Key Issues:

8- Minority Group

1-Biological Diversity

13- Improvement of Infrastructure

Climate Zone:

Df: Severe, with precipitation in all seasons

Subjects:

- Joint implementation of remedial measures with indigenous people

Effects:

- Facilitating traditional activities for Cree Indians
- Capacity building
- Preserving biodiversity
- Enhancing wildlife habitat and territory access conditions

Project Name: La Grande Complex (Laforge-1)

Country: Canada

Implementing Party & Period

- Project: Hydro-Québec
1971 - 2000

- Good Practice: Opimiscow-Sotrac Company (Hydro-Québec and the Cree of Québec)
1993 - 1997

Key Words:

Joint implementation of mitigation measures, capacity building, sustaining traditional activities, enhancement of wildlife habitat and access conditions

Abstract:

A large-scale program aimed at the implementation of mitigation measures was jointly carried out by Hydro-Québec and the Cree in connection with the development of Laforge-1 and Laforge-2 hydroelectric projects in a remote area of Northern Québec, the James Bay territory. This venture required setting up a framework in the form of a jointly operated non-profit corporation. The remedial works were determined in consultation with Cree users of the territory. The five-year Remedial Works Program implemented an array of measures reflecting the priorities of Cree hunters—improving territory access for the pursuit of traditional activities, mitigating impacts of the projects on wildlife habitats and creating infrastructures that were later recycled by the Cree to develop tourism.

1. Outline of the Project

The Caniapiscau-Laforge Diversion, located in the northeast sector of the James Bay territory, is an important part of the La Grande complex. When this 230-km-long diversion was commissioned in 1984, its purpose was essentially to channel water from the upper Caniapiscau basin to the La Grande River and its generating stations. In 1989, a second construction phase was undertaken to develop its remaining hydroelectric potential. This complementary development included the construction of three generating stations with a total installed capacity of 1,700 MW and also called for the impoundment of a new reservoir and the construction of additional power lines and access roads.

Fig. 1: Location map of the project

2. Features of the Project Area

The James Bay territory covers approximately 400,000 km^2 between the 49th and 55th parallels in Northern Québec. The whole region is part of the Canadian Shield, a 2.5—billion-year-old geological formation of igneous and metamorphic rock. The successive passage of glaciers has significantly altered regional topography. The eastern sector features hilly terrain and numerous lakes, with a cold continental climate. The minimum average temperature is approximately –23^{O}C in January with peaks down to -50^{O}C and a maximum average temperature of around 14^{O}C in July. The vegetation is of the Northern taiga type. The low evergreen forest is mainly composed of black spruce, tamarack and jack pine. Peat bogs are also abundant in the region. These vast open areas, as well as the dense network of rivers and lakes, host numerous nesting grounds for duck and geese, which are of great interest to Cree hunters.

No permanent native settlement exists in the vicinity of the Caniapiscau-Laforge Diversion. Traditionally,

the area's wildlife resources have been harvested by Cree hunters from the Chisasibi community – a 3,500-person settlement on the coast of James Bay, some 500 km west of the Caniapiscau-Laforge Diversion. This is why the ancestral Cree hunting territory is loosely governed by family units, a remnant of the old fur trading days. Nowadays, most Chisasibi hunters go to their eastern hunting territories on a seasonal basis and participate in goose hunting in fall and trapping in late fall, caribou hunting and trapping in winter, waterfowl hunting and fishing in spring, and fishing in summer.

Fig 2: Typical peat in the Northern taiga

3. Major Impacts

Brisay and Laforge-2 generating stations were built at the outlet to existing reservoirs and involved minimal environmental impacts. The Laforge-1 development, on the other hand, involved the creation of a new reservoir. Laforge 1 Reservoir covers approximately 1,300 km2. It has an average depth of 5.6 m and is dotted by over a thousand islands and islets. This impoundment brought about flooding of prime riverside habitat and waterfowl nesting sites.

In addition to the loss of trapping and hunting grounds, it also created significant navigation and access problems for Cree users.

Fig. 3: Flooded trees in Laforge 1 Reservoir

Fig. 4: Partially dried-up Vincelotte River bed

Besides the creation of a vast and shallow reservoir, another significant environmental issue in the Laforge-1 development was the diversion of the Vincelotte River. This 75 km-long river stretch was to be partially dried up following the construction of the Vincelotte dam. The flow at the mouth of the Vincelotte River was to be reduced by about two-thirds, from its original 67 m^3/s to 21 m^3/s. As a result, the average water level would be lowered by one to two metres in the various river sections.

