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Nature's Power and Native Persistence: The Influence of First Nations and the Environment is the Development of the Mattagami Hydro-Electric System During the Twentieth Century

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Résumé de l'article

A ce jour, la plupart des analyses du développement hydroélectrique présentent l'environnement et les peuples autochtones comme autant de victimes incapables d'infléchir ou de contrer ce type d''intrusion dans un pays. Pourtant, l'histoire des ouvrages de la rivière Mattagami dans la région nord-est de l'Ontario montre que les conditions environnementales exercent une influence constante sur la forme et le déploiement d'un système hydroélectrique. De plus, la faculté des autochtones du nord-est de peser sur les décisions concernant les travaux est récemment sortie des limites dans lesquelles la plus grande partie de ce siècle l'avait confinée. La combinaison de leur acharnement et des changements judiciaires et législatifs a permis aux Premières nations de négocier avec Ontario Hydro un moratoire sur les futurs projets d'exploitation de la rivière Mattagami.

Nature's Power and Native Persistence: The Influence of First Nations and the Environment in the Development of the Mattagami Hydro-Electric System During the Twentieth Century

JEAN MANORE

Résumé

To date, most analyses of hydro-electric development portray the environment and Aboriginal Peoples as victims unable to alter or resist its intrusion on to the landscape. However, an examination of the Mattagami river developments in northeastern Ontario illustrates that environmental conditions constantly influence the shape and development of the hydro-electric system. Also, while the ability of the northeastern Aboriginal Peoples to affect hydro-electric development is limited for much of this century, by the 1990s, their persistence and perseverance coalesces with changing court decisions and legislation, empowering them to negotiate with Ontario Hydro a moratorium on further development on the Mattagami River.

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À ce jour, la plupart des analyses du développement hydroélectrique présentent l'environnement et les peuples autochtones comme autant de victimes incapables d'infléchir ou de contrer ce type d'intrusion dans un pays. Pourtant, l'histoire des ouvrages de la rivière Mattagami dans la région nord-est de l'Ontario montre que les conditions environnementales exercent une influence constante sur la forme et le déploiement d'un système hydroélectrique. De plus, la faculté des autochtones du nord-est de peser sur les décisions concernant les travaux est récemment sortie des limites dans lesquelles la plus grande partie de ce siècle l'avait confinée. La combinaison de leur acharnement et des changements judiciaires et législatifs a permis aux Premières nations de négocier avec Ontario Hydro un moratoire sur les futurs projets d'exploitation de la rivière Mattagami.

Those few histories that study hydro-electric systems and their relationship with nature and Native Peoples discuss one idea only, the idea of power – the power of technology to transform the environment. Often surrounding this discussion is a moral debate over whether these transformations are inherently good or bad for humanity. For most of the twentieth century, writers portrayed hydro-electric technology as the agent that gave entrepreneurs the power to harness nature's wealth for the service of humankind. Through technology, engineers brought rivers under control: dykes and canals diverted flows and dams created storage reservoirs. The result, as evidenced in such works as

Merrill Denison's *The People's Power*, was a booming economy and an increased standard of living. Industrial technology also proved the "superiority" of Western culture as other cultures, in particular Aboriginal ones, seemed unable to withstand its advance. During the first half of the century, technology was the conquering hero, the consummate agent of control, and while some regret may have been expressed over certain losses as a result of technological progress, the benefits far outweighed the costs.

In recent years, feelings of regret have gained in importance. Technology is still a conqueror, but no longer idolized as such. Now hydro-electric power is more commonly portrayed as a creator of victims, rather than benefits. It is portrayed as the destroyer of the environment and the oppressor of Aboriginal peoples. This coincides with public concerns about the impact of hydro-electric development on the environment, and on First Nations who rely on rivers for their subsistence. Manitoba and Quebec, in particular, have become the focus of intense anthropological, historical and ecological scrutiny, because the governments of these two provinces have supported large-scale diversion projects in their northern regions over the past two decades. James Waldram has criticized Manitoba's diversion of its rivers in his *As Long as the Rivers Run.*[1] Boyce Richardson has used similar arguments in his critique of Quebec's James Bay projects in his book, *Strangers Devour the Land.* These studies have looked askance at the claim that hydro-electric development is "environmentally friendly" and stand in stark contrast to earlier writings. They have also criticized the non-Native governments for dismissing as invalid Aboriginal uses of the rivers and denying Aboriginal rights in general.

Additionally, Fikret Berkes has written extensively on the environmental impacts of hydro-electric projects on river systems and the species of flora and fauna that depend upon their waters. His list of over twenty possible impacts includes the flooding of land and loss of wilderness areas, the reversal of natural seasonal flow patterns, the loss of fish habitat, river bank erosion downstream from dams, the creation of dead zones around reservoirs, and mercury accumulation in reservoir fish.[2] The sheer length of his list, let alone the data that support it, leads people to believe that the riverine environment is a victim of technological "progress."[3] Despite the current popularity of these studies, our understanding of the relationship between technical systems and the environment remains limited.

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1. For another example of this approach to technology and the environment see: Martin Loney, "The Construction of Dependency: The Case of the Grand Rapids Hydro Project," *The Canadian Journal of Native Studies*, VII, 1 (1987): 57-78.
2. Toronto. Ontario Hydro Public Reference Centre (OH/PRC), Ontario Hydro Demand/Supply Plan Environmental Assessment (hereinafter DSP/ EA), Exhibit #807, "Environmental Impacts of Large Hydroelectric Projects" (Fikret Berkes), 7-10.
3. The debate about the negative effects of technology on the environment is not a closed one. Scientists have pointed out that the level of environmental destruction to rivers is hard to determine because there was very little knowledge of the riverine environments before construction of the dams took place. For a discussion that includes this perspective see: Sean McCutcheon, *Electric Rivers: The Story of the James Bay Project* (Montreal, 1991).

There is more that can be learned about the interaction between the environment and technical systems than what is derived from studying the "conquest" of it and the victimization of the First Nations. The literature to date tells us little about the characteristics of the rivers and their environment that might have imposed constraints on hydro-electric development. Similarly, little has been written on the ability of the First Nations to overcome the difficulties posed by hydro-electric development or to resist it. One notable exception to this is Michael Posluns, *Voices from the Odeyak*, a chronicle of the James Bay Cree campaign against hydro-electric development in their homeland.

Nature does have the power to affect hydro-electric development profoundly and the First Nations have effectively resisted the assimilationist tendencies of western technologies; recently, they have even been able to stop further development. Thus, a much broader perspective is needed to understand fully how technical systems interact with the environment and with the First Nations; specifically, how these two actors affect the planning of systems designers when trying to develop hydro-electric power sites. Their importance in the development process is amply illustrated by the history of hydro-electric development on the Mattagami river.

