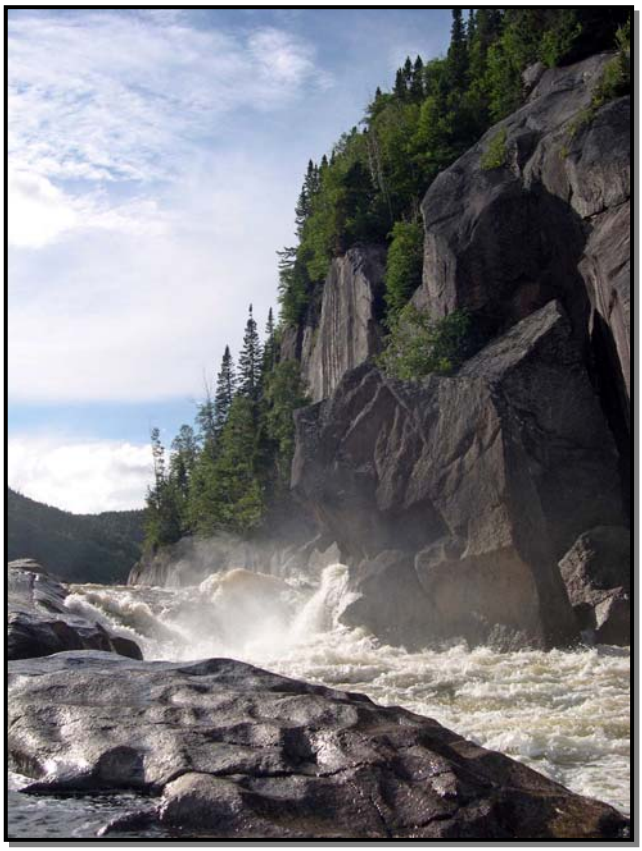
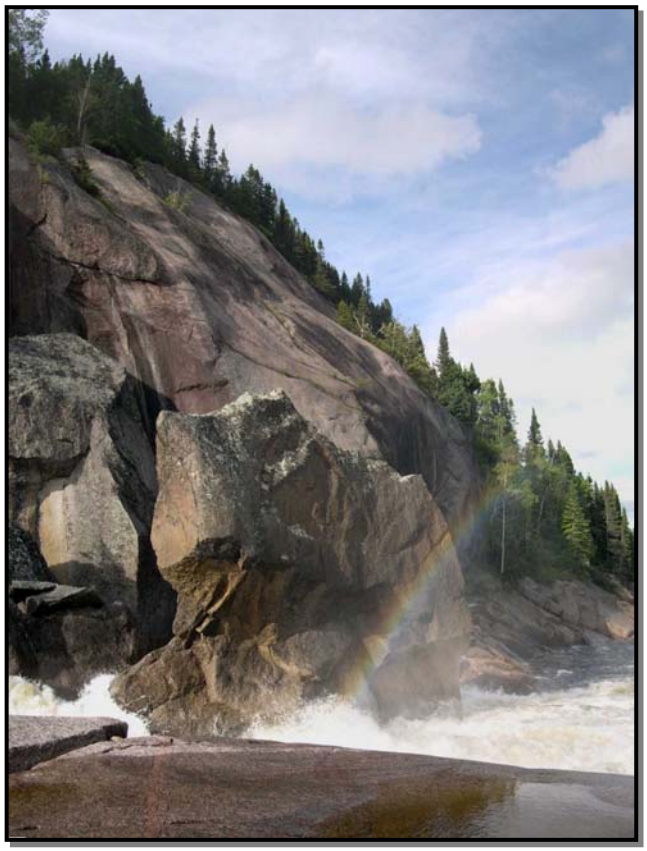
Brief: In Opposition to the Romaine River Hydro-Electric Mega Project

Presented to the BAPE, November 27, 2008





Alliance Romaine

Alliance Romaine, un groupe environnemental fondé en janvier 2008 pour opposer le projet d'Hydro-Québec de construction de 4 barrages sur la rivière Romaine, représente plus de 100 membres à travers le Québec, le Canada et les États-Unis, parmi lesquels on retrouve des scientifiques, des académiciens, des éducateurs pleinairistes et des citoyens concernés. Alliance Romaine s'est dévoué à la rivière cet été et a mené une expédition de canot de 48 jours. Les membres sont principalement des jeunes engagés qui veulent s'impliquer dans l'édification d'un monde meilleur, ce monde dans lequel ils vont continuer de vivre. Alliance Romaine a participé activement aux procédures publiques jusqu'à présent, soit dans le contexte de l'Agence canadienne d'évaluation environnementale et du BAPE.

Intérêts

Nos intérêts principaux dans ce projet sont ceux de citoyens concernés par l'environnement que nous laisserons aux générations futures et concernés par un besoin de voir nos autorités politiques mettre en place un plan énergétique ambitieux axé sur la conservation de l'énergie plutot que la surconsommation de ressources et investissant de manière transparente dans les énergies propres et renouvelables. En tant que contribuables, nous ne voulons pas devoir payer pour les pertes et nous ne voulons pas passer les prochains 50 ans de nos vies à absorber les couts de barrages rendus désuets ou qui auraient pu être évités.

Summary

This Brief is based on an extensive review of the Environmental Impact Statement (EIS) and scientific literature relating to the environmental impacts of large dams, as well as on first- hand experience of the local environment.

The pristine River Romaine is one of the last major free flowing rivers in Quebec and one of the most beautiful. The proposed hydro-electric megaproject will alter the entire river ecosystem and have potential far reaching and long term environmental and social consequences.

Potentially significant emissions of green house gases (GHGs) (methane, Co2), caused by the decomposition of flooded organic matter, will arise from reservoir surfaces, turbines, spillways and associated structures. GHG emissions attributable to the megaproject will also arise from loss of boreal forest and associated peat lands due to inundation, deforestation by the Forestry Industry and by installation of 500 km transmission line corridor and 150 km access road, from construction activities (use of fuel etc.) and from the energy intensive Aluminum Smelting Industry supplied with electricity from the Romaine complex.

Mercury bioaccumulation in the food chain resulting from reservoir creation is an important health issue particularly for local communities relying on fish as a dietary staple. The incremental loading of mercury into the St. Lawrence estuary and its impact on fish eating birds and animal species is also a concern.

Migratory and resident fish species to be potentially impacted by loss or degradation of habitat, by changes in river flow regime and by other perturbations, include two genetically unique races of the economically important Atlantic Salmon (at risk), the American Eel (at risk), Arctic Char subspecies oquassa (protected status), Brook Trout,

Sea-Run Brook Trout, Landlocked Atlantic Salmon (Ouananiche), Rainbow Smelt, White Fish and Lake Trout.

Perturbations and loss of habitat (construction, inundation, transmission lines, roads, future deforestation and mining etc.) will have potential major repercussions on birds, animals and plants, incuding species considered to be at risk. Examples are the Woodland Caribou, Lynx, Wolf, Wolverine, Black Bear, Osprey, Bald Eagle, Golden Eagle, Peregrine Falcon, Horned Grebe, Harlequin Duck, Barrow's Goldeneye, Nighthawk and Short Eared Owl, amongst others. Plant species include medicinal plants and those that are rare or with protected status, such as orchids. The ecological integrity of the coastal wetland complex at the mouth of the Romaine River, an area is known for its rare biotypes, is of special concern.

A major concern is that the proposed large scale hydrological alterations may have repercussions with respect to the productivity of the marine ecosystem (i.e., the river mouth zone, the Mingan Archipelago, National Park Reserve and beyond) and its ability to support the current population levels of marine birds (e.g. Puffins, Penguins, Eider Duck, Arctic Tern, Razor Bill etc.) and mammals (e.g. seals, dolphins, whales) as well as commercially important fish, mollusc and crustacean species (e.g. snow crab, whelk, clam, scallop, capelin etc). Of particular concern are major alterations to freshwater flows, sediments, organic matter (dissolved and particulate) and inorganic nutrient (e.g. silicates, iron) inputs to the coastal zone with regard to short and long term impacts on primary and secondary productivity . The impact of the proposed hydrological alterations on the incidence of toxic algal blooms in the coastal zone (e.g. Diarrhetic Shell Fish Poisoning and Paralytic Shell Fish Poisoning) is another concern.

Other impacts of the megaproject include potential deterioration of water quality and reservoir induced seismicity (earthquakes).

The potential loss of natural heritage and ecosystem services on which the local and regional economy depends is considered to outweigh any short term economic benefits accruing from the megaproject. Of particular concern is the potential of the megaproject to severely compromise sustainable employment from development of ecotourism, recreational activities and Fisheries.