4. Mitigation Measures

Some new components of the Caniapiscau-Laforge Diversion, such as the Laforge-2 generating station and its related structures, were not included in the original description of the La Grande complex as agreed upon in the *James Bay and Northern Québec Agreement1* (JBNQA). In addition, the Cree and Hydro-Québec did not agree as to whether the final design of Laforge-1 development complied with its description in the JBNQA. In order to settle this litigious issue, the parties negotiated an amendment to the JBNQA and signed the *Opimiscow-La Grande Agreement (1992)*, in which they agreed upon remedial measures to

The *James Bay and Northern Québec Agreement* (JBNQA) was signed in November 1975 by the Government of Canada, the Government of Québec, Hydro-Québec, the James Bay Energy Corporation (a subsidiary of Hydro-Québec), the James Bay Development Corporation, the Cree and the Inuit.

The JBNQA is a landmark agreement in Aboriginal land and land-use claims. It established mechanisms for mitigating the environmental impacts of hydroelectric projects and activities and for supporting traditional economic pursuits. However, the agreement was first and foremost a social contract between aboriginal nations and the government; only one chapter out of thirty actually deals with hydroelectric development.

The JBNQA took two years of exhausting, intense, high-level negotiation to hammer out. Since then, this trail-blazing agreement has shaped relations not only between Hydro-Québec and the Cree but also with other indigenous nations throughout the province of Québec.

be implemented in the area of the Caniapiscau-Laforge Diversion to correct the impact of the projects or to compensate for the loss of harvesting areas by increasing the carrying capacity and enhancing habitats around the project sites.

For this purpose, Hydro-Québec agreed to provide the Cree with a C$25 million Remedial Measures Fund. The parties also agreed to create a non-profit organization called Opimiscow-Sotrac Company in order to carry out the mitigation works.

The Opimiscow-Sotrac Company

The Opmiscow-Sotrac Company's mandate was to study, plan, evaluate, authorize and carry out the various remedial measures required to achieve the following goals:

- facilitate the pursuit of native traditional activities
- alleviate the negative impacts of the hydroelectric projects
- facilitate the use by the Cree of the area affected by the projects
- preserve the productivity as well as the biological and visual quality of the environment
- restore wildlife habitats

The board of directors of the Opimiscow-Sotrac Company had six voting members. Three were appointed by the Cree and the other three by Hydro-Québec. Any resolution taken by the board had to have the consent of the majority, including at least one member of each party. The Opimiscow-Sotrac Company also relied on the services of a secretary and a general manager.

A major issue for the Opimiscow board of directors was to provide an efficient framework of cooperation between the Cree and Hydro-Québec, which was achieved using the following consultation process. First, affected users were supplied with the appropriate information (maps, technical advice, etc.). Next, the general manager consulted users about desirable projects. Finally, users' recommendations were forwarded to the board, which approved and oversaw the execution of the

initiatives.

Mandating an indigenous company with project management responsibilities

According to the Opimiscow-La Grande Agreement, remedial measures, as a general rule, were to be carried out by Cree entities. In compliance with this provision, Chee-Bee Cree Construction (CBCC) was chosen to do the work. CBCC is a joint venture formed by Chisasibi-based Chee-Bee Construction and the Cree Construction and Development Company Ltd.

Beyond its role as project manager, CBCC was also responsible for financial budgeting and planning, supply and coordination of logistics services to the other participants and quality control. From the very beginning, CBCC was involved as technical advisor for the planning and selection of remedial measures.

CBCC maintained permanent and temporary facilities on the territory to cope with the remoteness of the area. The construction of a permanent camp (shown below) was necessary given the magnitude and the duration of the work,. These infrastructures are now managed by the Cree as tourist accommodations.

Fig. 5: Permanent work camp Kiskimaastakin ("The Portage" in Cree)

Capacity building

A training program was given during the first four years, in compliance with the Opimiscow program favoring the development of human resources and the goals sought by CBCC. The programs were essentially coaching-based.

The following table shows the types of jobs involved and the length of the training sessions.

Personnel Training					
Job Title	***Number of Weeks***				
	1993	1994	1995	1996	**Total**
Assistant project manager	12	-	22	-	**34**
Assistant coordinator	-	-	11	21	**32**
Camp manager	-	-	-	13	**13**
First and assistant cook	-	20	38	-	**58**
Administrative clerk	12	9	16	19	**56**
Maintenance men/camp	-	22	19	23	**64**
Mechanic/small tools	12	-	-	-	**12**
Foreman/mechanic piling	-	14	-	-	**14**
Apprentice tallyman	-	-	-	9	**9**
Total	**36**	**65**	**106**	**85**	**292**

The success of the on-the-job training programs prompted CBCC and the employees involved to further develop their skills, via the following activities:

- Training sessions with the Chee-Bee Cree Construction and the Cree Construction and Development Company
- Winter land surveying courses
- First aid courses in remote areas
- Cooking courses

These courses were financed by CBCC and local organizations.
The results of these training programs were very positive. Many employees took advantage of the opportunity to develop or to improve their skills and were subsequently able to find permanent jobs in their community.