The Mattagami River flows north out of Lake Mattagami just east of Gogama and drains into the Moose River at a point 96 kilometres upstream of James Bay. The Mattagami drainage basin, comprised of the Mattagami, the Kapuskasing and the Groundhog Rivers, lies generally between the communities of Kapuskasing and Smooth Rock Falls in the north and Chapleau and Timmins in the south. Total fall over the length of the river is approximately 329 metres, two hundred metres of which is presently developed.[4]

Hydro-electric development along the Mattagami River system consists of a series of storage lakes, dams and generating stations. Control dams within the Mattagami basin, which regulate water levels but also serve as storage, are Mesomikenda Lake, Mattagami Lake, the Opasatika Diversion and Peter Long Lake. Smoky Falls, Sandy Falls, the Lower Sturgeon, Little Long and Harmon, Wawaitin and Kipling are all generating stations. Sandy Falls, the oldest of these, was built and brought into service by the Hollinger Syndicate to supply power to its Porcupine mines in 1911. In June 1912, Hollinger sold the station to Northern Canada Power Corporation. This company expanded the station's energy output in 1916. The development of the Wawaitin (pronounced Wa-we-at-in) generating station was originally undertaken by a private entrepreneur from Montreal, E.A. Wallberg, but he sold out to Northern Canada Power in 1912. This organization then completed the construction of the plant, again to serve the Porcupine mines. Northern Canada Power (Northern Ontario Power after 1928) was also the original developer of the Lower Sturgeon station, which was built in 1923.

4. Toronto. OH/PRC, Environmental Studies and Assessments Department, "Mattagami River, Preliminary Environmental Appraisal of Hydroelectric Development Potential between Yellow Falls and Grand Rapids," Report No. 82071, June 1982, Appendix A, A.1.

In the early 1930s, the Hydro-Electric Power Commission of Ontario, familiarly known as Ontario Hydro but hereinafter referred to as the HEPCO, entered northeastern Ontario by purchasing Sudbury's municipal generating facilities and by taking over the development of the Abitibi Canyon power source from the Abitibi Pulp and Paper Company. Northern Ontario Power sold its power generating stations, including those on the Mattagami river, to the HEPCO in 1944. Little Long, Harmon, and Kipling stations were brought into service by the HEPCO in 1963, 1965, and 1966 respectively. The Spruce Falls Power and Paper Company developed the Smoky Falls generating station in the early 1920s. Negotiations for its transfer to the HEPCO were finalized in 1993.[5]

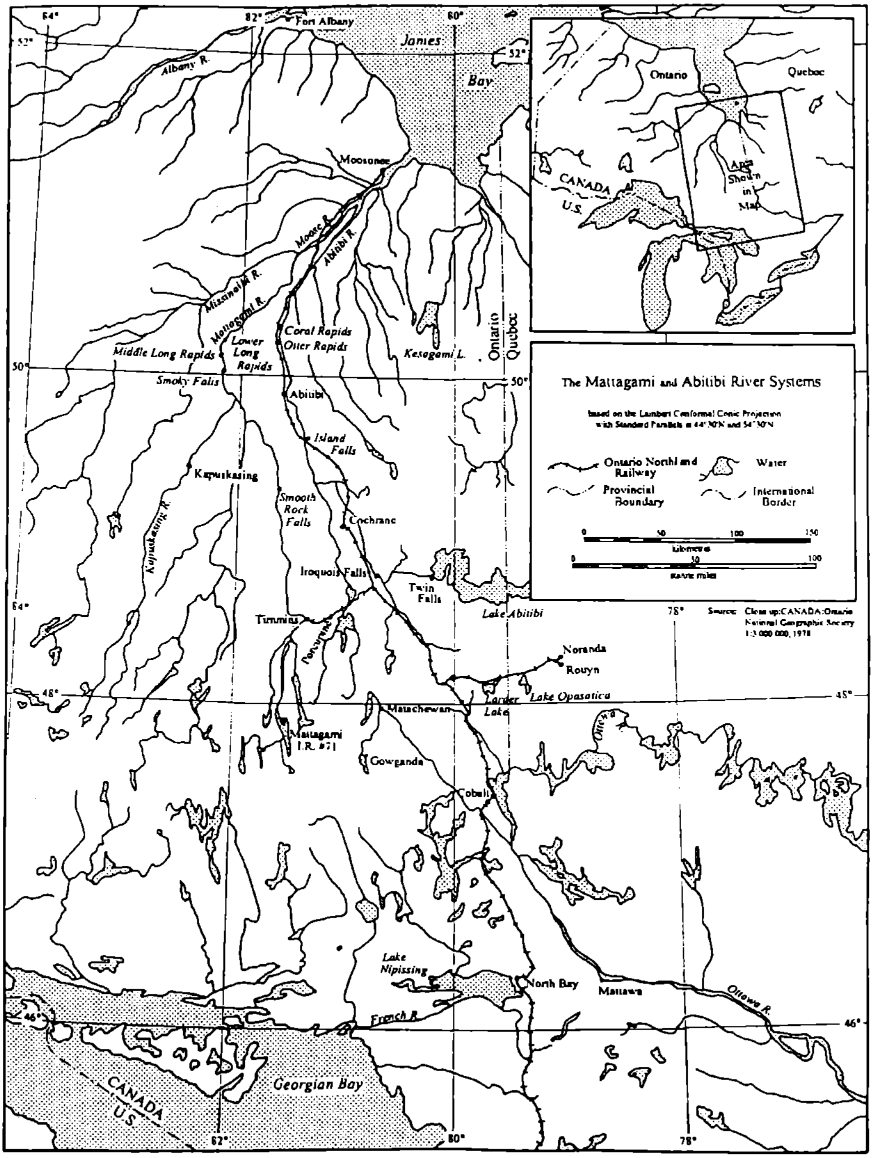
The preceding description gives the impression that the Mattagami hydro-electric system is a complex and well-developed technical system with no hint of the constant interaction between people and the environment that goes into the planning of such systems. So important is this interaction that even before hydro-electric development can begin, a compatible natural environment has to exist in order for the building of that system to succeed.

Rivers are part of a natural system that does not always cater to the demands of hydro-electric system designers. The linear progression of the Mattagami from headwaters to the sea takes place within a system that follows a cyclical pattern. The seasonal cycle is well-known: the rivers unfreeze from their winter locks, burst over during spring freshets, warm in the summer, empty in the fall and freeze over again in winter and, in the process, give shelter and food to fish and wildfowl and nourishment to wildlife. Also, rivers are part of another cycle, the hydrological cycle. Rivers fill with rainwater and run-off and then drain by discharging into the sea or through evaporation that occurs at any time and any place along the river. The water that is evaporated later returns to the river in the form of precipitation and the cycle begins again.

System designers appreciated this cycle to the extent that they viewed hydro-electricity as a "renewable" resource; however, their ideas about renewability clashed with the reality that the hydrological cycle was an unpredictable one: recurring droughts in northeastern Ontario were a persistent problem for system designers throughout the twentieth century. Hence, Nature was more than a mere backdrop for development; it was a significant actor in the drama.

