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# COMMITTEE ON AGRICULTURE

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## ENVIRONMENT AND AGRICULTURE

## Item 6 of the Provisional Agenda

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# I. Introduction

1. This paper addresses global environmental questions from within the agricultural constituency. It specifically describes three crucial factors that undercut food security: biodiversity, climate change, bioenergy and their critical role in agricultural economies.

2. The use of an inherited capital such as biodiversity produces bioenergy and partly mediates climate conditions. The use of biofuels in international carbon budgets to reach climate management objectives, and the related changes in land use and climate conditions, have crucial food security implications. These forces require new objectives and different approaches in agricultural policy.

3. The paper considers synergies and trade-offs that must be examined between food security and environmental stewardship. It suggests that deeper understanding is needed on how existing food production systems can accommodate the new demands for biofuel feedstocks and cope with changing climate and shrinking biodiversity - while contributing to the attainment of both Millennium Development Goal (MDG) 1 for alleviating hunger and MDG 7 for sustainably using environmental resources.

4. Coherent policy analysis and decision-making, at national and international levels, can produce substantial benefits and returns to agriculture. Tackling problems at national level without seeing the global picture risks shifting them to other parts of the world. Considering the role of agriculture as a global land user and service provider, FAO has a role to play for delivering the MDGs and more effectively contributing to international environmental governance related to food security strategies and programmes.

5. This paper suggests initiating a process by which member countries may contribute to international policy formulation and promote synergy with the environmental sector, namely through the identification of a Strategic Framework for Agriculture and Environmental Challenges of the 21st Century.

# II. Agriculture and the Environment

## A. Agriculture as a natural resource-based industry

6. Agriculture is an essential component of societal well-being. It occupies 40 percent of the land surface, consumes 70 percent of global water resources and manages biodiversity at genetic, species and ecosystem levels.

7. At every point of production, agriculture influences and is influenced by ecosystems, biodiversity, climate and the economy, including energy trade. Modern agriculture is a fossil fuel energy-intensive industry and its development is tightly linked to energy factors.

8. Just as the successes in agriculture production over the last half decade are heralded, the inequitable benefits and unsustainable impacts on natural resources are becoming more evident. Just as hunger and poverty heighten vulnerability and instability to the detriment of all, the acceleration of environmental degradation and climate change have direct effects on agricultural productivity and food security.

## B. The environmental challenge of agriculture

9. There is no global challenge facing humanity that is more important than managing the earth's environment to assure that it can sustain life in all its forms. The ecological balance on which current and future generations depend can only be preserved through food chains that

balance energy and nutrient flows. The challenge is to balance the competing demands of different users of the same resources and of managing the resources to optimize the benefits to be derived on a sustainable basis.

10. The impact of agriculture, forestry and fisheries on the environment, as well as the impact of natural resources degradation on agriculture are widely documented in the Millennium Ecosystem Assessment (MEA, 2005). Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. Between 1960 and 2000, the demand for ecosystem services grew significantly as the world population doubled to 6 billion people and the global economy increased more than six fold. To meet these growing demands, food production increased by roughly two-and-a half times, water use doubled, wood harvests for pulp and paper production tripled and timber production increased by more than half.

11. Approximately 60 percent of the ecosystem services evaluated in the MEA are being degraded or used unsustainably, including: capture fisheries, water supply, waste treatment and detoxification, water purification, natural hazard protection, regulation of air quality, regulation of regional and local climate, regulation of erosion and aesthetic enjoyment. Degradation of ecosystem services could grow significantly worse during the first half of this century – becoming a barrier to achieving the Millennium Development Goals.

12. A series of recent assessments have indicated that the target of the World Food Summit to reduce the number of food insecure persons is not being met and that, despite the signing of major environmental agreements, carbon emissions continue to rise, species extinction is continuing and desertification continues to be of great concern in arid, semi-arid and sub-humid areas. With an increasing global population and overall purchasing power, more food calories are required while the availability of the necessary biotic and abiotic production factors is shrinking: land is being converted to non-food production systems, water resources are more scarce[1] and climate change and shrinking biodiversity are threatening the viability of farming in various settings. Today it is clear that there is no choice but producing more with less, while deploying every effort to minimize production factors' risks. This means that environmental sustainability in agriculture is no longer an option but an imperative.