Conservation, combined with the development of alternative energy sources such as wind and solar, represent alternative options that are consistent with sustainable development while respecting the needs and quality of life of present and future generations.

The Romaine River, a Unique Natural Wonder: Description of the River Environment, Flora and Fauna

The Romaine is one of the most beautiful rivers in Quebec. It is almost 500km long and rises North of the 52nd parallel on the Labrador plateau about 45 km South west of the Churchill River where it forms part of the Quebec–Labrador boundary. From its source (elevation 750 metres) the river flows in a series of chutes, falls and rapids through some of the world's most picturesque scenery that include rock islets and a series of deep gorges cut through ancient Precambrian mountains rising to more than 2000 ft. The Romaine is a large, powerful river and in places is more than 1 km wide.

Over the last 50 km, the river flows through a vast and magnificent post-glacial delta, complete with coastal wetlands, before entering the Gulf of St Lawrence near the town of Havre St Pierre (population 3,500). There is no road access inland and the Romaine is traversed only by route 138 near its mouth and by a 40 km long railway at kilometre 15 (Chute de l'eglise) to a titanium mine at Lac Allard.

Historically, the Innu people used the river in their annual migrations to the Labrador coast. The name "Romaine" derives from the Innu word "uramen" or red ochre that describes the river's red coloured rock formations.

The pristine waters of the Romaine and a tributary, the Puyjalon, attract spawning runs of Atlantic salmon, a prized species that is considered to be at risk. The Romaine and Puyjalon salmon represent genetically distinct strains and are unique in the world.

About 50 km from the mouth of the Romaine is a spectacular waterfall, aptly named the "Grande Chute", where the entire river plunges more than 80 vertical feet into a spray filled gorge.

The Romaine salmon are unable to negotiate this obstacle and spawn in the main channel of the river. The Romaine is well known for the large size of its salmon and specimens of over 40 lbs have been caught.

Churchill and Roosevelt are thought to have fished the river around the time of the Second World War. Prior to about 1980, a salmon club had exclusive fishing rights and operated a camp near the mouth of the river as well as a smaller camp on the Puyjalon. After 1980 the river was made public.

The salmon are of importance to sport fishermen and to Innu people from neighbouring communities and a subsistence gill net fishery is operated in the river.

Other migratory fish species of importance include sea trout (sea run brook trout), rainbow smelt and the American Eel (a species considered to be at risk).

Above the Grande Chute (km 50) are populations of scarce landlocked salmon or Ouananiche (descendants of Atlantic salmon), an endangered subspecies of arctic char, lake trout, white fish and brook trout. Because populations of brook trout have been isolated between impassable falls and chutes they may represent a number of distinct genetic strains.

The southern part of the river basin provides habitat for moose whereas further north is a population of endangered woodland caribou, already impacted by loss of habitat from flooding much of the Labrador plateau by the massive Smallwood Reservoir near the headwaters of the Romaine (third largest in the world, by area). Other animal species include lynx, wolves, wolverine, beaver and black bears. Bird species include the Osprey, Bald Eagle, Golden Eagle the endangered Peregrine Falcon, Horned grebe, Harlequin Duck, Barrow's Goldeneye, Nighthawk and Short Eared Owl amongst others.

Because of the absence of roads, the river valley is covered with virgin boreal forest, interspersed with wetlands rich in biodiversity. The Romaine's plants have been little studied, although medicinal plants and species that are rare or have protected status (e.g. Hudsonia tomentosa, orchids such Arethusa bulbosa and the "Mingan thistle") are known to occur. The spray zone in the vicinity of the Grande chute probably harbours rare and uniquely adapted plant species.

In the mouth of the Romaine lies the Mingan Archipelago National Park Reserve (27)**,** a unique treasure consisting of a chain of forty limestone islands and numerous granite islets and reefs. The islands continue to be shaped through erosion by the wind, sea and by the strong currents of the Romaine River give rise to strange rock monoliths. Partly because of the freshwater, organic /inorganic nutrients and sediments supplied by the Romaine River, the river mouth zone, islands and surrounding marine environment support abundant wild life including seabird colonies (e.g Puffins, Penguins, Razor Bills, Arctic Terns, Eider Ducks), seals, dolphins and nine species of whales (e.g endangered Humpbacks and the world's largest animal - the Blue Whale). Rare and unique plant species also occur on the islands. Commercially important snow crab, shrimp, herring and capelin occur in this zone as well as various mollusc species such as clams, whelk and scallops.

The Romaine is known among kayakers and canoeists not only for its world class challenging white water, but also for its pristine natural beauty. An interesting account of a kayak expedition on the Romaine was published in the American White Water Journal (28). The authors describe their experience: "*It's good to know that there are still some*

parts of this world where we don't belong. Not many people will see what we have seen.… No descriptions or photographs can do the Romaine justice. Only in our heads can the magic be preserved".

During 2007 and 2008, Alliance Romaine undertook two major canoes trips from the source to the mouth of the Romaine. Bernard Voyer (29), famous explorer**,** canoed the Romaine, an expedition that is ranked with his other notable adventures such as canoeing the once pristine Rupert River in James Bay (currently undergoing Hydro-electric development), the ascent of Everest and skiing to the North and South Poles.

One Hundred and One Reasons for Opposing the Romaine Hydro-Electric Mega Project: Green, Clean and Sustainable?

Climate Change: Green House Gas Emissions (GHGs)

1. GHG Emissions from reservoir surfaces - diffusive and bubbling fluxes (Co2, methane and nitrous oxides)

It is well known that when land is flooded, the labile carbon in plants and soil is decomposed by micro-organisms leading to the release (via diffusion and gas bubbles) of carbon dioxide and the potent GHGs, methane and nitrous oxides to the atmosphere. Emissions also result from the decomposition of plankton produced in the reservoirs and from organic matter entering reservoirs from upstream or from shoreline erosion (3,7, 8).

All reservoirs that have been investigated in various regions of the world (boreal, temperate and tropics) have been found to emit methane and carbon dioxide as well as small quantities of nitrous oxides (3).

Researchers at the Canadian Government's Freshwater Research Institute investigated several hydroelectric reservoirs in Northern Canada to produce the first detailed calculations of GHG emissions. At one site it was estimated that annual production of methane was more than 7 grams per square meter of reservoir surface. In another study on flooded peat bog, it was estimated that each year, up to 30 grams of methane and between 450 and 1800 grams of C02 were emitted per square meter of reservoir surface.

GHG emissions over the 50 year productive life expectancy of a hydro-electric reservoir were calculated. It was estimated that about two thirds of labile carbon in flooded vegetation and soils would decompose over that period; up to 10% of this carbon would be released as methane with the remainder as C02. Averaged over the 50 year life expectancy, it was estimated that each square metre of a typical reservoir in Northern Canada will emit between 400 and 700 grams GHGs (CO2 equivalents) per year - the higher figures corresponding to those reservoirs where peat bog dominates. For the Cedar

Lake Reservoir in Northern Manitoba, it was estimated that GHG emissions over the 50 years could be similar to a coal-fired power station of equivalent capacity (1-7).

Methane and C02 have recently been shown to accumulate under ice cover during winter. A preliminary study on three Quebec reservoirs suggests that the winter diffusive fluxes at the air–water interface represent < 7% of the cumulative carbon emissions during the ice-free period. The release (upon ice-break) of methane bubbles accumulated under ice during the winter was estimated to represent about 2% of the summer carbon emissions from hydroelectric reservoirs in Northern Quebec. These represent a small, but non–negligible component of annual GHG emissions (9).

The surface soil layers in the study area of the Romaine complex are almost entirely peat based (high organic matter). These, together with the substantial areas of wetlands that are to be flooded, may contribute significantly to annual GHG emissions (methane, Co2).

2. GHG emissions (degassing fluxes) from turbines, spillways and associated structures.

Until recently researchers had only considered emissions from reservoir surfaces that originate from diffusion of dissolved gas through the water column or from bubbles rising to the surface. It is now known that a significant source of methane emissions is downstream of the dam: from the turbines and spillways (10 -14). Methane gas is produced by microbes that decompose organic matter under oxygen depleted conditions. The gas produced dissolves under the pressure of deep water. When water is drawn through the turbines and discharged from spillways the pressure is released and the gases escape to the atmosphere. When "degassing" emissions of methane from turbines and spillways were first measured and factored into estimates for a Brazilian hydro dam, they were several orders of magnitude higher than official estimates (10 - 13)**.**

As far as is known, there have been no studies on potentially significant degassing emissions of methane from spillways and turbines of Quebec's hydro- reservoirs.