Implementation of mitigation measures
Generally speaking, the remedial measures established by Cree users involved improvement of access to the territory and harvesting conditions or enhancement of wildlife habitats. The two major areas where remedial measures were undertaken are Laforge 1 Reservoir and the Vincelotte River. The mitigation works carried out in each of these sectors were determined by considering the scope of the impacts and the enhancement possibilities of the local environment.

Fig. 6: Cree workers building a weir on the Vincelotte River

The following is a more detailed description of the remedial works developed by the Opimiscow-Sotrac Company:

Accessibility and use of the territory
- Building access roads, weirs and boat launches near Laforge 1 Reservoir and along the Vincelotte River
- Cleaning and marking navigation corridors and pre-selected shore sections for boat landings in the area of the future Laforge 1 Reservoir prior to impoundment
- Clearing net fishing areas prior to impoundment of Laforge 1 Reservoir
- Building portages with hauling structures along the Vincelotte River
- Excavating navigation channels in shallow stretches of the Vincelotte River
- Clearing traditional portages around Laforge 1 Reservoir to facilitate travel to neighboring hunting territories

Fig. 7: Construction of the Vincelotte access road

Fig. 8: Vincelotte River access ramp and canoe racks

Fig. 9: Portage with hauling structure Vincelotte River

Fig. 10: Navigation corridor before impoundment Laforge 1 Reservoir

Enhancement of wildlife habitat

- Deforesting vast areas around Laforge 1 Reservoir (50 to 250 ha) to recreate an open waterfowl habitat (complementary topsoil tilling, seeding of grassy plants and creation of shallow wet zones)
- Building weirs (4) along the Vincelotte River to raise water levels and restore fish habitat (facilitating navigation was a secondary objective)
- Seeding grassy plants on newly exposed parts of the shore of the Vincelotte River and mechanical control of invading shrubs
- Clearing islands in Laforge 1 Reservoir to create nesting habitats for waterfowl and seagull
- Clearing summit of hills around Laforge 1 Reservoir to create snow goose migration staging areas
- Felling of dead wood and clearing of ligneous debris on the reservoir shores
- Mowing of berry plants

Fig. 11: Cree worker deforesting waterfowl area

Fig. 12: Topsoil tilling of waterfowl area

Fig. 13: Waterfowl staging area in Laforge 1 Reservoir

Fig. 14: Cree seeding grass in waterfowl area Laforge 1 Reservoir

Fig. 15: Seeded plot in waterfowl area Laforge 1 Reservoir

Fig. 16: Combination of tree clearing and seeding Vincelotte River

Fig. 17: Concrete weir with control structure Vincelotte River

Fig. 18: Clearing nesting grounds on islands

Fig. 19: Clearing snow goose staging area on hill

5. Results of the Mitigation Measures

The remedial measures of the Opimiscow program took place over a five-year summer period from 1993 to 1997. The positive and active approach of the promoter, the Opimiscow Company and the master builder, Chee-Bee Cree Construction (CBCC), promoted innovative joint management activities. Mitigation measures were determined through ongoing consultation with territory users. These consultations were carried out by three groups of participants: the board members of the Opimiscow Company, Cree users and CBCC staff.

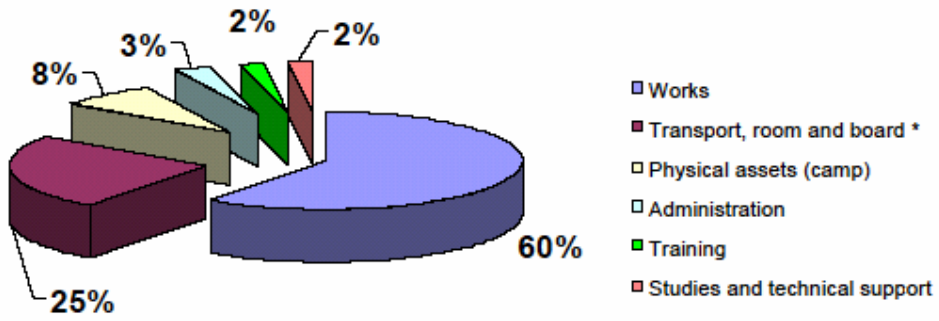
Given their interest in the project, a large number of Cree participated in the remedial measures program, which contributed to the success of the training programs. The CBCC's dynamic approach also favored technology transfers to the benefit of Cree workers. At the end of the five-year program, many CBCC employees found jobs in their communities in their fields. Several are now qualified to supervise major work sites, isolated camps and forest crews. Participants are justifiably proud of the program's success and the skills they have developed.

