Implications of Climate Change on Sanitary and Phytosanitary (SPS) Issues and Development Objectives

Background Note

I. INTRODUCTION

1. This background paper is part of the initiative undertaken by the Standards and Trade Development Facility (STDF) to raise the profile of SPS issues within a broader context of climate change impacts on agriculture, trade, poverty and development strategies. The objective of this paper is to facilitate the discussion during the seminar entitled "New developments on climate change and trade" which will be held in Washington, D.C., on 22-23 September 2009 and organized jointly by the STDF and the World Bank. Specifically, this paper aims to:

- provide common understanding of the link between climate change-induced emerging SPS risks and broader issues such as agriculture productivity, food supply, trade flows and poverty;
- provide examples of information gaps and technical assistance needs in the area of climate change and SPS and of ongoing efforts to respond to these needs; and
- highlight relevant aspects related to mainstreaming climate change into development policies and strategies.

2. In the context of climate change and ecological perturbation, it is fundamental to document and understand the health, agricultural, societal and economic impact of pathogens and emerging infectious diseases. Several scientific studies have been undertaken to determine the impact of climate change on the evolution of specific pests or disease pressures. A large body of scientific evidence is available today documenting the overall increase in the number of disease outbreaks and northward migration of a wide variety of weeds, insects, and pathogens. The results of these studies provide useful information on the disease potential of organisms, the prevalence of pests, the dynamics of pathogen populations, etc. International organizations, national institutions[1] and policy research institutes have also undertaken extensive work to identify the implications of climate change on strategies to ensure food safety and control transboundary pests and diseases, and on plant and animal production and food security in developing countries more generally.

3. To make the scientific results more accessible to SPS practitioners, the Food and Agriculture Organization of the United Nations (FAO) recently published a report which explains the implications of climate change on food safety.[2] The report emphasizes that the challenges posed by climate change should lead many countries to intensify their efforts to implement programmes of food safety management in line with the guidance provided by FAO and the World Health Organization (WHO). Countries need to be capable of recognizing emerging risks as early as possible and prepared to respond promptly to them. The report highlights the need for continued emphasis on food safety capacity building to developing countries and concludes that coordination among the providers of technical assistance in this area remains a central issue. A series of events, such as an expert consultation in Rome from 25 to 27 February 2008 on "Climate related transboundary pests and diseases"[3] and a "High-level conference on food security: the challenges of climate change and bioenergy" from 3 to 5 June 2008 in Rome, have contributed to raising awareness of decision-makers on policy challenges in the area of SPS and climate change.

4. Likewise, in 2008 the World Organization for Animal Health (OIE) published a report entitled "Climate change: impact on the epidemiology and control of animal diseases".[4] The report compiles a series of articles addressing the impact of climate change on animal diseases and their control, including tools to monitor trends in animal disease transmission for a better risk assessment.

OIE is planning to hold a technical session on climate change implications on animal diseases on the margins of its General Session in May 2009 and to publish the conclusions and recommendations of this session in the Scientific and Technical Review in late 2009.

II. IMPACTS OF CLIMATE CHANGE ON SPS RISKS

5. By altering temperature and precipitation conditions at a global level, climate change threatens to shift world patterns of comparative advantage in the production of many crops and livestock products.[5] The effect of climate change may materialize through changing abiotic factors such as higher temperature, which increases the prevalence of temperature-sensitive pests and disease vectors, or reduced water availability, which causes substantial productivity losses as a result of scarcity of forage. Another example is persistent circulation of pathogens due to the concentration of animals around water sources.

6. Likewise, climate change could affect the spatial distribution and access to fishing resources at community and national level, thereby changing the "winners" and the "losers" of fishery production-trade nexus. Many fish populations migrate over long distances and over multiple territorial waters. This may require new policy and legal arrangements in relation to transboundary management, control and utilization issues. In addition, changes in the fish habitat temperature may significantly influence fish metabolism including susceptibility to diseases and toxins.[6,7] The potential increase and expansion of aquatic diseases in aquaculture and the expansion of exotic pest species may require specific transboundary actions, particularly in large international watersheds such as the Mekong River and the Mediterranean. Biosecurity and prevention measures need to change according to the exacerbated aquatic pathogen risks. Early identification and detection mechanisms need to be improved, and suitable treatment strategies and products developed.[7]

7. In the area of plant protection, climate change influences two levels of intervention. At a regulatory level, it may affect the pest risk assessment (PRA) process, which in turn underpins phytosanitary decision-making. Indeed, climate is one of the key parameters for the assessment of pest introduction potential. It is now well recognized that factors such as earlier springs, altered growing seasons, etc. may result in the shifting of (i) pest and host distribution ranges; (ii) establishment potential of pests; (iii) phonological cycles of plants; and (iv) synchronization between pest and plants.