## C. The central role of agriculture in environmental governance

13. In this era of unprecedented speed and scale of global flows (of finance, goods, services and people) and the globalization of challenges such as hunger, poverty, environmental degradation, disease and conflict, agriculture can no longer be planned and implemented in isolation. Environmental concerns such as climate change, the unsustainable supply and use of energy and the rapid erosion of natural resources such as biodiversity have global impacts that are felt by all, but disproportionally by those typically lacking social safety nets.

14. It is now clear that agriculture must co-exist with the natural environment and not erode the underlying resources on which it depends. The MEA acknowledges that the challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met, but this involves significant changes in policies, institutions, and practices that are not currently under way. Many options exist to conserve or enhance specific ecosystem services in ways that reduce negative trade-offs or that provide positive synergies with other ecosystem services.

15. Furthermore, the interdependence of development and the environment is subject to many international discussions seeking to establish an enabling framework for achieving the Millennium Development Goals. The objective is to mainstream environmental and risk reduction

[1] See COAG/2007/7 *Agriculture and water scarcity: a programmatic approach to water use efficiency and agricultural productivity.*

issues into development operations, as critical components of national poverty reduction strategies and sustainable development plans.

16. Agricultural policies must consider new parameters, such as massive reallocation of agricultural land use (and possible conversion of non-agricultural lands) that are implied under some scenarios, the substitution of current food crops with energy crops, and the potential contributions of agriculture to global economic development. Bottlenecks need to be identified and approached pragmatically, through the mobilization of political will within agricultural sector institutions, because it is in agriculture that many of the problems, and many of the solutions, lie.

# III. Biodiversity

## A. Agriculture as the largest user of biodiversity

17. The effects of agriculture on the larger environment, including on wild biodiversity, and the roles of agrobiodiversity within agriculture are two separate subjects. Agriculture (including forestry and rangelands) is the largest single user of land and the burgeoning populations of the last century have resulted in large conversions of wild land to agriculture.

18. Populations will continue to rise in the foreseeable future, which means that agricultural production and food availability must increase, in order to meet Millennium Development Goal 1 on hunger reduction. Productivity rose massively through intensification rather than through expansion over the past half century, which meant that the intrusion of agriculture on wild habitats grew more slowly than food availability.

19. At the same time however, increasing reliance on external inputs (such as pesticides and fertilizers) in some cases increased the negative impact on surrounding areas, through such phenomena as eutrophication of water bodies and unintended negative effects of pesticides, including bio-accumulation and bio-magnification, on wildlife and other non-target organisms, including pollinators, soil micro-organisms, aquatic organisms, predators of agricultural pests, beneficial parasitoids and wild plant biodiversity.

20. In the future, climate change is expected to accelerate many pressures on the wild environment, as long-established production systems become destabilized and abiotic stress (such as water shortages, salinity, aridity and heat) are increased, always in the light of a growing demand for food. Furthermore, the expected increase of biofuel and bioplastic[2] feedstock monoculture production may lead to increased rates of genetic erosion. These changes pose great challenges because biodiversity is the raw material that breeders use to create the new crop varieties that will be needed to safeguard biodiversity for food and agriculture for future generations as well as maintaining a broad gene pool, which ensures ecosystem resilience.

## B. Agrobiodiversity underpins our life-support system

21. It is not wild biodiversity that feeds the human population, but the complex of agricultural species and the rich portfolio of genetic diversity within individual crops and farm animal species. This portfolio was built up by the iterated selection activities of farmers throughout the world, and the exchanges among regions and cultures. Biodiversity for food and agriculture often cannot survive without human interventions through production systems. Unless taken into *ex situ* management, this intra-specific variation can be lost as traditional farming systems are replaced.

22. Biodiversity in agriculture, forestry and fisheries underpins not only the production of food, fuels and fibres but also a range of ecological services. There is a firm scientific consensus that maintaining biodiversity in managed ecosystems:

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[2] Novartis Master-Bi in Terni (Italy) already produces 35 000 tons of biopolyesters from vegetable oil (sunflower, colza, ricin) and will soon go up to 60 000 tons, representing 60 percent of world market of bioplastics.