Throughout the program, employees felt that they were fully involved in selecting the initiatives and work methods to be used as well as in performing the actual work. Their excellent knowledge of the territory allowed mistakes to be avoided and appropriate modifications to be made based upon their recommendations.

Overall, the remedial measures program shows highly positive results and the area now boasts new infrastructure to facilitate hunting, fishing and trapping activities.

Many of the environmental initiatives are innovative and very positive. Most of the wildlife deforestation, weir construction, waterfowl management areas, and seeding of grassy plants measures have been successful, even if some of the experimental work such as the creation of wet zones with low dikes did not meet all expectations. The intensive use of the waterfowl management areas show the relevance of these initiatives.

The following breakdown of the C$25 million budget shows that most of the money has been used for the development of environmental protection and enhancement measures, demonstrating the efficiency of the joint management mode set up to implement the program.



* The fraction of the budget devoted to logistics is due to the remoteness of the general work area as well as the need to use special transportation means such as helicopters.

Fig. 20: Breakdown of the C$25 million budget (%)

A follow-up assessment of the Opimiscow remedial measures took place in 1999. Bird aerial censuses were conducted along the Vincelotte River and around Laforge 1 Reservoir. A general assessment of the lasting quality of the remedial works and infrastructure built during the program was also done during

summer 1999.

Bird inventories revealed a moderate increase in the number of anatids (ducks and geese) along the Vincelotte River. The results are much more conclusive in the case of the vast open waterfowl habitats created around Laforge 1 Reservoir. For example, the density of anatids on the larger of the Laforge-1 Waterfowl Management Areas (250 hectares) was 76 birds/km^2,, compared with 3.2 birds/km^2 on the unmanaged control plots around Laforge 1 Reservoir, a 20-fold difference. Bird inventories also showed that other birds such as threatened osprey and short-eared owl were taking advantage of the open areas created.

Table 1: Evolution of Waterfowl Populations – Vincelotte River

(Number of individuals registered per 10 km via helicopter survey)

Year	*Project Work Phases*	*Number of Individuals*
1982	Before start of construction activities	2.2
1984	Completion of partial river diversion	15.0
1993	Completion of total river diversion	44.5
1995	Before implementation of mitigation measures	58.7
1999	After implementation of mitigation measures	69.4

Table 2: Summary Results of Bird Counting in 1999

	June	*July*
Total inventoried individuals	**430**	**518**
- in enhanced habitat areas	240	121
- in pristine areas	190	397
Canada geese	257	291
American black ducks	59	131
Mergansers	69	56

The 1999 follow-up of remedial measures also confirmed that the infrastructure built by Opimiscow-Sotrac Company for the benefit of the Cree was indeed being used. Since 1995, Cree trappers have built a dozen permanent cabins along the 9-km access road to the Vincelotte River, among others. Finally, a valuable by-product of the Opimiscow Remedial Works Program has turned out to be the 100-person permanent camp built in 1993 to accommodate program participants, recycled for tourism in 2001. A Chisasibi-based Cree company now offers caribou hunting packages at Kiskimaastakin Camp ("the Portage" in Cree) and is considering developing sport fishing packages.

Fig. 21: Cree trapper cabin and snowmobiles along Vincelotte access road

6. Reasons for Success

Given the active involvement of Cree trappers and the primacy of their recommendations in the Opimiscow decision-making process, it was to be expected that mitigation measures and works would be oriented toward environmental components and species of particular interest for traditional activities. This approach also provided the opportunity to experiment with innovative remedial measures. Among others, the creation of large open areas around the new Laforge 1 Reservoir was very effective in replacing lost waterfowl riverine habitats, thus preserving biodiversity in an area directly impacted by the hydroelectric development. The infrastructure built to facilitate access to the territory for the Cree has also been beneficial and is helping maintain traditional activities in this region.

Hydro-Québec's approach with respect to mitigation measures opens the doors to the direct involvement of local communities. Close involvement of Cree users in the determination and implementation of the Opimiscow remedial measures not only guaranteed the compatibility of these measures with the pursuit of their traditional activities, but also confirmed their role as partners in the development and involved them in the sharing of financial benefits.

7. Outside Comments

The Caniapiscau-Laforge Diversion is located in a remote territory, more than a thousand kilometres away from any major non-native settlement. Also, despite its magnitude, this development is only one of many in the La Grande Complex and is not as well-known as some of the older and larger ones (La Grande-2, La Grande-3, and La Grande-4). This may explain why the Opimiscow-Sotrac venture has failed to raise much media attention. However, the Opimiscow Remedial Works Program has since been cited as a success story by the Cree Nation and constitutes a guideline in the joint implementation of mitigation measures for other hydroelectric developments. Environmental follow-up studies on waterfowl have been conducted in collaboration with one of the regulatory agencies involved, Environment Canada.

8. Further Information

8.1 References

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