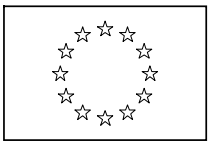

COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

Statistical Information needed for Indicators to monitor the Integration of Environmental concerns into the Common Agricultural Policy

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1. THE MANDATE

Successive European Councils[1] have reaffirmed a commitment to integrate the environment into all Community policies and to ensure that these policies contribute to sustainable development. A Commission Communication to the Council and the European Parliament, COM (2000) 20 "Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy", presented the context within which indicators are being developed to monitor the effectiveness of the strategy to integrate environmental concerns into agricultural and rural policies within the EU. The report emphasised the need for appropriate and reliable statistical information on which to base these indicators and (in section 4.2) gave a commitment to prepare a further Communication dealing with this topic.

The present document has been prepared in response to this commitment. It will not repeat the in-depth discussion of the previous Communication and in the Council Strategy adopted in November 1999, nor will it deal with sustainability, as the Commission will produce a separate Communication specifically on sustainable agriculture. The consequences for environmental concerns outside the Union, and particularly in developing countries, go beyond the scope of this Communication and are not dealt with here. The present text focuses on the data needed to compile the indicators already identified in COM(2000) 20, and the steps envisaged to supply that data. As with all Commission activities, the success of these steps will depend on commitment and resources not only within the Commission, but also within Member States who are the principal partners of the Commission in the European Statistical System.

The European Parliament and the Council are invited to consider the proposals presented in this communication and to give a mandate to the Commission to pursue work in this area.

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[1] The European Council at Cardiff in June 1998 invited all relevant formations of the Council to establish their own strategies for giving effect to environmental integration and sustainable development within their respective policy areas. It invited among others the Agriculture Council to start this process. The European Council in Vienna in December 1998 reaffirmed the commitment to integrate the environment and sustainable development into all Community policies.. The Agriculture Council was invited to continue its work with a view to submitting a comprehensive strategy, including a timetable for further measures and a set of indicators, to the Helsinki European Council. The European Council in Cologne in June 1999 took the process further and the European Council in Helsinki (December 1999) called for the submission to the European Council in June 2001 of comprehensive strategies including a timetable for further measures and a set of indicators for the main sectors

2. AGRICULTURE AND THE ENVIRONMENT

Agriculture interacts with the environment in many ways. The rural landscape in Europe has been formed by agricultural practices over the centuries and the symbiosis between farmers and the environment is complex and close. Agriculture, the major user of land and provider of food for the EU, relies heavily on healthy eco-systems to function properly and efficiently. Farmers are guardians of the countryside, of eco-systems and of the rural landscape. Disrupted eco-systems can result in water pollution, plagues of insects, spread of plant and livestock diseases, flooding, loss of soil fertility, etc. The challenge for policy is to protect eco-systems while minimising unwanted impacts inside and outside the sector concerned. This implies encouragement and support for the activities which protect and enhance the environment (activities widely practised by the agricultural sector as a matter of enlightened self-interest) and discouragement of those which have negative effects.

In November 1999 the Agriculture Council adopted a strategy to address the integration of environmental requirements into the Common Agricultural Policy (CAP) through the reforms adopted under Agenda 2000. Objectives were set for water, agri-chemicals, land use and soil, climate change and air quality, and landscape and biodiversity.

3. INDICATORS

Detailed policy objectives have to be set and progress in reaching these objectives measured.

Thus a solid set of indicators is needed:

– to help monitor and assess agri-environmental policies and programmes, and to provide contextual information for rural development in general;

– to identify environmental issues related to European agriculture;

– to help target programmes that address agri-environmental issues;

– to understand the linkages between agricultural practices and the environment.

The work of the Commission services is developed from that of the OECD[2], adapting and extending it to cover the European Agricultural system. The Commission's work goes further in trying to define not only the necessary indicators, but also methodologies to be applied, and possible data sources or data collection methods, so that indicators for EU Member States are harmonised and comparable.

The main criteria for choosing agri-environmental indicators are:

- *policy-relevance* –address the key environmental issues

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[2] For more detail, see OECD publication "Environmental Indicators for Agriculture" :Volume 1 : Concepts and framework, OECD 1997; Volume 2 : Issues and Design, OECD 1999: Volume 3 : Methods and Results, (foreseen for 2001)

- *responsiveness* –change sufficiently quickly in response to action
- *analytical soundness* – based on sound science
- *measurability* – feasible in terms of current or planned data availability
- *ease of interpretation* –communicate essential information in a way that is unambiguous and easy to understand;
- *cost effectiveness*–costs in proportion to the value of information derived

COM (2000) 20 presented an initial set of indicators and areas where indicators are needed. These are summarised, together with additional information, in a table at the end of the present document. The level of development of these indicator areas varies and they can be divided into four groups.

(a) A first group contains indicators for which it is immediately clear what statistical data need to be collected.

(b) For the second group, statistics are not the appropriate source of information, though statisticians may make a contribution to the overall picture, by structuring and integrating data from different sources.

(c) In the third group the indicators have not yet been sufficiently well defined to identify the most appropriate data.

(d) For a fourth group, indicators are needed, but no indicator could yet be defined. Recommendations on data requirements cannot yet be made.