8. Therefore, risk assessors have started to look into risk assessment models to determine how and to which extent these may be affected by the change in climate in order to enable risk managers to build their phytosanitary measures on a legitimate and sound assessment of risks as provided for in the WTO SPS Agreement. In a recent colloquium organized by the European Food Safety Authority (EFSA), plant health experts attempted to answer fundamental questions related to PRA methodologies to ensure that (i) these effectively consider the potential impact (direct and indirect) of climate change on host's growth, phenology, demography and distribution; and (ii) existing models (e.g. climate matching) can still provide valid outputs. Questions included whether climate change predictions affect the ability to model pest and plant development accurately and if so, how to correct the situation. [8]

9. At farm level, climate change may affect plant disease management practices. More frequent precipitation events and higher winter temperatures could result in more frequent pesticide applications, such as of contact fungicides which are washed out by rainfall or increased frequency of insecticide treatment due to more generations and/or higher populations of pests. This would incur increased costs to farmers and compound environmental damages caused by phytosanitary chemicals.[9]

10. Plant pests and animal diseases generally require more localized or regionalized strategies to manage or control them.[10,11] The remaining uncertainties in climate change scenarios and the interactions of environmental, economic and agricultural management policies suggest that there is no

one-size-fits-all adaptation option. However, a twin-track approach mixing globally agreed models and "customized" responses may be required. The growth in volumes of trade flows can increase the likelihood of spread of transboundary animal and plant pests and diseases, and of alien invasive species. Countries take SPS measures to avoid the entry of new pests and diseases into their territories. According to the SPS Agreement, such measures should be scientifically justified and least restrictive to trade. New uncertainties and possibilities of pest and disease introduction caused by climate change have the potential to exacerbate perceptions of SPS threats and to influence the regulation-making process in a way that negatively affects trade. It is therefore crucial to understand the relationship between the effects of climate change and global trade on pest and disease introduction, and to promote greater cooperation in establishing/revising quarantine laws and control measures across borders.

11. Climate change impacts not only on primary production but also on food manufacturing. For instance, emerging hazards in primary production could influence the design of the safety management systems required to effectively control those hazards and ensure the safety of the final product. Furthermore, increasing average temperatures could increase hygiene risks associated with storage and distribution of food commodities. [2]

III. EXAMPLES OF TECHNICAL ASSISTANCE NEEDS AND RESPONSES IN THE AREA OF SPS AND CLIMATE CHANGE

12. Development partners have launched assistance programmes to bridge the gap between sheer scientific knowledge and practical actions to increase resilience to climate change and to formulate policy recommendations for developing countries, particularly those vulnerable to exacerbated food insecurity. Some common needs emerge regardless of the specific sector in which adaptation is required. These include access to forecasts and early warning tools to prepare for emergencies and reduce climate vulnerability, as well as open source information to strengthen the national data network and decision support system.[17]

13. In the SPS area, investment in research to develop new cultivars and livestock breeds specifically adapted to changing climate conditions may be a promising policy option - as long as it is accompanied by measures to promote access by farmers to these improved technologies and farm management practices. Specific support is also needed to develop primary data for faunal structure and biodiversity. Field and laboratory studies are necessary to determine developmental thresholds, tolerances and tipping points for many pathogens to establish a context for recognizing current constraints and future perturbation, and to explore factors that promote emergence for a variety of pathogens, vectors and pest species.[12] Once basic data on potential disease evolution is gathered, risk prioritization is necessary to establish specific surveillance and control measures for high-priority risks. Surveillance includes elements such as epidemiological, ecological and economic monitoring to track the emergence of new markets, the opening of new trade channels, trade volumes and types of trade.[13] Setting-up and developing such surveillance and monitoring systems requires information and training for field operators (farmers and veterinarians), especially for diseases that are exotic to the territories concerned.[13]

