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# Agricultural Biological Diversity

Discussion Paper

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## INTRODUCTION AND SUMMARY

The purpose of this paper is to present an overview of Pan-European aspects and policies relevant to agricultural biological diversity (agrobiodiversity), and formulate suggestions for discussion. A substantive amount of documentation on biodiversity and agriculture has been taken into account when writing this paper. However, more information on Eastern Europe is urgently needed.

While the use of the term “agrobiodiversity” is rapidly increasing, there is still no consensus on what is exactly meant by it, neither at the European, nor global level.

It is recommended for the Riga meeting to discuss this and define a broad scope on the basis of the full range of functions of biodiversity in agriculture areas:

- a) production of food, fuel and other raw materials;
- b) life support functions, and
- c) nature conservation, landscape protection and related tourism (NB here there is a certain relationship with the EU concept of multifunctional agriculture, including
  - ◆ producing food, feed and fibre,
  - ◆ preserving the rural environment and landscape and c)contributing to the viability of rural areas and a balanced territorial development)

In this paper the focus is on the last category, assuming that the second will have a positive correlation with it and with the general environmental quality. The issue of genetic resources is not dealt with extensively; it has been discussed for many years in the FAO-framework.

The paper presents some suggestions for actions, drawn from the numerous policy and policy related documentation on the issue. It is proposed to continue to invest in defining agrobiodiversity with a broad scope at the global level and press for more attention for the functions described above under c). Within Europe itself, the further inclusion of agrobiodiversity planning and regulations is recommended , for example through the development of agrobiodiversity action plans and the optimal use of agri-environmental measures, targeted on biodiversity. Additionally, suggestions are given for implementation tools and mechanisms.



## 1. CONTEXT OF “AGROBIODIVERSITY”

The 3rd Conference of the Parties to the Convention on Biological Diversity (COP-3 CBD, Buenos Aires, 1996, decision III/11) decided to develop a phased, multi-year programme of work on the conservation and sustainable use of agricultural biological diversity aiming at: *“...first, to promote the positive effects and mitigate the negative impacts of agricultural practices on biological diversity in agro-ecosystems and their interface with other ecosystems; second, to promote the conservation and sustainable use of genetic resources of actual or potential value for food and agriculture; and third, to promote the fair and equitable sharing of benefits arising out of the utilisation of genetic resources...”* and to promote the development of national strategies, programmes and action plans on agrobiodiversity.

COP-4 (Bratislava, 1998, decision IV/6) recognised that there is a need for a greater commitment and urgency to mainstream and prioritise activities for the conservation and sustainable use of agricultural biological diversity in the wide range of existing environmental and agricultural strategies, programmes and action plans for rural development. Many relevant instruments and tools exist which could be more effectively and widely applied to promote the conservation and sustainable use of agrobiodiversity. Also there is a growing need to clearly understand the relationship between agri-environmental measures and factors that enhance or constrain their effects on farms and their implementation by farmers.

On the basis of these COP-3 and COP-4 decisions the CBD Secretariat increased co-operation with in particular the Food and Agriculture Organisation (FAO), which has been supported and facilitated by the Government of the Netherlands. On the basis of two workshops in Rome, an overall assessment of ongoing activities in the field of agrobiodiversity was compiled and gaps were identified. A proposal for a work programme was developed, intensively discussed and redefined at the 5th Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-5, February 2000). This draft programme, for consideration and adoption at COP-5 is a major breakthrough for agrobiodiversity at the global level.

The 4th Pan-European Conference of Environment Ministers, “Environment for Europe” (Aarhus 1998) is considered a further step ahead in the integration of Central and Eastern Europe with Western Europe in the sphere of the environment. The importance of the impact of agriculture on biodiversity is also highlighted in the Pan-European Biodiversity and Landscape Strategy: *“In particular, we note that land use has a strong impact on biological and landscape diversity and that there are currently wide opportunities for progress as well as potential risks in this area. To take advantage of opportunities and to avoid negative impacts, we will take initiatives to integrate biodiversity considerations into the agricultural sector within EU enlargement and in transition processes”*.

One of the most important objectives for the European Union Common Agricultural Policy (CAP) reform stated in Agenda 2000 is consistent with the integration of environmental objectives in the CAP and with the empowerment of the role of farmers in the management and conservation of natural resources and landscapes.