3. Indirect GHG Emissions

These include emissions attributable to:

a) Large scale deforestation resulting from flooding, road construction, clearing of 500km transmission line corridor, logging by the Forestry Industry etc. Canada's boreal forests, associated peat deposits and wetlands represent one of the largest stores of carbon on earth. Peat lands are considered sinks for C02 but are slight sources of methane; boreal forests are slight sinks for methane but are neutral for C02 (7). Deforestation upsets these balances and constitutes an indirect form of greenhouse gas emissions. The

preservation of Canada's boreal forests is essential for a healthy future and for mitigating against climate change.

b) The use of cement in the construction of four mega dams (the manufacture of 1 ton of cement releases 1 ton of Co2).

c) The use of fuel during construction over a 10 year period (helicopters, planes, heavy vehicles etc.) and from eventual mining operations for intensive mineral extraction etc.

d) The energy intensive Aluminum Smelting Industry (one of the world's largest) that is supplied with cheap electricity from the Romaine complex. More energy is spent in aluminum production than in any other industrial process. GHGs emissions from smelting include as much as 1.6 tons of Co2 per ton of metal produced and, perfluorocarbons (PFCs), potent GHG's, with a lifespan of up to 50,000 years and a global warming potential of 6,500 - 9,200 times greater than that of Co2) (16).

e) Potential cumulative impacts on the efficiency of the ocean to act as sink for atmospheric C02 (17, 21). Research has shown that reservoirs are effective at retaining silicates (clay based minerals). Diatom populations (silicate 'shelled' phytoplankton) in coastal areas are sustained by silicate inputs from rivers and by ocean upwelling. More than 80% of the total silicate input to the oceans is supplied by rivers (22). Diatoms play a crucial role in the biological uptake of Co2 by the ocean through the so-called Biological carbon pump (when diatoms die they settle to the ocean floor, thereby sequestering carbon). Could the large scale damming of most of the major rivers draining into the St. Lawrence (e.g. Ottawa, Betsiamites, Outardes, Manicougan, Saguenay, Sainte Marguerite etc.) have incremental and cumulative impacts on this process?

The United Nations Intergovernmental Panel on Climate Change (IPCC) recommends accounting for direct and indirect GHG emissions attributable to mega projects such as the Romaine complex.

Migratory and resident fish species: two genetically unique races of Atlantic Salmon, the American Eel (at risk), Arctic Char subspecies oquassa (protected status), Brook Trout, Sea-Run Brook Trout, Landlocked Atlantic Salmon (Ouananiche), Rainbow Smelt, White Fish and Lake Trout.

1. Atlantic salmon

Atlantic salmon are in severe decline throughout their range and are considered to be 'at risk'. Historically, numerous wild Atlantic salmon populations have been extirpated as a direct result of dam construction on rivers throughout North America and Europe.

The Romaine's wild salmon are of economic importance and are valued by sports fishermen; specimens of over 40 lbs have been caught. The salmon are of particular importance to the local Innu community and a subsistence fishery is operated on the river. The Grande Chute (a spectacular 80 ft waterfall) located at the 50 km point serves as a natural barrier to salmon migration; this is the site proposed for the construction of Romaine 1 dam.

The Atlantic salmon that spawn in the main channel of the Romaine River are morphologically and genetically distinct from those that spawn in the River Puyjalon (a major tributary located at the 12 km point); both strains of salmon are unique.

Concerns regarding the survival of viable wild salmon runs include (see also15, 30):

- potential deterioration of suitable salmon spawning areas due to siltation (during construction)
- potential negative impacts on spawning salmon from reduced river flow (during reservoir filling) and from sub-optimal flow regimes after reservoir filling; low water levels (dewatering) could cause mortality in developing eggs.
- potential loss of spawning sites from erosion as sediment deficient water discharged from the dams (after reservoir filling) attempts to regain sediment equilibrium; permanent loss of two spawning grounds in the tail-race canal below the Romaine 1 dam (EIS: CA-042)
- negative impacts on the downstream productivity of invertebrates (such as insects) on which jeuvenile fish depend for food due to retention of organic and inorganic nutrients in the reservoirs.
- potential premature development of salmon eggs in winter causing jeuveniles to emerge at an inappropriate time for finding food (release of warmer than normal water in winter and cooler than normal water in summer due to thermal stratification in reservoirs)
- potential negative impacts on jeuveniles (smolts and parr), and on the timing of salmon runs caused by irregular river flows and changes in seasonal flow pattern. [Hydro-electric reservoirs trap high spring flows for storage and release higher than normal flows in winter when power is most needed. This changes the natural cycle by transferring runoff from the biologically active period (spring) to the biologically inactive (winter)]

- potential negative impacts on the productivity of the river mouth zone that is likely used as a feeding ground for jeuvenile salmon (smolts) before they move off shore on their ocean migration. (Dams cause major changes in river inputs of freshwater, nutrients (organic and inorganic) and sediments to the coastal zone).

To mitigate for perturbations and loss of salmon spawning habitat (EIS) it is proposed to stock the river with salmon (artificially reared) and to create artificial spawning beds. According to DFO (EIS: CA-041), stocking is not an acceptable means of compensating for loss of spawning habitat. The success of man-made spawning sites is poorly documented and has not been demonstrated on large rivers such as the Romaine, making this a high risk venture. Stocking could also jeopardize efforts to monitor any salmon recovery after dam construction.

In contrast to constructing new dams on salmon rivers, other countries such as France and the US (e.g. 15, 20, 30) have long embarked on programs to dismantle dams particularly on rivers where salmon have been rendered extinct or are in severe decline.

It has been stated (EIS: A-034) that approval of the Romaine megaproject is needed in order to proceed with a future hydro-electric megaproject on the River Mecatina. This is a major river and one of the last pristine wild Atlantic salmon rivers in Quebec.

2. American Eel (at risk), rainbow smelt and sea run brook trout:

These migratory species may be negatively impacted by many of the factors detailed for the Atlantic salmon and in particular by regulated river flow and potential impoverishment or perturbation of feeding grounds at the mouth of the Romaine due to altered inputs of freshwater, organic and inorganic nutrients and sediments (retention by the dams). Refuge habitat (in the mouth of the river) for rainbow smelt could be negatively impacted during winter. The American eel is in critical decline throughout its range.

3. Brook Trout, Arctic Char subspecies oquassa (protected status), Landlocked Atlantic Salmon (Ouananiche), White Fish and Lake Trout:

The brook trout populations resident in the Romaine are adapted to well oxygenated river water and spawn in the littoral zone. They may represent a number of distinct populations isolated between impassible chutes and falls. According to the EIS they will be displaced following creation of the very deep reservoirs, due to habitat loss. A similar fate probably awaits Arctic Char subspecies oquassa that has protected status (resident in certain lakes), Land-Locked Salmon, Whitefish and Lake Trout populations. The fluctuations (draw down) in the Romaine's deep reservoirs will be as much as 19 metres (EIS) potentially causing major perturbations and loss of suitable fish habitat.

In the EIS it is concluded that fish production in the Romaine's deep reservoirs will be similar to relatively shallow reservoirs such as the Caniapiscau Hydro-Electric Reservoir in Hudson's Bay. DFO experts do not consider that this comparison is valid (EIS: CA-043). The physical and operational characteristics of Romaine 2, 3 and 4 reservoirs raise major concerns about their quality as future fish habitat.
The proposed filling period of the Romaine's four reservoirs involves an interval of up to four months where no water will be discharged through the diversion tunnels. This will leave considerable expanses of riverbed below the dams almost devoid of water. The resulting desiccation will be potentially very damaging to fish communities and their habitat. (EIS: CA-056 and CA-057)

Mercury Bioaccumulation in the Food Chain: an Important Health issue

It is well known that decomposing organic matter in hydro-electric reservoirs provides conditions suitable for bacteria to convert naturally occurring inorganic mercury into readily available organic methyl mercury, a potent neurotoxin. Methyl mercury is assimilated by aquatic organisms and bio-accumulates with each level in the food chain. Predatory fish (e.g., lake trout) are most affected and can be rendered unsafe to eat. For example, mercury in the flesh of predatory fish in La Grande 2 Reservoir in James Bay reached about six times background level, or more than seven times the Canadian marketing limit of 0.05ug/g (19). Mercury levels in fish may remain at elevated levels for more than 30 years (18). Mercury contamination of the food chain is an important human health issue. Children and the developing foetus are particularly susceptible.

