Section B

Trends in Natural Recovery after Emission Reductions

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In the background of the picture on the previous page the scene is one of desolation—the two smokestacks of the abandoned Coniston nickel smelter, the bare hills blackened from decades of intensive fumigation, and the dried remains of a fallen pine forest. These are the results of destructive smelting activities described in detail in earlier chapters of this book. However, this section deals not with the past but with recent evidence that natural processes are beginning to repair the damage to terrestrial and aquatic ecosystems in the Sudbury Basin. The focus is, therefore, on recovery, represented in the foreground of the picture by a young birch tree, one of the first tree species to recolonize the harsh landscape of the Sudbury barrens.

Resilience or the ability to *re-create* are terms often used when describing healthy ecosystems. Ecologists argue strenuously about the appropriateness of such terms, but whether it is a seedling pushing its way up through urban pavement or wind-blown insects landing on a newly formed volcanic island, disturbed and even severely damaged land does not remain empty of plants and animals indefinitely. The Sudbury landscape was repeatedly scoured of soil and vegetation by the passage of mile-high ice during six glaciations in the past 190,000 years. This fact does not make the current damage any more acceptable, but it does offer hope through example that natural recovery can occur despite what may appear to be irreparable damage. However, recovery cannot happen unless something else happens—the cause of the damage ceases. The Sudbury situation illustrates this point.

In recent decades, emissions of sulfur dioxide and metal particulates from Sudbury smelters have been reduced dramatically. As the authors of the following chapters show, controlling pollution at the source not only protects sensitive ecosystems from being damaged but also permits damaged systems to begin to recover. Preventing damage from occurring is the ultimate solution to

pollution problems, but seeing evidence of recovery also provides powerful support for the legislated effort to reduce present and future emissions. Too often the argument has been made that, although tragic, "the damage has been done." Evidence of natural recovery after abatement programs at an internationally known site such as Sudbury indicates clearly that damage can be undone and that environmental degradation is not a license to continue to pollute. Extensive remedial work may be needed to speed the process, but the evidence of natural recovery indicates that we are on the right track—that the corrective measures being taken currently are effective indeed.

Studies in the Sudbury area have contributed to international awareness of environmental problems. This was the case in the mid-1960s when one of us began working on some of the many remote, seemingly pristine lakes in the LaCloche Mountains, approximately 60 km southwest of the Sudbury smelters. During the course of these studies, which initially had nothing to do with air pollution, Beamish and Harvey discovered that the lakes were acidifying and fishes of many species were dying and disappearing from these lakes. These results opened the eyes of many people in North America to the problem of "acid rain." This finding was soon confirmed for other lakes in Ontario near point sources of sulfur dioxide pollution such as the Wawa area and for lakes in south-central Ontario: Parry Sound, Muskoka, and Haliburton, which were far removed from any point source. These findings, plus a rapidly accumulating list of similar results from many places, especially Scandinavia and northeastern United States, instigated an enormous public campaign that propelled governments into restricting the use of the atmosphere as a dumping ground for contaminants. Several important pieces of provincial and state legislation have been passed since, and more important, Canada and the United States have signed an accord requiring a large reduction in sulfur dioxide emissions within 10 years.

Chance also played a role in the observations of natural biological recovery of damaged lakes in the Sudbury area when, in the early 1980s, Gunn and Keller observed that a remnant population of lake trout was starting to reproduce again. This time the observation came from a study site far to the north of the smelters, but again links to Sudbury were made—water quality was improving, which allowed reproduction to occur, and all this was related directly to declining emissions. Unfortunately, on the global scale, observations of recovery are, as of yet, far less common than were the earlier reports of damage.

We thank the authors of the following chapters for their descriptions of air quality improvements and for the evidence they present of the beginnings of natural recovery of terrestrial and aquatic biological communities. We do not exaggerate the progress made, given the severe problems that still exist near Sudbury,

but the evidence presented does provide encouragement and strong support for continuing efforts to reduce atmospheric emissions. The people who live and work in the Sudbury Basin are the greatest benefactors of this progressive improvement in the quality of the natural environment. All Canadians will benefit from the changing image of Sudbury from an international center of pollution to that of a green and pleasant land.