In response to the requirements of the implementation of article 6 of the EU Amsterdam Treaty concerning the integration of environmental protection and sustainable development in all Community policies and activities, the European Commission produced a Communication to the European Council “Partnership for Integration: a strategy for Integrating Environment into EU Policies” (Cardiff, 1998). This Communication points out that “Integration of environmental considerations into other policies is no longer an option but an obligation”. Agriculture is seen as a key area. In 1999 a number of



strategies of the Council for the integration of environment in sectors were adopted at the Helsinki summit. The paper stresses amongst other things the multifunctional role of agriculture; the European model of agriculture "Agenda 2000"; consumer concerns; sustainable agriculture in the framework of EU-enlargement; non-trade concerns in the WTO-round; development of indicators; and coherence between agricultural and environmental policy.

The European Commission adopted the European Community Biodiversity Strategy in 1998, which was supported by Council conclusions and well received by the European Parliament. The Strategy provides the framework for developing Community policies and instruments in order to comply with the CBD. The policy areas concerned within the Strategy are conservation of natural resources, agriculture, fisheries, regional policies and spatial planning, forests, energy and transport, tourism and development and economic co-operation. The Strategy includes the obligation for the European Commission to work out Action Plans for a number of sectors. The one on agriculture was well advanced in February 2000.



## 2. AGRICULTURE AND BIODIVERSITY IN THE PAN-EUROPEAN REGION: AN OVERVIEW

Agroecosystems cover a large area of Europe: in western and central Europe, farming occupies around 50% of the land surface while protected areas cover some 10-12%. A significant proportion of the protected area estate, in central and western Europe, is farmed (precise figure unknown). It is clear that Europeans can only meet the provisions of the CBD by further developing policy in the direction of an overall agri-environment strategy. In the EU and candidate countries this will generally include inter alia various rural development measures like agri-environmental measures, LFA schemes etc., while various opportunities under the Common Market Organisations can be used as well. Other countries will have to rely on national policies. Examples of this are Switzerland and Norway. The situation in non EU candidate CEEC's is less clear. Regarding priority setting Natura 2000, the Emerald Network and wider national ecological networks are important tools, although in many cases the ambitions of agri-environmental policies cover larger parts of the countryside.

Today the bulk of Europe's farmland with high natural values as such is not under nature protection. Large categories like semi-natural habitats (semi-natural grassland, heathland, garrigue, etc), Important Bird Areas (for breeding or migratory birds) and areas rich in landscape features (hedges, ditches, woodlots etc) are covered by formal protection to only a limited extent. A large area of farmland (20%) is under EU agri-environmental programmes but many of these programmes are not yet well targeted on biodiversity and many areas of high conservation value are still lacking such measures, e.g. in the Mediterranean part of Europe. Equally only a relatively limited amount of the total agricultural area is likely to be designated as Natura 2000 areas.

The biodiversity and landscape values in many of these areas have suffered a dramatic decline over the last 50 or more years. Semi-natural habitats have become very rare in the Northwest European lowlands and many of the formerly collectively farmed regions in Central and Eastern Europe. However, important strongholds still exist in less intensively farmed regions, like uplands, mountains and certain river valleys. Important Bird Areas are still numerous in Europe but in many cases the quality has declined, especially for breeding birds. Regions rich in landscape features have equally suffered great losses, although important concentrations do still exist, in the Atlantic region. Most of the losses were caused by intensification of agriculture but land abandonment is becoming more and more important as a threat as well. At this moment this is already visible especially in Central and Eastern Europe.

In some cases withdrawal of land from agriculture for the creation of professionally managed protected areas or for nature restoration could be an effective option but it is expensive and a time consuming process. In the Netherlands, with its intensive agriculture, this option is as important as the agri-environmental measures. Most of the biodiversity on Europe's farmland will, however, continue to depend on developments in agriculture and agri-environmental measures and policies in this sector. Therefore, abandonment of high nature value farmland without provisions for continued grazing, is a major threat, like it is intensification.

In spite of the dramatic decline of biodiversity on Europe's farmland, there are, varying by region, still many areas of high natural value left that urgently require efforts for their conservation and management. Agri-environmental programmes, including payments for public goods, can be expected to improve in coverage and quality in the course of time. Currently the European Commission is looking at around 150 rural development plans in all member states under Regulation 1257/1999. Similarly, several of the applicant countries have included pilot agri-environmental programmes in their submission of rural development plans under the SAPARD regulation. These measures can have a very important impact in these countries.