Birds (e.g. Osprey) and animals that feed on contaminated fish are affected. Fish resident below dams often show exceedingly high levels of mercury in their flesh. Methyl mercury may bind to organic matter in reservoirs and be transported downstream for considerable distances; ultimately it is deposited in sediments in coastal areas. Marine mammals such as seals that feed on fish in affected estuaries can accumulate high levels of mercury.

Of particular concern are the potential health impacts of pervasive long term mercury contamination on local and Innu communities and in particular those that rely on fish as a dietary staple. Also of concern are the potential long term effects of incremental loadings of mercury into the St. Lawrence and the impacts on populations of fish eating birds.

Animals, birds and plants, including species that are rare or with protected status.

Many bird and animal species will be impacted by extensive habitat loss caused by: flooding, irregular fluctuations in reservoir water levels (drawdown), construction of 150 km access roads and more than 500 culverts, deforestation via logging, mining operations, and the installation of 500 kilometres transmission line corridor.

Other impacts can be expected to result from disturbance (human encroachment, construction activities such as use of explosives and helicopters), from the use of herbicides in transmission line corridors and from potential pollution from construction activities (fuel spills, generation of air borne fine particulates etc.). Of particular significance could be the loss of migratory bird species from collisions with future transmission lines.

Species with protected status that could be impacted include: Woodland Caribou (already in severe decline throughout its range), Wolverine, Eastern Wolf, Yellow Nosed Vole, Peregrine Falcon, Golden Eagle, Bald Eagle, Short Eared Owl, Harlequin Duck, Nighthawk, Barrow's Goldeneye and the Horned Grebe.

The Eastern Wolf, is given little attention in the EIS because they were not detected in the Sectoral studies. In 2007, Alliance Romaine observed an Eastern Wolf in the area of the proposed Romaine 2 dam, and numerous tracks were observed in both 2007 and 2008.

Particularly vulnerable will be the Woodland Caribou population that frequents the Romaine valley due to loss of habitat and human encroachment.

In the EIS, helicopters were used (mostly during winter) to count Woodland Caribou, but few observations were made. Caribou are notoriously sensitive to disturbance and noise, more so than most animals. As a result, Caribou may be difficult to observe from helicopters, particularly in winter when sound travels more readily. In the EIS it is estimated that there are only about 0.29 Moose per 10 km 2 and 0.37 Caribou per 100 km 2 in winter.

During the summer of 2008, Alliance Romaine observed significantly higher numbers of both Moose and Caribou than is indicated in the EIS.

Based on our observations there may be significant differences in the size of summer and winter populations of Woodland Caribou. There is clearly an urgent need for further studies on summer populations.

The Government of Newfoundland and Labrador has also expressed concern regarding the fate of Woodland Caribou populations in the region. Because of the very limited area

studied in the EIS, the impacts of the megaproject on the Lac Joseph herd of Caribou were not considered. In this regard, there is an urgent need for follow up studies.

According to Health Canada, the filling of the Romaine's reservoirs will result in net habitat loss for about 97,000 bird pairs (EIS: CA-100), including species with protected status. As well, there could be significant potential loss of migratory bird nests and eggs due to deforestation.

Plant species to be potentially impacted by loss of habitat include medicinal plants and rare/protected status species such as *Hudsonia tomentosa* and orchids such as *Arethusa bulbosa*. These species have highly specialized habitat requirements. In the EIS it is proposed to mitigate for loss of habitat (e.g. *H. tomentosa)* by transplanting to new locations.

The peat / wetland complex at the mouth of the Romaine River has been identified as an area in need protection under Environment Canada's conservation plan to protect the biodiversity of the St. Lawrence (24). This area constitutes a very fragile ecosystem and is known for its rare biotypes. Of concern is the potential for sediment deficient water discharged from the Romaine 1 Dam to cause erosion of the river bed and thereby affect (lower) the water table of the peat land complex situated at the mouth of the River Romaine. This in turn could have potential negative impacts on plant, animal and bird diversity and abundance through loss of habitat. The potential construction of permanent access roads through this area could also have potential negative impacts.

Marine environment and the Mingan Archipelago: birds, mammals (whales etc.) and Fisheries

It is well documented that natural seasonal runoff patterns heavily influence downstream deltaic, estuarine and marine coastal areas (e.g. 19). These areas are high in biological productivity because of the delivery of freshwater and nutrients (inorganic and organic) in river runoff. As well, river runoff may cause mixing and entrainment of nutrient rich, deep ocean water, to the surface. Near shore biological processes (e.g., primary and secondary productivity, fish feeding, migration and spawning etc.) are attuned to these natural seasonal runoff cycles (19). Once a dam is constructed it disrupts natural river processes and the flow of nutrients and sediments to the ocean are impeded. Northern rivers typically have high flows in the spring and low flows in winter. Hydro-electric developments, on the other hand, usually trap the high spring flows for storage in reservoirs and release higher than normal flows in the winter when power is most needed. This transfers runoff from the biologically active period (spring) to the biologically inactive (winter). The large scale construction of hydro-electric dams in the St Lawrence drainage basin has greatly reduced freshwater flow to the Gulf during the natural flood

period (June) but raised it in winter. The cumulative impact of these hydrological alterations on the marine environment is unknown (25).

A concern is that the hydrological alterations proposed for the Romaine will have potential repercussions with respect to the productivity of the marine ecosystem and its ability to support the current population levels of marine birds (e.g. Puffins, Penguins, Eider Duck, Arctic Tern, Razor Bill etc.) and mammals as well as commercially important fish, mollusc and crustacean species (e.g. snow crab, whelk, clam, scallop, capelin etc). Of particular concern are major alterations to freshwater flows, sediments, organic matter (dissolved and particulate) and inorganic nutrient (e.g. silicates, iron) inputs to the coastal zone with regard to short and long term impacts on primary and secondary production.

Reduced freshwater inputs can result in a loss of the stable layer (stratification) that is necessary for high offshore primary production in the Spring (19). As well, plant communities in salt marshes of islands of the Mingan Archipelago (e.g. la Grosse and la Petite Romaine) could be impacted by reduced river flow from the proposed Romaine complex, particularly in the Spring period (EIS: CA-122).

Silicates (clay minerals) are essential for the development of certain types of phytoplankton (diatoms) that possess silicate walls or “shells”. Diatoms are a major component of primary production. Diatom populations in coastal waters are sustained by silicate inputs from rivers and by ocean upwelling. More than 80% of the total silicate input to the oceans is supplied by rivers (22).

Reservoirs are very effective at retaining silicates (31). Evidence suggests that reduced silicate inputs from dammed rivers may cause changes in the composition of marine plankton populations (favoring non-siliceous species) and thereby altering the food chain. These perturbations, in turn may affect Fisheries and the overall productivity of estuarine and coastal ecosystems. For example, reduced silicate inputs from the River Danube following damming is implicated in the collapse of a once highly productive fishery in the Black Sea (21, 31).

The pattern of silicate uptake and the availability of iron from rivers suggest that the effects of changing river inputs may go beyond coastal aquatic ecosystems: reduced river inputs of iron due to dams can affect the uptake of silicate in nutrient rich waters in upwelling regions away from the coast (21, 26).

A further concern is that the proposed megaproject might have potential impacts on whales (Rorquals, such as the Blue Whale and endangered Hump Back Whale) that frequent the Mingan Archipelago. In the EIS (DFO comments : CA-085) it is pointed out that the assumption that the proposed hydrological alterations will not affect the

zooplankton prey (i.e. krill) of Baleen Whales is not valid because the results of the NPZ simulation model that was used to simulate primary production cannot reliably be extrapolated to secondary production (zooplankton).

Altered particulate and dissolved organic matter inputs (retention by the reservoirs) could have potential negative effects on both primary and secondary production, particularly in the spring flood season (EIS: CA-084).

It is well documented that the sediments transported by free flowing rivers play a vital role in the stabilization and maintenance of sand bars and deltas in estuaries and coastal zones. These are important areas for biological productivity (e.g. fish and shellfish). The discharge of sediment deficient water from dammed rivers can result in the erosion and destabilization of these coastal areas resulting in a loss of habitat and biological productivity (19, 30).

Of concern are the impacts of significantly reduced sediment inputs from the Romaine hydro-complex on shoreline stability and erosion, on Shellfish (e.g. soft shelled clam), on Capelin spawning grounds and on Snow Crab (EIS: CA070 – CA083). Reduced sediment inputs could also reduce the input of natural ballasts that are important in the removal and preservation of carbon (19).