The challenge now is i) to provide the inputs needed to calculate and maintain identified indicators, by finding and integrating data from statistical, administrative and environmental information sources within a sound analytic framework, ii) to define more clearly the indicators in the third and fourth groups.

This Communication looks at the data needs which are readily identifiable (group a), and makes some proposals for tackling the issues in groups b and c.

In providing data for indicators efforts will in the first place maximise use of existing sources. Secondly, additional information will where possible be obtained by extending the scope of existing statistical or administrative data sets. Only where these possibilities cannot meet requirements will new data be collected.

4. EXISTING STATISTICAL AND OTHER SOURCES OF RELEVANT INFORMATION

The European Statistical System (ESS), consisting of Eurostat and the appropriate bodies in Member State administrations, ensures that the statistical needs of policy makers are met. Data derived from administrative procedures provide a rich source of information although considerable effort may be needed to ensure that this information is correctly integrated into a statistical environment. Geo-spatial tools could be used to integrate statistical, administrative and environmental data (soil, land-cover, catchment, rivers, climate …) in a sound analytical framework and

provide relevant indicators. Outputs of the activities of the ESS are readily available at the Commission but significant detail of the information collected for administrative purposes is currently unavailable for Community use or even unknown at Community level. Progress in this area is being advanced by gathering information on local studies (sub-regional) as well as national or regional surveys of agricultural practices.

The ESS produces a set of basic data, which can be combined in different ways to produce a variety of indicators which can be modified as policies evolve. So, special emphasis will be given to:

– providing data at local level for combination into a number of different geographical areas, e.g. river basins, vulnerable zones, etc.

– providing new data through existing surveys, as this is cost effective and ensures compatibility with the other survey data.

4.1. Data sources

4.1.1. The Farm Structure Survey

A Farm Structure Survey (FSS), covering all EU Member States and a wide range of questions, has been carried out every two or three years since 1966/67, permitting analysis of associations between characteristics. The next survey will be in 2003. For the full decennial censuses a detailed geographic analysis is possible.

4.1.2. Livestock, crop and related statistics

The ESS has long experience in the production of statistics of livestock and crop products and their prices. Thus, long time series for livestock numbers and composition, crop areas and farm produce together with the corresponding product prices are available.

4.1.3. Forestry statistics

Much forestry activity is associated with agricultural holdings and has clear environmental implications. A Communication (COM (1998) 649) on forestry strategy was followed by a Council Resolution[3] on the same subject. There is a need for further indicators to ensure adequate monitoring of this strategy, by taking account of progress in the work on criteria and indicators for sustainable forest management. This work has been undertaken, inter alia, in the context of the follow-up process to the Ministerial Conferences on the Protection of Forests in Europe.

4.1.4. Land use statistics

The LUCAS (Land Use/Cover Area Frame Statistical Survey) project will give detailed geo-referenced information for agricultural and environmental analysis. First results will relate to 2001 and the value of this tool will be fully realised as

[3] Council Resolution 1999/C 56/01 of 15.12.1998, OJ C56, 26.02.1999

information from successive surveys provides a clear picture of agricultural and environmental trends.

4.1.5. Environment Statistics questionnaire

The ESS collects its main environment statistics every two years in co-operation with OECD through a joint questionnaire. Collaboration with the European Environment Agency and UN agencies ensures coherence of work in this field.

4.1.6. The Farm Accountancy Data Network

The Farm Accountancy Data Network of the European Union (FADN) was established in 1965 [4] to collect accountancy data for the determination of incomes and for the business analysis of agricultural holdings. It is based on a sample of 60000 holdings.

4.1.7. The Integrated Administrative and Control System (IACS)

This system[5] integrates the control of Community aid systems and generates a range of administrative information of potential use for agri-environmental indicators. How best to exploit this source is under study (new legislation will be required).

4.1.8. The Rural Development Programme

The monitoring and evaluation of the rural development programmes[6] is partly based on common indicators, several of which concern specific agri-environmental measures[7] or environmental aspects of other rural development measures. Monitoring concerns the direct programme outputs while evaluation examines the results/impacts on, for example, biodiversity, landscapes and natural resources such as water and soil. Such indicators cover the zone of the programmes and relate mainly to the direct or indirect beneficiaries. The common evaluation indicators help answer a predefined set of questions through a number of judgement criteria.

Rural development programmes hence provide agri-environmental indicators for the zones covered, but information from other sources about the context has to be added (e.g., agri-environmental indicators relating to all farmland in the sector/region) in order to compare the evolution within the programme with the general trend.

4.1.9. Other administrative sources

A significant amount of potentially useful data is generated as a by-product of Community regulatory procedures. Not all of this is currently available to the

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4 Council Regulation (EEC) 79/65 of 15.6.1965, OJ 109, of 23.06.1965

5 Council regulation (EEC) No 3508/92 of 27.11.1992, OJ L 355, 05.12.1992

6 Council Regulation (EC) No 1257/1999, on support for rural development from European Agricultural Guidance and Guarantee Fund (EAGGF) (OJ L160, 23.6.1999, p. 80) and Commission Regulation No 1750/99 of 23.07.1999 laying down the detailed rules for the application of Council Regulation No 1257/99 (OJ L 214, 13.08.1999, p.31).

