THE NEW YORK BOTANICAL GARDEN

Triage for Plants: NYBG Scientists Devise Quick Way To Identify Plant Species Most Likely To Be at Risk of Decline or Extinction

Using Puerto Rico's Native Plants as a Test, Rapid Assessment Method Allows Scientists To Sort Through Thousands of Species and Focus on the Most Vulnerable

To speed up the process of identifying threatened and endangered plant species, a team of New York Botanical Garden scientists has developed a streamlined method for evaluating the conservation status of large numbers of plant species, using information from plant research collections and Geographic Information Systems technology.

Faced with such threats as deforestation, climate change, and invasive species, a significant proportion of the world's plant species are commonly believed to be in serious decline and possibly headed toward extinction. For government officials, non-governmental organizations, and anyone working to preserve biodiversity, knowing which species are most at risk is a critical piece of information, but the conservation status of only a fraction of the world's plant species has been determined.

The rapid assessment method developed by Botanical Garden scientists uses the geographic range of a species as an indicator of its vulnerability. Sorting through thousands of species, the process identifies which ones are widespread in a region—and thus not in any immediate risk—and which have restricted ranges, making them more susceptible to extinction when faced with environmental problems.

"The lack of a comprehensive list of threatened and endangered species is one of the greatest impediments to the effort to preserve plant biodiversity," said James S. Miller, Ph.D., the Garden's Dean and Vice President for Science and the lead author of the paper that outlines the method and the results when it was tested on Puerto Rico's native plant species. "Having a more efficient system for assessing threats means that we can quickly focus conservation efforts on priority areas and species that need the most attention."

Rapid Assessment Method Possible Key to Meeting 2020 Conservation Goal

Using the Garden's streamlined assessment process could make it possible for the conservation community to meet a key target of the Global Strategy for Plant Conservation (GSPC), which calls for an assessment of the conservation status of all known plant species by 2020. (The GSPC is a product of the 1992 Convention on Biological Diversity, an international treaty that calls for the conservation and sustainable use of Earth's biodiversity.)

Currently, the standard conservation assessment method is the one created by the International Union for the Conservation of Nature (IUCN) for its Red List, which since 1994 has used a scientifically rigorous, multicriteria process that assigns a species to such categories as "extinct," "least concern," "endangered," and "critically endangered."

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Red List assessments have been completed for large groups of animal species—birds, mammals, and amphibians—but so far, fewer than 15,000 plant species have been evaluated under the Red List process, in part because the procedure requires more data than is readily available for many species. According to Dr. Miller, there are approximately 300,000 known plant species, but many more remain to be discovered.

In designing a simpler process for evaluating plant species, Dr. Miller and his colleagues decided to assign species to only two categories: "At Risk" or "Not at Risk." The key criterion for determining a species' status was the size of its geographical range, or extent of occurrence (EOO). Under one of IUCN's criteria, a species with an EOO of more than 20,000 square kilometers (about 7,700 square miles, slightly smaller than the state of New Jersey) is considered not threatened, so that became the cutoff for determining whether a species would be categorized as At Risk or Not At Risk.

Assessment Finds 23 Percent of Puerto Rican Plant Species At Risk

The Garden's scientists tested their approach by evaluating the 2,025 species of seed plants native to Puerto Rico, which was chosen because its plants are well documented in research collections. Data for the study came from the Global Biodiversity Information Facility, an international, open-access resource, and from the Garden's C.V. Starr Virtual Herbarium, a repository of digitized information about more than 1.6 million plant specimens.

As described in the team's paper in a recent issue of the scientific journal *Biodiversity and Conservation,* the assessment consisted of two stages. An initial evaluation of the plant data determined that 1,476 species had ranges of more than 20,000 square kilometers and were classified as Not at Risk. Focusing on the remaining 549 species, the Garden scientists added more precise latitude and longitude references for the locations where many of the species samples had been collected. After recalculating their ranges, the team was able to determine that 90 additional species could be categorized as Not at Risk.

That means, however, that 459 species, or 23 percent of Puerto Rico's flora, should be considered At Risk. The analysis of more than 2,000 species took less than four months.

To test the method's reliability, the Garden scientists compared their results with the Red List, which has assessed only 77 species of Puerto Rican seed plants, assigning 53 to threatened categories. The Garden's rapid assessment process categorized 47 of the 53 species on the Red List as At Risk.

In addition to Dr. Miller, the Garden team consisted of Brian Boom, Ph.D., Director of the Garden's Caribbean Biodiversity Program; Holly A. Porter-Morgan, Ph.D.; Hannah Stevens; James Fleming; and Micah Gensler.

The *Biodiversity and Conservation* paper also describes a second rapid assessment method developed by the Smithsonian Institution, which categorized 367 species as At Risk. It overlapped with the Red List for 42 out of 53 species.

Beyond identifying a broad range of threatened species, the two methods could serve as valuable planning aids, the authors conclude. "The tools used to conduct these analyses can also map distributions of 'At Risk' species and identify specific geographic places where threatened plants are concentrated," they write. "The places thus identified may be considered priority areas for conservation and possible candidate areas for protected status."

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Media contact to obtain a copy of the *Biodiversity and Conservation* paper or to arrange interviews:
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