution of the territory according to various criteria, from a sample of geo-referenced “points” which an investigator goes on. The nomenclature of this investigation was conceived originally to describe the occupation and the land use, in particular by agriculture. Each point is described at the same time in a physical manner (surfaces occupied by crops, meadows, waste lands, moors, forests and other natural spaces, developed sites, roads, etc) and a functional one (agriculture, highway network, habitat, etc). Stemming from an area sample survey starting from a mesh of 144 km², marked out by 8 segments, made up each of 10 observation points (cf. graph 2), the surface estimates obtained are affected of a computable relative error, namely less than 5% for the 35 major categories of the physical nomenclature covering 95% of the national territory. The categories whose error is greater than 10% are relating to zones of lesser importance (less than 55,000 ha), apart from the salt marshes (88,000 ha) and the closed areas (127,000 ha) which can however be of some environmental interest, locally.

³⁸ 45 indicators of sustainable development: a contribution from *Ifen*, Etudes et Travaux n°41, *Ifen*, 143 p.

³⁹ *Agir dans la dynamique européenne : douze indicateurs « phares » de développement durable*, Stratégie nationale de développement durable 2003-2008, Services du Premier Ministre, novembre 2006, 27 p. (<http://www.developpementdurable.gouv.fr>).

⁴⁰ Term indicating the extension of the peri-urban and urban areas to the detriment of the natural environments favourable with the biodiversity like the littoral or some agricultural surfaces (bocage or meadows).

⁴¹ ‘Service central des enquêtes et études statistiques’ (Statistical Office of the French Agriculture Department).



Graph 2: Grid diagram by Teruti covering the metropolitan French territory (source SCEES).

The 2006 Corine Land Cover⁴² inventory (CLC 2006) carried out for France by *Ifen* in collaboration with the European Agency of Environment (AEE) will make it possible to shed light

⁴² The Corine Land Cover geographical database is produced within the framework of the European programme of Coordination of information on the environment (Corine). This biophysics geo-referred inventory provides information

on the evolutions occurred since 2000 as regards occupation of space, relating to in particular the evaluation of the dynamics of urban sprawl and its impact on the artificiality of the territories. The territory is analysed starting from satellite images like a sum of polygons distinguishing forests, urban fabric, natural environments, etc. Contrary to *Teruti*, the nomenclature of description is quite limited but however envisages mixed zones (bocage, for example) combining several types of occupation. Corine Cover Land with the advantage of providing results for relatively fine geographical levels: objects described starting from a surface of more than 25 hectares. Combined with inventory CLC 2000⁴³, the operation 2006 should constitute a reference index to appreciate the changes occurred on the coast line or having affected the agricultural territories. Lastly, the availability of a product high-resolution within the framework of the operation 2006 will contribute to raising the uncertainty, which surrounds the areas occupied by the forests.

Distributed according to the 6 criteria of sustainable management of Helsinki⁴⁴, “the indicators of sustainable management of the French forests 2005”⁴⁵ of the National Forest Inventory (*IFN*) present the 35 quantitative indicators adopted by the Vienna Conference in 2003. This list was supplemented by 21 indicators, of which some constitute an innovation, making it possible to take into account the specificity of the French forest. A systematic methodology of survey should allow a yearly national forest Inventory and a better precision in its results. Currently, the inventory is generalized and synchronous in the whole French territory, instead of a partial inventory but repeated during the decade. The change of method making it possible to have homogeneous annual data will in the future facilitate the follow-up and the evolution of many indicators.

5.3 Framework of reference for the administration of the water resource and the follow-up of the irrigation

Intended to answer the new requirements of the European parent water directive on 23 October 2000, the water information system (*SIE*) succeeded the domestic network of the data on the water, itself set up following the 3 January 1992 Water Act. The objective of the *SIE* is to give a progress report on the whole of the needs for data in the field of water. From this point of view, the Service of national administration of the data and framework of reference on water (*Sandre*) worked out a common language for the data on water because the public actors are numerous: Ministry for Ecology and Sustainable Development, Regional Management of the social and sanitary affairs, local departments of Agriculture and Fishing, Higher Council for Fishing, French Institute of Research for the Exploitation of the Sea (*Ifremer*), Water Agencies, Office of Geological and Mining Research, Research Institute for the Engineering of Agriculture and the Environment (*Cemagref*), local government agencies, federations of the fishing for leisure, Coast Line Cell for the monitoring of water quality. Thus, a certain number of geographical frameworks of reference for water were born: the hydrographical framework of reference for surface fresh water, the hydro geologic framework of reference for subterranean water, the framework of reference for the water masses, etc.

In a context where the risk of drought is more probable, agriculture must be regarded at the same time a contributor and as a consumer of the water resource on a territory scale. Because of

on the various modes of occupation of the grounds for the 29 European States and the coastal strips of Morocco and Tunisia. Ifen is charged to ensure the production, maintenance and the diffusion of Corine Land Cover in France.

⁴³ The Corine Land Cover 2000 database (CLC 2000), realized on the basis of satellite images starting from 2000, constitutes a reference frame of soil occupation, near by the date to the censuses of population (1999) and agriculture (2000). A first release of the base, known as CLC 1990, carried out starting from images acquired between 1987 and 1994, was rectified for comparisons with CLC 2000.

⁴⁴ Ministerial conference for the protection of the forests in Europe (1993). These criteria are: i) conservation and suitable improvement of the forest resources and their contribution to the world cycles of carbon; ii) maintenance of the health and the vitality of the forest ecosystems; iii) maintenance and encouragement of the functions of production of the forests (wood and not wood); iv) maintenance, conservation and suitable improvement of biological diversity in the forest ecosystems; v) maintenance and suitable improvement of the functions of protection in the management of the forests (in particular soil and water); vi) maintenance of other benefit and socio-economic conditions.