7 Previously Regulation 2078/92

Commission's services. The costs and benefits of its use (identification and acquisition of relevant data; integration with other data) are being examined.

4.2. EU research and development activities

4.2.1. The Joint Research Centre (JRC)

The JRC carries out research in support of EU policies. The "Agri-Environment Cluster" provides scientific and technical expertise in support to assessing, quantifying and monitoring the evolution of agri-environmental indicators.

Therefore, JRC has developed pan-european geo-environmental databases on soil, land-cover, catchments, river networks and climate to be combined with administrative statistics using spatial modelling tools (GIS) as a key feature**.**

4.2.2. The Community Research Framework Programmes

Research activities to improve our knowledge on the relationships between agriculture and the environment and to develop indicators have been funded under the successive EU RTD Framework Programmes. Addressed topics include desertification, soil erosion, pressures upon natural resources from fertilisers and pesticides, landscape and biodiversity and agricultural emissions of greenhouse gases. The current Fifth Framework Programme provides such support, in particular under the key actions "Sustainable Agriculture, Fisheries and Forestry" and "Global Change, Climate and Biodiversity" and the generic research activities on socio-economic aspects of the environment.

4.2.3. The European Environment Agency (EEA)

Through its specialised European Topic Centres, the EEA is the lead organisation for collection of information on air emissions, land cover, water quality, and nature/biodiversity. In particular, the CORINE landcover inventories provide a basis for representing statistics on a more detailed spatial level as well as being a source of basic data needed to compile indicators on changes in the landscape.

4.2.4. TAPAS

The TAPAS (Technical Action Plans for Agricultural Statistics) programme[8] facilitates improvements in the Community system of agricultural statistics. One of the areas identified for support is agri-environmental indicators.

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[8] Council decision 96/411/EC of 25 June 1996 "On improving Community Agricultural Statistics" OJ L162, 01.07.1996 most recently prolonged by European Parliament and Council Decision 2298/2000 of 28.09.2000, OJ L263, 18.10.2000.

5. THE INDICATORS[9]:

5.1. Indicator 1: Area under agri-environment support (group b)

Concept: Council Regulation 1257/99 provides for programmes to encourage farmers to carry out 'environmentally beneficial' activities on their land

Indicator: *The area of farmland covered by the agri-environmental programmes under Regulation 1257/99,* classified by type of activity.

Proposal: No new data collection needed.

5.2. Indicator 2: Regional levels of good farming practice (group b)

Concept: Farming practices have a direct impact on the environment; therefore regional information is needed on farming practices. Codes of good agricultural practice exist in all Member States, at national or regional level. Consolidation of existing documentation is needed.

Indicator: *Number of farms complying with regional standards of good farming practice.* Minimum standards are laid down by Commission Regulation 1750/1999.

Proposal: Additionally, document those regions which have established specific codes of good agricultural practice which go beyond the requirements of Community legislation. Establish system to collect information on actual practices at regular intervals to monitor trends.

5.3. Indicator 3: Regional levels for environmental targets (group d)

Further work is needed to develop this indicator; an approach might be to determine which regions have environmental targets and to measure the success in meeting these targets using either administrative or statistical data.

5.4. Indicator 4: Area under nature protection (group b)

Concept: Some farmland is subject to restrictions on what may be produced and on the farming practices which can be used because the area is part of a nature protection zone covered, for example, by Natura 2000 or by voluntary agreements. Farmers may be compensated for these restrictions.

Indicator: *Area and percentage of farmland subject to such restrictions,* classified by type of farmland (see indicator 26).

Proposal: Use of information derived from monitoring of Natura 2000 and Rural Development programmes, initially in the context of a pilot study. The possibility of classification by type of restriction and programme will be studied.

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[9] Comments on the set of indicators in COM 2000 (20) section 3.3.2. The groups are described in section 3 above.

5.5. Indicator 5: Market signals: organic producer price premiums (group a)

Concept: The difference between the market prices of conventional produce and organic produce is an indicator of the premium attached to organic products. A second issue affecting the conversion to organic farming practices is the income for organic farmers.

Indicator: *1) Index of the relationship between the prices of organic products and those of conventional products* and *2) Economic results of organic farms compared to similar sized farms in the same area.*

Proposal: Pilot projects 1) to use the system of agricultural price statistics to distinguish organic produce from conventional produce. 2) to test whether FADN data give sufficient information to calculate indicator 2.

5.6. Indicator 6: Technology and skills: holder's training level (group a/c)

Concept: Additional technology and skills may be expected to lead to efficiency in the production process which manifests itself as productivity gains, improved working conditions and product quality which, in turn, have an impact on the environment.

Indicator: *Agri-environmental training of farmers*

Proposal: The FSS records the level of training of heads of holdings. However, neither the date of training nor the age at which it was received is recorded. Refinement of the FSS information, supplemented by questions on agri-environmental development activities followed by the farmer should be the subject of a pilot study.

5.7. Indicator 7: Area under organic farming (group a/b)

Concept: Organic farming involves a less intensive use of land, more varied cultivation practices and entails significant restrictions on the use of fertilisers and pesticides. Council Regulation 2092/91 sets out strict requirements which producers must meet before agricultural products can be marketed in the EU as organic.

Indicator: *Area under organic farming*: This is available from the voluntary questionnaire developed to ensure a common set of information is available to monitor implementation of this Regulation.