- Ensures agricultural productivity, for example through the conservation and sustainable use of plant and animal (both terrestrial and aquatic) genetic resources.
- Provides ecosystem services such as pollination, pest suppression, carbon sequestration, nutrient cycling and watershed management.
- Contributes to the productivity, adaptation and maintenance of natural and agricultural ecosystem functions.
- Provides ecosystem resilience in the face of environmental stresses such as changing climate.

23. Over time, global trends have shown how natural resources have been placed at risk by short-sighted strategies of agricultural intensification and expansion. Poor choices can destroy biodiversity and habitats, driven wild species towards extinction, created pesticide pollution, accelerated the loss of environmental production services (e.g. soil nutrient transformation, water drainage, pest control, pollination) and reduced agricultural genetic resources for the future. With the global population expected to increase by 50 percent in the next 50 years, it is necessary and profitable to manage biodiversity more adaptively to promote sustainable increases in agricultural productivity as well as to conserve a good level of wild and cultivated biodiversity.

24. Well-designed and adaptively managed sustainable agricultural systems provide clear opportunities for agriculture and the environment to work in symbiosis. Examples include managing natural resources to benefit agriculture while conserving the environment (e.g. agroecology) and mixed farming systems (e.g. aquaculture and rice systems). A fundamental understanding of biodiversity in ecosystems can improve ecosystem dynamics (e.g. energy flow, community structure) and sound breeding, domestication and locally diverse agricultural systems can enhance food supply and respond to demands for environmental quality and market requirements (e.g. organic and ethically produced commodities).

### C. Biodiversity issues can only be resolved in agriculture

25. Within a scenario of change, agriculture is increasingly being called upon to provide ecosystem services such as carbon sequestration and produce biofuel and bioplastic feedstocks. High production efficiencies and substantial surfaces will be required, often in competition with food production. Such feedstocks are often produced in monocultures and these are more vulnerable to pest outbreaks. Large expansions with low labour inputs could threaten certain poor rural communities with loss of livelihood and food security. It is not yet clear how such challenges will be accommodated by the ecosystems they affect and managed by the people affected, but there is a clear need for research, and for agricultural planning measures that aim at mitigating negative physical and socio-economic impact.

26. The complex biodiversity challenge cannot be effectively addressed piecemeal: a coherent framework for planning for change and agreements on practical measures to conserve and use optimally biodiversity for food and agriculture are imperative. Such planning must be approached firstly in the agricultural sector itself, as remediation of negative impacts has been and remains a major part of agricultural institutions.

## IV. Climate Change

### A. Climate change concerns all economies

27. The impact of climate change is global and all countries could be affected. The most vulnerable – the poorest countries and populations – could be the first to suffer and the most affected.

28. Recent assessments have confirmed that, due to greenhouse gas emissions, global temperature rose by one degree Celsius since 1850. If these emissions are not seriously reduced, there is more than a 75 percent probability that global temperature will rise between two and three

degrees Celsius over the next 50 years. There is even a 50 percent chance that average global temperatures could increase by five degrees Celsius. Climate change will affect the basic elements of life for people around the world including access to water, forest and fishery resources, food production, health and the environment.

29. Using the results from formal economic models, one independent review[3] estimates that, in the absence of an effective counteraction, the overall costs and risks of climate change will be equivalent to losing at least 5 percent of global GDP each year. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20 percent of GDP or more, with a disproportionate burden and increased risk of famine on the poorest countries. The costs of extreme weather events, including floods, droughts and storms are already rising, including for developed countries. Without action, millions of people could become refugees as their homes and lands are hit by drought or flood.

## B. The agriculture-climate interdependency

30. Climatic factors like solar energy and water are essential to agricultural production as they constitute major environmental resources. World agriculture and forestry practices (e.g. conversion of wetlands to agriculture, deforestation, rice paddies, cattle feedlots, fertilizer use) today contribute about 25 percent to the emissions of greenhouse gases reduce carbon sinks and change hydrological cycles, thus exacerbating climate change effects. In turn, the increasing frequency of storms, drought and flooding has implications on the viability of agro-ecosystems and global food availability.

