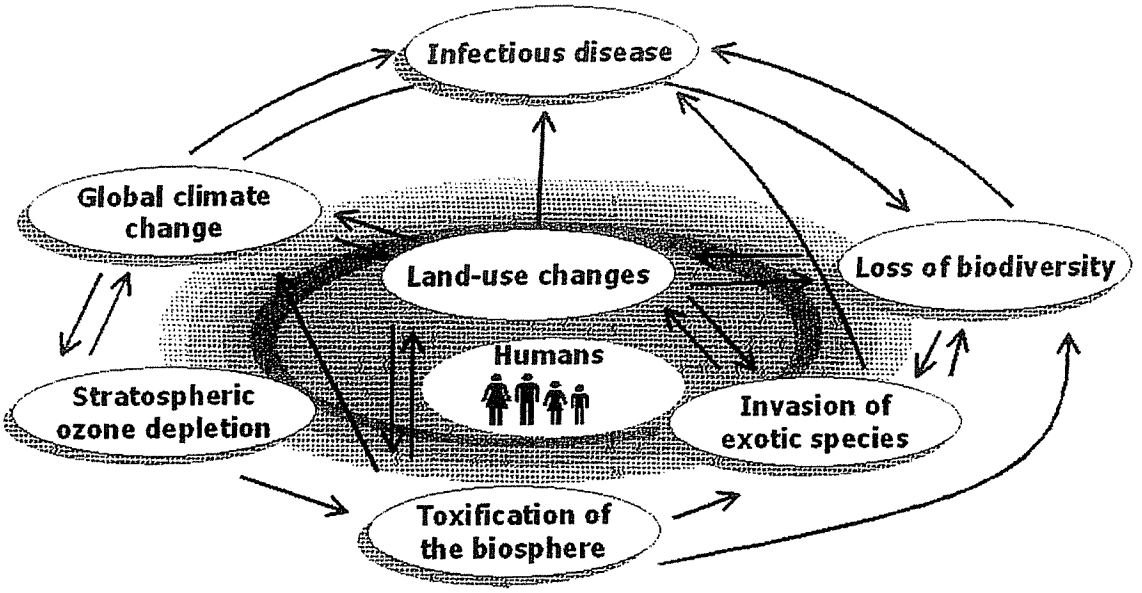
Information Item

G. E. Likens, Providing limnological leadership



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Master Homepage: http://lakes.chebucto.org

Ref.: NWCC_WQ (total: 4 pages)

To: **Chair and members, North West Community Council, HRM**

From: S. M. Mandaville Post-Grad Dip., Professional Lake Manage.
Chairman and Scientific Director
Date: January 01, 2008
Subject: **Water Quality basics- Biotic Integrity and Biodiversity**

An overview of the scientific water quality with the imperative biotic integrity and biodiversity is attached in 3 pages. The specific web page (http://lakes.chebucto.org/quotes.html) has various clickable web links, visible by a suttle change in colour, to hundreds of our award winning as well as other authorities!

It is real high time to incorporate credible performance standards in projects, present/past, which drain into our urban, suburban, and rural lakes no matter how unpopular they may be with `polluters' and/or the perpetual `nay-sayers'!

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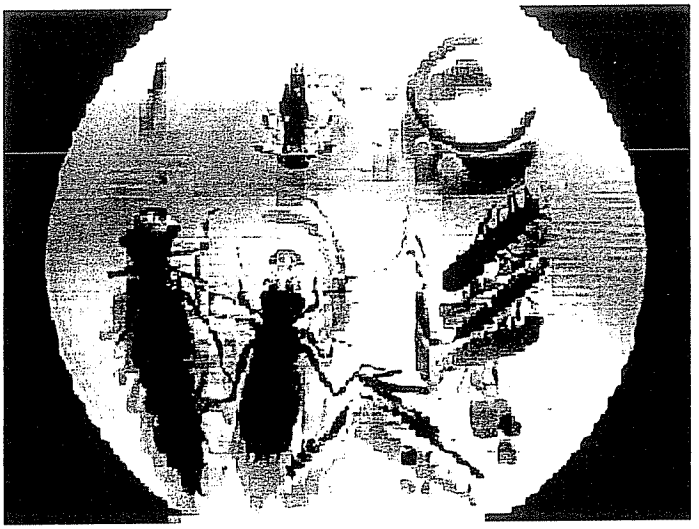
Chemical vs Biological monitoring in limnology



Soil & Water Conservation Society of Metro Halifax (SWCSMH)

July 03, 2006 HOME PAGE Our *modus operandi!*

Contents:

Primary citations from leading worldwide scientists

"Chemical measurements are like taking snapshots of the ecosystem, whereas biological measurements are like making a videotape."