Eelgrass beds are common in estuaries and are important areas for high primary and secondary productivity and as feeding, shelter and nursery areas for fish. Studies have shown that hydro-electric developments can affect eelgrass beds and may even destroy them (EIS: CA-080). The potential impacts of stresses from the Romaine mega project on the Eelgrass beds at the mouth of the River and, in particular the cumulative effects associated with altered (reduced) river flow, and changes in temperature, salinity and ice formation characteristics are of particular concern (EIS: CA-080).

Toxic algal blooms

Changes in nutrient ratios in coastal zones have been postulated to be responsible not only for shifts in phytoplankton communities but also to favor the growth of toxic algae (31).

Diatoms (silicate shelled phytoplankton) are a major component of primary production and require dissolved silicate (clay minerals) as a nutrient whereas non-siliceous phytoplankton do not.

More than 80% of the total silicate input to the oceans is supplied by rivers (22). Hydro-electric reservoirs are effective at retaining silicates. Diatoms in coastal areas are sensitive to a decline in Silicate (Si):Nitrate (N) and Si:P (Phosphate) ratios. Growth of

diatoms have been reported to be affected by dissolved silicate limitation, giving rise to non siliceous algal types, such as the Dinoflagellates, which have many more toxic species (21, 23, 31). Diarrhetic Shell Fish Poisoning and Paralytic Shell Fish Poisoning, represent an important health issue in the St. Lawrence region and are caused by toxic blooms of Dinoflagellate species. Red tide events caused by toxic algae occur in the St. Lawrence estuary and can cause amongst other things, fish and mammal deaths (e.g. whales).

The decomposition of organic matter in the first few years following impoundment of reservoirs leads to an increase in the level of phosphates and humic compounds. These compounds, transported downstream to coastal areas in the discharge water from dams, have been implicated in promoting the growth of toxic algal blooms of Dinoflagellates (e.g. Paralytic Shell Fish Poisoning) in the St. Lawrence estuary (32, 33; EIS: CA-086). Additionally, reduced river flows following impoundment of the Romaine's reservoirs could reduce the 'flushing" effect of toxic algal cysts (a highly resistant and long lived life stage) from the river mouth zone and thereby facilitate the deposition of cysts in sediments (EIS: CA- 086).

Water Quality

Research has shown that significant changes in water quality may occur following impoundment of hydro-electric reservoirs. For example, depletion of oxygen triggers reduction of nitrate, manganese oxides, iron oxides and sulphate. Reduced products of manganese, iron, ammonium and hydrogen sulphide may accumulate in deep water. The reduced compounds are not only toxic to fish and other organisms, but may also cause a reduction in the capacity of sediments to retain phosphates. As a result phosphate levels become elevated (31).

The filling of nearby River Sainte Marguerite 3 (SM3) Reservoir in about 1998 was reported to have caused certain metals (unspecified) to become elevated to toxic levels in a down-stream reservoir. This rendered the water unfit to drink. Bottled water was distributed to affected users. Clarke City which drew water from the affected reservoir was connected to a new supply of drinking water in Sept Iles (34).

Increased salinity of the drinking water was encountered by the Inuit of Kuujjuaq at the mouth of the Koksoak River following impoundment of the Caniapiscau River in 1982 to fill the Caniapiscau Reservoir (19).

A concern is that the large scale hydrological alterations proposed for the Romaine could affect (lower) the water table at the mouth of the river and thereby affect the quality of the drinking water of Havre St Pierre that is currently pumped from ground water. Another concern is the potential impact on water quality caused by construction

activities, as well as the operation and maintenance of 150 km access road and about 500 culverts (EIS).

Reservoir Induced Seismicity (earthquakes)

Reservoir induced earthquakes occurred after the filling of the Manicougan (Manic 3), Toulnostouc and Sainte Marguerite River (SM3) reservoirs (35). Globally, more than 90 earthquakes have been triggered by the filling of reservoirs. The largest and most damaging earthquake triggered by a reservoir was in 1967 in Koyna, India: the magnitude of the earthquake was a 6.3. Depth of water (> 80 metres) is considered to be the most important factor in reservoir induced earthquakes (36, 37). Some of the reservoirs proposed for the Romaine complex exceed 80 metres at the foot end. Of concern, is the risk of potential earthquakes (induced by reservoir filling) affecting the structural integrity of older dams in the region.

Social, Economic and other considerations

1. According to the EIS, the power generated by the proposed Romaine megaproject will be sold to Ontario, New York State and to the New England States. However, based on size limitations, the current Renewable Portfolio Standards (RSP) for Massachusetts (39) and Maine (40) do not allow for the purchase of electricity generated from the Romaine Hydro complex. New York State and other New England States also have limitations on the sources from which power can be purchased. As the American Public becomes more environmentally conscious, they may pay more attention to the source of their power and favour local sourcing (e.g. Vermont Power Co-ops.)

The EIS indicates that it will cost 9.2¢/kWh (Canadian $) to produce electricity from the Romaine complex. This does not consider power transmission, which may significantly increase the cost of production. In March 2008 an agreement was signed between the Government of Quebec and Alcoa, to supply subsidized electricity at 4 ¢/kWh until 2050. If the power is from the Romaine complex, then any shortfall will likely have to be made good by the Quebec taxpayer.

Justification of the hydro-electric complex is based on the revenue that will be generated by the sale of electrical power. The EIS does not consider any uncertainty with regard to the price at which prospective buyers will pay for the power or the exchange rate between the Canadian and U.S. dollars. These factors have an impact on the value of any sales made to the U.S. Moreover, the price of alternate fuels, (e.g., natural gas), that compete with Hydro could influence the economic viability of the megaproject.

Chaton and Doucet (41) used modelling to assess potential investment decisions for electricity generation by Hydro-Quebec. The model considered the effects of uncertainty

in demand growth and fuel prices, and attempted to minimize expected costs. The authors state: *"Given the current cost of CCGT* [Combined Cycle Gas Turbine]*, which are likely to be the marginal units in most neighbouring systems, it may be difficult to justify large investments in large-scale hydro projects based on export opportunities."* The authors acknowledge that this conclusion could change if any underlying factors change and they cite the possibility of increased demand for hydro because of climate change concerns.

The EIS refers to anticipated additional revenue that the Romaine Hydro- electric complex will generate for Quebec and Federal Governments. Some of this revenue will be in the form of additional payments to the Fonds des générations to help reduce the provincial debt , additional payroll taxes, contributions to the Régime des rentes du Québec (RRQ), Fonds des services de santé (FSS), Commission de la santé et de la sécurité au travail (CSST) and Employment Insurance. These payroll taxes are paid by all employees in Quebec, irrespective of the nature of their work and therefore this should not be included as Government revenue attributable to this project.

2. The construction phase of the Romaine megaproject is expected to bring short term manufacturing jobs to Industrial regions of Quebec and short term construction jobs to local communities. Local communities and tourism may be adversely affected during the construction phase due to congestion of the coastal road (route 138), by trucks and heavy equipment, by noise and aerial pollution (particulates, fumes etc). The transmission lines for the Romaine complex are expected to follow the coastal highway (Route 138), thereby degrading the aesthetic value of the Region's natural attractions. Once the project is completed construction jobs will all but disappear. The natural environment (terrestrial and marine) will be irrevocably degraded, potentially compromising sustainable employment from the development of ecotourism, recreational activities and Fisheries. The traditional lifestyle of aboriginal communities may be adversely affected by, amongst other things, loss of ancestral hunting, fishing and gathering grounds, by encroachment and by long term mercury contamination of fish, a dietary staple.

3. The potential of Quebec's little known lower North shore region for ecotourism and recreational activities is enormous and probably surpasses that of the Gaspesie region. Currently, the Havre-St Pierre area attracts more than 30,000 tourists each year. Activities focus on the areas unspoilt natural attractions and, include sports fishing, hunting, canoeing/kayaking, cruises, whale/ bird watching and visits to Anticosti Island and the Mingan Archipelogo, National Park Reserve. The River Romaine's natural attractions including the Grande Chute (a magnificent 80ft waterfall) and the river mouth area, have yet to be developed for ecotourism.

Historic and prehistoric artefacts have been found in the Romaine watershed (EIS) and the flooding of this area could result in the loss of archaeology of cultural significance.

4. Natural Wonders and Cultural Treasures: Mingan Archipelago National Park Reserve of Canada: Parks Canada's mission: "*At a time when nearly every natural environment has been exploited by man, it is good to know that there are still some that remain unspoiled. This is precisely Parks Canada's mission: to protect the natural resources of representative regions around the country. The Mingan Archipelago National Park Reserve of Canada is one of these. This park protects and maintains the ecological integrity of the region of the Eastern St. Lawrence Lowlands*" (27).

