

Nooksack-Abbotsford-Sumas Transboundary Study: Developing a nitrogen assessment to support nitrogen management

We need your help make this a successful project!

What is this project about?

The Nooksack-Abbotsford-Sumas Transboundary Study is a North American pilot demonstration of a global initiative. It gathers stakeholders to work together to understand and address problems and opportunities associated with modern beneficial uses of nitrogen (N) for food and manufacturing. The Nooksack-Abbotsford-Sumas region includes a diverse set of fairly well organized stakeholders in a relatively small, transnational watershed. This diversity and scale provides a unique opportunity to work collaboratively with stakeholders to better understand and manage nitrogen.

The issues we struggle with are common to many other parts of the world. For example, excess nitrate concentrations in the aquifer

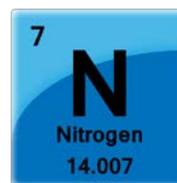
What is Nitrogen?

Nitrogen (N) is an essential element that is found in all living things. It builds the proteins that do the cellular work that keeps all organisms alive. Ironically, while we are surrounded by N (it makes up 78% of Earth's atmosphere), it is in a biologically unavailable form necessary for plant growth, including for agriculture.

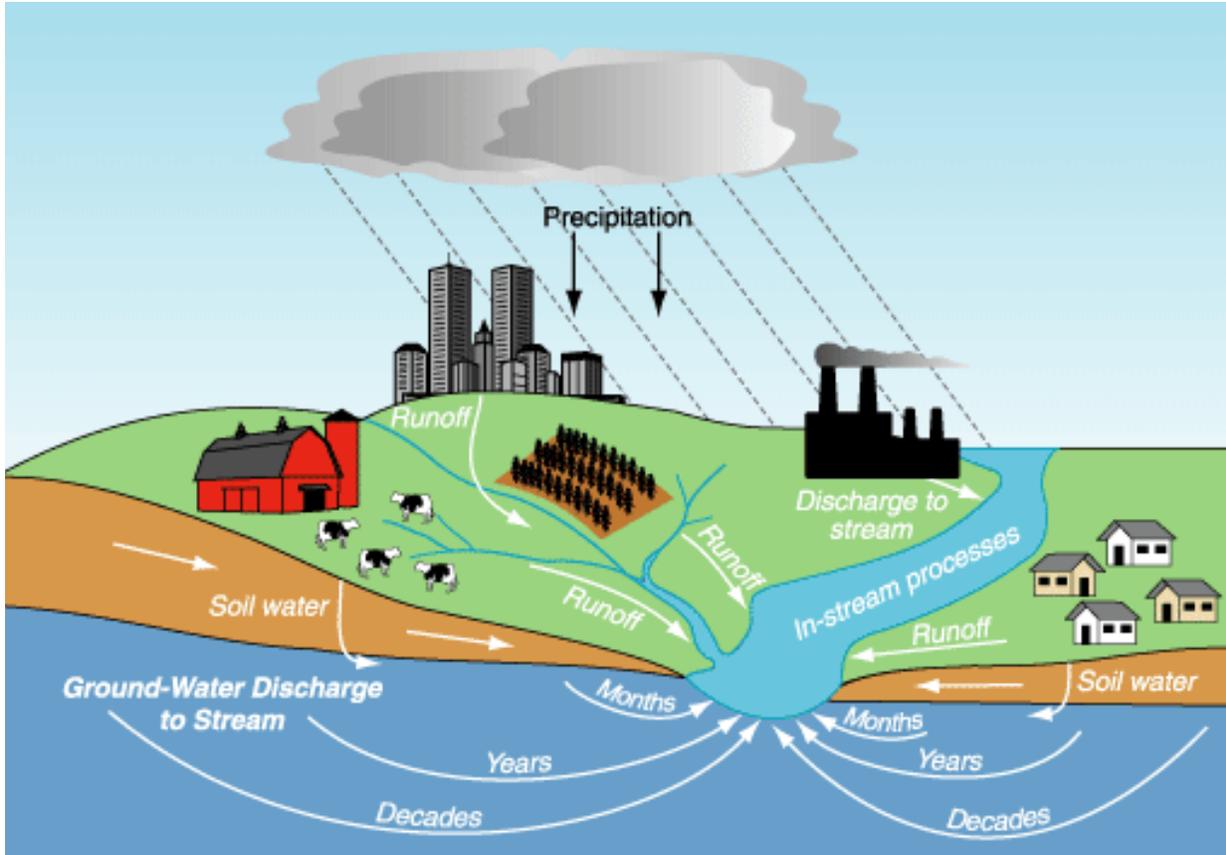
People have added this essential nutrient to increase crop production through use of legumes, recycling animal manures and plant residues, and industrial production of fertilizer. Ready access to cheap and abundant plant available N has contributed greatly to the abundance of affordable food



shared by Canada and the USA affect thousands of wells and households in both countries. Concentrations in some water supply wells often exceed U.S., Canadian, and international drinking water standards and guidelines of 10 ppm nitrate-N that were set to safeguard human health (especially infants). High concentrations have been observed since the 1970s.



in many parts of the world. Excess nitrogen use in some areas contributes to water pollution, in surface and groundwater. Biologically available nitrogen is also made as a by-product of burning fossil fuels for energy generation, industrial processes, and transportation. In such cases, it can be an important contributor to air pollution, such as haze or smog. The challenge society now faces is how to exploit nitrogen for its benefits in a sustainable manner without harming air, water, and soil. The health and well being of future generations is at stake.