Proposal: The questionnaire will be reviewed to validate its coverage and whether voluntary responses to all parts of the questionnaire yield adequate information or whether some elements should be obligatory.

5.8. Indicator 8: Quantities of nitrogen (N) and phosphate (P) fertilisers used (group a)

Concept: Risks of negative impact to human health and environment, associated with the use of fertilisers in agriculture, may grow with increased consumption of fertilisers, particularly in the case where the volume of nutrients provided is higher than the uptake capacity of crops.

Indicator: *Fertiliser use by crop and by region.*

Proposal: this indicator should be considered in conjunction with indicator18.

5.9. Indicator 9: Consumption of pesticides (group a/c)

Concept: The use of pesticides should not involve unacceptable risks to human health or to the environment. The risks vary considerably from one pesticide to another, depending on specific characteristics (i.e. toxicity, persistence) of their active ingredients and use patterns (i.e. volumes applied, application period and method, type of crop treated, type of soil).

Indicator: Two complementary indicators can be envisaged: 1) *Index of pesticide use*, weighted to take into account different types of toxicity and use patterns, etc. 2) *pesticide use*, classified according to intrinsic characteristics e.g. toxicities to non-target species, long term effects, persistence in the environment, etc.

Proposal: 1) Continue to collect data on the use of individual herbicides, fungicides and insecticides from the major pesticide producers and, where available, from Member States. Encourage Member States to complement this through the TAPAS programme with direct surveys of farmers.

2) Develop pesticide classes, based on the characteristics of the active ingredients. (This could be the subject of a research project.)

5.10. Indicator 10: Water use intensity (group a)

Concept: In countries with dry growing periods, the use of water for irrigation can put limited water resources under stress. Crops grown should reflect the climate and the availability of water, and appropriate irrigation techniques should be used (e.g. drip irrigation) with a view to increasing irrigation efficiency and minimising water loss.

Indicator: *Use of water per €1000 output of irrigated crops*.

Proposal: No data source currently exists. Data on water purchased/used could be incorporated into the FADN, starting with Member States in which these data are already available. Specific surveys of water use may need to be developed

5.11. Indicator 11: Energy use (group a)

Concept: In order to reduce emissions of CO_2, all sectors of the economy have to use energy rationally and to improve energy efficiency.

Indicator: *Annual use of energy, by fuel type.* The available data on energy use by agriculture is mainly limited to petroleum products, easily distinguishable because of specific tax regimes applied to diesel used for agricultural purposes. Other fuels used in agriculture are mainly electricity and, in a few countries, natural gas.

Proposal: In FADN, information on total expenditure on fuels is collected, without details concerning types of fuels and volumes purchased. The FADN survey could be extended to cover the missing information, starting from those Member States in which these data are already available.

5.12. Indicator 12: Land use: topological change (group b)

Concept: Development activities have an important impact on the environment and landscape. These developments have their origins in the needs of different sectors, (agriculture, transport, urban development, energy production and distribution, industry….) and have a wide variety of impacts (on wildlife habitats, plant life, surface and underground water, landscape,..).

Indicator: An inventory of *developments classified by type and location.*

Proposal: Many development activities receive support from public finances (local, national or European) and most are subject to regulatory processes. Accordingly administrative records exist covering the location, nature and scale of these changes. A pilot study to establish the feasibility of using such records is needed and legislation to permit their use for statistical purposes will probably be required.

5.13. Indicator 13. Land use: cropping/livestock patterns (group a/c)

Concept: Management of livestock and individual parcels of agricultural land is a matter for the individual strategies of farmers. Changes in land use may have an impact on environment (on wildlife habitats, landscape,..), even if this impact is often poorly documented and little understood.

Indicator: Based on a Community typology of agricultural practices and strategies (to be developed) *the share of each holding in each category of the typology*, possibly extended to cover all rural activities**.**

Proposals: Some Member States already have carried out studies to classify strategies and practices of farmers in the context of national or local policies. A pilot study based development of the methodologies and data will permit a consolidation of existing experience.

5.14. Indicator 14: Management: see also indicator 2 (group d)[10]

Further work on the definition of this indicator is needed.

5.15. Indicator 15: Trends: intensification/extensification, specialisation (group a/c)

Concept: Specialisation of holdings yields economies of scale both in production and in transport costs. Intensification of farming improves the viability of holdings and the maintenance of employment; however the combination of increasing specialisation and intensification leads to higher environmental and other risks as well as a reduction in diversity. In view of the externalities involved, assessment should be related to the appropriate spatial units (e.g. river basins, employment catchment areas, agri-industrial collection centres).

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[10] The indicators needed in relation to the indicator areas 14, 30 and 31 have not yet been identified and are thus not dealt with in this Communication)

Indicator: Since intensification can concern all factors of production *the number of possible indicators is high.* For example, *the relation between livestock numbers and fodder areas* may be appropriate for some types of livestock farming.

Proposals: The Community Typology of Agricultural Holdings permits identification and measurement of aspects of intensification and specialisation of farms and of production zones. Refinements of the typology will improve information on the geographic distribution of different types of farm and of their management practices. Bringing together production data with those from the FSS and FADN will contribute to the establishment of an appropriate typology This will not involve the collection of any new data but a pilot study will provide the information necessary to refine the choice of appropriate indicators.