The importance of environmental factors in shaping the development of the Mattagami system can perhaps be illustrated by way of a question: why have there been no massive hydro-electric undertakings on the west coast of James Bay similar to that on the east coast of James Bay? After all, HEPCO engineers were just as keen as their Quebec counterparts to develop all available hydro-electric resources; they did undertake a large diversion project, known as the Ogoki diversion, in Northwestern Ontario

5. Glynis Biggar, *Ontario Hydro's History and Description of Hydro-Electric Generating Stations* (Toronto, 1991), 289.



The Mattagami and Abitibi River Systems (Michael Dickson 1994).

in 1942, and they had few qualms about flooding villages, as evidenced by the submerging of settlements along the St. Lawrence during the 1950s and of Native communities in the north in the 1960s. An examination of the documents reveals that environmental factors in northeastern Ontario prevented the type of development that occurred along James Bay's eastern shore.

Comparing the geology of eastern and western James Bay reveals many similarities but two important differences. The Ontario side of James Bay consists mostly of unconsolidated or "loose" material, including glacial deposits, gravels, sands, clays, and organic terrain such as muskeg and bogs. In Quebec, while there is some unconsolidated material, there is also a substantial amount of bedrock.[6] The "unconsolidated material" in northeastern Ontario and to a certain extent in northwestern Quebec consists of what are called gleysol, fibrisal and mesisol soils. The latter two soils are peatland covering permafrost and indicate a low-lying area of extremely poor drainage.[7] In Ontario, these wetlands make up 61 percent or more of any given topographic, section whereas in Quebec the percentage is between 12 and 51 percent.[8] Bedrock provides a much more stable foundation for dam construction than "loose materials." Wet earth and permafrost cannot be used as dam materials because the moisture would prevent suitable compaction of the earthen works and permafrost can cause frost heave.[9]

The earliest hydro-electric developers knew about these geologic shortcomings after federal and provincial surveyors explored the northern territories from 1879 onward. E. B. Borron in that year cruised the Albany, Moose, Abitibi and Harricanaw region. He reported that "the shores of James' Bay, from the eastern boundary to the Albany river, are low and flat, and the bay is exceedingly shallow."[10] In his 1880 report regarding the coast of James Bay, Borron, when heading inland, noted that:

> the ground became wetter and wetter, that sphagnum moss covered the surface to a greater and greater depth, and that generally in less than half a mile we came to where peat had been formed; that as these peat-mosses increased in depth, first the poplar, aspen and birch would give place to spruce, and to what is called in this country juniper or tamarack....The cause of this is owing partly to the climate and partly to the soil, but chiefly to the physical conformation of the country.[11]

The weakness of the soil structures has remained a hindrance to hydro-electric development in northeastern Ontario and is a source of another difficulty in developing hydro-electric power. Along the Mattagami river itself, hydro officials, as late as 1982, noted the problem of erosion:

> There are examples of active bank erosion, particularly on steeply sloped banks composed of overburden (eg., glacial tills and marine clays) within the headponds of exist-

6. Canada, Energy, Mines and Resources, *The National Atlas of Canada* (Ottawa, 1974), 37-38.
7. Ontario, Royal Commission on the Northern Environment, *North of 50°. An Atlas for Far Northern Ontario* (Toronto, 1985), Plate 14.
8. *National Atlas*, 39-40.
9. Toronto. Ontario Hydro Archives (OHA), GSI OR 843, Civil Engineering Research Soil Mechanics and Foundation, "The Practical Use of Soil Mechanics in the Design of Earth Structures."
10. E. B. Borron, *Report on the Basin of Moose River and Adjacent Country belonging to the Province of Ontario* (Toronto, 1890), 7.
11. Ibid., 9.

> ing developments on the Mattagami due to fluctuating water levels. The greatest erosional concern stems from Adam Creek which is used to divert excessive river flows around Little Long, Smoky Falls, Harmon and Kipling GS. An estimated volume of 23-31 million cubic metres of soil or granular materials has been eroded from the creek since 1963 with the greatest erosion taking place in the first few seasons of flooding.[12]

To arrest the rate of erosion, the HEPCO paved the creek bed with boulders.[13]

Another environmental difficulty for hydro-electric developers was the variation in water flows caused by precipitation and seasonal change. Engineers designing hydro-electric systems were always mindful of uneven water levels for, if they became too low, the ability to produce power would be diminished. The chief vehicle for regulating water levels was the dams. Engineers designed dams to prevent flooding during spring break-up, to store excess water for future use and to allow drawdowns during periods of low flow.

In general, water levels were kept fairly high during the summer and winter, followed by drawdowns in the fall and spring.[14] However despite this regulation, the engineers had to allow a lot of water to flow over the dams, unused, during the months of April, May and June because water levels varied seasonally in the headponds of the existing generating stations. In the Little Long headpond alone, levels fluctuated up to three metres during the year because there was a lack of storage reservoirs within the Mattagami drainage basin. The total capacity of upstream storage installed by 1982 amounted to approximately 475,309 acre-feet, which meant a storage factor of 36 acre-feet per square mile. This is an exceptionally low ratio of storage capacity to flow, given that the preferred ratio is three hundred acre-feet per square mile. The lack of storage was due not to a shortage of lakes but due to the surrounding muskeg and swamp. Lakes that leak out every which way will not be transformed into storage reservoirs by building a few dams.[15]

There is yet one more environmental characteristic that profoundly influenced the hydro-electric system in northeastern Ontario: drought. In fact, during the post-war period, drought decreased the amount of power available for years at a time making hydro-electric sources in northeastern Ontario unreliable. Combined with the drought problem in the northeast was a supply problem in the south. A post-war economic boom put pressure on power sources to produce even larger amounts of energy, adding to the difficulties posed by northeastern drought. The Sudbury/ Nipissing district faced a power

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12. Toronto. OH/PRC, Design and Development Division – Generation, "Mattagami River Preliminary Environmental Appraisal of Hydroelectric Development Potential between Yellow Falls and Grand Rapids," Environmental Studies and Assessments Department, Report No.82071 (June, 1982), A.4.
13. Ibid.
14. "Mattagami River Preliminary Environmental Appraisal ... Yellow Falls and Grand Rapids," A.3.
15. Toronto. OHA, GSI OR 192-1, Mattagami River, "Mattagami River Storage," 17 April 1952.

shortage for three months in 1947[16] while, at the same time, power demands in southern Ontario had almost doubled since 1938.[17] From 1948 to 1952, power demands in southern Ontario continued to increase an average of 13 percent yearly.[18]

In response to these environmental and economic conditions, the HEPCO devised numerous strategies for carrying out its mandate of supplying power to all the citizens of Ontario at lowest possible cost. The strategies, although they will be discussed here sequentially, were all adopted and carried out during the 1940s, 1950s and early 1960s so that many, if not all, overlapped. The first strategy was conservation: consumers were requested to restrict their power consumption and then were forced to do so by the imposition of quotas. The second strategy was to build more generating stations: hydroelectric ones at first and then fossil fuel and nuclear stations. The third strategy, which fits hand-in-glove with the second, was to consolidate generation and distribution of energy under one system, effectively managed from Toronto.

