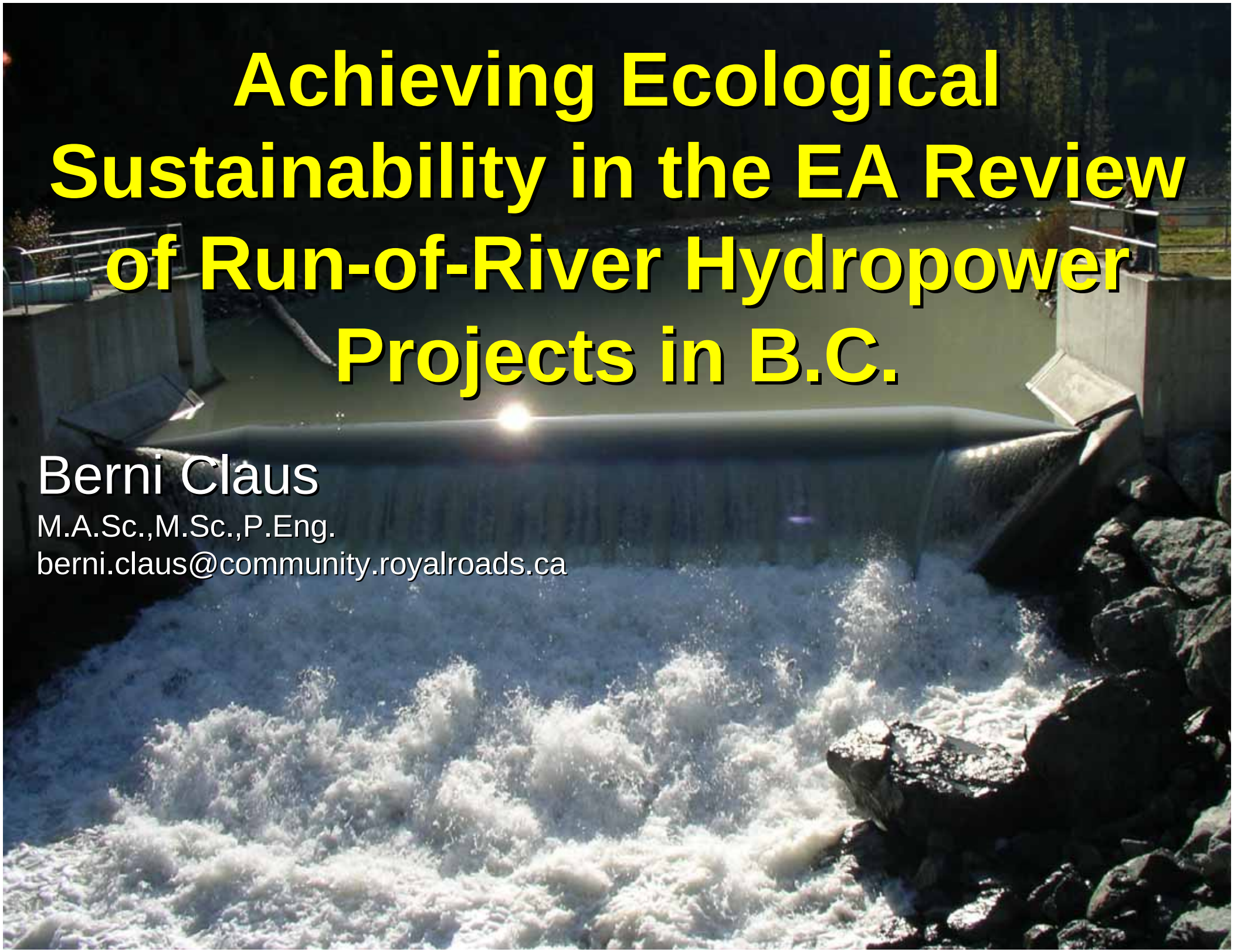
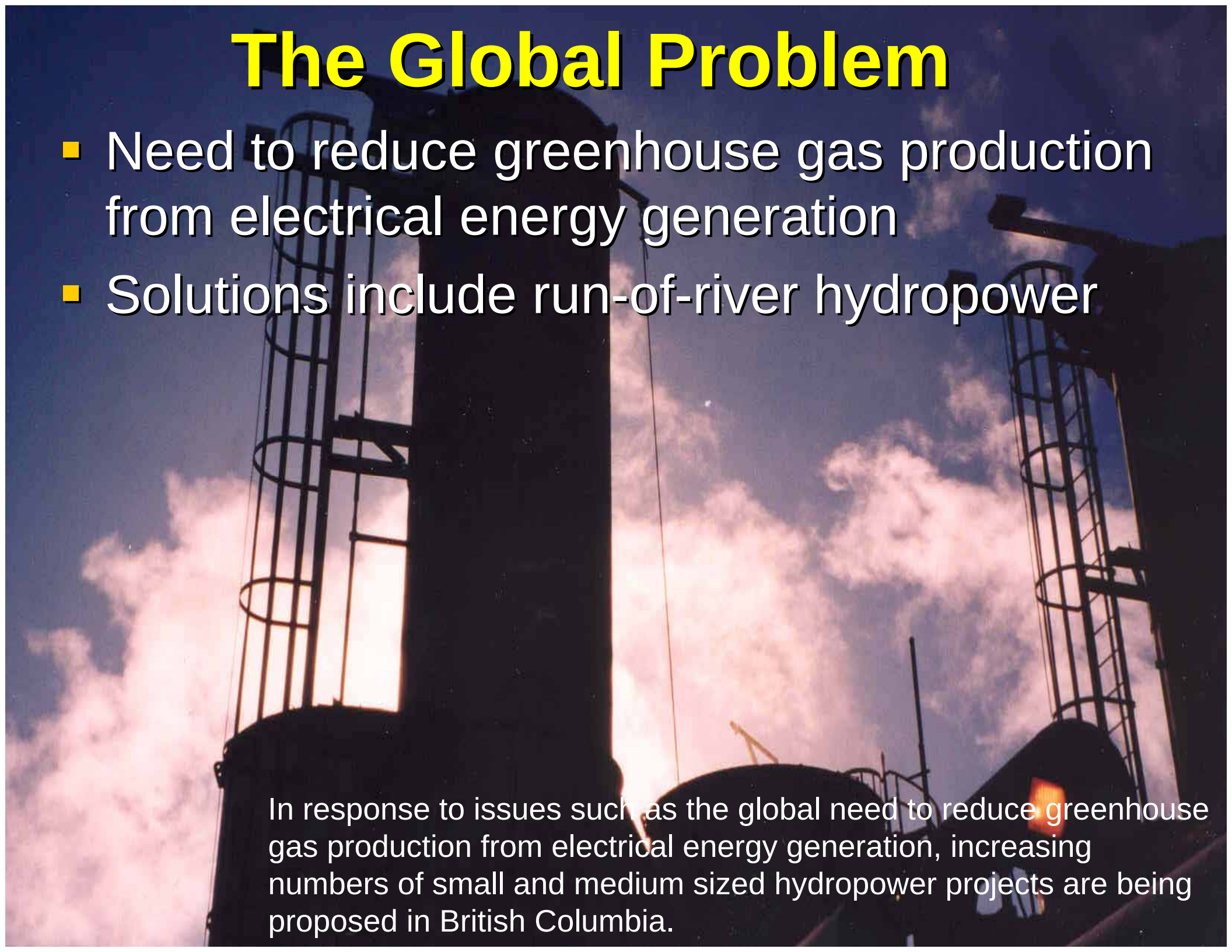


