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THE BIODIVERSITY SCIENCE PROBLEM IN CANADA: AN UNRECOGNIZED CRISIS

This statement was first released at the National Science Meeting of the Ecological Monitoring and Assessment Network (EMAN) just over a year ago on 19 January 2000. It has been slightly modified for publication.

Biodiversity science is a highly strategic international enterprise. Many countries now view biodiversity as living capital that supports and sustains ecosystems and the human societies that depend on them. Concerns about the potential impact of global change on landscapes, ecosystems, and human health are focusing attention on the urgent need for scientifically sound and adaptive social and economic strategies. Most developed countries are adopting forward-looking biodiversity science plans recognizing the implications that biodiversity issues have for their wealth, health, and national security. Canada has yet to develop such a plan.

Canada has a history of strong investment and accomplishment in biological sciences. During the post-World War II era Canada was among the world leaders in training and productively employing professional biodiversity experts. For many years Canada has capitalized on this advantage scientifically, economically, and socially. For example, Canadian biologists conducted key experiments leading to an understanding of how excess nutrients cause eutrophication of lakes. This new scientific understanding had a far-reaching impact on social policy here and throughout the world. Similarly, Canadian botanists have developed new commercial crop varieties that have kept the country competitive in agricultural production. In the field of entomology, scientists coordinated their efforts to produce a series of assessments of the state of knowledge about insects. These assessments support efforts to conserve, use, and control insects in the pursuit of national economic and social objectives. For much of the post-war period, Canada's biodiversity science capacity was well matched to the needs and expectations of its population.

The current competitive position of Canada, however, is not secure and Canadians must overcome recent complacency in order to anticipate and respond to the accelerating challenges of the international biodiversity science agenda. Canada is losing its trained and experienced professionals to retirement or to attractive opportunities in other countries at an alarming rate. Federal and provincial governments are not recruiting the biodiversity specialists whom the country needs to compete scientifically. Universities

are abandoning both whole organism approaches and the natural history collections that support them. At the turn of the new century, the number of professional biosystematists employed in Canada has fallen to about one-third of the level during the 1970s.

Of greatest concern is the departure of many of Canada's brightest and best young minds. They are leaving Canada for advanced education and training in biodiversity science in other countries, with little prospect of returning to attractive careers in Canada. There are currently fewer than ten Ph.D. students in biosystematics in Canada! This is hardly surprising given the scarcity of graduate-level programs nationwide compared to the wealth of opportunities that was available to aspiring professionals in this field during the 1970s.

Canada faces the prospect of entering the new century with inadequate capacity to understand the evolutionary and ecological relationships of, or even to identify, the organisms that comprise ecosystems and support the burgeoning global bio-economy. This will seriously impair Canada's ability to develop inventories of native species and their distributions, detect and manage pest and disease organisms, assess and interpret impacts of climate and other environmental changes, monitor and manage species at risk, and respond to threats from invasive alien species. Fewer than half of Canada's species are adequately known. We need urgent and strong action to reinvigorate the biodiversity science capacity within this nation. Only thus can Canadians ensure their social and economic competitiveness and meet Canada's obligations under the Canadian Biodiversity Strategy and Convention on Biological Diversity.

Canada requires its own biodiversity science capacity. We cannot borrow or buy the information and wisdom required from other countries. The species composition, structure, and dynamics of Canadian ecosystems are unique. Decision making in Canada must be based on a sophisticated understanding of the global situation, tailored to the country's circumstances by knowledgeable experts. This national expertise must incorporate the new tools of the trade that are currently under development in areas such as conservation biology, landscape ecology, biotechnology, and information management. These fields are progressing rapidly and Canada cannot afford to be left behind.

GUIDELINES FOR SOLUTIONS

Canada's solutions must recognize that the issues cut across traditional sectorial interests and boundaries that have dictated the way biological science has been conducted in the past. Canada must adopt a new ap-

proach that integrates scientific and other advice into decisions that reflect and balance multiple viewpoints. This has important implications for the management of biodiversity science, and the ways in which governments, universities, and the private sector should interact in this area.

Governments must realize that the biodiversity science agenda poses challenges that exceed the in-house expertise of any one department or jurisdiction. The issues are frequently *horizontal* and involve significant scientific uncertainty that has implications for sensitive areas of public policy. In these cases, independent scientific analysis is essential to foster public confidence in government policies and decisions. Governments, universities, and industry must collaborate to train and employ the next generation of biodiversity experts and equip them with the tools to innovate productively.

THE NEED FOR A NEW FRAMEWORK FOR BIODIVERSITY SCIENCE IN CANADA

Canada cannot address current and future challenges in biodiversity science effectively within an organizational framework that is fragmented along jurisdictional and sectoral lines. This country needs to establish a new national biodiversity science network, which will be dedicated to developing, organizing, and applying knowledge of Canadian genes, species, and ecosystems to support the conservation and sustainable use of the living capital.

This biodiversity science network should build on strengths nationally by enhancing existing federal, provincial, and university programs, and by developing strong links with appropriate international initiatives. It should consolidate existing systematic and ecological knowledge, identify and address deficiencies, and develop a comprehensive capacity for research, monitoring, and development of collections. The network should incorporate new approaches for information management and technology transfer, so that it can function as an efficient source for scientific information and advice on policy issues in all jurisdictions. It should include:

- A strong national biodiversity science facility that will integrate the management, research expertise, collections, and resources of existing federal departments and agencies in order to provide a focus for addressing national issues in a balanced way and for representing Canada internationally.
- A coordinated and well-funded program of biodiversity chairs. These would provide undergraduate and graduate training at Canadian universities sufficient to meet the future needs of the country for professional experts in systematics and ecological research, information manage-

ment, and natural resources conservation and to permit effective successional planning.

- A group of regional centres involving public and private partners, with the capacity to conduct research, develop collections, manage information, and support the implementation of resource management decisions within Canadian ecozones.
- A well-designed and well-equipped distributed information network linking national and regional facilities together and to other data sources and users nationally and internationally. This would allow integration of biodiversity data into comprehensive analytical frameworks to support decision making.
- A well-financed national funding agency with an expert advisory panel and the capacity to support the resource requirements of the national network and its components in a strategic manner.

This new biodiversity science network should be established immediately and become fully functional within two years. It would require a commitment in the range of \$100 million of new funding to launch the network through its initial stages of development, with annual operating costs estimated to be in the order of \$100 million based on a combination of reinvestment and new allocations.

CONCLUSION

Canada is rapidly losing its capacity in biodiversity science, putting at risk our wealth, health and national security. Canada needs to establish a comprehensive focus and authoritative national voice for its biodiversity science community comparable with those of other developed countries. This can be accomplished in a short time frame, with modest new investment, by creating a national biodiversity science network based on partnerships between government, universities, and the private sector. This would provide Canada with the capacity to integrate and optimize existing national and regional facilities so as to participate fully in the global biodiversity science agenda and meet its commitments under the Canadian Biodiversity Strategy and the Convention on Biological Diversity.

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