

Improving pest risk maps for management of invasive species

DESPITE THE URGENCY OF RESPONDING TO A BIOLOGICAL invasion, plant or animal, careful analysis of the situation and informed decision making will ultimately lead to a more effective solution. The pest risk map is a powerful tool for any resource manager faced with surveillance for invasive species because it tracks the arrival and spread of these species and illustrates their potential impacts across spatial and temporal scales.

Pest risk maps are prepared by various organizations, including the USDA Forest Service, which has its own pest risk mapping team. Depending on the type of pest, a team of experts is assembled that can include animal or plant pathologists, botanists, ecologists, and climatologists.

Though risk map development has evolved to include global environmental databases and computer-generated models of a species' geographic distribution, Venette et al. (2010) point to uncertainties surrounding the creation and interpretation of risk maps and recommend several improvements to current widespread methods.

Expounding on a 2007 meeting of the USDA Pest Risk Mapping Workgroup, the authors detail 10 recommendations for improving the accuracy and clarity of pest risk maps. At the top of the list is greater communication between map developers and stakeholders regarding methods for developing maps. With greater documentation of model development, land managers

can more appropriately assess the given information. Thorough documentation of a map's rationale, comprehensive explanations of data-gathering procedures, and a clear statement of the map's intent by analysts will allow resource managers to better evaluate the model.

The workgroup's recommendations also call for better representation of uncertainty, a factor inherent in compiling all risk maps because of the vast complexity of ecological systems. In a study of risk maps of the nonnative woodwasp (*Sirex noctilio*), detected in the United States and Canada, Koch et al. (2009) explore how numeric assumptions that accompany uncertainties can impact the reliability of a risk map. Detailed consideration of uncertainty, the authors affirm, should be standard procedure.

Other methods for improving the effectiveness of pest risk maps are expanding the availability and accessibility of primary data, developing a best-practices guide and tool kit for modeling, detailing impacts, increasing international collaboration, incorporating climate change data, studying how human and biological dimensions interact, and providing training in pest risk modeling practice.

Venette et al. (2010) conclude that the quality of available data should be considered when analyzing the accuracy of any pest risk map. Unfortunately, the function of such a map is often constrained by a small set of available data coupled with the urgency of implementation. Another major conclusion is that risk maps can and should be assembled with greater ambition to include meteorological, economic, and historical information to address more elements related to invasion risk than just basic geographic reach. Perhaps the most potent conclusion is that the development of risk maps should be documented in greater detail so that resource managers can more aptly and effectively analyze their relevance and usefulness.

References

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