5.16. Indicator 16: Trends: Specialisation/diversification (group a)

Concept: Diversification of activities is a medium term strategy to manage risk. Diversification may be purely agricultural, may involve non-agricultural activities on the holding (multi-functionality) or may involve off-farm activities (pluriactivity) whether in agriculture or in other sectors. While the income effect may be limited these strategies have a positive effect on farm viability.

Indicator: *Importance of different categories in the Community Typology. Proportion of farmers with other gainful activities. Ratio of farmers' agricultural/non-agricultural incomes.*

Proposals: Additional FSS questions are needed to measure the scale of pluriactivity (and not only its presence). Statistics on farm household income with sufficient detail to measure the impact of pluriactivity on the viability of farms will be an important input to this work.

5.17. Indicator 17: Trends: marginalisation (group a/c)

Concept: Marginalisation may be defined in terms of the inability of holdings to provide an acceptable income. This may be the result of deterioration in the economic or physical environment and lead to an increased risk of the cessation of agricultural activity on the farms concerned.

Indicator: *State and evolution of the density of farms with and without successors.* The state of the supporting infrastructure (services, administration, communications,..) may also contribute to this indicator.

Proposal: Much of the necessary information is available from the FSS; appropriate (fine) geographic detail may be obtained by a redistribution of these data. This would be supplemented by national information on the supporting infrastructure and, if necessary by additional FSS questions. This proposal will require validation by means of a pilot study.

5.18. Indicator 18: Soil surface nutrient balance, including indicator 8: fertiliser use (group a)

Concept: Nutrients are essential for plant growth. Applied in excess they can run off to surface water and/or leach to ground water, raising the nitrate content to

unacceptable levels. The most appropriate method of estimating the excess nutrient use is the soil surface nutrient balance. Appropriate data may be derived from the FSS. However, real insight is provided only at regional, local or river basin level.

Indicator: The *soil surface nutrient balance* is defined as *total nutrient input* (organic and mineral fertilisers, atmospheric deposition, fixation by leguminous crops) *minus the uptake by crops* (including removals by grazing).

Proposals: 1) Nutrient balances at NUTS 2 level are available, but further work is needed to address some methodological problems, i.e.

a) Fertilizers: Figures are available for sales of mineral fertilisers by country, but allocating these to the regions is problematic. Farmers in the FADN panel report on expenditure on fertilisers. This could be expanded to cover quantities purchased, broken down by type of fertiliser (N, P) and begin with those Member States in which this data is already available.

b) Livestock manure: Manure coefficients vary widely from one country to another, because of different measuring or modelling methods.

c) Uptake by crops: Improved models to estimate N removed in fodder crops and through grazing are needed.

2) Pilot project to test feasibility of developing tools to calculate balances for river basins or drainage basins is proposed.

5.19. Indicator 19: Methane (CH_4) emissions (group a)

Concept: Agriculture is a major source of methane and nitrous oxide emissions, both greenhouse gases many times more powerful than CO_2. These gases are given off mainly from livestock manure. The commitment to reduce greenhouse gases by 8% by 2008-2012 is a high political priority in the EU.

Indicator: *Aggregated annual agricultural emissions of CH_4, N_2O and CO_2,* weighted by global warming potential.

Proposal: Data on emissions of all of greenhouse gases are available from the European Environment Agency. The data could be refined by collecting information on the deliberate production (in anaerobic digestors), capture and use of methane (identical to natural gas) as an energy source on farms. This use has the double benefit of reducing methane emissions as well as the amount of conventional fuel used on the farm. The FSS list of characteristics could be extended to collect information on installations, their capacity and use.

5.20. Indicator 20: pesticide soil contamination (group c)

Concept: Show the extent to which pesticide residues accumulate in the soil.

Indicator/Proposal: Definition and production of this indicator requires a considerable effort, validated by soil sampling, in collaboration with environmental authorities.

5.21. Indicator 21: water contamination (group c)

Concept: The approach is similar to that adopted for indicator 20. The focus is on pollutants such as heavy metals and organic chemicals including residues of veterinary products (i.e. potential pollutants not covered by indicator 30).

Indicator/Proposal: Similar to indicator 20.

5.22. Indicator 22: Ground water abstraction (group a/c)

Concept: Direct pumping of ground water by farmers is generally unrecorded, but widely believed to be one of the main causes of falling water tables.

Indicator: Annual amount of *ground water pumped directly* by farmers from ground water sources.

Proposal: Indicator 10 proposed data collection in this area. This requirement could be extended to cover self-supply and would include the source of the water pumped, i.e. ground water (from a well) or from a river or stream.

5.23. Indicator 23: Soil erosion (group a/b/c)

Concept: More than half of the land in Europe suffers some degree of soil erosion, reducing the productivity of the land and degrading ecosystems. The phenomenon is more severe in the southern European countries but, even in the northern part of Europe, the potential erosion risk can be important due, for example, to the lack of protective vegetative cover during the winter period. Physical factors such as climate, topography and soil characteristics are important in the process of soil erosion, but the most important factors are the land cover and the agricultural practices. Furthermore, soil erosion can be linked to agri-environmental measures.