⁴⁵ *Indicators for the sustainable management of French forests*, IFN, 2005, 136 p. (<http://www.ifn.fr>).

complementarities between irrigated agriculture and rainfed agriculture, these two functions are interdependent within a territory of quantitative management of water and must be analysed simultaneously and spatially on a basin scale.

The irrigation initially developed in the zones with arid tendency profiting from contributions of mountain water (e.g. basin of the Rhone in the South-east of France). It has been then extended to other areas, by an active policy of the installation (flood barriers, hill reserves, ...), of investments in the networks of irrigation as in the individual irrigation and of development of the resources locally available: individual pumping into underground water-level and river.

The most complete statistical data relates to the irrigated surfaces, which are quantified in the successive censuses of agriculture (1970, 1979, 1988, 2000) and in the inter-census surveys on the structure of the farms ("Farm Structure Survey"), like through the CAP declarations for the surface in cereals, oilseeds and protein crops. With regards to consumed volumes of water, one has only recent data, based on the irrigation royalties paid at the Water Agencies, but very unequally accessible and studied. For the quantities brought per hectare, information is limited to the one provided by the "Cultivation methods" *SCEES* survey for 2001 (rather wet year), and to data for more restricted zones. The sampling data for irrigation provided by the Water Agencies were regarded as not fully reliable before 2000 (in particular because of the possible undervaluation of the surfaces declared with the fixed price, still important at this time).

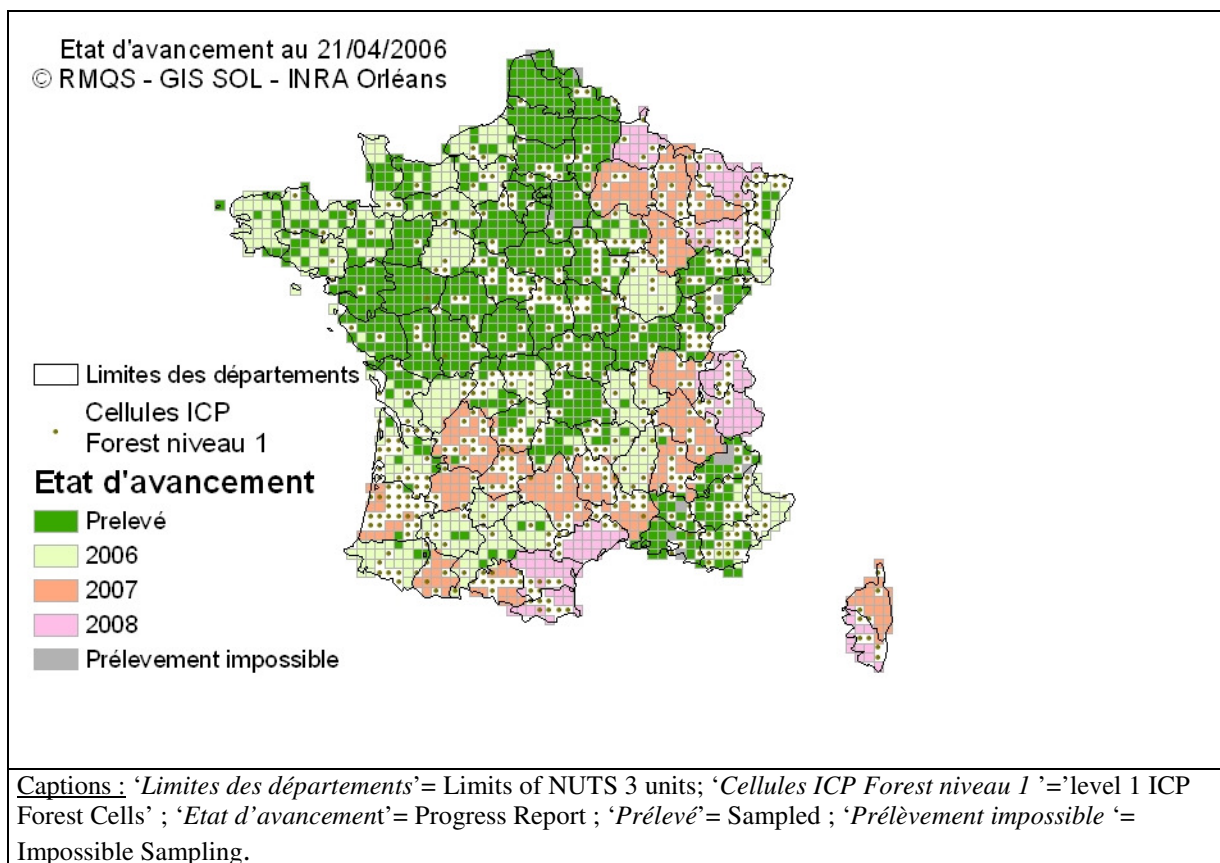
The generalisation of the volume-meters has made it possible for a few years to estimate with a better precision the actually taken volumes, via in particular the use of various statistical databases (Agricultural Census, *SCEES* practical cropping at farm survey, CAP declarations, etc). The professional literature and the studies produced by the Chambers of Agriculture ('*Chambres d'Agriculture*') offer more specific information in addition, and field studies undertaken by the *Cemagref*⁴⁶ can also be used. The integration of the sources of available data at the national level within the same datawarehouse could constitute a significant advance for the study of the practices of irrigation in France, a point already underlined in the *CGGREF* report⁴⁷ in 2005, even if progress were already recorded, in particular via the reorganisation of the regional statistical services of the ministry for Agriculture.