31. Agriculture and forestry can be part of the solution by contributing to climate change mitigation, through carbon conservation, sequestration and substitution, and establishing ecologically designed agricultural systems that can buffer extreme events. Through carbon sequestration, agriculture and forestry can also contribute to implementing the Kyoto Protocol.

32. The viability of agro-ecosystems and food availability at local and regional levels will be affected, with geographically uneven food production assets. Marked changes in the geographic distribution of climates and their associated land-use patterns and migration of species and ecosystems will eventually result in a modification of the international food balance of food production. High-latitude temperate regions could experience an increase in productivity, while tropical, low-latitude regions might suffer a loss in cereal productivity. Concerning fisheries, climate change has important feedback loops to global ocean circulation patterns, sea level rise and changes in ocean salinity, all of which affect the biological properties and distribution of species and overall health of the aquatic food web.

33. Although not clearly understood, modifications of biodiversity are foreseen at all levels, including ecosystem composition and species' metabolism. Besides expected losses of biodiversity, the resulting lengthening of farming and freshwater fishing seasons and shorter cycles for all organisms will modify crop/animal and pest/disease relationships. The emergence of new pests and diseases will entail changes in economic returns. More generally, risk patterns and variability are increasing, with consequent impacts on food security, population movements and conflicts.

## C. Harnessing agriculture's adaptive capacity

34. Historically, agriculture has shown substantial adaptive capacity under changing climatic conditions. At the global level, it can probably adapt to a moderate amount of global warming, assuming there is no abrupt modification of climate variability. Regional variations are the most important. Cereal crop performances at low latitudes are generally close to their limits of heat

[3] *Stern Review Report on the Economics of Climate Change* (October 2006).

tolerance, while growing conditions are likely to improve at higher latitudes, where agriculture could gain some competitive advantage. Adaptive capacity is likely to be a major factor in determining the relative distribution of adverse impacts.

35. Although most of the discussion on climate change still focuses on mitigation measures (such as the Kyoto Protocol), more attention is to be given to climate change adaptation, especially to prevent excess hardship to developing countries. Planned adaptation to climate change means building resilience and minimizing costs through improved planning and more climate-resilient farming approaches.

36. Adaptation science is required to provide climate-related knowledge to farmers, herders and foresters including:

- Agro-meteorological data and tools for forecasting, monitoring growing and post-harvest conditions. This can be done by using models, identifying critical thresholds, forecasting the impact of drought, fires, hail, frost, vernalization and extreme climatic factors, forecasting yields, quality of production and phenology (harvest time and labour requirements) and estimating international markets as a result of production and related prices.
- Agro-climatic zoning for impact modelling and vulnerability management. This considers issues such as water conservation and harvesting, use of occult precipitation and artificial climates (e.g. greenhouses) and agroclimatic risk mitigation through microclimate modification and windbreaks.
- Agroecological approaches to farming decisions, based on appropriate biodiversity management to increase resilience to changing environmental conditions and stresses. In fact, genetically diverse populations and species-rich ecosystems have greater potential to adapt to climate change, for example through use of indigenous and locally adapted diversity of plants and animals as well as the selection and multiplication of crop varieties and autochthonous races adapted or resistant to adverse conditions. For example, the selection of appropriate rice varieties can reduce the production and flux of methane from flooded rice fields if combined with proper water regime (e.g. intermittent irrigation and/or alternating dry-wet irrigation) and soil organic matter management can decrease irrigation needs by 30-50 percent.

37. The magnitude of climate-related risks to food security is large but investments today will pay back in the future, not just environmentally but economically as well. There is also a growing focus on identifying and quantifying both the possible economic effects of climatic change, and the investments that will be required to reduce the rate of fossil carbon release. These are matters that affect all countries, developing and developed, as no country can singly address such global phenomena. Policy incentives are needed to promote planned adaptation of agriculture, sustainable forestry, low carbon technologies, agroecological knowledge and markets for low-energy and non-polluting agriculture commodities.