# Achieving Ecological Sustainability in the EA Review of Run-of-River Hydropower Projects in B.C.

Berni Claus
M.A.Sc.,M.Sc.,P.Eng.
berni.claus@community.royalroads.ca

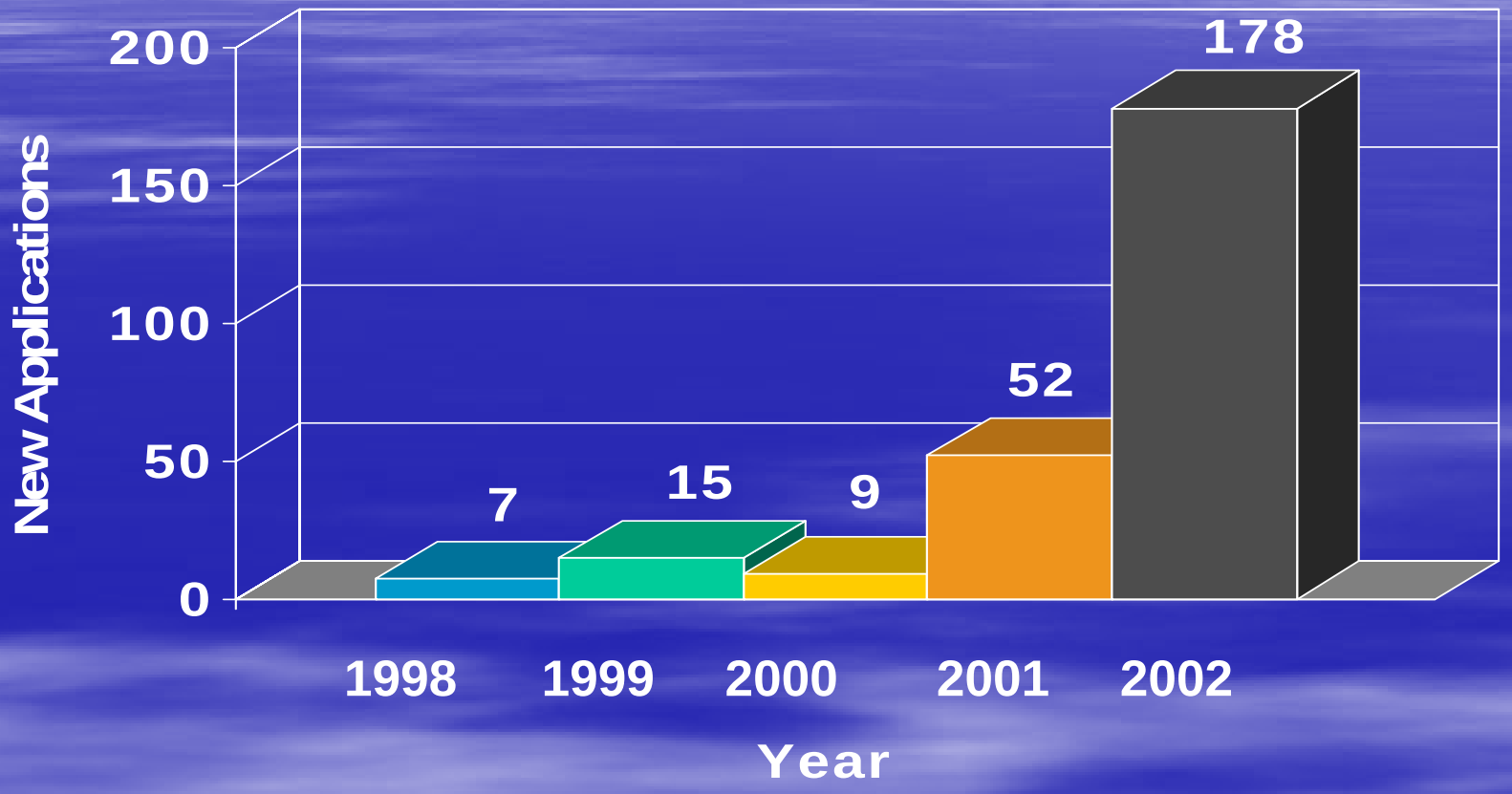
# The Global Problem

- Need to reduce greenhouse gas production from electrical energy generation
- Solutions include run-of-river hydropower



In response to issues such as the global need to reduce greenhouse gas production from electrical energy generation, increasing numbers of small and medium sized hydropower projects are being proposed in British Columbia.

# B.C. Water License Applications filed for Water Power Projects




This chart shows the very sharp increase in waterpower applications in recent years, and hence the pressure all these projects place on EA processes.

# The Paradox

- These smaller hydro projects are often called "green energy”
- However, if not planned, built and operated correctly, they can significantly impact local environment.
- In solving the global problem, ecological impacts are transferred to regional and local levels.

# Research Question

- How can review agencies and proponents achieve ecological sustainability in the environmental assessment of run-of-river hydropower projects in British Columbia?
- For federal agencies in particular, how should they "…take actions that promote sustainable development" in their reviews as encouraged by the *Canadian Environmental Assessment Act.*