5.4 Quality of the grounds, management of waste and exposure to the risks

How to lead to an environmental pressure gauge on the soils when that exerted by the population is seized on the level of the municipality and that of the units livestock is provided to the municipality cluster level ('*canton*')? The Network for Measurement of the Soils Quality (*RMQS*) takes samples of soils on more than 2,000 sites distributed uniformly on the French territory according to a square mesh of 16 km side. The grid of the *RMQS* represents indeed a space unit (25,600 ha) enough fine to allow a comparative study of the distribution of the environmental pressures at the national level and enough large to authorize the aggregation of the various indicators within this one. The battery of the environmental indicators for the *RMQS* is defined starting from the elaborated European indicators by the European Agency of the Environment, supplemented at the national level by *Ifen* and *Inra*, that is to say on the whole more than one hundred of indicators and components. The battery of indicators is structured in three types according to the model "pressure-state-response" (PSR) developed by OECD, that is to say: pressure gauges such as the density of the highway network, the population, the number of cattle unit; indicators of state like the percentage of carbon in the soils, the texture of the soils, the drained surface; and indicators of response such as the number of measuring sites of plant health products, and the progress report of the *RMQS*.

⁴⁶ Cemagref is a public research institute that targets results directly useable in land and water management.

⁴⁷ The CGGREF is the National Audit Council for the French ministry for Agriculture



Graph 3: Progress report of the RMQS (source GIS SOL)

Model PSR was amended by the European Agency of the Environment in a model “driving forces-pressure-state-impact-response” (*DPSIR*). The environmental indicators of the *RMQS* are calculated starting from multiple databases national (Corine Land Cover, digital model of altitude, map of the France pedology, agricultural census, population census, base of polluted sites and soils, database of the French hydro-geologic Reference Frame, etc...). The complete cover of the territory by the *RMQS* is planned for 2009.

Among the challenges that the French statistical national system attempts to raise, figure Regulation 2150/2002 of the Parliament and the European Council of 25 November 2002 determining the statistical data that the Member States must provide on the production, the valorisation and the waste disposal. The next answer concerning the year 2006 must be sent in June 2008. A work group controlled by Ifen was made up in order to better full fill the requirements of this European payment, in particular by investigations near the companies in the trade and industry, of the estimates in agriculture and the services, a better exploitation of the declarations of dangerous waste of the companies and installations of processing waste. In this context, the complete cover of the territory by the Network of measurement of the quality of soils (*RMQS*⁴⁸) is planned for 2009. Another challenge, there exists an important request for a better knowledge of the human and economic stakes of the zones exposed to the harmful effects and the natural and technological risks. It is desirable that sources, such as the census of population or the *Sirene*⁴⁹ repertory of the companies, can be mobilized for better knowing the situation of the floodplains, exposed to the noise or the harmful effects and risks industrial. The test study on the evaluation of the stakes

⁴⁸ The *RMQS* is managed by the scientific grouping of interest SOL in which *Ifen* collaborates with the Agency of the Environment and the Control of Energy (*Ademe*), *Inra* and the Research institute for Development (*IRD*). The *RMQS* takes samples of soils on more than 2000 sites distributed uniformly on the metropolitan territory according to a square mesh of 16 side km.

⁴⁹ National system of identification of the natural persons and morals and their establishments (articles R. 123-220 with R. 123-234, D. 123-235 and D. 123-236 of the commercial law) articulated around the repertory of the companies and the establishments. The management of this repertory is entrusted to *Insee*.

vulnerable to the risk of flood in the French department of Loiret led to the development of a methodology and a whole of treatments making it possible to estimate the number of inhabitants and residences present in floodplain, according to whether the commune is covered or not by the Repertory of the localised buildings (*Ril*⁵⁰) of *Insee*. In the communes of more than 10,000 inhabitants for whom *Ril* is available, these administrative data then make it possible to characterize populations (population pyramid, occupational and professional status,...) and the stakes (economic activities and public equipment).

Lastly, the knowledge of matter flows and the productivity of the resources take an increasing importance within the framework of the international approach of sustainable development, as the promotion efforts carried out by OECD and Eurostat testify some.

The first estimates for France should be available at the end of 2007. In 2008, Ifen will be implied in the biannual supply of matrices NAMEA, according to the recommendation of Eurostat.

6 Towards individual indicators of sustainability at the farm level: the IDERICA experiment

Under the combined pressure of the new trends of consumption, evolution of the rules of the international business, widening of the EU to the Central European country and Eastern, French agriculture is led to re-examine a certain number of its orientations. The current context of redefinition of the CAP fixes a renewed framework which one can synthesize as follows: a more competitive European agriculture and an agricultural policy more favourable to the international exchanges, more centred on the needs for the consumers and however more respectful of the environment and the natural resources.

6.1 Farm as an organisational entity impossible to circumvent

Facing these challenges, the program "Agriculture and sustainable development" of the National Agency of Research (*ANR*)⁵¹ stress that the farm constitutes an organisational entity impossible to circumvent as a point of meeting of the public policies and the mechanisms of market, of the economic issues, environmental, social and territorial. The instruments and the models established during the last decades to study and accompany the evolution by the farms must however be re-examined in order to take account of the transformations in progress, which they are the context, the aims in view or the types of innovations to be taken into account.

The identification of the relevant indicators of sustainability at the farm level requires a critical survey of the increasing literature on the indicators, their methodologies of development, the advantages and the disadvantages of each method of analysis⁵². Once these clearly identified indicators, it will be possible to work with the construction of proxies of the ideal indicators when the latter cannot be calculated on the basis of statistical data available, starting from individual information extracted the public surveys on agriculture (*RICA-FADN*, Agricultural Census, Farm Structure Survey, etc). Indeed, of many indicators of sustainability require the recourse to specific data, which could not be only obtained by direct investigations from farmers. In addition to the recourse to the economic, bio-technical and environmental processes which generate them, one can also imagine the design of proxies on statistical bases, for example by identification of robust statistical relations between the indicators provided by the data of investigations and the designed proxies starting from the official statistics. It is in particular within the framework of these problems that experiment IDERICA was undertaken.

⁵⁰ The repertory of localised buildings (*Ril*) is a database geographical including/understanding the whole of the addresses and their geographical location of the communes of 10,000 inhabitants or more. It contains the addresses of dwelling, the *SIREN* establishments, the communities and medium-term, the urban equipment.