During the late 1940s and 1950s, drought in northeastern Ontario proved to be the bane of engineering planning. Otto Holden, chief hydraulic engineer for the HEPCO during the war, recognized this fact in an address to the Royal Canadian Institute. In his concluding statement, Holden recited the following poem:

> The raging torrent's rush is stilled,
> The mighty river works the will of man.
> O'er countless miles his web is flung
> From which is drawn the quickening force
> That drives our modern age.
> All this his mind and hand has wrought
> That he may lift to happier plane his daily round,
> But hand and mind and heart have toiled in vain,
> If God, sends not the rain.[19]

In 1948, rainfall and snowfall in the Abitibi and Mattagami River watersheds was well below normal. These two watersheds comprised about one half of the region's storage capacity and the Sturgeon and Wahnapitae River watersheds, comprising about one third of the storage capacity, also faced a comparable decline in precipitation.[20]

With no improvement in sight, the HEPCO recommended that all energy consumers

16. Toronto. OHA, GSI OR 402, Bulk Electricity Systems, Northern Ontario Properties, August 1933 – August 1973, Vol. 8, A. M. Manby, Assistant General Manager – Administration, HEPCO to R. L. Hearn, 5 May 1947.
17. Toronto. OHA, GSI OR 123, Vol. 37, Professional Associations, Canadian Manufacturing Association 1923-1964, "Notes Re Power Situation in Ontario," 25 September 1947.
18. Toronto. OHA, HEPCO Annual Reports, 1948 to 1952 inclusive.
19. Toronto. OHA, Speeches, "Canada's Water Power: Its Development and Importance," Dr. Otto Holden, Presidential Address, Royal Canadian Institute, 30 October 1943.
20. Toronto. OHA, GSI OR 402, Vol. 2, Bulk Electrical Systems, General, Report "Northeastern Region Rainfall 1947, 1948," Power Supervisor's Office, 22 October 1948.

reduce their loads.[21] This action was believed necessary because no other sources of power were available. Mr. Challies explained that the HEPCO could not buy power from either Quebec Hydro or Northern Quebec Power Co., because each faced the same drought conditions. Other private companies in Northeastern Ontario were also short of water. Indeed, two small towns supplied with power by the Proprietary Mines Ltd. in the Larder Lake area were "threatened with drastic curtailment," and the small amount of power that the HEPCO received from the Abitibi Electrical Development Company (about 4,500 kilowatts) was to be curtailed if flow in the Abitibi River were further reduced.[22] Both industries and municipalities reduced their power consumption: industries, by cutting back on their production and municipalities, by cutting back on street lighting.[23]

These conservation measures did not improve the situation. A follow-up report on water storage levels in October of that year reported that there had been a further decline in the amount of water held in storage. In fact, all reservoirs throughout the northeast were "now showing signs of serious depletion."[24] Consequently, in an announcement to northeastern power consumers, E. B. Easson declared that:

> rainfall has been entirely inadequate to replenish our storage reservoirs, with the result that the water now held in storage is only sufficient to support an average output from our generating Stations from now until the Spring break-up of approximately 143,000kws. As against this, we estimate average consumption in the same period, without conservation or allocation, could be 164,000kws, leaving a deficiency of 21,000kws average or roughly 13%.[25]

Conditions improved somewhat the following year, but drought returned in January 1950 and the HEPCO once again imposed energy quotas. In January, the total amount of water in storage was 39 percent of capacity compared to 52 percent the previous year and, because overall demand for energy had increased over 1949, even more stress was added to the system.[26]

These quotas were lifted in March 1950 with the arrival of spring break-up. By this time, HEPCO engineers, no longer assuming that they could rely on sufficient rainfall, had begun building several new hydro-electric stations on other rivers. Echoing an

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21. Toronto. OHA, GSI OR 402, Vol. 2, Bulk Electrical System General (Northeastern Region) "Energy Deficiency, North Eastern Ontario," E. B. Easson, Acting Secretary, HEPCO to Hon. D. R. Michener, Provincial Secretary, 21 January 1948.
22. Ibid.
23. Ibid.
24. Toronto. OHA, GSI OR 402, Vol. 2, Bulk Electricity Systems General, "The Power Situation in NE Region," 18 October 1948.
25. OH, GSI OR 505.1, Vol. 2, Utilization of Energy Restrictions/Conservation, August 1939 - December 1967, E. B. Easson, Secretary, HEPCO, "Power Conservation: NE Region," 26 October 1948.
26. Toronto. OHA, GSI OR 530, Direct Customers, The Huronian Co. Ltd., Letter to the Huronian Co. Ltd., Copper Cliff, 6 January 1950.

announcement made by the HEPCO Chairman, Mr. H. R. Graham, manager of the HEPCO's northeastern region, attempted to reassure his customers that these new facilities would prevent the recurrence of power shortages. Graham announced that three new generating stations would be completed within the next two years and went on to say:

> It is our sincere hope that never again will there be a lack of electric power which might tend to retard development in this north country; but rather that a plentiful supply will be available for mining and manufacturing, for Cities, Towns and Hamlets, and for the development and improvement of rural areas and farms throughout Northern Ontario.[27]

Mr. Graham's hopes were not to be fulfilled, as some sceptics must have predicted. Insufficient precipitation continued to threaten power generation in the northeastern region throughout the 1950s and there was nothing the engineers could do to make it rain, even though they tried.

In 1948, the HEPCO collaborated with the Abitibi Pulp and Paper Company in "Operation Snowflake." Researchers from the Abitibi Company and the National Research Council conducted a test flight over Kapuskasing, during which ice crystals of frozen carbon dioxide were dropped in hopes that they would then form into clouds. The flights took place on 10 and 14 November. The results, as reported by D.W. Ambridge, President of the Abitibi Pulp and Paper Company, were "promising but inconclusive."[28]

During the 1950s, Abitibi continued its experiments while the HEPCO engineers went back to studying more orthodox avenues for relieving the power shortage, such as re-examining the usefulness of alternative fuels as sources of energy. Because of power shortages in southern Ontario during the booming post-war period, the HEPCO had had to build "emergency" steam plants in 1949 in Toronto, Hamilton, Thorold and Chatham.[29] At the time, the HEPCO considered these plants to be of secondary importance as a source of power and it was hoped that future installations would not be necessary.

Yet by the early 1950s, attitudes towards fossil fuel generation began to change. In the early years of hydro-electricity in Ontario, the power generated from hydro sources was used for base-load generation, that is, power was drawn off during the entire day. Fossil fuel was used only to make up any shortfall from the hydro-electric generators during times of the day when power demands peaked. By the late 1950s, with improvements to fossil fuel generation and with the advent of nuclear power, the roles of the hydro-electric and fossil fuel stations reversed. It became increasingly appealing to system planners to relegate most hydro-electric generation, with the

27. Toronto. OHA, GSI OR 505.121, Vol. 9, Restrictions/Conservation World War II/Post-War Power Shortage, January 1950 - September 1953, "Notice to all Consumers" H.R. Graham, Manager, Northeastern Region, 27 March 1950.
28. Toronto. Archives of Ontario (AO), MU 8661, Hearn Papers, File: "Operation Snowflake."
29. Toronto, OHA, GSI OR 130.01, Vol. 2, Progress and Activity Reports, Construction Department, May 1938 to October 1952, "The HEPCO Construction Activities During the 1949 Calendar Year."

exception of the Niagara station, to peaking purposes.