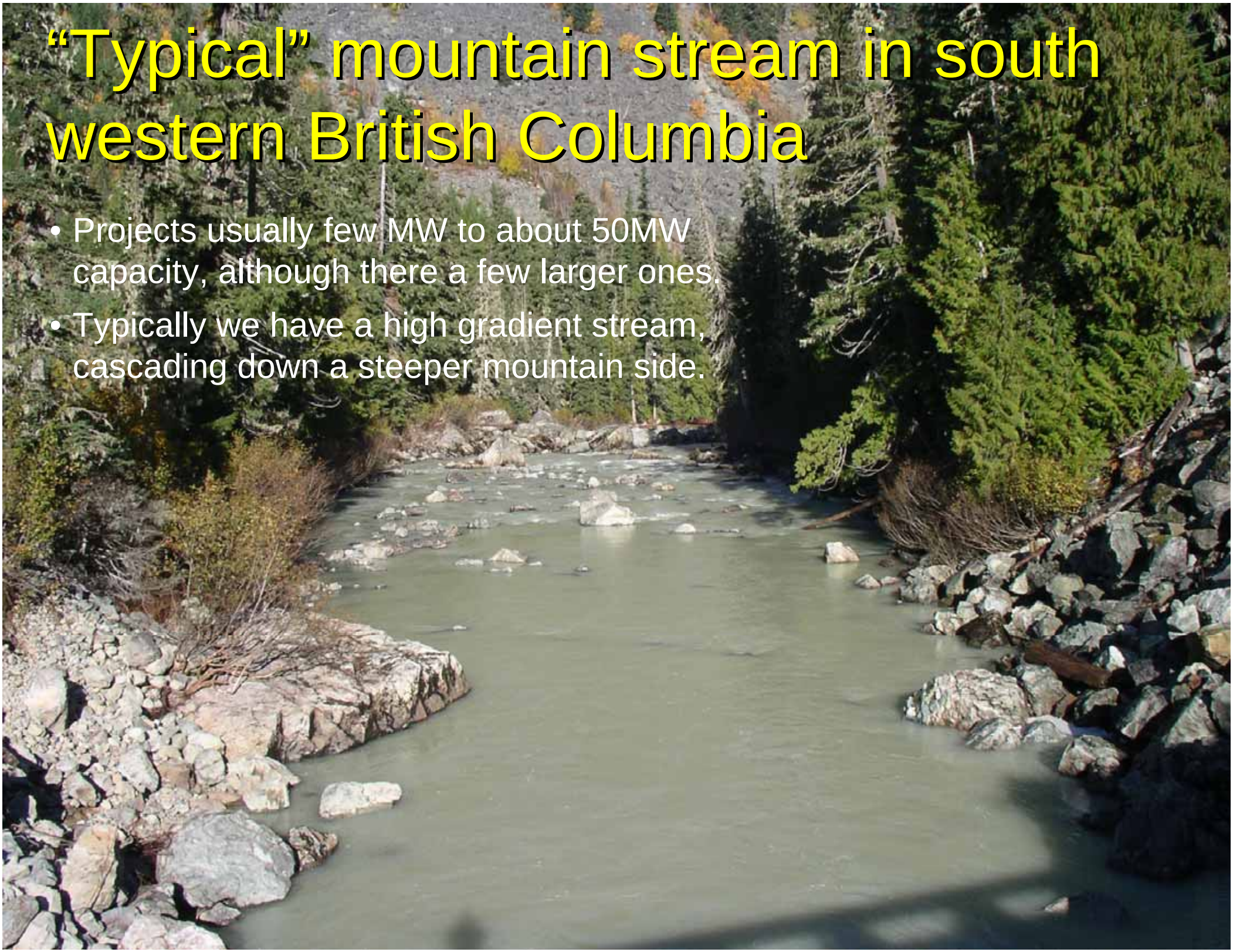
# Ecological Sustainability

"Meeting human needs without