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Reclamation of peat-based wetlands affected by Alberta, Canada's oil sands development

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The ability to construct or reclaim functional peat-based wetlands as a replacement for those lost to development activity is uncertain. Oil sands development in northern Alberta, Canada will ultimately result in the removal of over 85 km2 of peat-based wetlands. To examine potential replacement of these lost peatlands we compared four treatments assigned to 16 known-age wetlands where we followed plant community, carbon dynamics, water quality, invertebrates and top predators for 5 years. Key questions followed by a synopsis of findings include: (1) Will wetland communities become more natural with age? – Yes, however industrial effluents of salinity and napthenates will slow succession and may truncate development compared to natural systems; (2) Can community succession be accelerated? – Yes, the addition of carbon-rich soils can facilitate development in some zones but cautions are raised about a "green desert" of vigorous plant stands with low insect and vertebrate diversity; (3) Is productivity sustainable? – Maybe, limitations of water chemistry (salinity and napthenates) and hydrologic regime appear to play large roles; (4) Will production support top predators? Sometimes; insectivorous birds, some small fish and a few amphibians persisted under all except the most saline and napthenate-enriched sites; (5) What is the role of the compromised water quality in reclamation? – Reduced diversity of plants, insects and vertebrates, reduced plant physiological efficiency and thus slower rates of reclamation. It is axiomatic and well demonstrated throughout Europe that it is easier and more cost effective to protect peatlands than it is to reclaim or create them. This is complicated, though, where mineral or property values soar to over $1 million per hectare. Industrial planners, governments and the public need to understand the options, possibilities, time frames and costs of peatland replacement to make the best land use decisions possible. Our research provides a quantifiable scientific basis for forecasting the future functions, conditions and replacement value of wetlands lost to development, while providing a basis for reclamation recommendations.