Nitrogen sources and movement in a watershed. Source: USGS

Nitrogen has environmental impacts, and high concentrations can degrade surface water quality and may harm fish in the river. It can also contribute to localized ocean pollution, promoting toxic algal blooms or acidification. In addition to the shared aquifer and surface waters, our region shares an airshed. Emissions into the atmosphere of certain nitrogen forms, such as ammonia and nitrogen oxides from

transportation, agriculture, and metropolitan areas, including Vancouver, add to the regional nitrogen surplus. These forms of nitrogen in the atmosphere contribute to smog, poor visibility, and respiratory ailments in humans, and eventually are deposited back on the earth where they acidify both soil and water, and can be re-emitted in a new form that contributes to global warming.

How will this project help and inform the local community?

1. Create a comprehensive inventory of N inputs from many sources (including natural sources, inputs from urban land, emissions, and agricultural inputs).
2. Identify voluntary approaches and best practices to reducing nitrate losses to the environment.
3. Provide a website containing a spatial database on N loading and related air and water quality information to be accessed by local stakeholders.

The goals of the project are to:

1. **Create a nitrogen inventory:** Trace and quantify the sources and movement of nitrogen, both inside and outside our study area. The first step in the project is to gather all of the currently available qualitative (who and what) and quantitative (how much) information on nitrogen sources and uses including inputs and outputs. Next would be to quantify effects of different nitrogen types on resources (i.e., air, surface water, groundwater, soil, etc.), and to identify knowledge gaps.
2. **Share among stakeholders:** Bring together stakeholders in the study region to share the information collected in Step 1 and collect their input, knowledge and concerns. This second step aims to find out what kinds of information or management tools would be most useful to different stakeholders. Anyone affected by nitrogen in some way is a stakeholder who is welcome to participate, adding your information, knowledge, and perspective, such as:
 - a. People living here, using and working with the land, air and water resources,
 - b. Groups/entities supporting stakeholder deliberations by providing objective information and scientific understanding, and
 - c. Governmental representatives who might later on be responsible for supporting implementation of any strategies that are agreed upon by stakeholders.
3. **Identify and evaluate solutions:** Work with all stakeholders to develop a menu of strategies for dealing with regional nitrogen issues, along with pros and cons. The goal of this third step is to find ways to work together to protect local food production, the economy, and natural resources, including air and water. Gathering and presenting a common set of biophysical facts and viewing them from multiple socioeconomic perspectives can help everyone to understand the problems and to identify the preferred potential solutions to a variety of nitrogen-related issues.



Who are the parties involved?

An international team of scientists and natural resource professionals from Canada, the United States, the Lummi Nation and the Nooksack Indian Tribe are collaborating in this project to develop a regional nitrogen assessment for the Nooksack-Abbotsford-Sumas Transboundary Region. So far, about 50 individuals from a diverse array of agencies, organizations, tribes, and institutions have participated in initial meetings and correspondence. In addition to a small amount of financial support from the National Science Foundation and the Environmental Protection Agency, stakeholders donate their time and resources. Additional funding is being sought.

How do I interact with the project?

In order to make a successful and effective model of nitrogen use and cycling, we need the most current and accurate information we can gather. This will require stakeholders, individual land users and industries to assist us by providing data relevant and representative to their individual nitrogen use activities, including recommendations for best management practices based on local ideas. If approached for information, please consider working with us. The highest quality discussions about possible management strategies—which we want to encourage—will only happen if we have highest quality information to work with.

What do you plan to do with the data collected?

Locally, we hope to work with stakeholders to provide information that can be used to develop lasting nitrogen management solutions that benefit everyone in the Nooksack-Abbotsford-Sumas Transboundary Region. This may include promotion of successful nitrogen management practices, suggestions to modify current activities to reduce nitrogen losses, and looking to the future to reduce potential nitrogen losses. Our intent is to inform the public and stakeholders about nitrogen cycling in the project area with the hope that different sectors can use it to modify and promote

behaviors as appropriate. Our intent is not to use the data for regulatory purposes.

Internationally, the data, and the ways in which we use them, will serve as the North American demonstration project for the International Nitrogen Management System (<http://www.inms.international/>), a program of the Global Environmental Facility and the International Nitrogen Initiative. Other demonstration projects are being developed in Latin America, Africa, Western Europe, Eastern Europe, Asia, and Australia.

Will the data/results be used in a regulatory context?

If no, how can you ensure that? If yes, how does that affect me?

Our intent is to provide scientifically sound, objective information that can be used by local stakeholders to identify common regional goals and practical, comprehensive, and sustainable solutions where everyone, including people and their livelihoods, and the environment, benefits. More regulation should be the last and least preferable resort.

Who is involved?

Western Washington University
University of Washington – Vancouver
University of British Columbia
Northwest Indian College
University of Maryland
Colorado State University
Washington Department of Health
Whatcom Conservation District
Natural Resource Marketplace Working Group
Northwest Straits Commission
Washington State Department of Ecology
Washington State Department of Agriculture
Washington State Department of Health

British Columbia Ministry of Agriculture
British Columbia Ministry of Environment
Lummi Nation
Nooksack Indian Tribe
U.S. Geological Survey
U.S. Environmental Protection Agency
USDA Natural Resource Conservation Agency
National Park Service
National Oceanic and Atmospheric Administration
Environment and Climate Change Canada
Agriculture and Agri-Food Canada
International Nitrogen Initiative
International Nitrogen Management System

For more information please check our webpage or contact:

<https://drive.google.com/drive/u/0/folders/0B7CVzzwALo12NTI4dkc1Q3dHamM>

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