compromising the health of ecosystems."

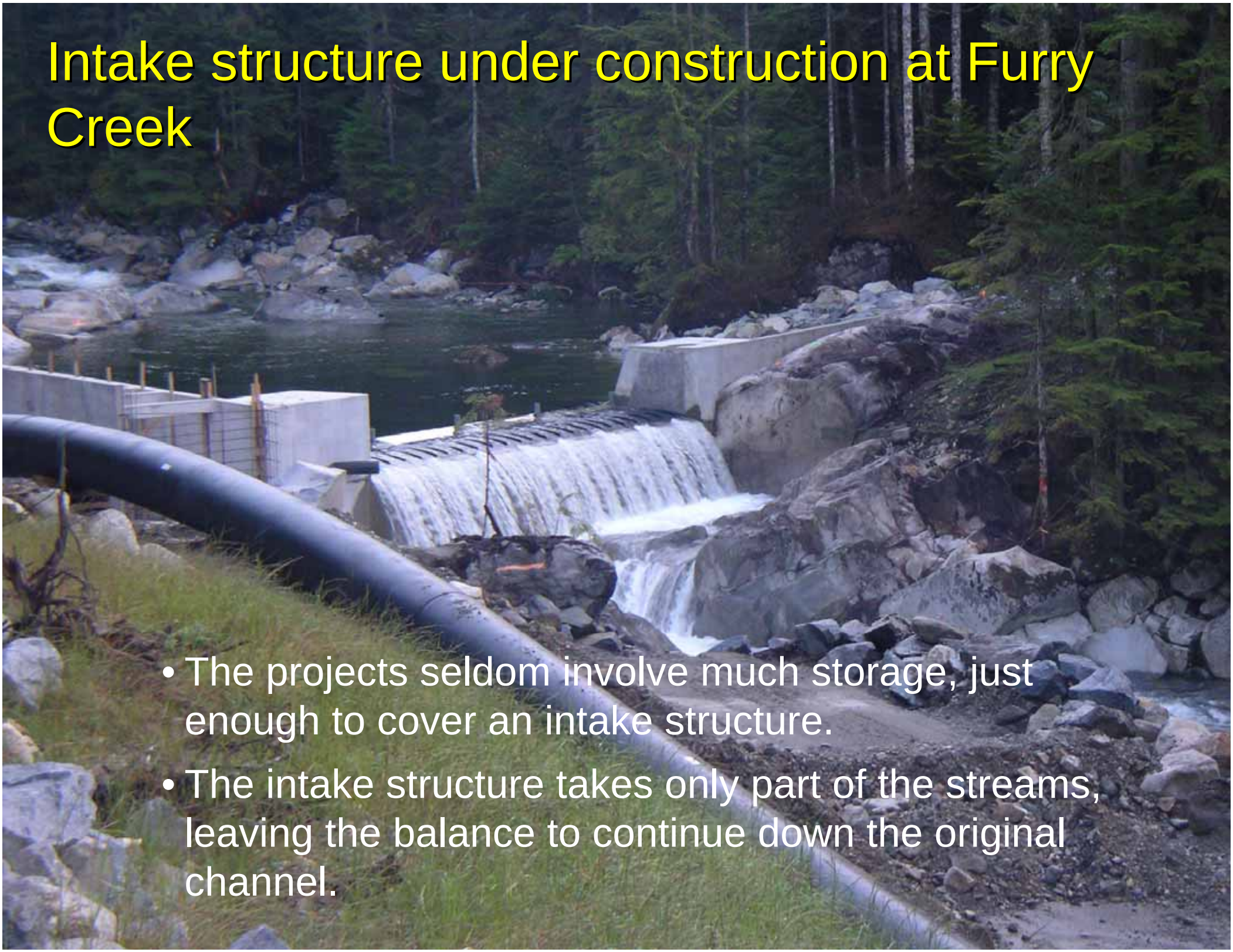
Callicott and Mumford (1997)