The ecological integrity of the Mingan Archipelago National Park is unquestionably heavily dependent on natural seasonal freshwater inputs from the Romaine River.

It is hard to reconcile Parks Canada's mission, for the benefit of present and future generations, with the proposal to harness the Romaine for electricity generation, deforestation and intensive mining.

5. The average useful life expectancy of a hydro-electric reservoir is about 50 years. The Romaine complex will take more than 10 years to complete at a cost of more than $6.5 billion. In the EIS, the environmental, social and economic costs of eventual dam decommissioning are not considered. This effectively passes on the considerable costs of inevitable decommissioning and remediation to future generations. With the prospect of climate change and the need for clean energy, dam decommissioning is likely to become a major environmental and economic issue in the coming decades as many dams reach the end of their useful life.

6. Newfoundland and Labrador has announced its intention to proceed independently with a hydro-electric megaproject on the last remaining free flowing stretch of the lower Churchill River (Gull Island), apparently to supply energy to an aluminum smelting industry to be established in Labrador. Despite the fact that the water sheds of the Churchill and Romaine rivers share an interconnected and fragile ecosystem, the cumulative environmental and social impacts of the Gull Island megaproject were not considered in the Romaine Environmental Impact Study. Neither was consideration given to the cumulative environmental impacts of the other dams in the region (e.g., Ste. Marguarite, Manicougan, Outardes, Betsiamites, Saguenay or the Smallwood Reservoir complex in adjacent Labrador).

Conclusion and Recommendations

"Large dams [and river diversions] have proven to be primary destroyers of aquatic habitat, contributing substantially to the destruction of fisheries, the extinction of species and the overall loss of the ecosystem services on which the human economy depends. Their social and economic costs have also risen markedly over the last decades" [Postel, 1998 page 636 (38)].

The potential environmental, economic and social costs of the proposed Romaine River Hydro-electric mega project are anticipated to be far reaching and long term. The potential loss of
Natural heritage and ecosystem services on which the Local and Regional economy depends will likely outweigh any short term economic benefits.
It is recommended that a complete moratorium be placed on all proposed and future large dams. In recognition of the value of ecosystem services provided by free flowing rivers, the US and European countries have long undertaken initiatives to dismantle dams on rivers.
Alternatives to large dams exist, such as wind power (for which the lower North Shore region has enormous potential), and solar. Conservation measures could reduce the need for the construction of new dams. As an example, the economies of Denmark and Germany are benefitting significantly from leadership in the development of technologies for wind and solar power generation, respectively.

Résumé

Les émissions de gaz à effet de serre (GES)

Lorsqu'une terre est inondée, la matière organique se décompose à l'aide de micro-organismes, relâchant dans l'atmosphère du dioxyde de carbone, du méthane, et des oxydes de nitrate. Des chercheurs à l'Institut de l'eau douce du gouvernement fédéral ont étudié plusieurs réservoirs hydroélectriques dans le nord canadien. Dans l'un des sites, on calcule que la production annuelle de méthane dépasse les 7 grammes par mètre carré de surface du réservoir. Sur une pessière inondée, on estime que la production atteindrait jusqu'à 30 grammes annuellement par mètre carré. Dans un cas type, on trouve que la production de GES, calculé sur une période de cinquante ans (soit, la durée de vie productive d'un projet hydroélectrique) serait comparable à celle d'une centrale thermique au charbon qui générerait la même quantité d'énergie.

Émissions indirectes de GES

Le Groupe intergouvernemental d'experts sur le climat (GIEC) de l'ONU recommande que l'on comptabilise les émissions directes et indirectes de GES dans le cas de mégaprojets comme La Romaine. Cependant, alors qu'Hydro-Québec prétend qu'il ne peut être tenu responsable des effets négatifs indirects qui résulteraient du projet, il veut bien qu'on tienne en compte les effets indirects qui s'avéreraient positifs ! Dans son rapport (tome 3, question P1-P66), le promoteur affirme ne pas responsable être si les routes qu'il construit contribuent ensuite à l'augmentation des coupes forestières. Mais,

plus loin dans le même rapport, il se vante que ces mêmes routes ouvriront la voie à l'écotourisme ! Le promoteur se doit de demeurer conséquent. Soit il est responsable des effets indirects, bons et mauvais (et ce serait la position du GIEC), soit il ne l'est pas.

En ce qui a trait aux émissions de GES, les effets indirects du projet incluent la déforestation reliée à la construction de routes (sur 500 Km), l'utilisation de ciment pour 4 barrages (fabriquer une tonne de ciment équivaut à relâcher une tonne de CO2), et le carburant brûlé par les hélicoptères et véhicules lourds. Aussi, l'industrie d'aluminium, hyper polluante, bénéficiera d'une énergie à prix subventionné fourni par le complexe La Romaine.

Populations de poissons (migratoires et permanentes) deux races de saumons atlantiques, anguille américaine (à risque) omble chevalier arctique (statut protégé), truites, saumon atlantique non migratoire (ounaniche), et autres

Les saumons atlantiques, en déclin à travers tout leur territoire, sont considérés « à risque ». Par le passé, des populations de saumons atlantiques ont disparu à la suite de construction de barrages sur plusieurs rivières de l'Amérique du Nord et de l'Europe. Le saumon sauvage de la rivière Romaine est d'une importance économique et est prisé par les pêcheurs sportifs. La construction de quatre barrages risque fort d'affecter le cycle reproductif de cette espèce en raison d'une détérioration du milieu aquatique (envasement), d'une réduction du débit de la rivière, et d'une réduction de la population d'invertébrés (insectes) dont les jeunes saumons dépendent.

Afin de mitiger la perte de milieu aquatique servant à la reproduction, il a été proposé de transférer des saumons d'élevage dans la rivière, et d'y créer des zones reproductives artificielles. Mais, selon le Département des Pêches et Océans, le « stockage » ne représente pas une manière acceptable de compenser la perte d'habitat reproductif. Le succès des zones reproductives artificielles est peu documenté et n'a pas été démontré sur des grandes rivières comme la Romaine. Plutôt que de construire de nouveaux barrages sur des rivières à saumon, d'autres pays comme la France et les Etats-Unis réalisent des programmes pour démanteler des barrages, particulièrement sur les rivières où les saumons ont disparu ou bien sont en déclin.

En outre, il a été dit (étude d'impact A-034) que le mégaprojet de la Romaine est un préalable à la réalisation d'un futur mégaprojet sur la rivière Mécatina. Or la Mécatina est une rivière majeure, et constitue une des dernières rivières à saumon à survivre à l'état naturel au Québec.

D'autres espèces

Les autres espèces de poissons, dont plusieurs à risque ou possédant un statut protégé, seront affectés par la plupart des mêmes facteurs touchant le saumon. On n'insistera jamais assez sur le fait que l'habitat en aval des barrages pourrait ne plus recevoir les sédiments, de même que les nutriments organiques et inorganiques qui constituent la base de la chaîne alimentaire en milieu aquatique. Les scientifiques se demandent si la raison que la morue ne s'est pas remise dans le Golfe Saint-Laurent, malgré le moratoire sur la pêche, serait le grand nombre de barrages sur toutes les rivières qui fournissaient jadis le fleuve Saint-Laurent en nutriments.

Le projet, tel qu'il est proposé par Hydro-Québec, transformera l'écosystème de la rivière Romaine en une série de lacs. On prétend que les valeurs ichthyques ne seront pas atteintes parce que le volume (biomasse) de poissons restera le même. C'est une affirmation simpliste et idéologique ne considérant pas le fait que le nombre et la diversité des espèces seront diminués. Selon le promoteur, le brochet nordique, entre autres, disparaîtra de la rivière. Dans un rapport de 2000, les scientifiques Kolar et Lodge expliquent qu'il y a une forte relation entre la construction de barrages, et l'établissement d'espèces exotiques invasives sur les rivières. Le promoteur ne propose aucune mesure pour pallier à la perte de diversité et l'altération de l'écosystème.

Bioaccumulation de mercure: un enjeu de santé

Il est bien connu que la décomposition de matière organique dans le réservoir crée des conditions propices pour la conversion de mercure inorganique, déjà existant, en méthylmercure, une neurotoxine. Les niveaux de mercure chez les poissons peuvent rester élevés pendant plus que 30 ans. Le mercure a tendance à monter, et à se concentrer dans la chaîne alimentaire chez les animaux. La contamination de la chaîne alimentaire pose un risque inacceptable aux populations humaines. Les enfants et les fétus sont particulièrement à risque.