# V. Bioenergy

## A. Agriculture as a source of energy

38. This century could see a significant switch from fossil fuel to bioenergy[4] with agriculture and forestry as the leading sources of biomass for biofuels. There is growing interest on the part of governments and the private sector in developed countries and in many developing countries, in expanding the use of biofuels. Projections to 2050 suggest that, given plausible economic and

[4] Bionergy: all energy produced from biofuels. Biofuel: fuel produced directly or indirectly from biomass. Biomass: material of biological origin (excluding material embedded in geological formations and transformed to fossil), such as: fuelwood, charcoal, agricultural wastes and by-products, energy crops, livestock manure, biogas, biohydrogen, bioalcohol, microbial biomass, and others. Bionergy includes all wood energy and all agro-energy resources.

institutional assumptions, bioenergy sources could supply 10 to 25 percent of the total energy demand.

39. While increased production of, and access to, bioenergy is only one of the possible answers to the climate change and energy security challenges, a number of features make it a very interesting option. From the energy point of view, biomass provides the feedstock for the provision of all types of energy services, a whole range of gaseous liquid and solid biofuels, and its diversity and availability in rural areas facilitate local access.

40. Agriculture and forestry have always been a major supplier and user of energy. Energy production in these sectors thus also affects land use. Current high fossil fuel prices, and the resulting increasing demand for biofuel derived from agricultural biomass, are accelerating changes in land use patterns. For farmers, bioenergy offers a means of diversification of production options, especially for rural communities which are able to access additional markets (for energy services) and create additional demand for their products and factors of production (land, labour, water and other inputs).

## B. The agriculture, bioenergy and climate link

41. Energy markets have always influenced agricultural markets through the input side, as low or high energy prices affect the cost of fertilizers, pesticides and diesel. Relatively high petroleum prices in recent years and policy changes mandating increased use of liquid biofuels have made a number of agricultural products competitive sources of energy. It has stimulated investment in bioenergy, and has a direct impact on agricultural output prices, including those of several basic food commodities.

42. The increasingly strong link of agriculture to the quasi indefinite demand for energy is already resulting in price increases for agricultural commodities, namely sugar. Since 2004, oil and sugar prices have been moving up in tandem. As some countries started to shift out of sugar and into ethanol, thus reducing sugar exports during a period of deficit global supplies, sugar prices went up on the world market, enticing farmers in other countries to increase production of sugar (in substitution to other crops), thus causing an increase in prices in other crops as well[5].

43. As a nearly carbon-neutral source of energy, most bioenergy systems can contribute to climate change mitigation through substituting fossil fuels, and through carbon sequestration in bioenergy plantations. The likely biofuel use in 2050 is estimated to reduce annual $CO_2$ emission by 1.4 to 4.2 GtC, corresponding to a 5-25 percent reduction of fossil fuel emissions. Emissions trading is already generating additional revenue streams to projects in developing countries and bioenergy projects are the largest category, representing one third of projects registered under the Clean Development Mechanism.

## C. Managing competitive use of agricultural resources

44. Linking demand for energy to agriculture should lead to an increase in demand for all agricultural inputs and production factors by different competing uses. The expansion of bioenergy raises concerns on food security, at household, national and global levels. The availability of adequate food supplies could be threatened by bioenergy production if land and other productive resources are switched from food production. Similarly, if bioenergy production drives up commodity prices (e.g. maize in 2006), food access could be reduced for low-income net food purchasers. Yet, the market for bioenergy feedstocks offers a new and rapidly growing

[5] Analysis of biofuels trade chains shows that biofuels from developing countries can generally be provided to OECD markets at lower cost than domestic production cost in OECD countries. The measure for a country's ability to supply biofuel to the global market at competitive prices is the break-even point, the point where the world market price is equivalent to the price that the producing country (or company) is willing to accept for its biofuel. For example, for bioethanol from Brazilian sugar cane, this point is estimated to be 35 US$/barrel of oil equivalent.

opportunity for agricultural producers and could contribute significantly to higher farm incomes and could support productivity growth with positive implications for food availability and access. In the long term, food security could be affected by the growth of bioenergy because the price volatility from the petroleum sector would directly and strongly be transmitted to the agricultural sector.