⁵¹ Agriculture and Sustainable Development " (*ADD*) is a federalising development and research program of which the ambition is to renew and widen the manner of apprehending the agricultural activities starting from the stakes of sustainable development, cf. <http://www.agence-nationale-recherche.fr>.

⁵² A critical work survey of durability evaluation methodologies was undertaken within the framework of the program *ADD/Impacts*, cf. "Analysis of 15 years of agriculture sustainability methods evaluation", Rosnoblet J., Girardin P., Weinzaepfler E., Bockstaller C., IXth ESA Symposium, Warsaw, 2006.

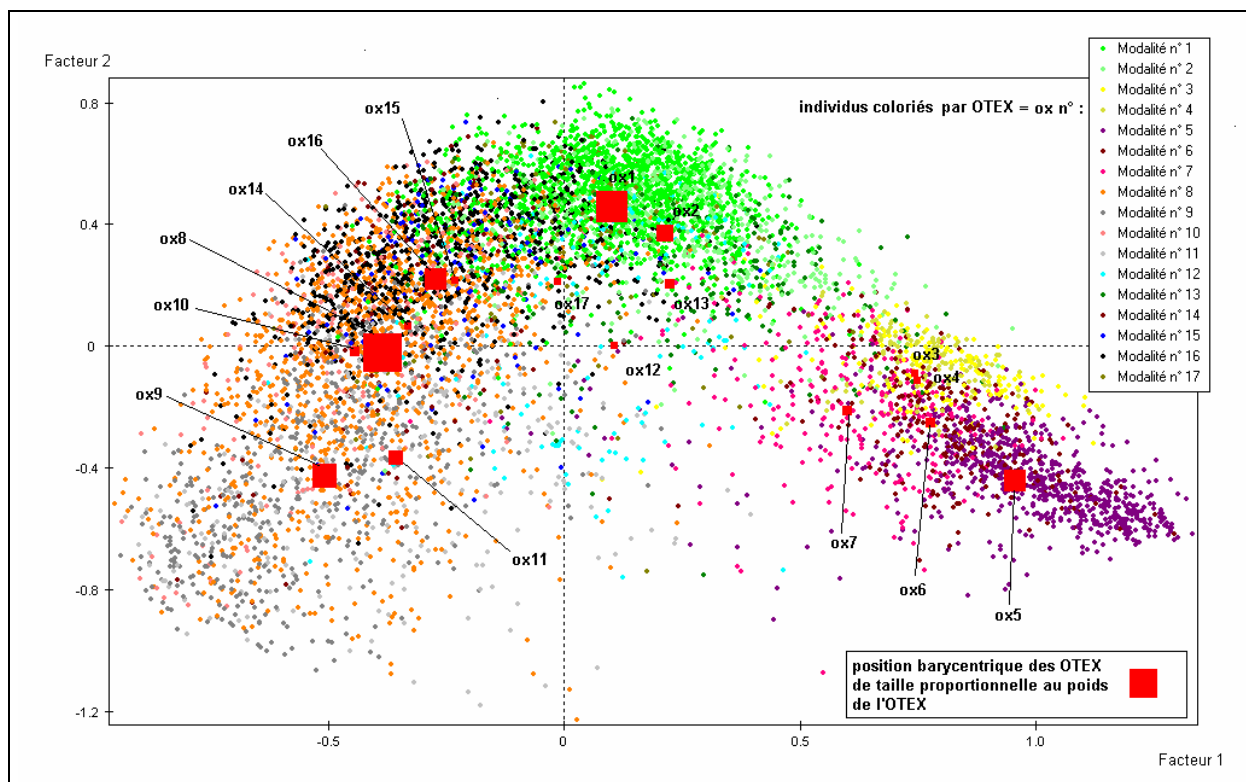
6.2 Lessons from *IDERICA* experiment

Among the studies carried out to the measure of sustainability starting from individual information extracted the public surveys on agriculture, the Exploratory study appears on the characterisation and the follow-up of the sustainability of the French exploitations (*IDERICA*⁵³). The objectives laid down at this programme of studies by the French Department of Agriculture were: i) to consider the elements of sustainability current of French agriculture; ii) to define the criteria (and the indicators corresponding) allowing to carry out a follow-up of the most sustainable exploitations in the environmental, social and economic plan for each technical-economic orientation of production; iii) to make territorial analyses. This study generalises the *IDEA* method⁵⁴ to quantify the sustainability of the French farm holdings at the national scale starting from the French Farm Accounting Data Network (*RICA*) and of the agricultural census for 2000 (*RA 2000*). It shows that the sustainability of the farm holdings within each dominant production and each area is variable, and that margins of progression exist whatever the systems of production and their localisation. According to the evaluation report of *Coperci*⁵⁵, it must be regarded a stage in research on appreciation of the sustainability of the exploitations and not as a result. Indeed, in the *IDEA* method, the value of the synthetic indicator of sustainability (*ISD*) is equal at least scores obtained by the exploitation according to the three selected scales of sustainability (agro-ecological, socio-territorial, economic). Thus, only 7 indicators out of the 16 indicators of the socio-territorial sustainability scale can be indicated according to the *IDERICA* methodology whereas 13 indicators out of 19 for the agro-ecological sustainability scale and all 6 indicators of the sustainability economic scale can be indicated. It results a mechanical alignment from the synthetic indicator of sustainability on the sum of the indicators of the scale of socio-territorial sustainability because of the criterion of aggregation (which retains the minimum of the scores obtained for each scale) as well as some imbalance between the three scales of sustainability.

⁵³ *IDERICA, étude prospective sur la caractérisation et le suivi de la durabilité des exploitations agricoles françaises*, Direction des Affaires Financières - DAF - Institut national polytechnique de Lorraine – P.Girardin ; C.Mouchet ; F.Schneider ; P.Viaux ; L.Vilain ; P.Bossard – December 2004, 72 p.