# “Typical” mountain stream in south western British Columbia

- Projects usually few MW to about 50MW capacity, although there a few larger ones.
- Typically we have a high gradient stream, cascading down a steeper mountain side.

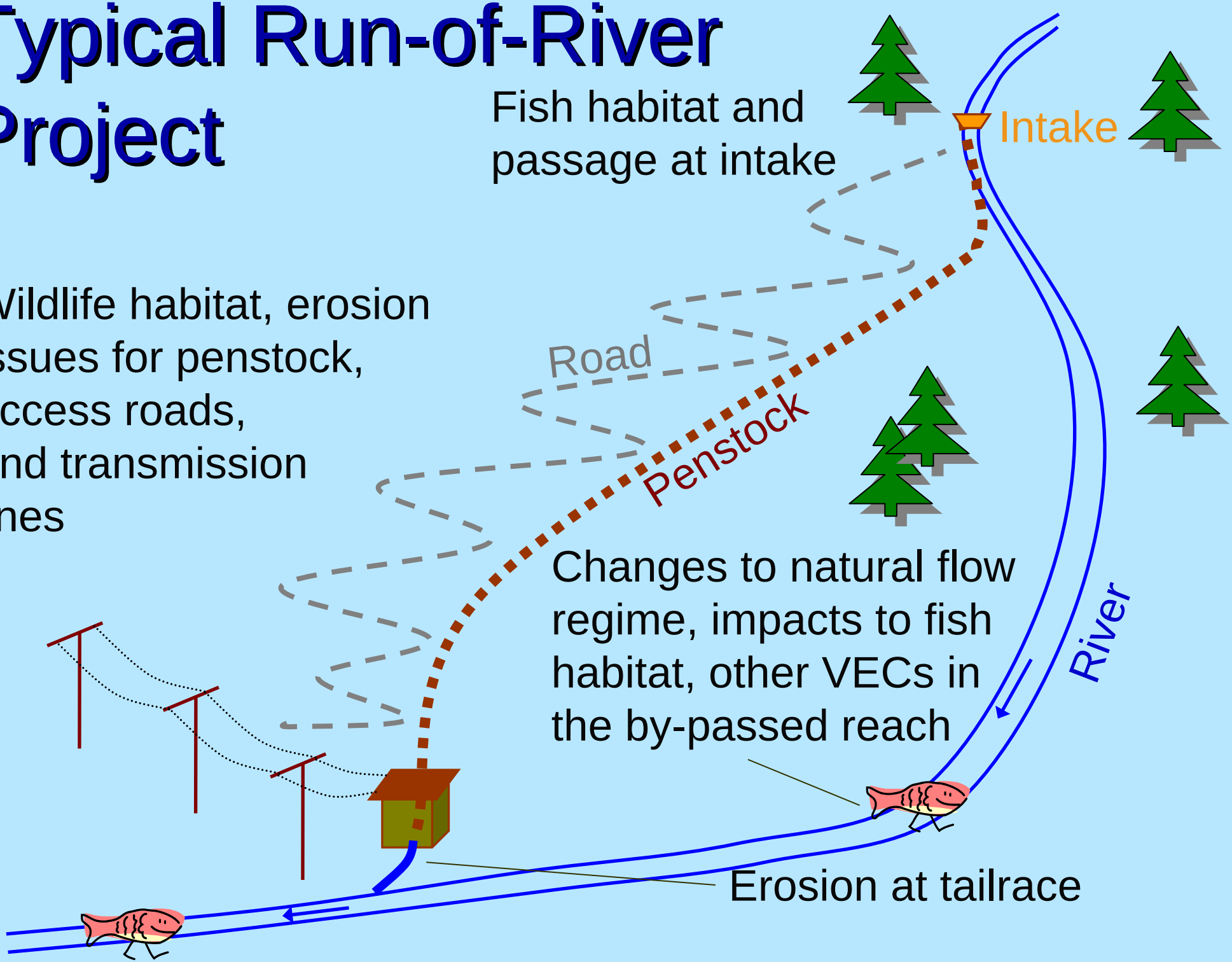


# Intake structure under construction at Furry Creek



- The projects seldom involve much storage, just enough to cover an intake structure.
- The intake structure takes only part of the streams, leaving the balance to continue down the original channel.

# Typical Run-of-River Project



# Consequences of Inaction

- If the EA process is inefficient, then investment dollars may be diverted towards non-sustainable non-renewable power generation.
- High-profile failures from poorly constructed projects may result in a public backlash to reject *all* run-of-river projects