Indicators: Location and estimation of the *amount of topsoil loss* and *maps of soil erosion risk*. *Land cover and agricultural practices in areas at risk.*

Proposals: Based on combining geo-referenced and harmonised data on European soils, land-cover, digital terrain models and meteorological data, a geo-spatial modelling approach could provide consistent and harmonised maps of soil erosion risk.

5.24. Indicator 24: Resource depletion: Land Cover change (group a)

Concept: A matrix of changes in land cover (LC) is essential in order to track developments. From the agri-environment viewpoint, a matrix of agricultural uses showing entries, exits and internal changes of use is the key requirement.

Indicator: Matrix of *changes in LC classified by type and size.*

Proposal: The implementation and regular updating of LUCAS[11] will permit production of the matrices required.

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[11] See 4.1.4 above.

5.25. Indicator 25: Genetic diversity of species (group b)

Concept. Biodiversity is the variety of life and its processes and is generally recognised on three levels:

- Genetic diversity - the variety of genetic building blocks found among individual representatives of a species;
- Species diversity – the variety of living organisms found in a particular place; and
- Ecosystem diversity- the variety of species, ecological functions and processes, that occurs in different physical settings.

While genetic improvements can contribute to agricultural productivity they may also pave the way to a process of progressive erosion of the genetic stock whereby agricultural production would become more and more vulnerable to the risks linked to the spread of new pests and diseases or climatic change.

Indicator: 1) *The total number and shares in production of main crop varieties/livestock breeds* and 2) *The number of national crop varieties/livestock breeds that are endangered.*

The first indicator reveals the extent of biodiversity in agricultural production and tracks any increase/decrease. The second provides information on the risk of genetic erosion and irreparable loss of part of the existing genetic pool.

Proposals: For indicator 1 the basic crop information comes from the Common catalogue of varieties of agricultural plant species[12]. This will need to be supplemented by a specific information network.

5.26. Indicator 26: Area of high nature value, grassland, etc. (group b)

This indicator is a subset of indicator 4

5.27. Indicator 27: Production of renewable energy sources (group a)

Concept: Renewable energy sources such as biodiesel and wood can contribute to reductions in use of fossil fuels and net emissions of CO_2 emissions.

Indicator: *Area and volume of production of coppice woodland and of oilseed crops intended for production of biodiesel.*

Proposal: Administrative data on this topic are collected. Alternatively FSS and crop production statistics could be expanded to cover production concerned.

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[12] The common catalogue of varieties of agricultural plant species is published in accordance with provisions of Article 18 of Council Directive 70/457/EEC of 29 September 1970, on the common catalogue of varieties of agricultural plant species (OJ L225, 12.10.1970, p.1). The catalogue was published for the first time on 21 July 1975 (OJ C164, 21.7.1975, p.1). It is periodically updated. Thus, the 21st edition was published on 9 November 1999 (OJ C321A, 9.11.1999, p.1).

5.28. Indicator 28: Species richness (group d)

Concept: Some species, linked to typical agricultural habitats, can be used as bio-indicators for certain developments in agriculture although species diversity and number of individuals may be influenced by non-agricultural events. The choice of species and the availability of a long-enough monitoring period to distinguish natural influences, like weather, from man-induced changes are some of the difficulties encountered in producing this indicator. Some national examples exist, mainly based on bird-counts. Because of their less technical nature these bio-indicators appeal to a wide public.

Indicator: To be defined, based on available data. Current data availability is an important argument because of the length of the time series needed.

Proposal: Further development of this indicator is needed.

5.29. Indicator 29: Soil quality (group c)

Concept: The key policy objective for soil management in agriculture is to ensure the appropriate functioning of soils as a limited resource for agricultural production, in ways that are environmentally sound, economically viable and socially acceptable. Comparison of soil "capability" maps with actual land use maps can identify areas of mismatch, indicate areas with potential risk of soil degradation and be relevant information for policy evaluation / monitoring / orientation.

Indicator: *Agricultural areas where there is a mismatch between soil capability and the actual or impending land-use.*

Proposals: (1) Determine soil limitations (topography, rooting depth, fertility, organic carbon, water retaining capacity[13], texture) of European soils (using harmonised European soil information system); (2) derive crop suitability zones and (3) compare the capability maps with land use maps.

5.30. Indicator 30: Nitrates/pesticides in water (group d) [14]

Concept: Agriculture is one of the main sources of nutrients and pesticide-residues in ground and surface water. The evolution of the concentrations in ground and surface water is an indicator of the success of measures taken by the agricultural sector. A geographical analysis of results would permit the localisation of problems.

Indicator: The definition of the indicator has to be further developed

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[13] Water retaining capacity has been identified as an indicator in itself in the OECD work. It is considered very important for regions where there are alternate periods of drought, which limits soil vegetation cover, followed by heavy rainfall. For countries with steep and rapid rivers and heavy rainfall, a good soil structure with high water retaining capacity is essential for flood and landslide prevention, the consequences of which can be costly to the economy.

[14] The indicators needed in relation to the indicator areas 14, 30 and 31 have not yet been identified and are thus not dealt with in this Communication)

Proposal: In principle data are available at national and EU level, though more on nitrates than on pesticides. Data can be selected and presented in various ways, taking for instance the main land use in the catchment area into account. Further discussion is needed between policy makers, data providers and environmental experts to define and construct the indicator.