45. Over 200 species of plants are known to be of importance for bioenergy, corresponding with a wider range of suitable agro-ecosystems, water requirements, stress tolerance (heat, drought, salinity) than traditional food crops. In principle, this would provide options for rehabilitating deforested, degraded and marginal lands help combat desertification and enhance resilience in the light of global environmental change. Some bioenergy feedstock plants, in particular Jatropha and Pongomia, have the potential to occupy marginal lands as they grow under conditions of low fertility and low rainfall. Jatropha is already used to address desertification in Africa, to rehabilitate degraded lands around mines in the Philippines and rapeseed is piloted for biofuel production on Chernobyl-affected land. However, the economic benefit for using marginal lands has yet to be assessed in terms of input requirements versus output price as well as pressure put on water and land resources.

46. Externalities are generally not reflected in market prices but, even with increased return on capital and labour, biofuel operations are likely to result in significant environmental costs. This will be the case when agricultural production systems are intensified in an unsustainable manner, with impacts on water and soil pollution and depletion, deforestation, loss of natural habitats and biodiversity. An extreme case of environmental degradation is a change of land use from natural forests to energy plantations, as is currently happening in a number of countries. The opposite effect can be expected where intensive annual crop systems are replaced with perennial fuelwood plantations.

47. A shift from food and feed production, including shift to intensive tropical crops for biofuel (e.g. sugar cane, maize) and breeding more high yielding plants (e.g. Jatropha), presents trade-offs with global food supply and market policies. Currently, bioenergy markets are conditioned by policies (subsidies, taxes, trade barriers and mandates) on both the input and output side, all of which may change in the future. Policies will be needed to regulate land allocation and use of marginal lands. Climate change issues are tightly linked with energy policies. There is an urgent need to assess the feasibility of selected bioenergy systems based on countries' needs and resource endowments, the prevailing policy environment at national, regional and global levels, and plausible scenarios for the relevant economic, environmental and policy variables. There is a clear need for well-informed decision-making, an area of great attention to FAO's efforts in this area.

48. The sustainable and equitable development of bioenergy is clearly an important element of agricultural food chains. Biofuel policy cannot be successfully managed outside the overall policy and regulatory framework of the agricultural sector, and it cannot be addressed outside agriculture. It will need to use the tools and instruments of the sector and re-direct agricultural planning and monitoring to new priorities. This will require coherent, long-term planning for transition and adjustment, which takes into account the complexities of managing change in a market-based world economy.

# VI. Conclusions

## A. The urgency to address the agriculture nexus

49. The above analysis shows clearly the central role of agriculture as a nexus in which major questions regarding biodiversity, bioenergy and climate change need to be addressed. Decisions regarding agricultural policy, in particular with respect to biofuels, have the potential to mitigate some of the effects of climate change, to limit the pressure of agriculture upon wild ecosystems and wild biodiversity and to value and deploy the portfolio of agricultural biodiversity, in order to

maximize the trade-off between food production and the production of other agricultural goods and services.

50. Agriculture is called upon to play a variety of roles, in which there are considerable and difficult trade-offs:

- as the guarantor of food security for a global population that is expected to increase by 50 percent with increasing per capita consumption demands;
- as the continuing source of livelihood for large numbers of people, particularly the poor;
- as a provider of ecosystem services to the wider environment and user of ecosystem services from that environment, even as environmental degradation increases;
- as a sink for carbon sequestration;
- as a more efficient user of energy, particularly fossil fuel-based;
- as the producer of feedstock for biofuels and bioplastics, industries which are expected to grow exponentially in the near future.

51. The trade-offs involved in such major changes to global agricultural production objectives are complex, and difficult to evaluate in terms of overall ecological impact, effects on food security, food prices, agricultural labour prices, the terms of trade between countries and regions, and access of the poor to land and social equity. It will be necessary to address the agricultural nexus holistically, to weigh and integrate food security, energy, climatic, ecosystem, development and trade objectives with the need to achieve Millennium Development Goals.

## B. Time to act globally

52. The realization of the central role of agricultural planning comes at a time when key international fora and processes are drawing together the three questions of biodiversity, climate and bioenergy. This nexus was specifically identified at the 32nd Session of the Committee on World Food Security (30 October - 4 November 2006) and it is clear in the Millennium Ecosystem Assessment.

