

Reclamation in Smelter-Impacted Landscapes in Northern Regions – A Comparison of Canadian and Russian Experiences¹

G. Spiers², P. Beckett, S. Koptsik, and G. Koptsik

Abstract: The nickel-processing industry has contributed significantly to environmental damage and deterioration both in Sudbury, Canada and the Kola Peninsula, Russia. The long-term effects of air emissions have created vast industrial barrens within the forested ecosystems near the smelter within both regions. Despite a significant reduction in air emissions in the recent decades, the accumulation of bioavailable and potentially toxic metal levels in the acid surface soils, accompanied by soil erosion and associated soil nutrient depletion, impede natural vegetation recovery. The internationally recognized Sudbury Protocol for technogenic barren landscape restoration has evolved over 40 years since 1978 from greening activities that involved application of dolomitic limestone, fertilizer, seeding of agricultural grasses, legumes and planting of tree seedling to a more complete biodiverse restoration strategy. By 2017, 3470 ha had received soil amelioration and 10 million trees and shrubs had been planted for approximately Can \$32 million while employing over 4700 individuals. The effectiveness and success of landscape rehabilitation programs initiated in 2003-2004 in the Kola Peninsula is also largely dependent on the continual decreases in pollutant loading onto the landscapes, on continuing improvements in the physico-chemical conditions of regional soils, and on the effectiveness and suitability of the continuously evolving land remediation technologies. There is an obvious need to accelerate the pace of remediation of the industrial barrens with the diversification and development of improved remediation technologies to enhance sustainable environmental management and regional economic development. Basic remediation options such as chemo-phytostabilization can provide rapid risk mitigation through containment and stabilization of the contaminants while potentially providing a range of additional economic (biomass generation as renewable energy source), social (leisure and recreation, educational value) and environmental (CO₂ sequestration, secondary pollution prevention) benefits. Ongoing research initiatives must include studies of the interactions between plants and microorganisms.

Additional Key Words: forest, greening, metals, restoration, economic diversification.

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 2. Graeme Spiers, Professor of Environmental Monitoring, School of the Environment and Peter Beckett, Restoration Ecologist, Biology Department, Laurentian University, Sudbury, Ontario, P3E 2C6 Canada; Sergey Koptsik, Faculty of Physics and Galina Koptsik, Faculty of Soil Science, Lomonosov Moscow State University, Leninskie gory, Moscow, 119991 Russia.
 3. Work reported here was conducted near Sudbury 46° 29' 24" N, 81° 0' 36." W; Kola Peninsula (Monchegorsk) (67°55'N, 32°48'E).