Co-incident with the rising importance of these other fuels was the simple recognition that further hydro-electric development was limited. H. H. Leeming, Director of Engineering, explained this in a memo to his staff in 1957:

> With the completion of the Niagara Developments on the Canadian side in 1958, and the St. Lawrence in 1958-1960, we will have harnessed the last major sources of hydraulic-electric power in Ontario therefore, major load growth beyond 1960 must be met by the erection of fossil-fired generating stations or from nuclear energy sources when such sources become economically competitive.[30]

Thus hydro-electric construction was nearing an end in southern Ontario. Additionally, those rivers in the north that remained undeveloped were too remote for economic exploitation.

By 1963, the HEPCO had fully integrated its hydro-electric generating stations into its thermal generation program. In a submission to the Legislative Committee on Energy, the new HEPCO Chairman, Mr. Ross Strike, explained the value of having a power system that offset the disadvantages of one energy source through the advantages of another. According to Mr. Strike, "the availability of thermal-electric reserves ... relieves the system from complete dependence on the fickleness of nature."[31] Strike added that combining energy sources also lowered overall costs:

> ...thermal plants provide both peak and energy reserves for a predominantly hydro-electric system at fairly low cost. Hydro-electric stations involve high capital costs but low operating costs; thermal plants on the other hand have relatively low capital costs, but involve higher operating costs. Developed together in some acceptable blend, hydro-electric and thermal-electric resources can result in a more favourable financial situation than is generally accepted.[32]

Evidently, hydro power was no longer the best answer to industrial development.

With the decline in opportunities for hydro-electric expansion, the HEPCO engineers also investigated nuclear power, even though they realized that it was, as yet, far from being economical. The HEPCO was attracted to the possibilities of nuclear power because nuclear power stations could be built anywhere in the province, including close to the market, thereby avoiding the problems posed by long-distance transmission. Moreover, the power source, uranium, was indigenous to Canada, allowing

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30. Toronto, OHA, GSI OR 131, Vol. 30, Organization (OOOH) General Departmental Memo, H.H. Leeming, Director of Engineering to the Staff of the Engineering Division, "Re-Organization of Generation Departments, Engineering Division," 2 December 1957.
31. OH, GSI OR 104.12, Vol. 5, Investigating Committees, Committee on Energy, January 1962-March 1963, "Report to the Legislative Committee on Energy," 20 March 1963, 4-6.
32. Ibid.

the HEPCO to be independent of foreign sources of fuel.[33] However, until nuclear generation became feasible, the HEPCO would continue to use and build up conventional sources. As M. Ward explained in a speech to the Sarnia branch of the Engineering Institute of Canada: "Our plan is to develop the remaining economic hydraulic sites in conjunction with conventional steam plants until the development of nuclear power has proceeded to the point where it is demonstrated to be reliable and approaches competition with conventional plants."[34]

Hence, reacting to conditions that overwhelmed the hydro-electric resources of the province, the HEPCO engineers intermixed northern waterpower with southern fossil fuel. In other words, they retreated from dependence on unpredictable and "limited" rivers and created a unified system in hopes of providing abundant and inexpensive power for all of Ontario.

The HEPCO engineers had one other response to the adverse environmental and economic conditions: the amalgamation of the northeastern system with the southern Ontario one. Pressure to join these systems had begun during the war years as a conservation measure. Realizing that the men and materials were not available for the construction of new plants, the Commission opted instead to link up the various systems in the province in order to allow exchanges of power between them.[35]

Amalgamation continued after the war because of continuing power shortages in southern Ontario, and continuing shortages of men and materials, thus delaying the development of new power sites. As a result, substantial power interruptions, especially in Toronto, occurred during peak periods from 16:00 to 19:00 and periodically from 8:00 to 20:00. The HEPCO announced that the power cuts during peak had been due to a lack of power supply within the system as a whole, and that the reductions throughout the day were directly attributable to the inability of the hydraulic plants to produce their normal levels of power because of low stream flow and the depletion of storage.[36]

Initially, the HEPCO was content to consolidate operations in the northern districts of Abitibi, Timiskaming and Sudbury. The amalgamation of these systems was only a technical one by way of a tie-line between them; the financial accounts of each system were still kept separate.[37] In 1949, the Little Current distributing station with connecting line from Inco's Lawson Quarry substation was placed in service. Thus, the Manitoulin district became interconnected with the Sudbury district and, therefore, the Abitibi, Timiskaming and Nipissing districts.[38]

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33. Robert Bothwell, *Nucleus: The History of AECL* (Toronto, 1988), 279.
34. Toronto, OHA, Speeches, "Power Requirements of Ontario Hydro and the Place of Nuclear Power in Ontario Hydro Planning," 19 November 1957.
35. Ibid.
36. Toronto, AO, RG 3, Box 440, File 137-G, Drew Papers, H-EPC Power Shortages, T. H. Hogg, HEPCO Chairman to all Municipal Commissions, 3 December 1946.
37. Toronto, OHA, GSI OR 126, Vol. 10, Conferences and Meetings Executive Meetings November 1946 - November 1951, Minutes of Executive Meeting, 1 March 1948.
38. Toronto, OHA, *Forty-second Annual Report of the HEPCO*, 26 (1949), 30-31.

The HEPCO then, in 1950, interconnected the northeastern system with the southern Ontario system (SOS). The HEPCO firmly believed that certain advantages would accrue to both the SOS and the northeastern one. Interconnections would allow the transfer of surplus energy either way during periods of power shortages. The total load of northeastern Ontario in 1948 was 208,000 kilowatts whereas, in the southern system, the total surpassed two million kilowatts; therefore, even if a deficiency existed in both systems, the SOS could help out the northeast without "materially increasing the deficiency in southern Ontario."[39] Also, the southern system could supply the northeast with power on weekends, thus conserving the water held in northeastern storage dams. As the HEPCO reported in April: "Later on, when all the new resources projected for southern Ontario are completed, there should be ample reserve capacity to transfer it to northern Ontario to take care of any condition such as was experienced last winter."[40] Interestingly, in 1952, the net result of power interchanges between the southern Ontario system and the northeastern one was the transfer of 105,799,500 kilowatt hours to the southern Ontario system.[41] By 1957, the net transfer throughout the year favoured the northeast almost exclusively.[42]

To summarize, in the post-war period, system planners were faced with the constant threat of power shortages due to drought in the northeast and excessive demand in the south. Because the hydro engineers could not depend on the northeastern rivers for an unlimited and reliable source of power due to environmental conditions, they had to develop other strategies for meeting the power needs of customers, both in the northeast and in the South. Thus, contrary to the prevailing historiography, hydro-electric development in northeastern Ontario was shaped and constrained by environmental conditions. Poor soils and drainage prevented the sorts of large scale diversions that have occurred in Manitoba and Quebec, and drought in the post-war period, coupled with excessive demand in the south, forced the hydro system designers to reinterpret the value and place of water-power in a province-wide electrical system. If Nature, instead of being a mere victim to development, was and is a powerful actor in shaping the development of the Mattagami hydro-electric system, could the same be said for the northern First Nations?