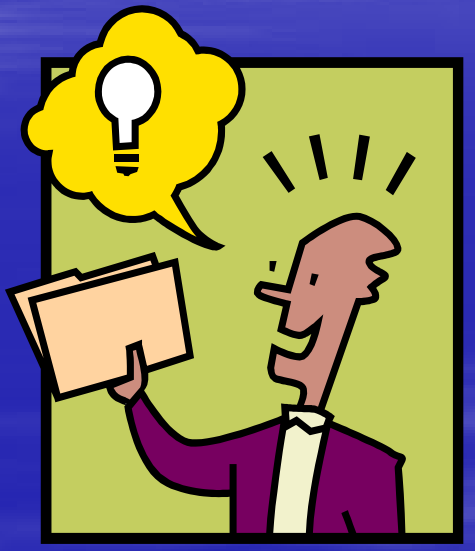
THE VANCOUVER SUN

Wednesday, December 18, 2002, Larry Pynn

# Salmon spawning threat cited: Federal officials probe release of sediment-bearing water into creek

The federal department of fisheries and oceans has launched an investigation into the sudden release of sediment-bearing waters from an independent power dam … near Pemberton while salmon were spawning downstream. …….

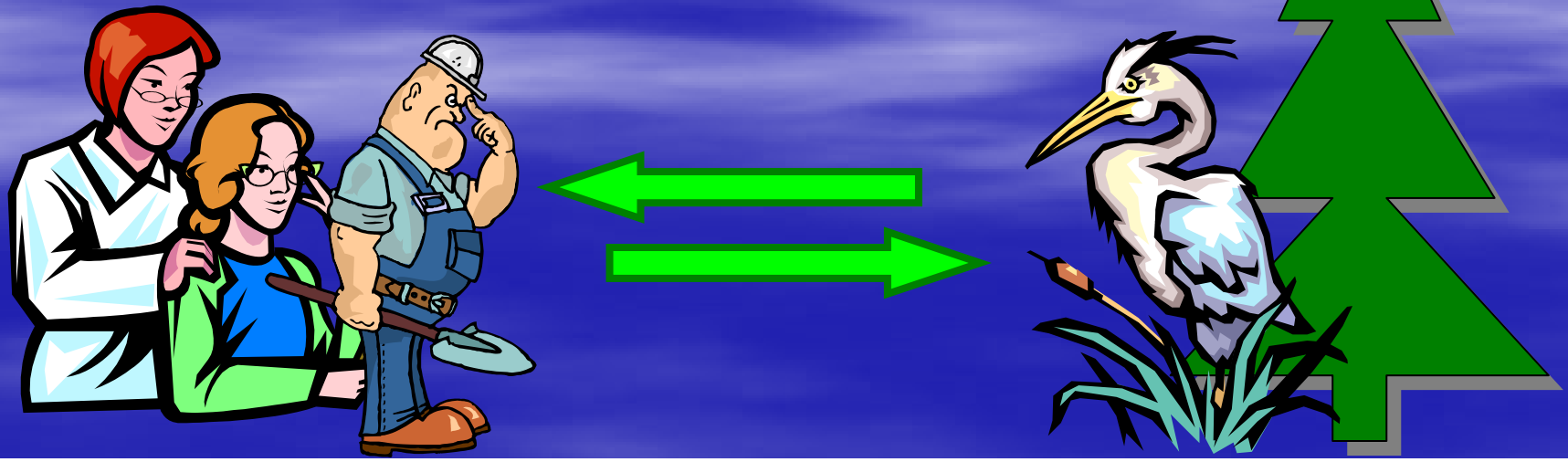
# Research Findings



# 1) Consider Both “How” (People) and “What” (Science) Issues

The question of ecological sustainability needs to be addressed from:

- The "how" or process and people issues,
- The "what" or environmental substance issues, and
- The interrelationships of these issues.