Some of the NIS countries have extensive ecosystems with low human populations and vast protected areas that could be said to protect the majority of their biodiversity (Russia, Kazakhstan). However,



like in Western and Central Europe, there are likely to be vast areas without protection that merit conservation measures from a European point of view.

A notable exception in any case to this is steppe lands which have been intensively exploited for agriculture with consequent losses of biodiversity. In the Russian Federation for example, steppeland protected areas constitute only some 0.4% of the protected areas estate. Up to 20 % of the tundra zone lands demonstrate pasture degradation as a result of domesticated reindeer grazing. The share of arable land varies from 35 to 80 % of the total steppe area, with black soils being ploughed almost completely. The humus content in steppe soils has decreased by 1.5 - 2.0 times over the last one hundred years. Considerable areas of the zone are eroded, salinated and flooded. Russian dry steppes and semideserts have been dramatically transformed into devastated pastures which were vulnerable to wind erosion, substitution of aboriginal vegetation, and massive loss of cattle in the 1980s. Today, the natural vegetation cover is gradually recovering.

The status of semi-natural grasslands and important bird areas in the boreal zone merit further consideration. Although the NIS countries are lacking the instruments available to the EU and the applicant countries, ways should be sought for development models respecting biodiversity.

In addition, Turkey, with its vast resources of steppe lands, is in a comparable position, although in the longer term EU instruments are expected to become available.

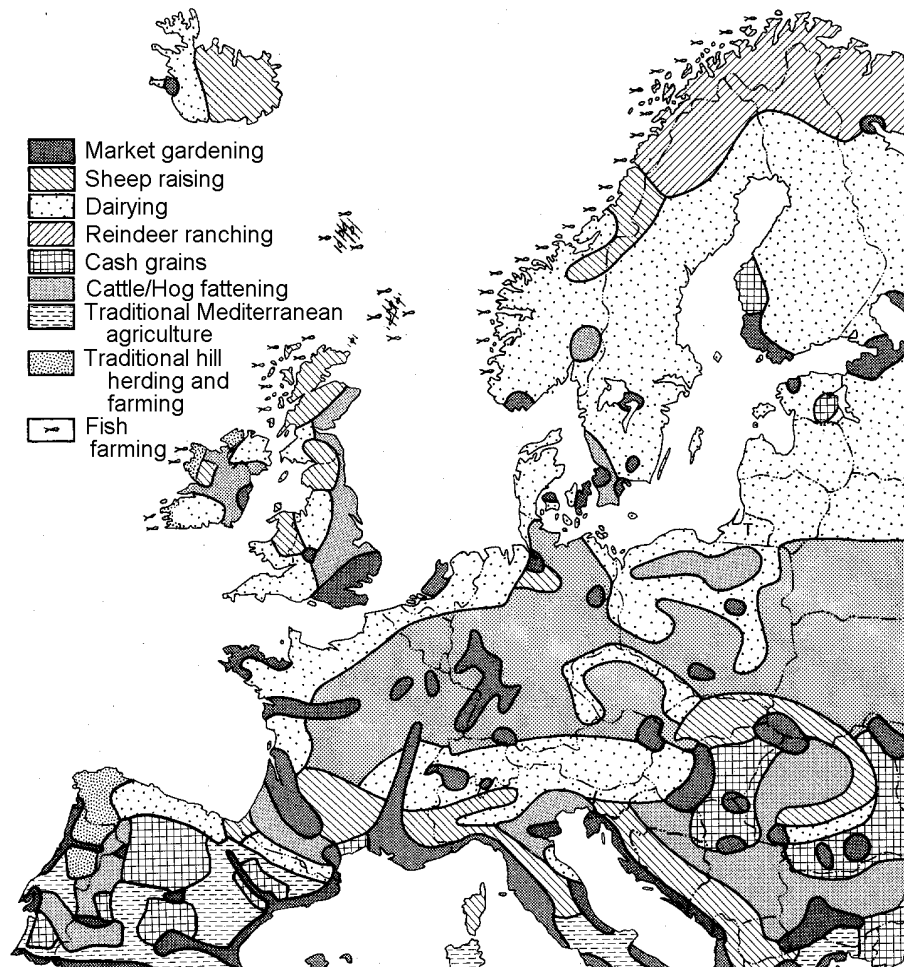
The agricultural use of natural resources in Europe is very diverse, as illustrated by Figure 1.

