

The Future of Ecological Integrity in our Parks and Protected Areas

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Biological integrity is the capacity of supporting and maintaining a balanced, integrated, adapted community of organisms having a species composition, diversity and functional organization comparable to that of natural habitats of the region.

James Karr, 1981

Parks Canada will make protection of heritage resources its primary consideration.

Ecological and historical integrity are Parks Canada's first consideration and must be regarded as prerequisites to use. Protection of heritage resources is fundamental to their use and enjoyment by present and future generations.

Parks Canada Policy, 1979

Maintenance of ecological integrity through the protection of natural resources shall be the first priority when considering Park zoning and ecosystem-based management practices.

NPA, 1988

- . . . National parks are part of larger ecosystems and must be managed in that context.
- Ecosystems have characteristic rates of change. Understanding rates and direction are critical to understand the system.
- The goal of conserving ecological integrity is best addressed by maintaining or restoring the diversity of genes, species and communities native to the region....

El Panel Report, 2000

Ecological integrity means with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes.

NPA, 2000

Maintenance or restoration of ecological integrity, through the protection of natural resources and processes, shall be the first priority of the Minister when considering all aspects of the management of parks.

NPA, 2000

What is Ecological Integrity and Where Did the Concept Come From?

Presentation by J. David Henry,
12 November 2010, CPAWS National Annual General Meeting
Presentation at EI Seminar entitled “The Future of Ecological Integrity in Our Parks and Protected Areas.”

It is important for people interested in national parks and protected areas to understand where the concept of Ecological Integrity came from and something about how it has developed over the past 30 years.

Why? To summarize a great deal of deliberations, we can just say: To know where we are going, it is useful to know where we have come from!

I will follow two lines in the development of Ecological Integrity or EI. One line can be called its scientific development. The other line can be called its policy development. I don't pretend to have all the answers. If you can shed further light on EI's development or can fill in any of my missing info, please share it with me this afternoon or this evening.

The Scientific Development of Ecological Integrity

I think much of the scientific rigor of EI was provided by or at least anticipated by the Index of Biotic Integrity (known as IBI) developed by James R. Karr and many other aquatic ecologists since the early 1980s. However, IBI's origins go back more than a century.

Beginning in the early 1900s and accelerating greatly in the last 20 years, fish community characteristics have been used to measure relative ecosystem health. For example, Forbes and Richardson in 1913 published a scientific study surveying fish populations in order to assess the health of the upper Illinois River.

In 1981, James Karr published a seminal article entitled “Assessment of Biotic Integrity using Fish Communities.” In this article, he defined biotic integrity as in Slide #2 “the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats of the region.”

Over the years, Karr and his colleagues have developed the IBI considerably. It is a suite of measurements that is adapted to different geographic regions and various kinds of water bodies (usually rivers or streams, but more recently lakes). Its goal is to measure and evaluate the consequences of human actions on the biological systems of that water body.

The IBI is based on the premise (now empirically tested) that living organisms adapt to conditions around them. Thus the measurement of species diversity as well as growth

parameters of populations can diagnose chemical, physical and biological impacts as well as cumulative environmental impacts.

IBI has received a great deal of scientific development and scrutiny. It has been challenged on numerous points, but limnologists and aquatic ecologists still find it to be of value. The volume that Thomas Simon has recently edited entitled “Assessing the Sustainability and Biological Integrity of Water Resources Using Fish Communities” is a good indication of its usefulness.

There are many commonalities between the aquatic concept of Biotic Integrity and the largely terrestrial concept of Ecological Integrity. I wonder if EI has taken maximum advantage of all the scientific work carried out on the IBI.

The Policy and Legislation Development of Ecological Integrity

In Canada, the earliest use of the term Ecological Integrity appears to be in the 1979 Parks Canada Policy (which many of us like to refer to as The Beaver Book). In its Program Policies, under Protecting Heritage Resources, it gives the following two strong statements (Slide #3):

- Parks Canada will make protection of heritage resources its primary consideration.
- Ecological and historical integrity are Parks Canada’s first consideration and must be regarded as prerequisites to use. Protection of heritage resources is fundamental to their use and enjoyment by present and future generations.

The phrase “ecological integrity” was occasionally used but remained in the background until the National Park Act (NPA) was revised in 1987-88. Alberta Wilderness Society (Diane Pachal) and CPAWS (Kevin McNamee) both presented briefs to the Parliamentary Standing Committee working on these revisions after they had been given second reading in the House of Commons. Both societies recommended that ecological integrity be given a high priority in the National Parks Act (Canada). The concept stimulated attention and discussion. It was reported on in the Globe and Mail, and our national parks have never quite been the same since.

As many of you know, these actions resulted in the 1988 amendment to the NPA stating that (Slide #4):

- Maintenance of ecological integrity through the protection of natural resources shall be the first priority when considering Park zoning and ecosystem-based management practices.

Soon the usefulness of the concept of EI was being realized in the planning and management of our national parks but also the frustration since we did not have a formal definition of EI, or more specifically a legally binding definition of EI.

In 2000 the Panel on the Ecological Integrity of Canada's National Parks suggested a definition for EI and produced several useful recommendations concerning it.

Several of its recommendations concerning EI in part read (Slide #5):

- Because ecosystems are dynamic, conservation strategies should maintain or restore key ecological processes within their natural range of variability.
- . . . National parks are part of larger ecosystems and must be managed in that context.
- Ecosystems have characteristic rates of change. Understanding rates and direction are critical to understand the system.
- The goal of conserving ecological integrity is best addressed by maintaining or restoring the diversity of genes, species and communities native to the region. . . .

Partly in response to the Panel's report, in 2000 the Minister of Canadian Heritage introduced further revisions to the NPA. One of these revisions established a legally binding definition of Ecological Integrity, and it reads (Slide #6):

- Ecological integrity means with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes.

Another revision to the NPA in 2000 strengthened a statement already in the Act. It reads (Slide #7):

- Maintenance or restoration of ecological integrity, through the protection of natural resources and processes, shall be the first priority of the Minister when considering all aspects of the management of parks.

About this time Parks Canada began to struggle with the question: If we are required to maintain or restore ecological integrity in national park ecosystems, how do we know we are fulfilling this legal responsibility unless we monitor relevant attributes of these ecosystems? This question has guided the development of EI monitoring programs in many parks.

Consequently, with the monitoring initiative I think we see a fusion of the policy and legislation development of EI with the scientific development of EI, and I think is largely where we are today.

Thank you, and have good deliberations about the future of EI in your discussion groups.