53. Agroecosystems and landscapes contain essential environmental services such as pollination, pest control and nutrient flows and better management of agrobiodiversity and habitats surrounding farms is key to sustainable food systems. As environmental change accelerates, agriculture must address production factors so far taken for granted.

54. There is a need to anticipate likely future changes and begin to shift production practices. To be effective, planning that foresees major adjustments in agricultural production, for biofuel and bioplastic feedstocks, must evaluate all consequences at global level, including phytosanitary risks such as pest introductions and invasive species propagation, as well as changing uses of genetic resources and synthetic agricultural inputs.

55. Policy makers, planners, researchers and operators must consider the larger energy economy that is now tied closely to agriculture. Energy efficiency of the total system, despite rapidly shifting prices, is an important goal. Farmers should be helped to adjust to changes on a short-term basis. On the longer term horizon, adaptation to climate change means rapid evolution of all agricultural and agroecological options, technologies and decision tools.

56. Agricultural planning still responds largely to national needs, with international trade playing a growing role, while these roles must be played out in a world that is highly inter-connected and which therefore requires global approaches. Financial globalization makes national autarchy impossible. Countries both benefit from and need to conform to the huge driving force of globalization. In this market-driven economy, the role of governments will be pivotal in shaping the rules and frameworks that can enable farmers, food business and citizens to cope with change.

### C. Agriculture as part of the solution

57. For better or for worse, it is in the agricultural sector that problems – such as non-sustainable production, poor fuel use, natural resource depletion and habitat exploitation – must be addressed, and governments will need to seek agreements and plan adjustments to policies, which correctly value the services provided by the sector, in order to face the challenge of climate change for food security.

58. Moreover, much of the discussion regarding biodiversity, climate change and bioenergy is currently taking place without the effective participation of the agricultural sector and ministries. This suggests that the window of opportunity in which the sector can still act as a driver of change, and thus integrate these various objectives successfully, is limited.

59. To be a good and effective partner to the environment and trade sectors, agriculture planning needs to draw on its current competitive advantages, which result from the centrality of the agricultural nexus in the debate, and put forward coherent policy options for governments to debate[6].

60. Integrated policy and planning, between line ministries and the private sector, and within and beyond national jurisdictions, requires first of all that the agricultural sector becomes aware of its own environmental externalities as well as of the impact of environmental change on its economic and societal performance. This will allow the definition of appropriate policy objectives within the agricultural sector, based on negotiated strategic actions, including legal structures and resource allocation.

## VII. FAO's Mandate

61. FAO's Members, in adopting its Strategic Framework 2000-2015, gave particular importance to Corporate Strategy B on "Promoting, developing and reinforcing policy and regulatory frameworks for food, agriculture, fisheries and forestry", covering both the international agreements concerning production, safe use and fair exchange of agri-goods and support to developing countries in benefiting from such a framework. Elements of Corporate Strategy D on "Supporting the conservation, improvement and sustainable use of natural resources for food and agriculture" foresee a significant role for FAO in contributing to international natural resource policy development.

62. Although FAO provides contributions to the major Multilateral Environmental Agreements , decisions on specific agriculture and environmental priorities are taken by different constituencies. Consequently, the implementation of sectoral commitments at country level is not always congruent. While multi-sector policy coordination remain difficult to achieve (by both international organizations and countries), the expansion of agricultural policy and planning to address cross-sectoral issues is possible. FAO's general mandate and planning tools are conducive to integrated programmes and activities, provided that the existing scattered elements are brought together into a single framework.

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[6] Such considerations are also addressed in the document CL 131/17 *New International Developments on Pesticide Management*, prepared for the 131st Session of the Council, November 2006. The agriculture sector is in a similar situation with regard to the Strategic Approach to International Chemicals Management (SAICM), adopted by the International Conference on Chemicals Management, in February 2006, and the role of the agricultural sector: "In its preparatory phase SAICM has largely been driven by the environment sector; in many countries, the agricultural sector has had minimal involvement. In order for the full benefits of SAICM to be realized and to avoid unnecessary duplication of effort with respect to existing programmes and activities on pesticides, it is important that the agricultural sector be actively involved in the implementation of SAICM".