# 1) Considering Both "How" "What" Issues (cont'd)

- Although one may think ecological sustainability relates primarily to bio-physical science, it is people who hold values and make the management decisions.
- Often very good scientists and engineers working on hydro projects, those who know about the "what" and science issues, do not pay close enough attention to the how and people issues. This can lead to mistrust between proponents, agencies, public and others, and result project delays and increases costs as the mistrust builds.
- Similarly, others, like some regulatory agencies are primarily concerned about "how" or legal process issues of EA, but which neglect environmental science of projects. Here people's laws might be observed, but natures laws are violated.
- Environmental assessment offers the ability to integrate both the how or process issues and the environmental substance issues, and therefore a solution for obtaining the ecological sustainability of power projects.

# 2) Understand Stakeholders' Roles and Interests

- Federal Agencies
- Provincial Agencies
- BC Hydro
- Independent Power Producers
- ENGOs
- First Nations/Indian Bands
- Local and Regional Government


Many of these stakeholders have some form of process to look at environmental and other issues. Sometimes these are working in unison, but more often at different time frames and which cause considerable uncertainty for power developers.

# 3) Develop a Shared Vision for Run-of-River Hydropower

The key stakeholders **really do** need to get together, and display some real leadership to help solve the question of sustainability in energy generation. For example, they to have a shared vision in order to move forward in the same direction.

> "Lower impact run-of-river hydropower projects are identified, encouraged, and reviewed, through an environmental assessment process, to consistently and efficiently meet the goals of ecological sustainability."

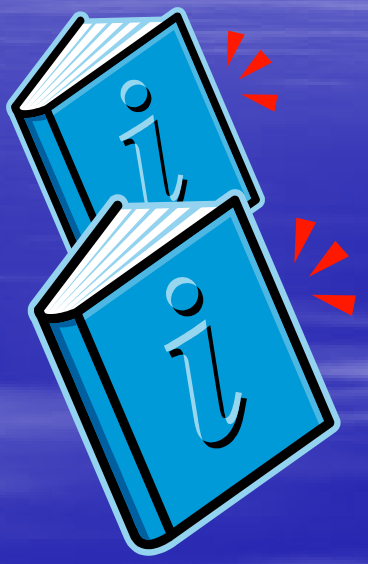
This vision, is draft, and requires modification and buy-in by the major stakeholders.

# 4) Class Assessments (Screenings)

- The Canadian Environmental Assessment Act, contains a provision to conduct generic EAs, known as class screenings or class assessments for similar and repetitive projects.
- Initially looked like promising solution.
- Closer examination found them too prescriptive (under CEAA) for the high variability found in hydro projects.
- Better to develop series of guidelines and BMPs, specifically targeted towards run-of-river hydropower projects.

# 5) Develop Guidelines and BMPs

- Federal EA requirements for hydropower
- Instream flow needs for fisheries in B.C.
- Instream flow needs for other VECs
- Acid Rock Drainage
- Cumulative Environmental Assessment
- Emergency preparedness
- Erosion and sediment control



This slide is only a partial list. Some of guidelines could be adapted from existing guidelines used in other environmental sectors. Some guidelines, such the instream flow needs for fisheries in B.C. are under development by provincial and federal agencies.

Where possible or applicable, guidelines “signed off” by agencies, to provide some certainty for proponents regarding EA requirements.


Erosion protection along access road (Furry Creek)
Erosion and sedimentation a very important issue for construction for mountainous regions of British Columbia

# 6) Ensure Proponent and Agency EA Capability and Capacity

- High quality information from proponents is essential to understand proposed projects, the environmental setting, potential impacts and adequacy of mitigation measures. High quality information provides confidence that projects are well managed and environmental issues will be addressed.
- Similarly, high quality technical capability and capacity from agencies is essential for EA review. DFO clearly has this capability to address impacts to fisheries. Indeed one should expect this, as this Department has fisheries science and management as its focus.
- Currently, there is little review capacity for Run-of-River Hydro for some agencies in BC, such as with Environment Canada. With their interest in climate change and other mandates, Environment Canada would well suited to advance the cause of good EA for these projects.
- Within the provincial government, we have very hard working, over taxed people trying to manage the water licences process required for power projects.
- However, the technical environmental review of these projects by the Provincial agencies can be very minimal or non-existent. For example, on the next slide…