The reason for this is the very different ecological, historical, social, institutional, and economic features, that strongly influence landscapes, biodiversity, cultivation practices, production and productivity, rural communities, farmers' skills and knowledge, land tenure, the size of farms and infrastructure. While there is detailed and aggregated data about the socio-economic aspects of agriculture in Europe, there are few combined data sources on agriculture and biodiversity. The following figures and text therefore offer only an illustration or snapshots of the issues.





**Figure 1 Specialised types of agriculture in contemporary (West) Europe. (Adapted from Jordan, 1996).**



Across much of Europe farming practice can be characterised by increasing specialisation and intensive production. Where production has been the main objective, the result has been a decline in biological and landscape diversity (see Table 1). The picture varies however, as a result of differences in specific agriculture policies employed – for example the levels of funding associated with these policies and the response of farmers. In countries in transition, there have been drastic reductions in agricultural inputs since 1989, which has led to a relatively favourable environmental situation from the viewpoint of nutrients and pesticides. Although this large-scale extensification may have been accompanied by some recovery in the biological diversity in agro-ecosystems, it is likely that the bulk of biodiversity is still concentrated in those areas where it already was before 1989, seeing the long time required for the development of many of these ecosystems. Against the background of recent land redistribution, the collapse of livestock farming in many areas, leading to outright abandonment, and uncertainties about future developments in agriculture as well in policies, the status of these biodiversity rich areas is still highly uncertain.

**Table 1 Impact of agriculture on biodiversity, habitat and landscape**

Agricultural practice	Impact
Specialisation and concentration	
Increasing field size, land consolidation, removal of vegetation cover	Loss of hedgerows, woodlands, small watercourses and ponds -> decrease in landscape variety and reduction in species diversity
Intensive animal husbandry and intensive cropping	Construction of storage silos, increased field sizes and land consolidation possibly required → changed landscape
Fertilisation	Dominance of few highly productive genetic varieties; loss of market potential for local varieties → genetic erosion
Animal manure	Potential loss of nutrient-poor habitats, including non farmed habitats affected by acidification and eutrofication
Commercial (nitrogen, phosphorus)	Direct contamination of fauna and flora with microbial agents and chemical; the ever increasing use of fertiliser during the last 100 years can be seen as the main factor of the huge decline of semi-natural areas.
Pesticides application (insecticides, fungicides, herbicides)	Possible wildlife poisoning incidents (non-targeted organisms), loss of habitat and food source for non-target species, resistance of some target organisms
Irrigation/water abstraction, drainage	Soil salinisation/alkalinisation → losses of species, desertification, drying out of natural elements affecting river ecosystems; loss of biodiversity in grasslands; many breeding areas of water- and grassland birds affected.
Mechanisation	Degradation of soil structure, loss of soil, erosion, desertification