This article started out by criticizing recent authors for their persistent portrayal of First Nations as victims of hydro-electric development. Is this criticism justified? Certainly, when development of the northeastern hydro-electric system commenced in 1911, the ability of the Mattagami Cree and Anishnabek to constrain hydro-electric development was not apparent, and testimonies of Aboriginal People who currently live in the area, coupled with the historic interpretation of aboriginal title and rights, support the thesis that hydro-electric development is harmful to First Nations. For example, witness statements taken from northern elders and chiefs for the 1990 Ontario Hydro

39. Toronto, AO, RG 3, Box 440, Drew Papers, File 137-G, H-EPC Power Supply, Report, "Power Supply — Northeast Region," 17 April 1948.

40. Ibid.

41. Toronto, OHA, *Forty-fifth Annual Report of the HEPCO* (1952), 11.

42. Toronto, OHA, *Fiftieth Annual Report of the HEPCO* (1957), 14.

Environmental Assessment detail the type and amount of environmental damage to the rivers, fish and adjoining countryside. These leaders testify that following dam construction, fish became smaller, rarer and often inedible – the meat was brown and smelled like mould or rotten earth. Some of them had had to move their traplines because the dams lowered the waters, causing certain areas to become too dry. Other elders noted that the changes in water levels made travelling treacherous. The ice was only half as thick as previously and became unsafe to cross because the water, when rising and falling, produced a pothole or false ice. Also, during the summer, the rivers became muddy. The silt build-up affected the ducks and other feeders of the river bottoms.[43]

Coupled with environmental degradation was the apparent inability of the First Nations to stop or impede hydro-electric development, their persistent protests notwithstanding. This was due largely to narrow interpretations of Aboriginal title and rights by the federal and provincial governments and the law courts of Canada and England during much of this century. In essence, non-Native governments and courts believed that Aboriginal title could be extinguished through treaty negotiations, and the exercise of Aboriginal rights was largely confined to reserves and interpreted, whenever possible, in keeping with the Common Law rights of other citizens. For instance, if the First Nations lost land as a result of treaty negotiations or technological developments, such as hydro-electric dams, then they were to receive compensation for their loss. Compensation for appropriated land was and is a Common Law principle.

The adherence to this narrow interpretation of Aboriginal rights was determined in the *St. Catherine's Milling Lumber Company* case of 1888.[44] This seminal case involved a dispute between the federal and Ontario governments over which level of government had the authority to manage unsold surrendered Indian lands. The Canadian government, then aligned with the St. Catherine's Company against Ontario, argued that Aboriginal title represented a complete proprietary interest, limited only by the restriction that alienation of Aboriginal lands could only take place by surrender to the Crown.[45] Lord Watson, who delivered the judgment, rejected the federal government's argument on the ground that it was inconsistent with the terms of the Royal Proclamation issued by George III on 7 October 1763.

According to Lord Watson, the possession of land by the Aboriginal Peoples then living under "the sovereignty and protection of the British Crown" could only be acknowledged as defined in the proclamation, from which Watson inferred "that the tenure of the Indians was a personal and usufructuary right, dependent upon the good

43. Toronto, OH/PRC, DSP/EA, Exhibits #829-868, #871-886, Witness Statements of northern First Nations chiefs and elders.
44. Barry Cottam, "The Twentieth Century Legacy of the St. Catherine's Case: Thoughts on Aboriginal Title in the Common Law," *Co-existence? Studies in Ontario-First Nations Relations* (Peterborough, 1992), 118.
45. Toronto. OH/PRC, DSP/EA, Exhibit #870, Kent McNeil and Patrick Macklem, "Aboriginal, Treaty and Riparian Rights in the Moose River Basin: The Potential Impact of the Ontario Hydraulic Plan" (December, 1992), Task 1, p.16.

will of the Sovereign."[46] Lord Watson declined to express any opinion on the "precise quality of the Indian right," but stated that it was the Privy Council's view that "there has been all along vested in the Crown a substantial and paramount estate, underlying the Indian title, which became a plenum dominium whenever that title was surrendered or otherwise extinguished."[47] He did however accept that a "burden," that is to say, Aboriginal title, lay on the Crown's "present proprietary estate in the land."[48] This title had to be extinguished or surrendered to the Crown before alienation of that land to private hands could occur.[49] Conversely, the Aboriginal People who had the title had a right to occupy and use the land and hold it against third parties, but their interest was at the pleasure of the Crown, which had the underlying title.[50]

Canadian and provincial governments interpreted this judgment to mean that the Crown could alienate land for development, providing they negotiated treaties with the First Nations for surrenders, and providing they gave adequate compensation for lost usufructuary rights. The custom of compensation had been established by the Royal Proclamation of 1763 and confirmed with the transfer of Rupert's Land to Canada. The Rupert's Land Act had stipulated that:

> ...upon the transference of the territories in question to the Canadian government, the claims of the Indian tribes to compensation for land required for the purposes of settlement will be considered and settled in conformity with the equitable principles which have uniformly governed the British Crown in its dealings with the aboriginals.[51]

Herein lies the importance of treaties for industrialists. Rather than protecting Aboriginal rights and lands, they served as vehicles for surrender and compensation, thereby clearing the way for development.

Other legal disputes further undermined Aboriginal rights. These disputes, such as the Arbitration cases between the federal and provincial governments over disputes arising from disparate interpretations of the Constitution Act of 1867, dealt with inland waterways and fishing rights. The usual result in these disputes favoured the provinces. They gained control of inland waterways and the harvesting of fish.[52]

An ancillary result of the disputes between the federal and provincial governments was to make Aboriginal waterway rights indistinguishable from those enjoyed by non-Native citizens, that is, Aboriginal rights to waterways were largely limited to fishing

46. Ibid.
47. Ibid.
48. Ibid., 16-17.
49. Ibid., Task 2, 17.
50. Ibid.
51. Michael Asch, *Home and Native Land: Aboriginal Rights and the Canadian Constitution* (Toronto, 1984), 58.
52. Lise Hansen, "Treaty Fishing Rights and the Development of Fisheries Legislation in Ontario: A Primer," *Native Studies Review*, VII, 1 (1991), 1-22.

rights, and these rights were further limited to the right to harvest fish only for personal consumption, not for trade. This interpretation of Aboriginal fishing rights was almost *de facto* government policy even before the federal and provincial governments negotiated Treaty #9 with the northern First Nations. With the treaty came a further restriction on aboriginal rights in the sense that Native People were effectively excluded from participating in hydro-electric development by the provision in Treaty #9 which stipulated that no land set aside for Native People could include water power sites of over 500kws. Thus by the end of the nineteenth century, certain principles were established to govern relations between Native and non-Native people: before settlement or development could proceed on aboriginal land, aboriginal title had to be extinguished through a process of negotiation which would, among other things, arrange for "appropriate" compensation. Once aboriginal title had been extinguished, the land became subject to provincial and/or federal jurisdiction and use of that land was regulated by those governments. Appropriation or loss of reserve land was subject to the same rules of compensation as the extinguishment of aboriginal title.