⁵⁴ "La méthode *IDEA*", *Indicateurs de durabilité des exploitations agricoles*, 2003, Educagri Editions, Dijon.

⁵⁵ Comité Permanent de Coordination des Inspections du ministère de l'Agriculture, *Evaluation de l'étude prospective sur la caractérisation et le suivi de la durabilité des exploitations agricoles françaises*, Report by A. Barbaroux, J.-P.Roubaud, Ministère de l'Agriculture, 2005 June, 5 p.



Reading the graph: in the factorial design crossing the first two axes of the analysis of the multiple correspondence, the farms scattergram presents a ‘‘Guttman effect’’ of score ordination, which is interpreted as follows: at the ends of the individual scattergram noted rather well, in South-West of the graph thanks to good scores on the agro-environmental scale are, in South-East of the graph thanks to the scores obtained on the economic scale; at the centre of the scattergram, North of the graph, are the individuals rather badly noted. The horizontal axis (first factorial axis), interpretable general component of durability, seems very related to the technical-economic orientation of the farm (OTEX).

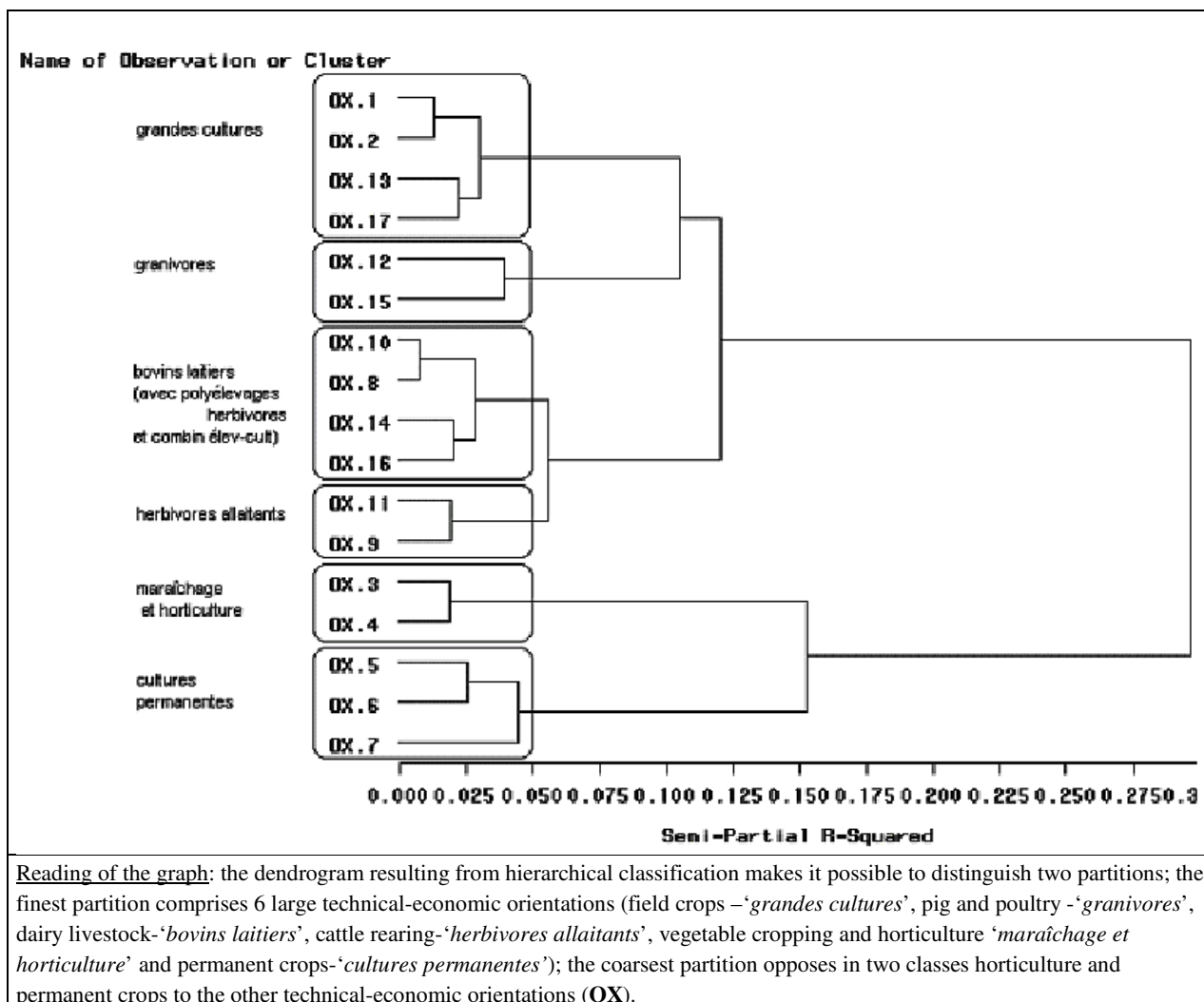
OTEX Nomenclature of farms in 17 categories (ox): **ox1**, Cereals, oilseeds, protein crops; **ox2**, Other field crops; **ox3**, Vegetable cropping; **ox4**, Flowers and other horticulture; **ox5**, Quality wine; **ox6**, Other vine growing; **ox7**, Fruits and other permanent crops; **ox8**, Dairy farms; **ox9**, Cattle rearing and fattening; **ox10**, Dairying, rearing and fattening; **ox11**, Ovine, caprine and other herbivores; **ox12**, Granivores; **ox13**, Mixed-cropping; **ox14**, Mixed livestock, mainly grazing; **ox 15**, Mixed livestock, mainly granivores; **ox 16**, Field crops — grazing livestock combined ; **ox17**, Various crops and livestock combined.

Graph 4: Multidimensional sustainability of the French farm holdings analyzes according to *IDERICA*.