Animaux et plantes (dont ceux qui sont rares, ou ont un statut protégé)

Le tome 4 de l'étude d'impact examine l'effet qu'auraient les barrages sur la flore et la faune. Dans cette analyse, on traite des étendues de forêt boréale qui seront inondées, et aussi une périphérie de 5 Km autour de la zone inondée. Cette démarche se révèle inadéquate, parce qu'un grand nombre d'animaux ont un habitat plus large que 5 Km (le caribou des bois, une espèce menacée, de même que le carcajou, le loup oriental, et de multiples espèces d'oiseaux migratoires). De nombreuses espèces seront touchées par la perte d'habitat, mais aussi par la construction de routes d'accès, la présence humaine, la déforestation encourue par les opérations forestières, etc. On redoute la contamination causée par les herbicides autour des lignes de transmission, ainsi que la pollution qui résulterait d'accidents industriels durant la construction.

Le projet perturbera un grand nombre d'espèces qui ont un statut protégé, dont notamment le caribou des bois, le carcajou, le loup oriental, et plusieurs rapaces. L'étude d'impact n'examine pas de manière adéquate à la perte et la fragmentation d'habitat chez les espèces nécessitant un grand territoire. Par exemple, Hydro-Québec néglige les effets sur le carcajou et le loup, arguant qu'il n'en a pas documenté sur le territoire. Par contre, les membres d'Alliance Romaine ont vu un loup oriental dans la région de Romaine 2 en 2007, et ils ont noté plusieurs traces de loups en 2007 et 2008. Le promoteur a effectué ses études en hélicoptère, alors que beaucoup d'espèces sont sensibles au bruit et auront tendance à fuir lorsqu'ils entendent le son des moteurs.

Selon Santé Canada, la mise à l'eau des réservoirs de la Romaine encourra une perte nette d'habitat pour 97 000 paires d'oiseaux, ce qui inclut des espèces dotées d'un statut protégé. Les plantes qui seraient affectées par une perte d'habitat incluent des plantes médicinales et des plantes rares ou protégées, nécessitant un habitat très spécialisé.

La pessière située à l'embouchure de la rivière Romaine a été identifiée comme ayant besoin de protection selon les critères d'Environnement Canada. Il s'agit d'un écosystème très fragile. On s'inquiète du manque de sédiment dans les eaux qui arriveront à l'embouchure, suite au projet - ce qui aura des conséquences sur la structure de la pessière.

Archipel de Mingan

En raison d'un manque de nutriments dans les eaux à l'embouchure, occasionné par les barrages, les changements sur la Romaine auront des répercussions potentielles sur la productivité des écosystèmes marins, et sur les espèces d'oiseaux, de mammifères et de crustacées. Une autre préoccupation est que le mégaprojet aurait des répercussions pour des espèces de baleines déjà menacées. Rappelons que l'Archipel de Mingan constitue un Parc national, censé être à l'abri des effets majeurs des mégaprojets. Des altérations dans le ratio de nutriments dans les eaux côtières seraient liées, selon certaines évidences, à une profusion d'algues bleues.

Considérations économiques

Le promoteur affirme qu'il pourra vendre de l'énergie provenant de la Romaine à l'Ontario, l'Etat de New York, ou la Nouvelle Angleterre. Toutefois, les normes d'énergie renouvelable qui sont en vigueur dans les états de Maine et Massachusetts ne permettent pas d'acheter de l'énergie produite à la Romaine. Ces normes fixent une taille maximale à tour projet hydroélectrique d'où l'on peut acheter l'énergie et, en l'occurrence, le Complexe de la Romaine sera trop grand. L'état de New York et la Nouvelle-Angleterre mettent aussi des limites sur les sources où ils s'approvisionneront en énergie. De plus en plus, les électeurs tiennent comptent de l'environnement dans leur

choix politiques; il est donc loin d'être certain, comme le voudrait le promoteur, que l'énergie de la Romaine sera vendable facilement.

L'étude d'impact affirme qu'il coûterait 9,2 sous le kWh pour produire l'électricité. Ceci ne tient pas compte des coûts de transmission des kilowatts, ce qui augmentera le coût du projet. On ne tient pas compte non plus du fait qu'en mars 2008, la province, Alcoa, et Hydro-Québec ont signé une entente pour fournir l'aluminerie d'Alcoa en électricité au prix de 4 sous kWh jusqu'en 2050. Il s'agit manifestement d'une subvention à être facturée aux contribuables, ce qui est inacceptable.

Il est vrai que la Côte Nord vit un taux de chômage élevé. Hydro-Québec se targue d'amener des jobs en région avec le projet. Malheureusement, ces emplois seront de courte durée, et l'immense majorité, ne dureront pas plus que le temps de la construction

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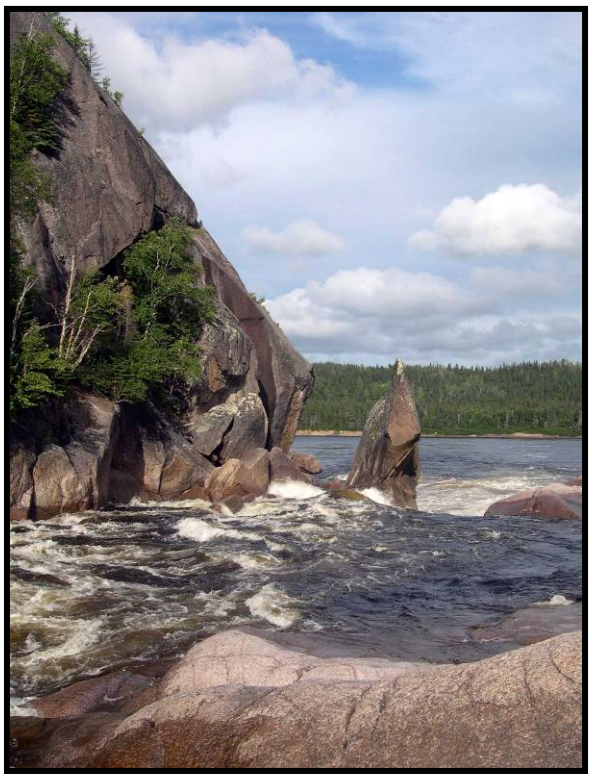
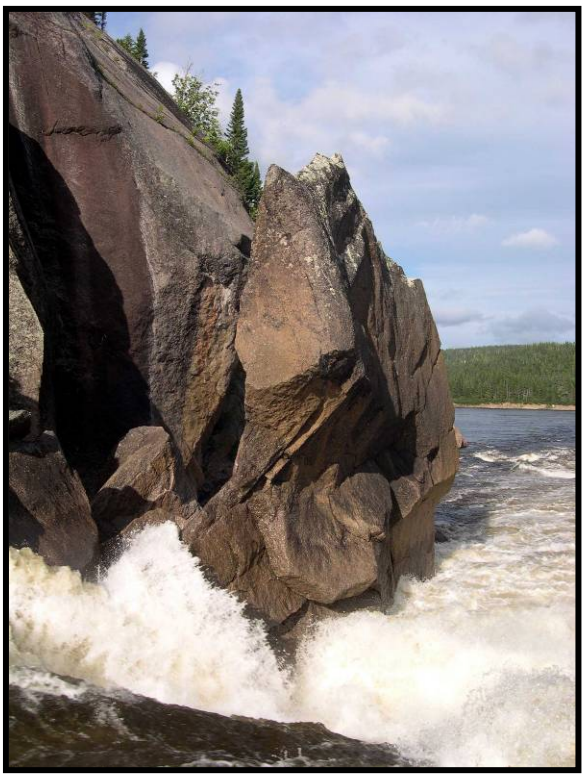
PHOTO GALLERY

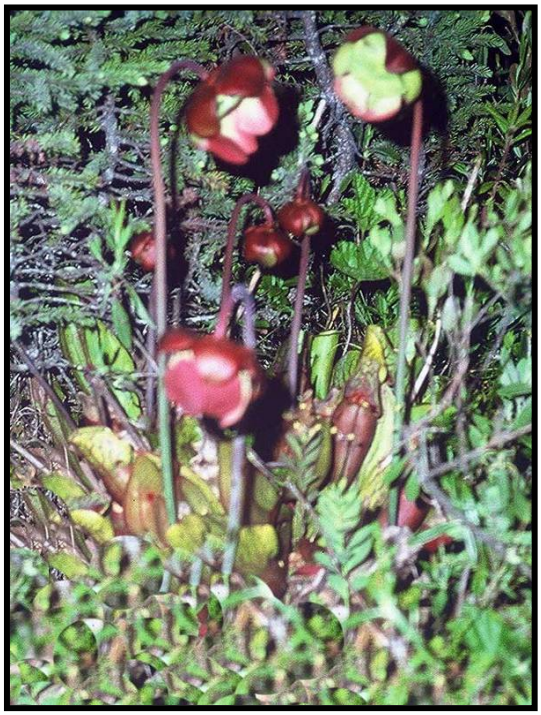
"No descriptions or photographs can do the Romaine justice. Only in our heads can the magic be preserved" Fairburn (1987)