There are many reasons why the courts would choose to limit or deny aboriginal rights. Apart from the obvious cultural biases against "primitive peoples," there were other ideological constructs that greatly influenced the interpretation of Canadian law in the nineteenth and twentieth centuries, ones that did not imply an attitude of superiority towards the First Nations but which, nevertheless, had the effect of denying their distinctiveness. Two of these were the equality principle and the principle of the common good. The equality principle did not mean that all people were equal but rather that one body of law, English Common Law, would be applied to all British subjects; it negated "special rights" for specific groups of people. The principle of the "common good" was a government tool for development which allowed large development projects, such as hydro-electric power projects, to proceed over the objections of individuals harmed by this development for the benefit of the group.[53] Both these constructs were (and are) antithetical to aboriginal rights because both deny the need for specific laws for specific peoples or circumstances. The denial of special rights meant that aboriginal rights, if given any recognition at all, would be interpreted within the customs and confines of English Common Law by Canadian and British judges, not as independent from Canadian authority. This antipathy to special rights explains in large measure the above-noted rulings. Because of the limitations placed on aboriginal rights by the courts and governments, any treaties negotiated between Aboriginal People and the Crown could not be interpreted as nation to nation but rather as a Crown policy which purported to smooth relations between two groups of subjects. Aboriginal rights were usufructuary rights to land and were "special" only in so far as recognized initially by the Royal Proclamation of 1763 and then by the Constitution Act of 1867. In effect, aboriginal rights were defined only in ways that entrenched their inferior status, whereas the equality principle denied their very existence.

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53. James Waldram, *As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada* (Winnipeg, 1988), 171-72.

With the weight of such legal interpretations and social policy operating against a recognition of aboriginal rights that would support aboriginal lifeways, the Aboriginal People themselves would be hard pressed to hinder or stop hydro-electric development. Despite these circumstances, the northern Cree and Anishnabek actively protested against environmental degradation and pressed for a recognition of their rights; however, for most of this century, as the historiography has highlighted, their protests had only minimal success.

For example, when the Northern Canada Power Company (the original operator of the Wawaitin generating station) raised the water level in the Kenogamissi storage dam in 1923, part of Mattagami Indian Reserve #71 was flooded. Not only was land flooded, but so too were traplines, graves and the village where many of the reserve inhabitants lived. At the time, minimal compensation was given, despite continued protests from the band. However, in 1951, the Department of Indian Affairs acquiesced to the persistent protest and proposed building new homes for the Mattagami First Nation on Indian Reserve #71. This proved to be a difficult task, as J.M. Taylor, the provincial District Forester, reported to his superior in July 1951:

> considerable difficulty has been encountered in the selection of a site suitable for basement construction and also for a water supply on the present reserve. For this reason, officers of the Department of Indian Affairs have enquired whether it would be possible to purchase additional land in the immediate vicinity of the present reserve which would provide suitable building sites.[54]

Taylor recommended that the application to purchase land south of the Mattagami Indian Reserve be considered favourably by the Ontario Government. He reasoned that having the new town site in this location, adjacent to the forest rangers' headquarters would "increase the value" of the Mattagami people for fire fighting purposes in the area. Ontario agreed, but grudgingly, as indicated by the number of restrictions placed on the lands that could be set aside. A.B. McLennan, when conducting the survey, was instructed to retain five acres for the Ontario Department of Lands and Forests and a right-of-way to cover the existing access road and telephone line to the new village. McLennan was also to ensure that "the north boundary should not encroach within the area reserved to the Hydro-Electric Power Commission for flooding rights and which extends to elevation 1070."[55] McLennan completed his survey in 1952. The addition to the Mattagami Reserve was two hundred acres and was transferred from Ontario to Canada for $363.02 in September, 1952.[56] It must be noted that this one success, after

54. Toronto. Ministry of Natural Resources Indian Land File #39414, J. M. Taylor to W. D. Cram, 5 July 1951.
55. Ibid., W. D. Cram to D. J. Allan, Superintendent, Reserves and Trusts, Indian Affairs, 20 July 1951; F. W. Beatty, Ontario Surveyor-General to B. W. Waugh, Surveyor-General, Canada, 1 November 1951; J. M. Taylor to Ontario Division of Surveys and Engineering, 12 November 1951.
56. Toronto. Ontario Native Affairs Secretariat Files, Ontario Order in Council #2123/52, 24 September 1952; Canada Order in Council, P.C. #4389, 30 October 1952.

decades of protest, was not soon to be repeated, nor did it alter the Mattagami hydro-electric system.

In 1960, Mattagami Chief Walter Naveau resubmitted a letter, written on 20 September 1929, to the Chapleau Indian Superintendent, C. R. Johnston, that questioned the amount of compensation granted the band for flooding damage of Mattagami Indian Reserve #71. In a memo dated 26 July 1960, Johnston forwarded a copy of this letter to Fred Matters, the Regional Supervisor in North Bay for the Department of Indian Affairs, and explained that Chief Naveau wanted to know "what action was take[n] on the letter in question and how much money, if any, was paid to Mattagami Band funds in remuneration for land flooded and resulting damage to timber."[57]

In his reply to Johnston, Matters included a memo showing compensation payments paid for flooding on the Mattagami Indian Reserve. Matters concluded: "It would seem that a reasonable compensation was paid at the time of the flooding both to individual band members and to band funds. If flooding has occurred beyond the line established at that time, then a further claim might be in order."[58] With this attitude prevalent in government circles, the HEPCO concluded that all compensation that was required of them under Canadian law had been paid. They believed that they could then proceed with further hydro-electric developments, despite the continuing damage done to reserve land and aboriginal subsistence activities. This they did in 1966, when three new generating stations at the Little Long, Middle Long and Upper Long Rapids on the Mattagami River were officially opened. However, these plants were to be the last built on the Mattagami River.

Thus far in the narrative, the ability of the First Nations to affect the development of the hydro-electric system has been negligible despite the existence of aboriginal and treaty rights. As distinct peoples, however, the northern Cree and Anishnabek did not disappear and, consequently, neither did the issue of aboriginal rights; it was merely submerged temporarily by over-riding legislation and non-Native preoccupations with development. The inability of Aboriginal People to affect development was not because they lacked the legal right to do so but, as Richard Bartlett has argued, because of "the disparity in the abilities of Indian bands to assert their legal rights compared to the ability of the utility companies to resist."[59] In the post-war period, this imbalance would change. New legislation, such as the Environmental Assessment Act, and new court decisions would be largely responsible for this change.