Prof. David M. Rosenberg PhD, Univ. of Manitoba and the Freshwater Institute, DFO, Winnipeg, and lead author of the EMAN Protocol (*cf.* Bull. Entomol. Soc. Can. 1998. 30(4):144-152)

... and ...

"The algologist can be compared to a doctor who tells us that the

patient is ill, while the benthologist may tell us whether the illness is critical or not."

Prof. Ole A. Saether PhD, Museum of Zoology, Univ. of Bergen, Norway, and Freshwater Institute, Winnipeg, Canada (*cf.* Prog. Wat. Tech., IAWPR/Pergamon Press Ltd., UK. 1980. 12:161-180)

Biological Integrity, USEPA

Biological integrity is commonly defined as "the ability to support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity and functional organization comparable to those of natural habitats within a region" (Karr, J. R. and D. R. Dudley. 1981. Ecological perspectives on water quality goals. Environmental Management 5: 55-68).

Biological integrity is equated with pristine conditions, or those conditions with no or minimal disturbance. The reference condition is commonly associated with biological integrity, and the threshold is some proportion of the reference condition.

After much careful study, environmental scientists have determined that the presence, condition, and numbers of the types of fish, insects, algae, and plants can provide accurate information about the health of a specific river, stream, lake, wetland, or estuary. These types of plants and animals are called biological indicators.

> "An indicator is a numerical value derived from actual measurements, has known statistical properties, and conveys useful information for environmental decision making. An ecological indicator is defined here as a measure, an index of measures, or a model that characterizes an ecosystem or one of its critical components." (USEPA)

Canadian Council of Ministers of the Environment (2006)

cf., Developing Biocriteria as a Water Quality Assessment Tool in Canada: Scoping Assessment. 2006. PN 1350. 60p. USING PDFs

(EQG refers to the CCME's Environmental Quality Guidelines)

"Among the limitations of relying solely on chemical and/or physical parameters to assess ecological health and sustainability is the fact that existing environmental quality guidelines

(EQGs) only consider a toxic response to single chemicals, and therefore cannot account for the cumulative impacts from multiple chemical discharges (a "cocktail" of compounds) which may be coupled with physical changes in the environment. Furthermore, EQGs may not account for lower response thresholds in highly sensitive organisms or life-stages. Single-point-in-time samples can miss, cannot detect, or cannot re-construct periodic events that collectively may influence a biota."

Ontario Ministry of Environment

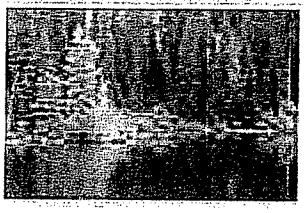
Although chemical monitoring is useful, there are important reasons for biological monitoring. Organisms have an integrating response to their environment. This means that fluctuations in water quality, which may be missed by intermittent chemical sampling and analysis, are reflected in biological assessments. Chemical monitoring will only record the contaminants that are analyzed for whereas the biota may respond to many other, unmeasured chemicals.

Biological monitoring is also important in situations where there are a range of contaminants whose biological effects may be synergistic or antagonistic and would not be appreciated through chemical measurements. Moreover, it can be argued that if we wish to maintain healthy, diverse biological communities, it is more appropriate to monitor the aquatic community rather than chemical variables only.

Periphyton, macroinvertebrates and fish are all sensitive indicators of aquatic ecosystem health. Furthermore, the aquatic biota can serve as sensitive early warning indicators of problems that may take years to fully develop (Winter, 2000).

HOME PAGE

SWCSMH Limnology Master Homepage



We salute the Chebucto Community Net (CCN) of Halifax, Nova Scotia, Canada for hosting our web site, and we applaud its volunteers for their devotion in making `CCN' the best community net in the world!