Reducing Nutrient Impacts on the Environment

Each year, more than 304,000 tonnes of nitrogen and 12,000 tonnes of phosphorus enter Canada's ground and surface waters, and a further 1.4 million tonnes of nitrogen are released to the atmosphere, all as a result of human activity.

Nutrients are elements that occur naturally in the environment and are essential to the growth and survival of plants, humans and other living things: examples are nitrogen and phosphorus.

Nutrients entering the environment from human activities, however, have increased the abundance of biologically reactive forms of these elements - to the detriment of the environment.

Runoff from agricultural fields, urban expansion and municipal sewage all contribute nutrients to rivers and lakes, often over-stimulating plant production. This nutrient enrichment affects fish and wildlife, imposes a toxic threat to plants and animals, and poses a risk to human health.

Nutrients stimulate the growth of algae, including toxic algae. Drinking water containing toxins from toxic algal species can affect the health of terrestrial animals, including humans. Algae can also cause taste and odour problems in drinking water drawn from lakes and reservoirs.

Ammonia and nitrate, two forms of nitrogen, may also contaminate surface and ground waters. At high concentrations, both are toxic to aquatic and terrestrial animals. Nitrate has been identified as a possible contributing factor to a decline in amphibian populations, and ammonia discharges to fish kills.

In 1994, the Parliamentary Standing Committee on Environment and Sustainable Development reviewed the *Canadian Environmental Protection Act* (CEPA). They found that only one class of nutrient is currently regulated (namely phosphorus in laundry detergents) and that other nutrient classes and sources may be adversely affecting the environment.

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NWRI and Nutrients and the Environment

The Government of Canada responded to these findings by conducting a cross-Canada study of nutrients derived from human activity to determine how they may be impairing Canadian ecosystems and affecting the quality of life and health of Canadians.

NWRI, as part of Environment Canada, led four other federal departments in this work, producing a national science assessment report in 2001. *Nutrients and their Impact on the Canadian Environment* concluded nutrients are indeed causing problems in certain ecosystems and affecting the quality of life for many Canadians.

Impacts include loss of habitat, fish kills, declines in amphibian populations, changes in biodiversity, contribution to acidification of soils and lakes, loss of recreational potential, and an increase across Canada in the occurrence of higher levels of nitrate in groundwater than those set out in drinking water guidelines.

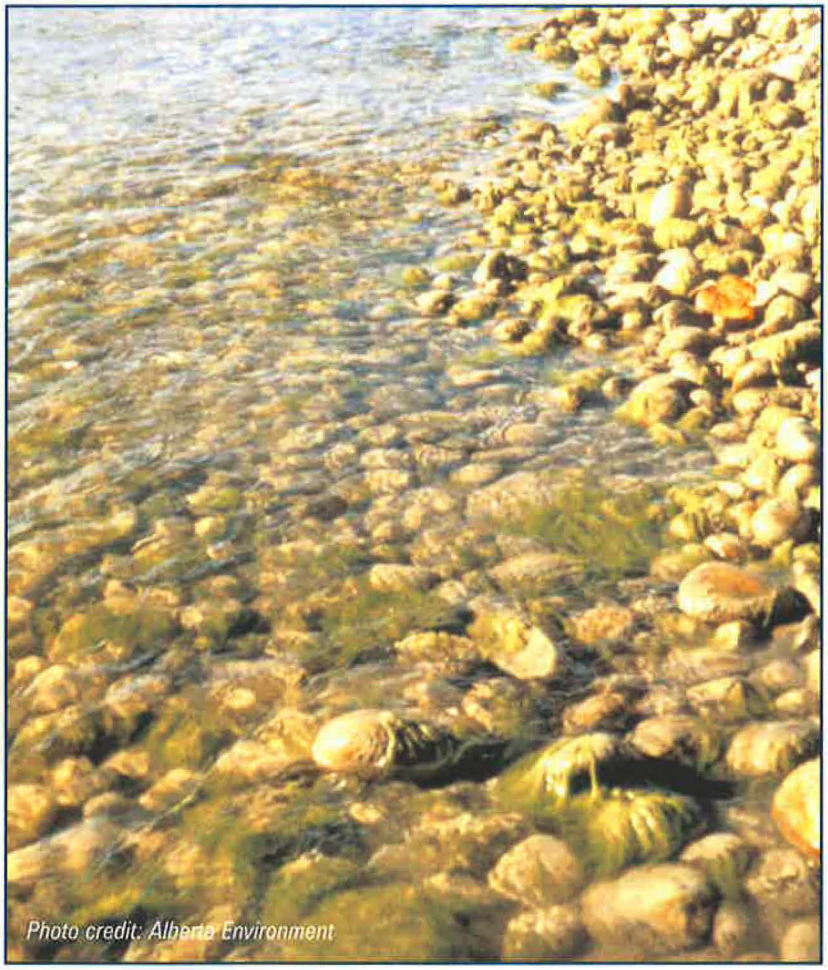

Photo credit: Alberta Environment

Impacts of NWRI Research on Decision Making

The subject of nutrients in the environment has attracted considerable interest. To date, more than 2000 copies of the scientific assessment - ***Nutrients and their Impact on the Canadian Environment*** - have been distributed. Although it is difficult to track its impact on provincial and local policy and regulation, the findings have spurred several initiatives at the federal level to control the problem of nutrients in the environment, for example:

- total phosphorus has been added to the National Pollutant Release Inventory - the only legislated, nation-wide, publicly accessible inventory of its type in Canada;
- dissolved ammonia in water has been added to the ***Canadian Environmental Protection Act*** List of Toxic Substances, which will help to control its use;
- nutrient discharges are an important consideration in developing a national framework for better management of municipal wastewater in Canada; and
- nutrients are included as a component of Canada's new Agricultural Policy Framework - which is designed to make Canada the world leader in food safety, innovation and environmentally responsible production.

Benefits to Canadians

Ongoing NWRI research on nutrients, along with closer monitoring of nutrients in the environment and subsequent actions to manage them better will bring health and economic benefits such as:

- reducing concentrations of nitrogen oxides contributing to smog;
- lowering the risk to human and livestock health from toxic algal blooms;
- encouraging sustainable agricultural practices;
- protecting aquatic biodiversity and the health of aquatic ecosystems; and
- improving recreational waters and their economic potential through reduction in unsightly plant growth.

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