The landmark case that started the shift was *Guerin v. the Queen*.[60] In this case, an action by the Musquiem Indian Band of British Columbia was brought against the fed-

57. Ibid., F. Matters to C. R. Johnston, 26 September 1960.
58. Ibid., W. Gefrownes for W. C. Bethune to F. Matters, 23 September 1960.
59. Waldram, *As Long as the Rivers Run*, 191.
60. Guerin was not the first case to acknowledge aboriginal rights in a manner more favourable than the St. Catherines Milling case. That honour goes to *Calder v. the Attorney General* of British Columbia, 1973. Guerin was however the first to be precedent-setting.

eral government. The band possessed valuable reserve lands in the city of Vancouver. They alleged that, in 1957, the government induced them to surrender part of their reserve to the Crown for leasing to a golf club, with the rent to be applied to the band's account. After obtaining the surrender from the band, the government leased the land to the golf club for seventy-five years on terms much less favourable than the band had agreed to, and then refused to give them a copy of the lease for 12 years. Evidence showed that the lands were potentially among the most valuable in Vancouver and could have commanded a much higher rent. The band argued that the government was guilty of a breach of trust, and asked for damages.

The government argued in reply that it was not legally responsible to the band for what it did with their lands after a surrender. In effect, it might have leased the lands on whatever terms it saw fit, regardless of what it had told the band earlier. The government's only responsibility to the band was "political rather than legal."[61] In 1984, the Supreme Court favoured the Musquiem band's interpretation.

Justice Dickson (as he then was) ruled in this case that aboriginal land rights are *sui generis* [unique] and he added:

> The doctrine of aboriginal land right does not originate in English or French property law, and it does not stem from native custom. It is an autonomous body of law that bridges the gulf between native systems of tenure and the European property systems applying in the settler communities. It overarches and embraces these systems, without forming part of them.[62]

Dickson's ruling also suggested that the Crown had a general "trust-like" obligation toward Aboriginal Peoples. According to Brian Slattery, this ruling has implications in a number of areas, but the most important implication was the fact that in Guerin, the Supreme Court showed a willingness to reconsider the topic of aboriginal rights, and to begin a dialogue concerning the broad principles underlying the subject.[63]

Thus Guerin established that the federal government had a fiduciary obligation to the First Nations and that aboriginal rights to land existed apart from the confines of Common Law and government policy. Other cases acknowledged aboriginal rights to hunting and fishing and included the provincial governments in the fiduciary obligation owing to the First Nations.

In 1990, the Supreme Court ruled in *Sioui v R* that treaties need not be limited to agreements over land. An agreement about political or social rights, such as the freedom of religion, could also be a treaty.[64] The Sioui case also "implicitly rejected restric-

61. Brian Slattery, "Understanding Aboriginal Rights," unpublished paper (December, 1986), 3-4.
62. Ibid., 38.
63. Ibid., 9.
64. McNeil and Macklem, Task 3, p.58.

tion of aboriginal land rights to pre-colonial uses."[65] One reason for this was the fact that this approach violated fundamental common law principles. In English law, "title to land ultimately depended on possession, not on the specific use to which the land was put."[66]

In that same year, the court elaborated on the findings of Sioui in the Sparrow case and gave recognition to the new status of aboriginal rights as indicated in the Constitution Act of 1982. In Sparrow, it was ruled that aboriginal fishing rights were not traditional property rights: rather, they were rights held by a collective and were in keeping with the culture and existence of that group.[67] It also regarded aboriginal title as more than a right to occupy land, but a right to use it as well in such a way as to allow hunting, fishing, trapping, and gathering of country foods and medicines.[68] Also, the Supreme Court specifically ruled that "common good" arguments were no longer sufficient to justify the negation of aboriginal rights.[69]

The HEPCO was sensitive to the changing legal environment and to the complaints of the the First Nations. In 1989, President Robert Franklin appointed Ray Baril to find ways in which the Commission could improve its relations with Aboriginal Peoples. The following year, when the HEPCO presented its Demand/Supply Plan for environmental assessment in 1990, the northern Cree and Anishnabek communities requested a moratorium on further development of hydro-electric sites on the Mattagami and other rivers in the northeast. The HEPCO, in keeping with its new policy of consultations with the First Nations, agreed to the moratorium until the concerns of the aboriginal communities were sufficiently addressed and, in 1991, as part of a general corporate reorganization, Baril's responsibilities were formalized and enlarged when he was appointed manager of the new Aboriginal and Northern Affairs branch.[70] From then on, the HEPCO opened negotiations with the First Nations in northern Ontario and developed guidelines for aboriginal relations that included: the recognition of the distinct legal, historical and cultural status of Aboriginal Peoples, the promise to consult with aboriginal communities at the earliest stages of project planning, to consider impacts upon the land and resources that Aboriginal Peoples depend on for their traditional livelihood and to achieve long-term benefits for aboriginal communities.[71]

In conclusion, during the history of hydro-electric development, much has been written about the desire to "harness nature's wealth for the service of humanity." Much has also been written about the negative impacts these developments have had on the

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65. Ibid., 19.
66. Ibid., 20.
67. *R v. Sparrow*, 1 S.C.R. [1990], 352.
68. McNeil and Macklem, Task 3, p.24.
69. McNeil and Macklem, Task 4, p.2.
70. Conversation with Ray Baril, Manager of Aboriginal and Northern Affairs, HEPCO, 16 July 1996.
71. Toronto. OH/PRC, DSP/EA, Exhibit #235, "Ontario Hydro Guidelines for Aboriginal Relations," June 1990.

riverine environments. What has not been discussed in any detail in the literature is the constraints imposed on hydro-electric developments by the nature of the river itself and the surrounding environment. What has also been lacking in the literature, until recently, is an appreciation of the First Nations' efforts to protest environmental degradation, to resist the assimilationist pressures of technical systems and even to bring technological development to a halt.

Studying the influence of rivers on the development of technical systems proves that nature does, indeed, affect their development. In the example provided here, the riverine ecosystem influenced the shape of the hydro-electric system significantly. Before hydro-electric development could take place, environmental conditions had to match the technical capabilities of the system builders. Afterwards, once hydro-electric generating stations had been established, the system's builders had to contend with recurring droughts. The system builders recognized that the natural limitations of hydro-electric power could not be overcome and thus opted to emphasize other fuel sources and consolidate the various resources into one centralized system.

Even though the First Nations were unable to affect the shape of the system during the first half of the twentieth century, their continued protest and persistence in maintaining their lifeways meant that the issues they raised about aboriginal rights and title would not be forgotten or simply go away. With favourable court decisions and with environmental assessment legislation, the First Nations were able to persuade the HEPCO in 1990 that a moratorium should be placed on further hydro-electric development in the Moose/Mattagami river basin until their concerns had been adequately addressed, thus effectively stopping further hydro-electric development.

By viewing the development of hydro-electric systems as a process in which the environment and Aboriginal Peoples are actors in technical change, rather than victims of it, we are brought closer to understanding the various interactions that occur during the process of development. Recognizing that these two actors have the ability to define, constrain and even stop development presents a more accurate model of how technological systems develop and expand than that given in the traditional historiography and elevates their place in the development drama from background and side-show to front and centre stage.