BRITISH COLUMBIA

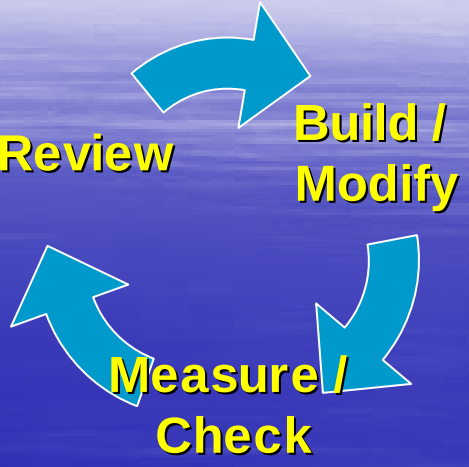
**Ministry of Water, Land and Air Protection**

"...Due to limited staff resources … the ministry will not be commenting on the May 22, 2002, "Development Plan for the ... Waterpower Project", which was submitted in support of the *Land Act* and *Water Act* applications."

"...The ministry wishes to be copied on any reports and other relevant environmental correspondence for its files but will not be commenting on the material."

# 7) Use Adaptive Management

- For the Project:
  - Shorter term e.g. adjusting minimum flows
  - Long term e.g. relicensing




Adaptive management, when used properly, is a powerful tool within EA since seldom are all project and environmental aspects known with certainty during the planning stages. Adaptive management could have a larger role with RoR, for example in adjusting project flows once the project is built, we can do the full scale experiment and we can measure things. Understandably, there are real risks and costs to proponents to build a larger capacity project, but then not get the flows.

One can also consider re-licensing, at longer intervals, a form of long term adaptive management. In federal EA, relicensing is usually not required, but really should be at, say the 25 to 50 year interval, after the proponent has received their economic pay-back, and as our environmental knowledge increases.

# 8) Cumulative Effects Assessment

- Cumulative effect of numerous project on one river system not well addressed.
- Difficult to assign responsibility to one proponent.
- Perhaps initiate a joint Industry-Government regional CEA
- Regional CEA, SEA or Land Use Planning may offer solutions.

# 9) Ecological Literacy for Decision Makers

- Actions are needed to improve the ecological literacy for senior agency managers, project owners and financiers, who decide on projects or approve the EA.
- For example, decision makers must understand that good science for hydropower development takes time and often operates on different time scales than those of business.
- Thus their planning must incorporate sufficient lead time for ecological studies to be undertaken.

# 10) Establish Semi-Autonomous EA Review and Learning Teams

- Learning is the most rational procedural response to uncertainty (Hilborn 1997)
- Sustainability requires continuous learning
- Clerk of the Privy Council and head of Canadian federal public service, counsels the federal government to become a learning organization.
- Accordingly, the leadership required to achieve ecological sustainability demands that federal and other organizations involved with the review of run-of-river hydropower projects do more than exchange letters and occasionally meet. They need to be able to come together as a learning team.

# Eststablish Semi-Autonomous EA Review and Learning Teams (cont'd)

- My vision is for an EA Review team, a semi-autonomous project review learning Team needs sufficient resources and strong links to expertise and knowledge within their respective organizations .
- Teams needs to be semi-autonomous, to look beyond own agency mandates. This will foster inter-disciplinary and inter-agency collaboration required to achieve sustainability.
- Understandably, differing political directions and legislation of federal, provincial and other organizations may make it difficult to establish such a team.
- If this occurred in our current political and legal climate in BC, it would indeed represent a profound change towards ecological sustainable energy development.


Site visit by review team

# Some Specific Actions to Achieve Ecological Sustainability

- Examine own and others' roles, interests, and world view on hydropower EA; be open to change with new evidence.
- Establish "pilot" EA review and learning team, among willing stakeholders.
- Develop shared vision for run-of-river hydropower among key stakeholders.
- Establish objectives and measurable targets for the hydropower EA regime, consistent with the Vision.
- Prepare federal EA hydropower requirements guidebook.
- Start adopting, preparing, testing, and establishing guidelines targeted at run-of-river hydropower projects.

# Some Specific Actions to Achieve Ecological Sustainability (continued)

- Promote, applicable use of adaptive management.
- Re-license projects every 25-50 years.
- Initiate a joint Industry-Government regional CEA and/or SEA for hydropower
- Deliver briefings to decision makers on the ecological aspects of hydropower.
- Federally, develop strategies to address provincial technical review voids
- Periodically review progress towards Vision, then modify objectives and targets as appropriate.


Penstock under construction
Questions?
Copies of research may be obtained from:
berni.claus@community.royalroads.ca