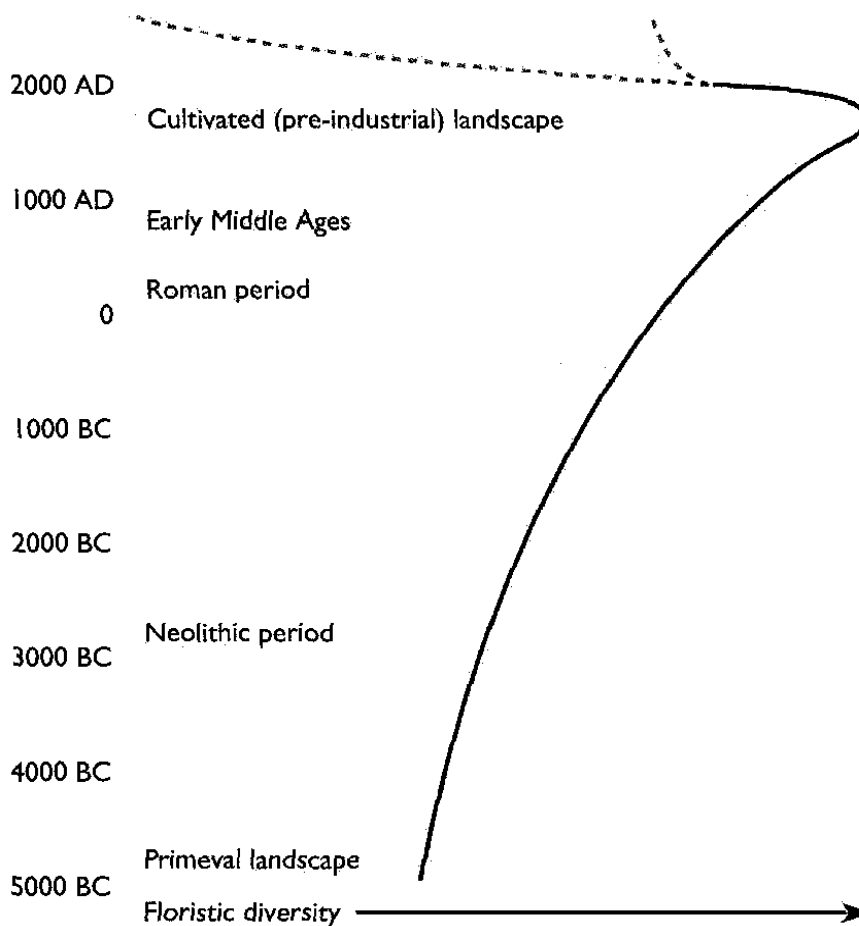


Figure 2 shows how species diversity increases initially in response to cultivation but that losses increase as intensity of management rises. Such losses may also affect food security through increasing vulnerability to diseases, competition from invasive species and economic opportunities through a narrower range of production choices.

Recent research (Vera, 1998) has revealed that the primeval landscape was probably much stronger influenced by wild herbivores than usually assumed. This may mean that the floristic diversity in that period was greater than suggested in Figure 2. Thus certain forms of livestock farming have become substitutes of natural processes. This function, however, has later come under severe pressure, especially in the course of the 20th century.

It is clear that “intensive agricultural systems have changed the genetic diversity of crops and livestock and are also having a major influence on wild species and unspoiled natural habitats” (EEA, 1998). However, abandonment of farmland can have similar effect as intensification.

**Figure 2** Agriculture and its effects on floristic diversity through time



Source: Stanners & Bordeaux, 1995.



### 3. THE SCOPE OF AGROBIODIVERSITY

The term "agricultural biodiversity" or "agrobiodiversity" has been extensively discussed in the CBD-framework, but a widely supported understanding has not yet been reached. The European Parties to the CBD expressed the need for a clearly defined, broad scope at the SBSTTA-5 meeting in February 2000. Part of this is reflected in the recommendation to COP-5:

*"Agricultural biodiversity is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agro-ecosystem: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes, in accordance with annex I of decision III/11."*

This definition builds upon the results of the international technical workshop on "Sustaining Agricultural Biodiversity and Agro-Ecosystem Function", jointly organised by FAO and the Secretariat of the CBD, with the support of the Government of the Netherlands (Rome, 1998) as:

*"Agricultural biodiversity refers to the variety and variability of animals, plants, and micro-organisms on earth that are important to food and agriculture which result from the interaction between the environment, genetic resources and the management systems and practices used by people. It takes into account not only genetic, species and agro-ecosystem diversity and the different ways land and water resources are used for production, but also cultural diversity, which influences human interactions at all levels. It has spatial, temporal and scale dimensions. It comprises the diversity of genetic resources (varieties, breeds, etc.) and species used directly or indirectly for food and agriculture (including, in the FAO definition, crops, livestock, forestry and fisheries) for the production of food, fodder, fibre, fuel and pharmaceuticals, the diversity of species that support production (soil biota, pollinators, predators, etc.) and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic), as well as the diversity of the agro-ecosystems themselves".*

Agro-ecosystems have been described (also in the context of the CBD-FAO workshops):

"Agricultural ecosystems (or agro-ecosystems) are those "ecosystems that are used for agriculture" in similar ways, with similar components and similar interactions and functions. Agro-ecosystems are determined by three sets of factors: the genetic resources, the physical environment and the human management practices, which exhibit genetic, spatial and temporal variation, as well as by their interactions.