14. Improving the ability of food safety managers to understand and control emerging microbiological hazards at all stages of the food chain will require efforts in a number of key areas including: (i) mathematical modelling; (ii) application of new scientific tools that allow the characterization of complex microbial communities[1]; and (iii) development and promotion of new tools for monitoring or screening programmes for foodborne pathogens. Of utmost importance is an improved epidemiological surveillance system which should ideally take a global approach given the

[1] For instance, there is a clear need to focus research efforts in the development of sensitive and specific methods to detect pathogens in complex sample matrices such as foods. An ideal method would be rapid (results in a few hours), easy, inexpensive, field deployable, and provide enumerative results

borderless nature of circulation of disease agents. Of particular significance is the rapid investigation of unusual outbreaks, with inclusion of environmental investigation to ascertain if climate change is a factor. Improved coordination among food safety, public health and veterinary health services would be valuable to ensure efficient control efforts. In addition, public health systems must be able to mobilize and respond quickly to emerging and re-emerging foodborne diseases of infectious origin. This requires tailor-made technical assistance programmes designed to improve this capacity in developing countries.[2]

15. In 2008, the Consultative Group on International Agricultural Research (CGIAR) adopted a new System-wide Program on Integrated Pest Management (IPM) with the objective of enhancing adaptation of IPM to climate variability and change. Activities include: (i) the development of methodologies to identify regions and cropping systems which are vulnerable to increased pest damage under climate change conditions; (ii) the identification of IPM strategies to enhance resilience to climate variability and change across vulnerable agro-ecosystems; (iii) the development of strategies for adapting host-plant resistance to pests under climate conditions; and (iv) the development of management options for the control of important soil and plant pests in key cropping systems. The programme includes an outreach component which aims to develop, disseminate and promote IPM information, training and decision support tools, and to generate and publicize information relevant to IPM policy formulation and implementation for integration into National Adaptation Action Plans (NAPAs) and other adaptation and mitigation plans. In addition, the programme promotes existing and new low-cost detection technologies for rapid identification and analyses of contaminants impacting food, feed, health and the environment, thereby helping policy makers regulate exposure to contaminants in food and trade systems. It advocates and raises awareness on IPM with special emphasis on adaptation to climate change, increased food safety and improved agro-eco system resilience.[14]

16. Late in 2008, five international research institutes (i.e. the International Potato Centre (CIP), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Food Policy Research Institute (IFPRI), the International Livestock Research Institute (ILRI) and the International Water Management Institute (IWMI)), two German universities and a German research centre received funding totalling € 10 million from the German Government to run a research programme focused on "Adaptation of African agriculture to climate change".[15] The programme aims at building local capacity and using local knowledge through active involvement of non-governmental organizations, farmer associations and national agricultural research centres.

IV. MAINSTREAMING CLIMATE CHANGE INTO DEVELOPMENT POLICIES

17. The development community is concerned about climate change challenges for developing countries as these directly affect food security and the livelihoods of the poorest. In this context, the World Bank's World Development Report 2010 will focus on the impact of climate change on development and vice versa, and on what this means in terms of re-thinking development policy.

18. Planning and implementing climate adaptation for development assistance is shaped by bilateral and multilateral donors. Decision-making on climate adaptation in the context of development assistance requires knowledge of climate impacts on development goals and ongoing adaptation activities within the donor community.[17] Several development partners have started to reflect on the best way to mainstream climate change into their aid policies and existing development frameworks, particularly Poverty Reduction Strategy Papers, sectoral planning and programmes, and country action plans to support progress towards the Millennium Development Goals (MDGs).[16] However, this would not be effective without securing the engagement of national policy makers.