5.31. Indicator 31: Ground water levels (group d)

Concept: The over-abstraction of groundwater by agriculture (see indicator 10), but also by other users leads to a lowering of groundwater tables. The disturbance of the hydrology of an area may have other consequences such as intrusion of saltwater in aquifers, further reducing supplies of fresh water.

Some countries have gathered long time series of groundwater levels at selected measuring stations, which is necessary to discern weather induced changes from man-made influences. No systematic data collection at EU level is known.

Indicator: To be specified.

Proposal: Further work is needed to formulate the expectations from this indicator and to define it.

5.32. Indicator 32. Landscape state (group b)

Concept: Landscape state can be interpreted by analytic indicators at different levels. Diversity and composition play their part in its description; elements such as the structure and organisation of agricultural parcels, overall land cover, distribution and types of buildings, visual elements, (including aspects such as homogenisation, derelict land, building encroachment etc.) all make a contribution. For an agri-environmental approach agricultural components have a particular importance.

Indicator: *Number and diversity of memorable elements visible.* (To be refined)

Proposal: The Commission has established an inventory of national systems used for the landscape evaluation. Ongoing work to validate and extend these approaches for use at a Community level should be continued and intensified. Environmental questions will be introduced into LUCAS; the responses to these, together with photographic information from the survey points, will contribute to the construction of indicators.

5.33. Indicator 33. Impact on habitats and biodiversity (group c)

Concept: Agriculture contributes to the management of the natural habitat both in cultivated areas and in the interstices between them such as hedges, ditches and other boundaries. Farmers' contribution to protection of the habitat consists of managing cultivated areas so as to preserve the natural flora and fauna as well as maintaining the boundary features in a good state. These actions may conflict with economically optimum practices.

Indicator: *Density of linear elements and diversity of land cover* at the level of the holding.

Proposal: Use of environmental questions in LUCAS and additional questions in FSS. Development of methodologies for estimation of diversity based on FSS data and possible use of Corine Land Cover (CLC) information for spatial redistribution of these data.

5.34. Indicator 34: Share of Agriculture in emissions, nitrate contamination, water use (group b)

Concept: Agriculture is but one sector contributing to emissions, contamination and water stress. Assessing the relative contribution of agriculture compared to other sectors is important to evaluate whether targeting agriculture is the most effective way of addressing the problem.

Indicator: 1) *Greenhouse gas emissions* by economic sector. 2) *Nitrogen emissions to water* by economic sector. 3) *Water use* by economic sector.

Proposals: 1) For greenhouse gases a full dataset is available. 2) There is no simple way of distinguishing nitrates from agriculture from nitrates from other sources. Therefore models will need to be developed to estimate the run-off from agricultural land, the nitrate inputs from (mainly the food) industry and the nitrates from other sources. 3) The current water statistics questionnaires should be completed more exhaustively by Member States.

5.35. Indicator 35: Impact on landscape diversity (group c)

Concept: The diversity of landscape is the result of natural conditions, the working of the land, and the interactions between agriculture and other users of land. This diversity should be regarded as a resource and is perceived at a more inclusive level than is the case for habitat.

Indicator: *Indices of overall and of agricultural diversity and of their evolution through time.*

Proposal: A study of the diversity of land use based on CLC has been undertaken[15]. This approach will be refined using environmental questions and the internal diversity of the network of points in LUCAS. The integration of data on soils together with topographical information and climate data will be used to establish a "natural" baseline of diversity. Matrices of change from LUCAS will permit isolation of the contribution of agriculture to diversity and to its evolution.

6. CONCLUSIONS

6.1. General requirements

The previous section set out the Commission's proposals for each of the indicators proposed in the Communication COM (2000) 20. They include identification of a number of requirements to be met for the definition or calculation of some indicators.

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15 From land cover to landscape diversity: European Commission/European Environment Agency joint report, 2000.

These are set out in summary form in the table below. It should be stressed that work on these tasks cannot be confined to the Commission as their successful implementation will require the full participation and commitment of national administrations and other agencies. The timetable and even the feasibility of the work identified will depend critically on the resources allocated to these tasks by all participants. The support of the European Parliament and Council will be indispensable if this endeavour is to make satisfactory progress. "Enlargement of the European Union also has to be taken into account. Following their accession, the new Member States will presumably be able only gradually to work their way up to a full part in the work which has to be done".

6.2. Further work (List of Recommendations and Timetable)

6.2.1. Priority

The Commission will continue to draw the attention of decision-making bodies to the importance of work on agri-environmental indicators and to the need for appropriate resources to be committed to the associated tasks. In particular, efforts to highlight the statistical implications of policy decisions will be reinforced. This will be a continuing exercise.

6.2.2. Inventories of data sources

The European Statistical System network for agricultural statistics is being used (via the regular programme of Working Party meetings) to update and complete the inventories of data sources relating to agri-environmental issues in Member States and in Candidate Countries. This inventory will cover all relevant data sources and not to be confined to traditional statistical sources.

6.2.3. Survey coverage of Farm Structure Survey and Farm Accountancy Data Network

The coverage of environmental characteristics by these two data sources will be kept under continuing review. This review is an ongoing process for the Farm Accountancy Data Network. The characteristics for the Farm Structure Survey are reviewed on the occasion of each survey. Examination of the Commission's proposals for the 2003 survey will be completed during the first half of 2001.