A complementary study⁵⁶ based on the multidimensional analysis of the scores however showed that the variability of the scores in the universe of the French farms is organised according to two major dimensions: the first opponent agro-environmental sustainability and economic sustainability, the second opposing the cultures to the permanent crops.

On the basis of barycentre of the *IDERICA* multidimensional analysis individual scores for each technique-economic orientation, the hierarchical clustering allows us to propose a typology of the farm holdings in the forms of large technical-economic trends (‘*GOTEX*’) as relevant clusters for the measurement of sustainability.

⁵⁶ *Etude d’une m thode de quantification de la durabilit  des exploitations agricoles fran aises*, Ambroise M., Beaujour M., Robert A. and Sauvadet L., directed by D.Desbois, Ecole Nationale de la Statistique et de l’Analyse de l’Information, 2005.



Graph 5: Typological clustering of the technical-economic orientations according to the IDERICA measurement of sustainability.

The complementary analyses carried out for each main technical-economic trend considered, suggest that it would be possible to work out, by means of a suitable weighting of the battery of the scores, an individual indicator of sustainability which is specific of each agricultural type of activity. The conclusions of this study suggest that the individual measurement of the sustainability of the farms can break up according to a general factor suitable for the productive profile of the farm holding and factors specific to the various types of activity agricultural.

Thus, the results of this study show that the multidimensional analysis makes it possible to release, in dimension specific to the indicators of sustainability on the one hand, of the aggregative indexes of sustainability and, on the other hand in dimension specific to the farms, a typology of the technical-economic orientations, which is adapted to the measurement of sustainability.

6.3 The problem of the coupling of the devices of measurement on various territorial scales

However, in terms of completion degree of the agro-environmental objectives, the mobilised statistical sources do not make it possible to fully exploit the micro-economic *IDEA* methodology of evaluation of sustainability. Moreover, the sampling of the *RICA*, designed to ensure a statistical representativeness at level 2 of the NUTS⁵⁷ (area), is insufficient to incorporate these measurements

⁵⁷ The Nomenclature of the statistical territorial units subdivides the countries of the European Union and Switzerland in areas, definite for the needs for the public statistics starting from regroupings of administrative units, according to the population resident according to the country corresponding, cf. Regulation of the Parliament and European Council (EC) n° 1059/2003 of May 26, 2003. This nomenclature is structured according to 3 levels: NUTS 3 (from 150,000 to 800,000 inhabitants); NUTS 2 (from 800,000 to 3,000 inhabitants); NUTS 1 (from 3 to 7 million inhabitants).

of sustainability at the territorial level most adequate which could be that of the Small Agricultural Area (SAA). Thus, a territorial measurement of the sustainability of the farms supposes the adaptation and the coupling of the devices of existing investigation, the mobilisation of administrative data and the implementation of satellite devices for further enquiry (e.g., installation of a technical-economic probe on the management of the inputs).

7 Future challenges for the French statistical system in the sustainability measurement

7.1 To assume the commitments entered into as regards environment for the development of the agricultural statistics community asset

Even if the budgetary commitments, undertaken by the European Council in December 2005 regarding the CAP over the period 2007-2013 did not reach the level desired by the Commission to finance the second pillar devoted to the environment and rural development, of new orientations are gradually implemented to preserve the natural resources (reduction of the inputs - plant health and manure, saving of water and energy, management of the bio-diversity), and to limit the health hazards (e.g. fight against the mycotoxins, or detection of residues related to the veterinary or plant health treatments in food). Thus, following the European statistical regulation on waste, a new European statistical Regulation on marketing and the use of the pesticides could be adopted in 2008⁵⁸ and cause work in 2009. The year 2008 will be also that of the first supply of accounts of flow matters, in accordance with the new Eurostat regulation.

7.2 To follow the adaptation of agriculture to the climate changes

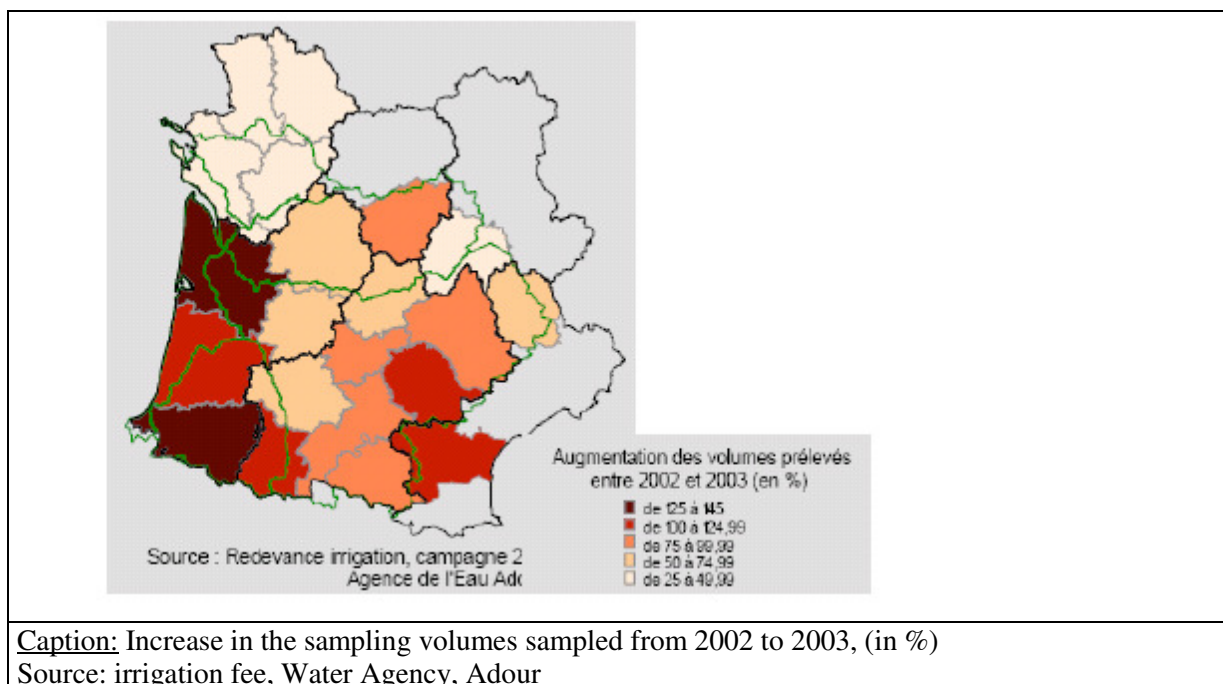
Over long period, among the determinants of the evolution of the agricultural sector, one can quote them technological innovations in particular in biotechnology, the increasing internationalisation of the agricultural markets, the industrialisation and “tertiarisation” of agriculture (vertical integration, formalisation by contract in the dies, development of service dimension), multi-functionality of agriculture (environmental impact, capacity required a public property) and, as a more recent concern, climate change.