*Agro-ecosystems may be identified at different levels or scales, for instance, a field/crop/herd/pond, a farming system, a land use system or watershed. These can be aggregated to form a hierarchy of agro-ecosystems.*

Agro-ecosystems comprise polycultures, monocultures, and mixed systems, including crop-livestock systems, agroforestry, agro-silvo-pastoral systems, aquaculture as well as rangelands, pastures and fallow lands. Their interactions with human activities, including socio-economic activity and sociocultural diversity are determinant."

Agricultural biodiversity has been further described in the process preparing for SBSTTA-5 as including:

- *harvested crop varieties, livestock breeds, fish species and non-domesticated ('wild') resources within field, forest, rangeland and aquatic ecosystems;*



- *non-harvested species within production ecosystems that support food provision, including soil micro-organisms, pollinators, green manures, biocontrol organisms and so forth; and*
- *non-harvested species in the wider environment that support food production ecosystems, (agricultural, pastoral, forest and aquatic) including landraces, 'wild' relatives of crops and livestock, environmental plants such as windbreaks for soil erosion control, etc."*

Other definitions shift attention from its components to the relationships between these and between the wider biodiversity, such as the definition proposed by IUCN in a Background study for the development of an IUCN Policy on Agriculture and Biodiversity (1999). While this definition overcomes some of the difficulties with the ones cited above, notably the problematic distinction between domestic and wild biodiversity, it could be seen as an "ecologists" definition in that it has lost a clear socio-economic and cultural element as well as the relationship of biodiversity to the production function of agriculture:

"The agrobiodiversity of a place or region is largely analogous to its biological diversity: it describes the range and variety of biological diversity within the farmed landscape. As farming has altered, and come to replace, the previous pattern of habitats and communities, agrobiodiversity also describes the range of different structures in the landscape, such as hedges and trees. For example, the agrobiodiversity of an up-land farm will summarise the obvious range of biological diversity and the variety of landscape features from the meadows, the walled and hedged fields through to marshland and small wooded areas."

OECD work on environmental indicators for agriculture including those for agrobiodiversity refers to the three different levels of Biodiversity (Genetic, Species and Ecosystem) and thirteen areas which range from wildlife habitat and biodiversity to farm financial resources and farm management, from nutrient use and soil quality to landscape and socio-cultural issues.

### 3.1. Some conclusions

SBSTTA-5 has resulted in important progress as regards the definition and scope of agrobiodiversity. The scope as defined is broad and suitable for the European context. However, there are three major concerns remaining here:

1. part of the discussion took only place in a contact group, late at night/early in the morning;
2. the proposed work programme as a whole still undervalues the functions of biodiversity in agricultural areas beyond the production of food and agriculture. In particular functions like nature conservation, landscape protection and tourism are hardly visible, whereas in particular these are crucial for the European countryside and
3. SBSTTA-5 "only" produced a recommendation: the discussion will come back at COP-5.

The Riga meeting can have a major contribution to overcoming these concerns. Some additional observations for the discussion:

- The agrobiodiversity work programme will have to address all biodiversity in agricultural areas. It should not only focus on biodiversity relevant to food and agriculture. Like the work programme on coastal and marine biodiversity addressing all biodiversity and not just fish, and the work programme on forest biodiversity paying attention to all biodiversity in forests, not just on trees. This is logical because of the strong interrelationship of all biodiversity within these systems, but also because of the ambition of the CBD to cover all biodiversity on earth through the set of



thematic work programmes. The discussions on the work programme on agrobiodiversity might be driven too much from an agronomist point of view, whereas an interdisciplinary approach is needed. This is also a challenge for other disciplines: nature conservationist should be active and open in an interdisciplinary dialogue.

- Whether the different approaches should be integrated or not, can be a matter of discussion.
- Another complicating factor is related to the functional approach, which is highly relevant to agrobiodiversity, given the relatively strong influence of man on these (eco)systems. In the framework of the CBD, the focus is on the different functions of *biodiversity* itself, as expressed in several definitions given above. This is easily confused with the intensive debate on the multifunctional character of *agriculture*.
- The socio-economic and cultural determinants of agrobiodiversity have been barely mentioned. Biodiversity has not been addressed as a factor of production, as has been the case for capital investments and labour. This point may need further discussion.
- A clear definition, discerning as main components of agrobiodiversity (1) the genetic variety of domesticated plants and animals, (2) life support systems and (3) all wild flora and fauna on farmland is very useful. In fact, many countries already include these components in their approach, although perhaps under different names. However, such components of biodiversity should not be identified as items without relationship to each other: "domestic", "small" and "wild" agrobiodiversity are placed in separate categories by modern scientist and policy makers, not by farmers or nature itself.



