



**NAPPO**

North American Plant Protection Organization  
Organización Norteamericana de Protección a las Plantas  
**MEXICO - USA - CANADA**

## NAPPO Executive Committee Position Paper

**PP: No. 5**

**Issue: Climate Change and Pest Risk Analysis, Technical Summary**

Approved by:

Greg Stubbings  
Executive Committee Member  
Canada

Rebecca A. Bech  
Executive Committee Member  
United States

Javier Trujillo Arriaga  
Executive Committee Member  
Mexico

Three handwritten signatures are present, each written over a horizontal line. The first signature is for Greg Stubbings, the second for Rebecca A. Bech, and the third for Javier Trujillo Arriaga.

Date: February 29, 2012

### Introduction

It is now widely accepted within the scientific community that our climate is changing at an unprecedented rate due to human activity, specifically due to anthropogenic emissions of greenhouse gases into the atmosphere. Changes in climate patterns will directly affect both human and biological systems, including the ability of pests and invasive species to establish and spread in new ecosystems. Accordingly, there is a need for governments and organizations at all levels to deal proactively with climate change, examining the ways in which it may affect their mandate and developing mitigation and adaptation measures if needed.

## Objective

This discussion paper represents the first attempt by the North American Plant Protection Organization (NAPPO) to document the ways in which climate change may affect plant protection activities, and specifically to discuss the implications of climate change for pest behaviour and pest risk analysis.

## Scope

Specifically, the scope of this assignment was:

- To review the scientific literature on climate change as it relates to the pest risk analysis (PRA) process, and;
- To draft a discussion document that examines:
  - The potential effects of climate change on the ability of pests to spread and establish in new areas, and
  - The implications / pertinence of this to the current PRA process.

## Content

### *An overview of climate change*

This section of the paper summarizes the current status of climate change and includes predictions for the coming decades, both globally and for North America. Specific trends include:

- Continued increases in average global temperatures, with greater increases at higher, and northern latitudes and land regions warming faster than the oceans;
- Continued increases in precipitation at high latitudes and likely decreases in most subtropical land regions;
- Rising sea levels and decreases in snow and ice extent consistent with warming; and,
- More extreme weather events.

Warming over the coming century is projected to be considerably greater than over the last century, as greenhouse gas emissions continue to rise. North America, like other regions, will be subject to the global predictions listed above. However, local and regional climate may vary more than the average global climate. Some projected impacts in North America include:

- Most of the continent will experience more warming in the summer than the winter, while northern areas like Alaska will experience the opposite (more in winter than summer);
- Average precipitation will continue to increase with wetter areas becoming even wetter, and drier areas drier, and increased probabilities of both heavy rainfall and drought;
- Sea level rise will cause flooding and erosion.

### *Climate change effects on pests and invasive species*

This section of the paper summarizes the predicted effects of climate change on pests and invasive species. In particular:

- Climate change has already been documented to have a number of effects on natural systems and will likely affect invasive species as well (e.g., it may change the habitable ranges for potential invaders, modify dispersal patterns, increase propagule pressure, facilitate spread, etc.);
- While a number of factors may influence changes in biological invasions, most literature focuses on temperature as a key factor, due to its capacity to limit survival, growth and reproduction in plants and many animals, and;
- It is generally predicted that invasive species, because of the characteristics associated with invasiveness (i.e., the ability to adapt to rapid changes and disturbances) will be better able to respond to climate change than native species, and that climate change will result in an increased number of invasions, and increased severity of invasions.

Many authors discuss the potential consequences of climate change for the sequential stages of an invasion process (i.e., climate change effects on pest introduction, colonization, establishment, and spread). The remainder of this section in the discussion paper lists these specific predictions relative to the International Plant Protection Convention (IPPC) terms used in Pest Risk Analysis: Entry, establishment, and spread, as well as pest impacts.

### *Global Change*

In addition to climate change, a large number of other interrelated factors affect the introduction, spread and impacts of pests and invasive species (e.g., globalization of commerce, waterway engineering, land use changes, intentional stocking, pollution, habitat destruction and fragmentation, overexploitation, etc.). In particular, a continued rapid increase in trade of plants and plant products is expected to result in new origins, new pathways and new pests. These complex and interrelated global change factors are acknowledged but not further addressed in the discussion paper.