Moose or caribou swims across tranquil stretch of the Romaine at sunset

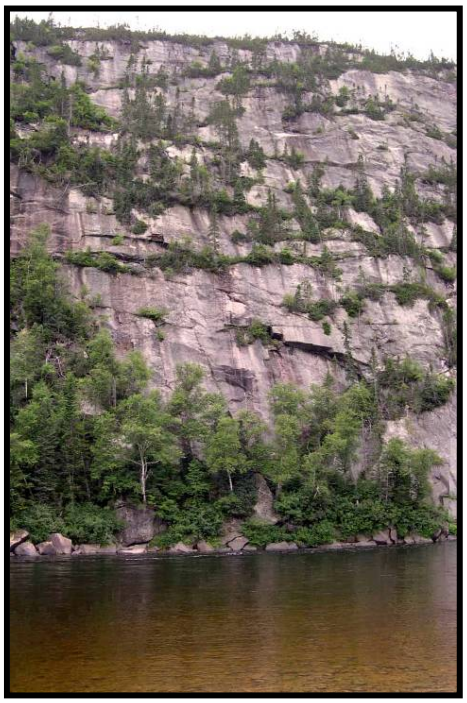
Lichens in the foreground serve as food for Caribou



Insectivorous Pitcher plants

Gentiana andrewsii (Closed Gentian)

Arctic Willow Herb



100 metre canyon

Romaine river mouth: One of two River channels entering the St Lawrence. In the distant background is la Grosse Ile Romaine and granite islets belonging to the Mingan Archipelago, National Park, Reserve.

Romaine river mouth panorama: One of two channels with Rapide a Brillant in the far distant background (left) and rock islets of the Mingan Archipelago in the right background.

Proposed Dam Sites:

La Grande Chute: Proposed site for Dam # 1

Proposed site for Dam #2

Proposed Site for Dam # 3

Proposed site for Dam #4

Expressions of Sentiment from Alliance Romaine Members

Listen to the Rivers

Quebec produces 96% of its electric power through the damming of its rivers. No one can measure the damage done to the environment when each of the rivers, listed below, was altered from its natural state to provide us with energy. What would these rivers tell us if you could ask them? Would they question why Quebecers need all this energy? Why their environment is destroyed so we, and others beyond our borders, can continue to use energy wastefully. Why do we dam them, creating mercury toxic lakes, silencing their voices that thunder through rapids and over falls, and blocking their life's ambition to reach the ocean? Here is their petition to save the Romaine, one of the few wild and free flowing rivers left in Quebec.

Abénaquis River
Batiscan River
Betsiamites River
Blanche River
Caniapiscau River
Chaudiere River
Chicoutimi River
Coaticook River
Coulonge River
Eastmain River
Etchemin River
Gatineau River
Gouffre River
Hall River
Hart-Jaune River
Jacques-Cartier River
Kiamika River
La Belle River
La Grande River
La Sarre River
Laforge River
Lievre River
Magog River
Magpie River
Manicouagan River
Maquatua River
Mistassibi River
Mitis River
Montmorency River
Nicolet River
Niger River
Noire River
Ottawa River
Ouareau River
Peribonka River
Petites Bergeronnes River
Portneuf River
Rimouski River
Riverin River
Rivière aux Outardes
Rivière aux Sables
Rivière des Prairies
Rivière du Loup
Rivière du Nord
Rivière du Sud
Rivière Ha! Ha!
Rouge River
Rupert River
Saguenay River
Sainte-Anne River
Sainte-Anne de la Pérade River
Sainte-Marguerite River
Saint-François River
Saint-Jean River
Saint-Maurice River
Salmon River
Sault aux Cochons River
Shawinigan River
Shipshaw River
St Francois River
St Lawrence River
Toulnustouc River
Winneway River
Yamaska River

If we can take energy from the sun without blocking out its rays and capture the power of the wind without stopping its flow, surely we can capture a river's energy without building dams?

Gary Bristow, Halifax, NS

Je sais que dans 50 ans, et même plus tôt, on va tellement regretter ces 4 barrages! (Gilles D.)

Il faut plus des gens comme Steve et Fran qui descendent et défendent la rivière en toute humilité! (Sylvie R.)

Ça fait longtemps qu'on milite pour sauver nos belles rivières du Québec, et une par une elles se font harnacher mais il ne faut pas lâcher parce que si on peut en sauver encore quelques unes, c'est déjà mieux que rien! (Jean-Guy P.)

Poor them (Charest and Hydro-Québec), one day they will realize what they've done to our precious rivers and forests, especially those of Northern Québec. (Simone A.L)

When are we going to stop going ahead with harmful projects without properly testing the consequences on future generations' health? When will health be more important than profit? (Alexandra R.)

My most intimate moment with a river was with a small unknown one in Northern Ontario. It was nightime and the stars were reflecting beautiful images and shadows onto the surface of the water and I felt so connected to nature at that moment. I wish everyone could feel that connection, that way we'd have more people trying to defend the Romaine river and other rivers. Until then, I hope that more people can seek that connection with the natural world and better understand that we are so closely connected and that we have to let the rivers run free. (Michelle T.)

Water is sacred. there is no greater argument to convince people that the Romaine River must not be dammed. (Marion D.)

When I meditate I put on CDs that have sounds of water flowing and moving and trickling. Water comforts me, soothes me, helps me reach a higher state of consciousness. lately this summer and fall, at times when I meditate, I imagine I am close to the Romaine River and I give it lots of love. (Janet M.)

Gaining market wealth by exhausting natural resources or polluting the environment does not generate real wealth. Real wealth means a spirit of adventure and inquiry. As a world citizen…what we do, how we act, at the crucial moment is what determines ultimate victory or defeat. We must not let our governments fail us in our vision to save this river from environmental impact disaster! (Russell J.)

I just want it to be free. I wish I could verbalize how I feel about the importance of the Romaine River, but the point is that I can't put it into words. It is part of my mental landscape... the rivers I have had the fortune of seeing and touching and feeling are a part of me, and I feel I am a part of them. The world needs a big, powerful, free, unfettered rushing river to stay free. (Tanya R.K.)

First and Last by Chantale K.

Every time I see Niagara Falls, I wonder what the first person ever to see that mighty force must have felt. Were they alone? With their whole tribe? Had they been traveling and heard the mighty roar for days? Had they dreamt of the river's power, of it tumbling over a great abyss? Surely they would not have had the historical perspective to know or to care that they were *the first ever*. The first ever human that is.

Our time on this planet has been brief. Very short indeed, and yet we have made ourselves known. A river is timeless, they say, it is always flowing. It is always changing too, never the same water twice. Many forces can affect a river, and many populations will change its composition. But when one single species can in 10 years or less disrupt a river to the point of affecting every single living population along that river, and of upsetting the balance quicker than any species can adapt, I say this is a rift in the pace of nature. And if not a rift, well, a cataclysm.

I don't pretend that any of what you read in this annex will have any direct affect on whether or not the Romaine is damned. I have seen through case study that there is no place in such matters for arguments based on emotion, spirit or beauty. The values have been chosen, and they just don't include anything quite so…artistic? Abstract? Some might say… human?

But I *do* hope that if all the very real political, economic, scientific, social and just plain rational reasons not to damn the Romaine are not enough, and if yet another wild river is harnessed for our consumption, if this is to be the way, I hope that somewhere, some engineer or labourer, or Hydro Quebec CEO with the historical perspective we have now gained will take the time to take a good look at that river just before it is damned. I hope this worker will pause to think about all the humans who have ever come to its banks in awe. I hope he or she will think about his or her very own ancestors and the first ever humans to come to the waters of the Romaine River. I long for them to stop to think about their own children, and the children of those around them. For in this age we are consuming many things which might have been theirs. I hope that someone somewhere will realize that *they* will be the very last human ever to see the Romaine River in its wild and whole form. I hope that person will dream of the river that night.