## 4. SUGGESTIONS FOR POLICY, PROGRAMMES AND ACTIONS

As mentioned in the introduction, this paper can only present some suggestions. Before doing so, it is important to highlight the following drivers for (possible) changes in the agricultural sector:

- a) Consumers, governments, NGO's and the public demanding better quality food, increased farm animal welfare and a continued supply of public goods in the form of environmental benefits of agriculture, including biodiversity.
- b) Liberalisation of economies including agricultural markets which increases competitive intensity on a global level. Although this may lead to diminished pressure on the environment in certain regions, it may also lead to intensification (within the limits of environmental legislation) in other areas as well as marginalisation and abandonment in economically weaker regions. Both intensification and abandonment would lead to loss of biodiversity in areas with high natural values, unless adequate accompanying policies are put in place, in other words, unless, for example, adequate (agri-)environmental or other measures are adopted simultaneously or, better, in advance.
- c) Economic and political transition in economies of central and eastern Europe which is loosening command and control management of agriculture and nature conservation sometimes in the absence of new institutions, laws and skills.
- d) The coming integration of markets of the EU-15 and the 13 candidate countries can lead to a new situation regarding competition, which may have consequences for the continuity of certain forms of land use and hence biodiversity. This requires careful analysis of the effect of different approaches and adequate policy development in this field.
- e) The global trade debate and European agricultural policies have their impact upon developing countries and agro-ecosystems. This should be carefully taken into account.

With this in mind, the following proposals are put forward for discussion.

### 4.1. Global level

#### ***4.1.1. As regards the CBD programme of work on agrobiodiversity:***

- 1) The multi-year programme on agrobiodiversity, to be adopted at COP5, should address in a balanced manner the three main interactions between agriculture and biodiversity in functional agro-ecosystems: a) the conservation and sustainable use of genetic resources useful for food, feed, fibre and agriculture as such, b) the conservation and sustainable use of components of biodiversity useful for maintaining the productivity of agricultural land and for food safety and c) the conservation and sustainable use of any other component of biological diversity occurring in agricultural landscapes.
- 2) Include in the CBD work programme a process in which the value of such a broad scope of agrobiodiversity is addressed, among others through public education and awareness;
- 3) Put more emphasis on mainstreaming agrobiodiversity by building biodiversity into agriculture planning. Promote expansion of CBD-FAO co-operation with IUCN, UNEP and World Bank;



- 4) Pay due attention to best farming practises and best policy practices. Best farming practices will help farmers to understand that agrobiodiversity can be translated into their daily management. Best policy practices will help to make best farming practices feasible. Make also better use of (traditional) knowledge on agrobiodiversity of local and indigenous communities in this respect.

#### **4.1.2. As regards the World Trade Organization:**

- 1) Investigate common interests in the field of biodiversity related to the WTO round of both all European countries and other, including developing, countries;
- 2) Build capacity, also at the Pan-European level, in order to understand and address complex issues, such as agricultural trade and globalization (e.g. the agreement on Trade-Related Aspects of Intellectual Property Rights), influence of multinational companies on agriculture sustainability, and sound and scientific evident
- 3) information on new technologies (e.g. GMOs);
- 4) Remove perverse incentives that will have a negative impact on conservation of biodiversity; maintain or improve measures with a beneficial effect on biodiversity.

## **4.2. Pan-European level (including EU)**

### **4.2.1. As regards planning and co-operation:**

- 1) Develop strategies for both the development of agriculture in CEE countries and the integration of markets of the candidate countries and the EU in order to ensure sustainable agricultural and rural development, respecting biodiversity;
- 2) Take due account of the impact on biodiversity of the next CAP reform
- 3) Develop strategies and means for similar objectives in NIS, taking both national resources and international funding mechanisms (like GEF, etc) into consideration.;
- 4) Develop a framework for information gathering and sharing on agrobiodiversity in a European context, which can be used in identifying priorities and formulating useful policy and guidance to other stakeholders such as the private commercial sector, farmers and consumers;
- 5) Make full use of the Pan-European High Level conference on agriculture and the environment in 2001 and the Kiev Environment for Europe Conference in 2002. , for increasing the political profile of the agrobiodiversity issue.