### *Climate Change and Pest Risk Analysis (PRA)*

This section of the discussion paper introduces the PRA process and discusses some of the reasons why climate change may or may not be an appropriate consideration in PRAs. While it is clear that climate change will have an effect on the ability of pests to enter, establish, and spread in new environments, there are a number of challenges involved in making specific predictions about climate change and pest behaviour that must be taken into account. In particular the following is highlighted:

- Models used for predicting climate change and simulating the impact of climate change on species distributions (e.g., envelope / ecological niche models) involve a number of assumptions and uncertainties. PRA is also a predictive process that involves significant uncertainty. There is concern that using climate change models in PRAs may increase uncertainty to the point of compromising their utility;
- Climate change models generally provide average predictions at a global or regional scale, and spatial resolution may not be sufficiently detailed to make predictions at local or regional scales that are more relevant to the PRA process;

- Climate change models are generally based on 30 year climate averages, and projections of at least 20 years are needed to make useful comparisons. By contrast, PRAs often focus on a shorter time frame, as problems with pests and invasive species are immediate and severe;
- PRAs usually need to be completed in a timely manner, in response to trade and regulatory requirements while climate modelling can be complex, time-consuming, and resource-intensive (and may not be necessary to answer the question at hand).

### *Legal Opinion on Interpretation of the Role of Climate Change in the Development of PRAs*

In addition to the scientific challenges involved in considering climate change in PRAs, there are also legal aspects which should be considered. To date, five disputes interpreting the role of PRA to justify sanitary and phytosanitary measures have traveled through the World Trade Organization (WTO) dispute settlement process to Appellate Body (AB) review. In each case, quarantine measures were challenged in a variety of areas but were ultimately judged to be in violation solely *because of the inadequacy of the risk analysis* to evidence the necessity of the measures under consideration without being overly restrictive. The interpretations of the SPS Agreement found in these reports provide some guidance as to when and where climate change could be considered in a PRA. In particular:

- To be valid, measures must be based on a risk assessment that provides evidence that the measures are applied only to the extent necessary to protect plant life and health;
- Climate change can be taken into consideration when developing a risk assessment but with the caveat that there must be an “actual potential for adverse effects”, and the risk assessment must evaluate what is likely or probable rather than possible;
- These judgments hinge on whether the PRA is considered to provide “sufficient evidence” that a chosen measure is not arbitrary, unjustified, or a disguised barrier to trade, although the definition of “sufficient” is relational. Therefore, climate change projections within a PRA must be sufficiently robust to meet these requirements.

### *Conclusion and Recommendations*

The interaction of climate change with the other pressures involved in global change including trade patterns will increase the need for PRAs as well as the revision of existing ones to take into account changes in pest distribution and the likelihood of association with pathways (EFSA 2007). However, the decision about whether or not to consider climate change scenarios or incorporate complex models into a PRA will depend on feasibility, fit-for-purpose, and the rigor of the associated scientific support. International agreements (e.g., IPPC; SPS Agreement) and international case law indicate that PRA is intended to provide sufficient evidence that a chosen measure(s) is not arbitrary, unjustified, or a disguised barrier to trade. Therefore, climate change projections within a PRA must be sufficiently robust to meet these requirements. This suggests that the role of climate change in the conduct of PRA will need to be considered on a case-by-case basis.

NAPPO will take a “fit-for-purpose” approach for the inclusion of climate change scenarios and models in PRAs, with the decision made and transparently documented on a case-by-case basis. In particular:

- The decision as to whether or not to include climate change in a PRA should be based on an initial assessment of the complexity of the issue, the relevance of climate to the phytosanitary issue at hand, and whether or not there is sufficient scientific evidence to show a causal link between climate change and the risk being assessed.
- A brief statement documenting this decision could be included in the PRA, to indicate whether or not climate change was explicitly considered, along with a brief explanation as to why or why not.
- Information on climate data used in a PRA should be included and properly referenced regardless of whether climate change scenarios are explicitly considered. Climate is typically defined as a 30-year average of weather (hence the 30-year climate normal) and most climate maps and classification systems commonly used in assessing potential establishment and spread are based on 30-year averages. It would be helpful to document this where possible (e.g., “this map was developed using 30-year climate data from 1960-90”).
- The time frame for which the PRA is considered to be “current” could be specified in the document, indicating that an update will be required after a specified amount of time. Currently, most PRAs are updated on an ad hoc basis when new information becomes available; a stated revision date could increase transparency and help to ensure that PRA conclusions are not relied upon past their expected date of validity. One possible approach might be to link the revision date to climate data used (e.g., PRA conclusions based on climate data from 1970-2000 would be valid until 2030, using the 30-year climate principle). However, revision dates may be based on other factors as well (e.g., new information about the biology of a pest, changing production practices, etc.). It may be useful to consider a list of conditions under which a PRA should be updated.

Prepared by members of the Pest Risk Analysis and Invasive Species Panels  
December 2011