63. In the case of biodiversity, the recognition by the Convention on Biological Diversity of the specific nature, problems and solutions of biodiversity for food and agriculture and of the need to address it within agriculture, led to a joint FAO/CBD implementation of the Programme of Work on Agricultural Biodiversity, including leadership in the International Pollinator Initiative. Within FAO, the Commission on Genetic Resources for Food and Agriculture, the International Treaty on Plant Genetic Resources for Food and Agriculture, the rolling Global Plan of Action on Plant Genetic Resources for Food and Agriculture, the Global Crop Diversity Trust and the forthcoming International Technical Conference on Animal Genetic Resources (Switzerland, October 2007) address policy, planning and management of agrobiodiversity resources. The International Plant Protection Convention provides a framework, not only to limit the spread of agricultural pests, but also to combat invasive species, including those affecting the larger natural environment. From the other end of the food chain, the Codex Alimentarius Commission has developed standards to protect consumers, which enforce stricter management of contaminants and input residues in the whole production system.

64. In 2005, COFO, COAG and the Council[7] endorsed the creation of a Priority Area for Interdisciplinary Action on Bioenergy, which has launched the International Bioenergy Platform to facilitate international collaboration on bioenergy. Also, the Global Bioenergy Partnership has its Secretariat based in FAO as of September 2006. In the context of the UN-Energy collaborative mechanism, FAO has been mandated to take the lead on the topic of bioenergy and a UN-Energy Bioenergy publication is under preparation for the Commission on Sustainable Development in May 2007[8].

65. In 2001, COFO and COAG considered climate variability and change[9] and recommended that FAO develops an integrated climate change programme based on current activities as well as new opportunities arising under the international climate negotiations. The Organization's activities in this area focused on assessing and monitoring climate variability and change impact on agriculture and forestry and representing the sector in international negotiations positions. Discussions are currently on-going with the UN Framework Convention on Climate Change with regards to FAO's lead role in implementing the Adaptation Fund, which seeks to support Least Developed Countries meeting the costs of the adverse effects of climate change; a large part of adaptation projects will focus on the management of food and agricultural systems.

66. The recent re-shaping of the Sustainable Development Department into the Natural Resources Management and Environment Department offers an opportunity to develop a coherent policy framework on agriculture and the environment, including strengthening FAO's capacity to address global environmental challenges crucial for the performance of the agriculture and food sectors.

## VIII. Recommendations from COAG

67. The considerations made in this paper raise the urgency of a global analysis as a basis for agreeing on global action, as traditional policy approaches are no longer adequate, given the pace of change and urgency to act. Environmental risks associated with agriculture, as well as sector failure in a business-as-usual scenario can be prevented by sound decision-making at all levels of responsibility.

68. It is proposed to develop a medium-term strategy that addresses environmental issues from within the agriculture sector mandate. The dual objective is to further increase productivity while contributing to global environmental stewardship and governance. Departing from a long-term vision for global governance of natural resources managed by agriculture, the strategy would

[7] See CL 128/9.

[8] A progress report on energy activities is available in COAG/2007/Inf. 12.

[9] COAG/01/5 and COFO/2001/09.

propose specific steps for understanding, planning and implementing a sectoral growth built on eco-efficiency.

69. Such a strategic framework would consider the main environmental challenges, including biodiversity, bioenergy and climate change (and eventually others) that influence food security globally. It will offer analysis of different sectors' interdependencies, bottlenecks, opportunities and trade-offs in different ecological zones and levels of development. It will propose options for ecologically and economically sound approaches, policy and regulatory adjustments and measures to be agreed upon by the international community. Finally, the role of FAO in developing effective cross-sectorial and cross-institutional synergy will be explored, as well as cooperation with key agencies and possible sources of funding.

70. The Committee may therefore consider requesting the Secretariat, and in particular its Natural Resources Management and Environment Department, to conduct a study for presentation and discussion at the 2009 FAO Conference, which could identify possible elements of a Strategic Framework for Agriculture and Environmental Challenges of the 21st Century.