### **4.2.2. As regards tools for implementation:**

- 1) Develop common standards for inclusion of agrobiodiversity in (eco)labels, used in many western European countries and increasingly in central Europe;
- 2) Encourage (information sharing on) good practices, for example, encouragement of organic agriculture, codes of good agricultural practice (including environmental legislation), cross-compliance and agri-environmental programmes.





## **4.3. National level**

### **4.3.1. Strategies and reports**

- 1) Develop or adapt existing biodiversity strategies and other initiatives such as NEAPs to include agrobiodiversity and/or develop Agrobiodiversity Action Plans and/or include agrobiodiversity in agricultural planning;
- 2) Optimise the use of agri-environmental and other rural policies for biodiversity in EU, other West-European countries and candidate countries;

### **4.3.2. Implementation tools**

- 1) Increase opportunities for combining biodiversity friendly agriculture with tourism in particular in areas suffering dereliction (e.g. through small scale on farm recreation facilities, improvement of regional/local agricultural products, etc.);
- 2) Recognise biodiversity as a public good which cannot always be captured by markets: greater emphasis on public payment for e public goods and services provided by farmers. Make better use of existing agri-environmental schemes for management agreements, including through better targeting for biodiversity. Make available sufficient budgets for this;
- 3) Develop indicators of delivery of environmental goods that include agrobiodiversity. Develop agrobiodiversity indicators within the overall CBD-framework on indicators, building upon work under way by OECD and EU.



## 5. LITERATURE

As stated earlier, there exists an enormous amount of documentation in the field of agriculture and biodiversity, in particular in the West European context; less so in the eastern parts of the continent. It is far beyond the purpose of this paper to present an overview. A selection of titles is mentioned below, without any prejudice to other sources.

*Biodiversity of Russia, 1997.* National report to COP5 of the Convention on Biological Diversity.

*Baldock, D., G. Beaufoy, G. Bennett & J. Clark, 1993:* Nature Conservation and New Directions in the Common Agricultural Policy, IEEP, London.

*Baldock, D., G. Beaufoy, F. Brouwer & F. Godeschalk, 1996:* "Farming at the Margins; Abandonment or redeployment of agricultural land in Europe". IEEP-LEI, London & The Hague.

*Beaufoy, G., D. Baldock & J. Clark, 1994* "The Nature of Farming", IEEP, London.

*Signal, E.M. & D. McCracken (ed.), 1994.* "Nature Conservation and Pastoralism in Europe" Proceedings of the Third European Forum on Nature Conservation and Pastoralism (1992) in Pau.

*Convention on Biological Diversity.* visit the website at [www.biodiv.org](http://www.biodiv.org). In particular relevant are the agrobiodiversity papers for and from SBSTTA-2, and -5, and COP-3, -4 and -5. Most recent information is contained in the report of SBSTTA-5, namely the recommendation on agricultural biodiversity.

*European Environmental Agency, 1998,* "Europe's Environment, the second assessment", European Environmental Agency

*Goriup, P., L. Batten & J.A. Norton (ed.) 1991* " The conservation of lowland dry grasslands in Europe", Proceedings of an international seminar, held in Reading, 1991.

*Hagemeijer, W.J.M. and Colin Bibby, 2000* "The Status of Birds in Europe and the impact of the EU Birds Directive". Proceedings of the conference on twenty years Birds Directive, held in Helsingör, 1999. (in press).

*McCracken, D. & E.M. Signal, 1995* "Farming on the edge: the nature of traditional farmland in Europe". Proceedings of the Fourth European Forum on Nature Conservation and Pastoralism, held in Trujillo, 1994.

*Nowicki, P.L. et al., 1999.* "Background study for the Development of an IUCN European policy on Agriculture and Biodiversity". IUCN European Regional Office, Tilburg.

*OECD, 1997.* "Environmental Benefits of Agriculture: Issues and Policies". Proceedings of The Helsinki seminar, 1996.

*Pain, D.J. & M.W. Pienkowski (ed.), 1997* "Farming and Birds in Europe". Academic Press, London.

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