Indeed, the Intergovernmental Group of experts on Climate (*GIEC*) envisages an increase in the variability of the climate, regarding as probable the increase in the risks of summer drought on the majority of the continental terrestrial zones of average altitude. Taking into account global warming, the adaptation of agriculture to the climate change, in particular to the episodes of drought, is likely to become a crucial question for the next decades.

The collective scientific report entitled “To reduce the vulnerability of agriculture to an increased risk of lack of water”, financed by the French ministry of Agriculture and the Fishing and controlled by *Inra*, announces the defect of databases necessary to the use of analytical tools available like the models of culture. The report of this expertise recommends the establishment of hydrous assessments of the basins slopes starting from the crossings {soils} X {climates} X {most plausible farming systems}, with micro-economic studies carrying in priority on knowledge of the costs and the benefit of the irrigation and, more generally, on the economic control of the choices of farming systems and of technical equipment of irrigated perimeter. The collection and the management of the necessary information to such studies will be under supervision of regionalized geographical information systems to implement in the southernmost French areas. Moreover, this collective scientific report recognizes that the insufficient development and organization of the sources of available data at the national level as regards irrigation constitute serious brakes being studied of the

⁵⁸ Europa Press Releases (<http://europa.eu/rapid/>) IP/07/970, Brussels/Luxembourg, 2007, June 28th. “Water quality standards. The Commission welcomes the political agreement on water quality standards which will reinforce the Water Framework Directive, the cornerstone of the European Union's water protection policy. The agreement endorses the core elements of the Commission proposal (see IP/06/1007), including environmental quality standards and the phasing out of some substances. The new directive will establish limits for concentrations of substances such as pesticides, heavy metals and biocides found in surface water” (underlined by the authors).

practices of irrigation in France, already not underlined in the report of the General Council for the Agricultural Engineering and the National Forestry (CGGREF 2005), even if progress proves to be real (via the statistical services of regional offices for agriculture and forest in particular).



Graph 6: Effect of the 2003 drought on the taking away of water in the Adour-Garonne basin.

Thus, the information relating to water consumption of irrigation on a piece, a farm holding, or at a territory scale are largely lacking, the data of sampling for irrigation exits of the Water Agencies being to analyse with precaution because of a non-exhaustive cover. The generalisation of the volume-meters will in the future make it possible to provide more detailed evaluations. To attenuate the impact of the realisation of a risk of drought, one can have recourse to the irrigation, the change of technology of irrigation (adoption of drop by drop), with the change of farming systems (rotation, variety) but also with the covering of the risk by a system of crop insurances, even with a mode of compensation for the agricultural catastrophes.

7.3 To accompany the devices aiming at reducing the exposure of the agricultural producers to the risks

In France, the protective system against the agricultural catastrophes went back from the agricultural laws of orientation from 1960 and 1962 and a specific law of 1964. Since, the nature of the risks and economic realities strongly evolved: the intensification and the specialisation of the exploitations expose them at the more important risks; the health hazards take an increased importance; the economic risk, in particular the risk of market, increases because of the globalisation and the deregulation of the agricultural markets. Thus, this evolution of the risks making the system of 1964 increasingly unsuited, the law of agricultural orientation of 5 January 2006 (leasing) reinforced the capacity of the holdings to be guarded against the risks, in particular by adapting the legislative framework so that insurance-harvest can be generalised with all the agricultural productions and on all the territory.