19. Coordination and communication within the donor community and with national agencies is a key factor of success in these endeavours. A recent study conducted by the World Bank in Mozambique identified institutional barriers and opportunities for mainstreaming climate adaptation

into development assistance. Essential requirements at government level to improve the integration of cross-cutting issues into development planning were found to include elements such as the need to strengthen environmental units in all relevant sector institutions in order to improve the network for awareness raising and organizational capacity building. Specialists within the environmental units, which would be able to identify the sector-specific climate impacts and develop appropriate adaptation strategies, are crucial to strengthen the capacity to effectively address climate risks within the respective sectors.[17]

V. FROM RESEARCH TO POLICY-MAKING: RECOMMENDATIONS TO BRIDGE AN OUTSTANDING GAP

20. Local relevance, past experience and indigenous knowledge are widely recognized as key elements when translating information provided by research into action plans. A structured dialogue is needed to assist the collaboration among scientists and policymakers.[18] In addition, interaction with a wider range of groups above and beyond extension and governmental agencies is required.[19] For instance, farmers may be reluctant to adopt new technologies which have been developed without their involvement.[20] One commentator has argued that "a critical need is the development of collaborative learning processes ... to better cope with the impacts of climate change. Research cannot hope to contribute to improving adaptive capacity without a comprehensive understanding of the context in which decisions about adaptation are made and of the capacity of decision makers to change. Farmers already have a wealth of indigenous knowledge on how to deal with climate variability and risk". [21]

21. The above-mentioned seminar organized by the World Bank and the STDF aims to provide an opportunity for a multi-stakeholder dialogue to identify effective ways to facilitate the communication between researchers and policymakers. The seminar will raise awareness on the importance of basing decision-making in the area of SPS on sound science in the current context of a changing climate. It will also aim at discussing ways to favour the uptake of research outputs such as new technologies and techniques to build capacities of end-users through an improved collaboration between researchers and technical assistance providers.

VI. CLIMATE CHANGE ADAPTATION STRATEGIES: ACTIONS TO DATE AND THE WAY FORWARD

22. At the EU level, discussion has begun to assist developing countries in putting in place mitigation and adaptation measures. Climate change appears as one of the eight areas of strategic partnership between the EU and Africa in the 2007 Joint Strategy for 2008-2010. The partnership provides for dialogue, cooperation and exchange of information on concrete actions to respond to climate change.[22] This takes into account African initiatives such as the Climate for Development in Africa Programme (ClimDev Africa), which was set up to integrate climate risk management into development across the continent, and which is implemented by a joint secretariat formed by the African Union Commission (AUC), the Economic Commission for Africa of the United Nations (ECA) and the African Development Bank (AfDB).[23]

23. Although related to agriculture, many of these initiatives do not specifically relate to SPS risks. Special attention should be paid to integrate these risks into the broad spectrum of climate change implications when preparing risk management strategies to increase resilience of the most affected countries. When designing, for instance, an adaptation strategy to climate change, such as new land use practices, scientists and planners also need to be aware of the potential impact on other environmental factors, such as pest and disease patterns.[10] Conversely, when assessing the various adaptation options for a particular SPS change, the framework of analysis should be expanded to include variables such as reduction of vulnerability of humans and ecosystems. Indeed, "such assessment needs to be done in conjunction with well-targeted capacity building efforts to help farmers deal with changes in their systems that go beyond what they have experienced in the past".[21]

Changing climate is only one factor in the complex web of factors that influence conditions in agriculture.

24. Designing holistic and well-integrated adaptation strategies requires a favourable institutional set-up. Effectively performing institutions are of paramount importance to reduce climate vulnerability. Institutions responsible for adaptation planning need to be able to anticipate and prepare for climate risks and to mainstream climate adaptation. This requires climate-specific skills such as the ability to observe current climate variability, to assess climate vulnerability, to properly assess adaptation measures and design climate policies accordingly, and to access and allocate resources. But effective adaptation also requires broader capacities such as good governance, conflict management, and information and communication skills.[17] Beside intrinsic individual institutional capacities, inter-institutional cooperation is also a fundamental condition to design coherent adaptation strategies. Decision-making power is often divided between various sectors. For instance, climate change mitigation by modifying the energy sector of a country may be discussed in the ministry responsible for energy or economy, while emerging pest problems would be handled by the ministry responsible for agriculture.[10] Overlapping mandates of government entities tend to create conflicts and slow responses to climate change.[17]

25. To assist developing countries in formulating policies to adapt to climate change in different fields, three funds have been set up: (i) the Least Developed Countries Fund (LDCF); (ii) the Special Climate Change Fund (SCCF) under the United Nations Framework Convention on Climate Change (UNFCCC); and (iii) the Adaptation Fund (AF) under the Kyoto Protocol. The Global Environment Facility (GEF) Trust Fund's Strategic Priority for Adaptation (SPA) is also a relevant funding scheme. The NAPAs provide a process for LDCs to identify their adaptation priorities. Countries with completed NAPAs are meant to access the LDCF for implementation funds. By October 2008, a total number of 38 countries, among which 26 African countries, had completed NAPAs.

