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Public Health

La Grande (LaForge-1), Canada

The issue of mercury contamination in fish within the La Grande complex (Canada) was identified, comprehensively researched, and strategies to mitigate any risks to human health were developed and implemented.

Overview

The James Bay territory, located in Northern Québec, Canada, lies between the 48th and 55th North parallels and covers 350,000 km² (135,187 sq. mi.).

The La Grande complex was constructed to produce electric power from the Grande Rivière and from the Caniapiscou and Eastmain rivers, which both have significant proportions of their flow diverted into the Grande Rivière catchment.

In its entirety, the complex is one of the largest hydropower installations in the world, with a generating capacity of 15,238 MW. The two-phase project comprised eight generating stations and required the impounding of eight reservoirs with a total surface area of 12,953 km², including 10 809 km² of flooded terrestrial area.

The complex is serviced by the longest high voltage transmission system in North America and cost upwards of 20 billion US dollars to build.

Dam Name

Scheme operator

Hydro Quebec

Size of scheme (MW)

15,238

Country

Canada

Catchment area

97400km²

River

Grande Rivière

Effective reservoir capacity

19.4 x 10⁹m³ (Robert-Bourassa Reservoir)

Construction years

1971-2000

Reservoir size2835km² (Robert-Bourassa Reservoir)**External recognition**

Nil

Details

Prior to construction of the La Grande Hydroelectric Project, mercury issues relating to water storage reservoirs had received little attention in the scientific literature. At La Grande, background mercury levels in fish were determined before creation of the first storage of the complex. An exploratory campaign was carried out 2 years after the inundation of the first reservoir, and the outcomes justified regular monitoring of mercury levels in fish within the lake environments. The Native Cree Indians were informed whenever monitoring revealed significant increases of mercury levels in fish.

To address the issue of increasing mercury levels due to hydroelectric developments, Hydro-Québec established a Mercury Research and Management Program that included:

- monitoring of mercury levels in fish of modified environments of the La Grande complex;
- development of models predicting mercury levels in fish of reservoirs;
- assessment of risks to piscivorous fauna;
- study of the sources and fate of mercury in natural environments and hydroelectric storages of Northern Québec;
- study of intensive fishing as a means of reducing mercury levels in fish of natural lakes and reservoirs;
- assessment of the health risks and benefits associated with the consumption of La Grande region fish;
- participation in a Canadian Department of Fisheries and Oceans study of the production of methylmercury in experimental reservoirs.

A number of these studies were carried out in collaboration with Government Organizations such as the Canadian Wildlife Service and the National Science and Engineering Research Council of Canada (which supported part of the funding of the Environmental Chair).

The James Bay Mercury Agreement between the Government of Québec, the Cree of Québec and Hydro-Québec was signed in 1987 and aimed to reduce the health risks and provide remedial measures allowing the Cree to carry on their traditional hunting and fishing activities and maintain their way of life. This 10 year Agreement (1987-1996), dealt with health, socio-cultural and environmental aspects of the mercury issue. For each of these aspects, research, monitoring and mitigation were performed under the guidance of a steering committee. The monitoring of mercury levels in fish and the level of exposure of Cree to mercury continued under the Agreement.

A critical review of potential mitigation measures for reducing mercury levels of fish in new reservoirs failed to reveal any realistic solution. Reasons for this include potential harmful side effects, economic and technical impracticability. Activities were then reoriented towards remedial measures to reduce health risks:

- subsidies for family and community fishing in natural lakes;
- subsidies for coastal fisheries of anadromous species;
- wildlife enhancement schemes;
- schemes to increase harvesting of migratory waterfowl, etc.

Appropriate biological monitoring of the fisheries was financed to avoid over harvesting. Information tools, such as booklets, maps and videos, were developed and information campaigns were delivered in Cree communities to improve awareness of the mercury issue and the health risks and benefits related to fish consumption. Fish consumption advisories were distributed to Cree sport and subsistence fishers, according to exposure criteria of the Cree Regional Board of Health and Social Services of James Bay.

Other aspects

[Environmental Assessment and Monitoring](#)

Mercury accumulation in fish as a result of dam construction was little known in the scientific literature prior to the La Grande Project. Considerable collaborative effort between the scheme owner, research institutions and government agencies resulted in a very significant knowledge bank on the subject.

Further information

Source: Hydropower Good Practices Workshop, Annex VIII - Examples for Good Practice Report, Villach, Austria, October 2005. International Energy Agency.

http://www.hydroquebec.com/visit/virtual_visit/index.html

http://en.wikipedia.org/wiki/James_Bay_Project#Environmental_Impact

Chevalier, G., Dumont, C., Langlois, C., Penn, A., 1997. Mercury in northern Québec: role of the mercury agreement and status of research and monitoring. *Water, Air and Soil Pollution*, vol. 97 (1977), p 53-61.

Lucotte, M., Schetagne, R., Thérien, N., Langlois, C., Tremblay, A., 1999. Mercury in the Biogeochemical Cycle : Natural Environments and Hydroelectric Reservoirs of Northern Québec. Berlin : Springer. 334 p.