6.2.4. Geographic resolution

Proposals for an evaluation project to study redistribution of existing data to a more environmentally meaningful geographic presentation have been drawn up. First results are expected in 2002.

6.2.5. Administrative data

The analysis in preceding sections of this Communication leads to the conclusion that the use of administrative data represents the most cost effective solution for the calculation of a number of indicators. Availability of administrative data for statistical purposes is frequently restricted by legislation. Proposals for changes to such legislation will be brought forward by the Commission. Since these changes will be subject to co-decision the views of Council and the Parliament on this analysis and their support for the approach proposed will be vital.

The technical issues involved in useful linkage of administrative and statistical data will be further studied and proposals made. In particular, the need to report administrative data in a structure consistent with the statistical system, especially with respect to the physical unit of reporting, should be emphasised so that further analysis and cross-checking will be possible.

The close collaboration which already exists between administrators and statisticians in relation to the management of statistical sources will be extended to the specifications of new and existing administrative sources.

6.2.6. Pilot studies and research

For a number of indicators, pilot studies or further research, have been identified as the best approach to making further progress. These are indicated in the text and in the summary table below.

DPSIR reference		Group	No.	Indicator	Data Sources	Requirements	Action
Responses	Public policy	b	1	Area under agri-environment support	Administrative	Access to administrative data	R
		b	2	Good farming practice	Administrative	Access to method, MS surveys Further research	M,R,S
		d	3	Environmental targets	*	Further study and research	M
		b	4	Nature protection	Information in Member States	Access to information	P,M,R
	Market signals	a	5.1	Organic producer prices	Agricultural price statistics	Extension of coverage	P,E,S
		a	5.2	Agricultural income of organic farmers	FADN	Implementation	E
	Technology and skills	a/c	6	Holders' training levels	FSS Rural Development data	New characteristics Access to administrative data.	E,MR
	Attitudes	a/b	7	Organic farming	Administrative data Ad hoc questionnaire	Access to data New questions	R,E
Driving forces	Input use	a	8	Fertiliser consumption	FADN and other sources Ad hoc survey	New characteristics Set up	P,E
		a/c	9	Pesticide consumption	Administrative data Results of TAPAS actions	Research on aquatic risk indicator Data access	P,S,R
		a	10	Water use	FADN, specific surveys	New characteristics, set up	E
		a	11	Energy use	FADN	New characteristics	E
	Land use	b	12	Topological change	National administrative records	Access to data	P,M,R
		a/c	13	Cropping/livestock patterns	National studies	Access to information Encouraging harmonisation	R,M S,M
	Management	d	14	Management practices	No proposals	Further study and research	S
	Trends	a/c	15	Intensification/extensification	FSS and FADN data	Fully exploitation of existing sources	P,S
		a	16	Diversification	FSS, GIS	New characteristics and relocation of FSS data	E,S
		a/c	17	Marginalisation	FSS, national data	Relocation of data, new characteristics, availability	P,R,E,M
Pressures	Pollution	a	18	Surface nutrient balance	FSS and administrative data	Methodological development	S,M,R
		a	19	CH_4 emissions	Inventories (EEA, MS) FSS	Access to existing inventories New characteristics	M E
		c	20	Pesticide soil contamination	*	Further work needed	En
		c	21	Water contamination	*	Further work needed	En
	Resource depletion	a/c	22	Ground water abstraction/water stress	Survey Source of water	cf. Indicator 10 Availability from MS	R,M
		a/b/c	23	Soil erosion	Existing studies and GIS	Methodological development	S En
		a	24	Land cover change	LUCAS	Successful deployment	L
		b	25	Genetic diversity	Administrative data	Supplementary survey	R,S
	Benefits	b	26	High nature value areas	NATURA 2000, CORINE land cover (CLC) and FSS	CLC update Integration of the sources	E S
		a	27	Renewable energy sources	Administrative data, FSS	Access to data, New characteristics	R,E
State	Biodiversity	d	28	Species richness	National data?	Further work needed	M
	Natural resources	c	29	Soil quality	CLC and existing data	Identifying the most useful sources	P,M En
		d	30	Nitrates/pesticides in water	National data?	Further study and research	M En
		d	31	Ground water levels	National data?	Further study and research	M En
	Landscape	b	32	Landuse matrix	LUCAS	Successful deployment	L
Impact	Habitats and biodiversity	c	33	Habitat and biodiversity	LUCAS FSS/CLC	Successful deployment Studies on spatial relocation	L S
	Natural resources	b	34.1	GHG emissions	Existing data	Modelling	S
		b	34.2	Nitrate contamination	National data	Modelling and national data	M,S
		b	34.3	Water use	Water questionnaire	Add items to questionnaire	E
	Landscape diversity	c	35	Agricultural and global diversity	LUCAS CLC	Successful deployment Update	L E

Action: R = Regulation for statistical use of administrative data and their integration with statistical sources where necessary, E = Based on existing surveys, M = use of data/methods from Member states, S = study / development, L = LUCAS survey, P = pilot study En = Environmental data bases such as CORINE Land Cover, soil, climate, etc.