26. Although agriculture appears as one of the priority areas in most NAPAs, research and policies for developing countries' adaptation to climate change have to date focused essentially on ways to adapt to climate variability and reduce vulnerability to extreme events such as droughts, flooding and cold spells. Very little attention has been paid to strategies for preparedness and adaptation to emerging plant and animal pests and diseases.

27. For developed countries, limited evidence exists of plans to tackle the issue of SPS threats and climate change through a holistic policy-making approach. At the EU level, a White Paper on the Adaptation to Climate Change was published on 1 April 2009.[24] It sets out a framework to enhance the European Union's resilience to the impacts of climate change. The White Paper was supported by working documents to highlight five key priority actions in the areas of human, animal and plant health:

- strengthened cooperation between the services of human, animal and plant health;
- development of action plans in the event of extreme weather conditions, in order to be better prepared and react in the best way;
- collection of more reliable information on the risks of climate change and cooperation with international organizations, in particular with the WHO;
- additional efforts to identify the most effective measures; and
- improving surveillance and control of animal diseases.

28. In North America, a diversity of programmes address the impact of environmental change on animal health, zoonoses, and human health, but as yet no comprehensive framework or strategy has emerged to develop and implement policy and planning related to climate change.[12]

29. In Australia, efforts and resources are devoted to examine and prepare for the effects of climate change through the Australian Biosecurity Cooperative Research Centre. The Approach

reflects the "one health" concept aimed at improving the health and well-being of all species through partnership approaches across scientific disciplines, industry and government sectors and across national boundaries.[25] Climate change is one of the underlying drivers of this integrated approach.

VII. CLIMATE CHANGE: ARE THERE OPPORTUNITIES TO SEIZE?

30. In terms of opportunities, the positive aspects of climate change for the agriculture sector relate to the fact that countries have to adapt to climate change by shifting towards more sustainable agriculture practices. This may include, *inter alia*, minimum/no-till systems, crop-livestock integration (agro-silvi-pastoral systems), using resistant breeds, changing crop varieties in cropping patterns, inter-cropping/relay cropping, mixed tree/grass/crop systems, rotations, use of crop residues, and adopting new technologies for management of crops under stressful conditions. The application of IPM techniques such as field monitoring, pest forecasting, recordkeeping, and selection of economically and environmentally sound control measures will also help farmers deal with the effects of climate change. This shift appears to be the only possible way to cope with the negative impacts of climate change effects. By adopting such measures, developing countries may expect an improvement in their farming practices such as rehabilitation of traditional species, preserved biodiversity, enhanced use of environmental services, better use of pesticides and therefore an improvement in food safety, occupational health for farm workers and sustainable livelihoods.

31. In the fisheries sector, new opportunities emerging from changes in species and new markets could arise. Albeit possible, these opportunities are not well understood. The ability of fisheries communities to benefit will also depend on their adaptive capacity.[7]

VIII. CONCLUSION

32. The ability to estimate climate change impacts on world food supply, demand and trade is conditioned by persistent uncertainties with regard to various important aspects including the potential climate-induced pest and disease damage to agriculture production and its geographical distribution.[5] Therefore, improved identification and evaluation of changing or emerging diseases and pests would contribute greatly to a better prediction of agri-food trade variations worldwide.

33. In addition, to promote effective adaptation strategies, it appears necessary to understand the intricate relationship between various elements at the front of which climate change-induced pest and disease evolution, agricultural production, trade flows, global food supply, poverty reduction and development objectives. Each of these elements is in itself influenced by a wide range of discrete factors.

34. An integrated and proactive planning process linking national and international resources can lead to informed predictions about the impact of environmental change and can identify pathways for potential management and mitigation.[12]

35. For this understanding to be complete, technical cooperation in the SPS area should focus on bridging the gap between research and policy making to translate knowledge into practice and to favour the uptake of effective management tools and new technologies (for instance, satellite images of vegetation can play a role in predicting outbreaks of vector-borne diseases). Building the capacity of vulnerable countries to be better prepared to manage emerging risks and to explore and seize potential opportunities is crucial to sustain development efforts.

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