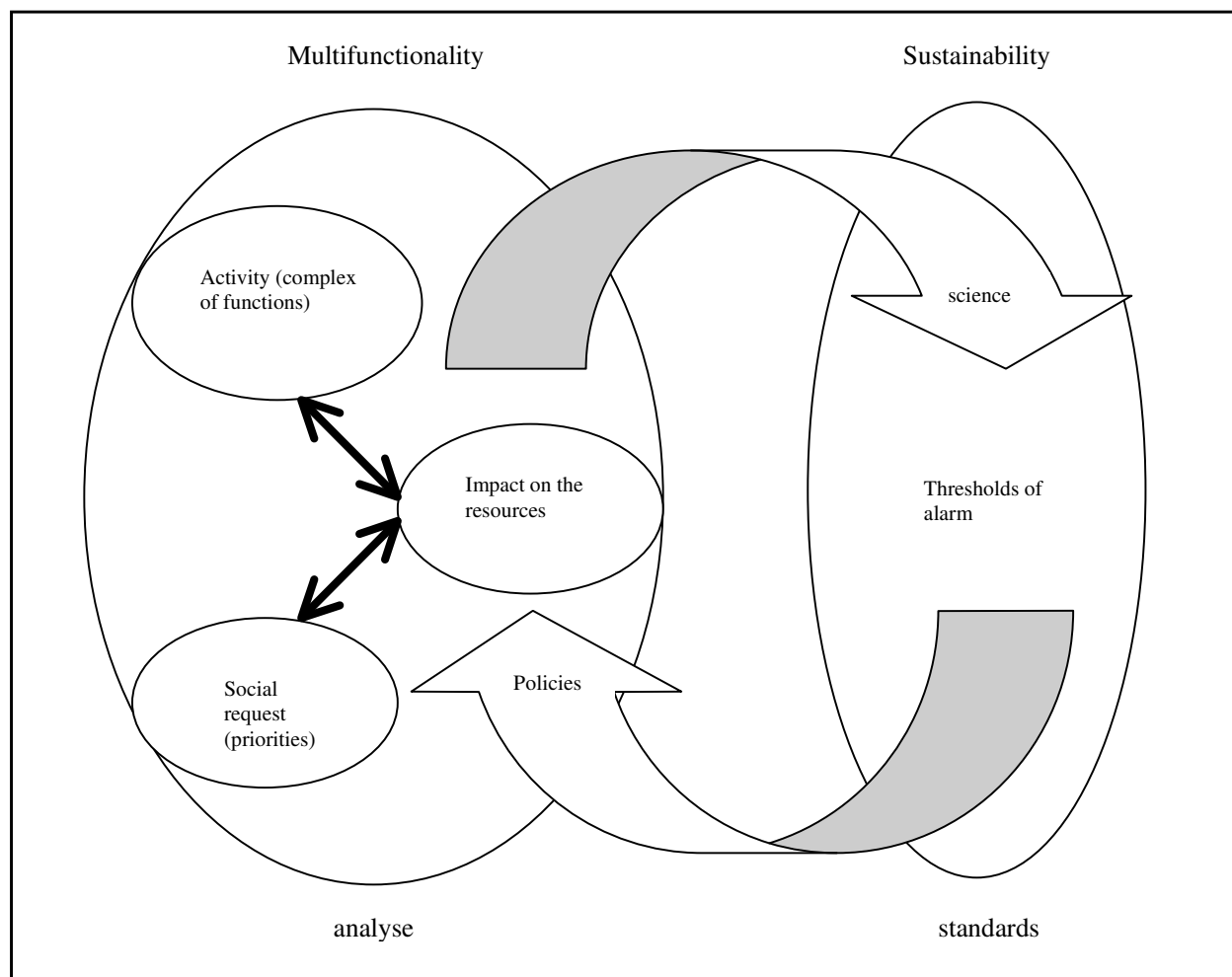
The determination of the levels of premium and compensation supposes to be able to quickly deliver reliable estimates concerning surfaces, the outputs and the prices observed. The more so as the economic losses relative to these risks can be very important: as example, the losses incurred by the producers at the time of 2003 drought were estimated at 13 billion € for the European Union and at 4 billion € for France.

It proves that, for the estimate of the amount of compensation for the losses of the 2003 drought in France, the statistical device of the ministry for agriculture was amply put at contribution.. The Teruti survey about the use of the territory (direct observation of 555,000 points) was used for the estimate of surfaces jointly to an investigation into the average yields registered after harvest relating to 9,000 owners, in addition to the mobilization of data resulting from administrative registers. In 2004, *Teruti* passed at 155,000 points of observation, while keeping a satisfying level of precision of the estimates of surfaces since the 35 major stations of the detailed physical nomenclature record a relative error lower than 5%, these stations covering 95% of the national territory in 2004⁵⁹. Sometimes thus, the introduction of methodological innovations for an optimal use of the means reserved for the public statistics makes it possible it to realize substantial savings. In the case of a crop insurance covering the variability of the outputs for an agricultural produce, the study of the statistical properties of such a product of insurance (average and variance of the allowances, correlation of the individual allowances) supposes to have outputs of reference on an adequate temporal basis and for a rather fine level of territorial cutting as well as individual outputs resulting from a constant sample of farms over the period of reference. About the prevention of the risk or of the answer to the risk realisation, those examples show that the capacities of the agricultural statistical services are strongly mobilised to ensure the availability of unbiased statistical data oriented towards operational use. Indeed, asymmetries of information were identified like one of the main obstacles to the development of the systems of insurance-harvest.

7.4 To reconcile European agriculture with society: the framework of multi-functionality

Multi-functionality, as a political concept, can be seen like a means of reconciling European agriculture with the company by providing an analytical reference frame likely to support the increase in sustainability while contributing to the objective-keys of the European strategy of sustainable development: regional development equitable, food safety and medical, conservation of the natural resources, diversification of the incomes in rural environment and total sustainability. Thus, within the framework of the multilateral negotiations within WTO on the trade of the agricultural produce, the concept of multi-functionality, emerging as of the Eighties, mobilised an increasing attention during the last decade in the discussions relating to the changes of orientation of the agricultural policies. Multi-functionality intervenes in the problems of sustainable development in the middle of the adjustments which take place between the productive complexes and the social requests, the bond between multi-functionality and sustainability being established because of the impacts that the activities can have on the resources. From this point of view, multi-functionality provides an analytical framework making it possible to make operational the concept of sustainability starting from the functions filled by agriculture.

⁵⁹ In fact, the precision of the estimates depends more of the number of primary education units of the spatial survey than of the number of points of observation per primary unit.



Graph 5: Relations between sustainability and multi-functionality (according to Multiagri⁶⁰)

The analytical framework makes it possible to specify the functions starting from the social request and the combination of activities. The study of the systemic attributes concerned with these functions (for example at the level of the farm, production, tourism and the protection of the water resource) should make it possible to evaluate the modifications intervening in the combination of concerned attributes, to simulate the impact, which a policy change could induce on these combinations, and thus to explore a whole of potential inflections while answering the normative question about the alarm thresholds.

⁶⁰ Cairol, D., Perret, E., Turpin, N., 2006. «Results of the Multiagri project concerning indicators of multi-functionality and their relevance for SEAMLESS-IF, SEAMLESS Report No.11, SEAMLESS integrated project, EU 6th Framework Programme, contract no. 010036-2, <http://www.SEAMLESS-IP.org>, 100 pp, ISBN no. 90-8585-040-1.