

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: DEC 30 1991

RECEIVED JAN 6 1992

SUBJECT: EOWG Subcommittee on Indicators of Responsible Stewardship for Lake Ontario

FROM:

Joel S. O'Connor *Joel O'Connor*

Subcommittee Membership
TO:

I send along a few additional ideas in advance of our January 9th meeting.

In accord with my request for stewardship indicator recommendations, my suggestion embraces what are termed the "integrated regional accounts" (in \$) of the L. Ontario basin, accounting for depreciation of the most important environmental assets in physical and/or aesthetic units. Dollar value of the integrated regional accounts would be expressed as gross regional product minus pollution-control expenditures, recognizing that the accounts must be further debited or qualified to account for resource use or degradation:

- o water - internal usage, import, export (water quality considered by others)
- o energy - internal usage, import, export
- o food - internal usage, import, export
- o land - restoration/development
- o fisheries - restoration/loss of historic stocks
- o air - restoration/loss of historic quality
- o satisfaction with what is produced by the economy.

Dennis King and others will undoubtedly help clarify such accounts.

Initially, it will be important to determine how much data/information exists to quantify stewardship indicators of potential interest. It may facilitate searches for such data/information if each of us describe briefly the sorts of data, information and contacts with which we are most familiar. To accomplish this efficiently, I ask that each of us bring to the Jan 9th meeting a concise description of our relevant informational strengths. To illustrate what I have in mind, my summary follows:

Joel O'Connor - L. Ontario informational strengths

broad ecology
fisheries dynamics, historical and modern
fish-eating birds, reproductive success
human values as indicators of behavior
moderate network of natural scientists in the region.

Please bring 12 copies of such a summary to the Jan 9th meeting.

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I attach a summary of discussions on L. Ontario stewardship indicators held last May at SUNY, Brockport. I believe that these categories of stewardship indicators deserve some thought prior to our Jan 9th meeting.

Sally Lerner has also identified a published suite of social and institutional performance indicators for wildlife and fishery resource management (selected pages attached from B.A. Knuth and L.A. Nielsen, Society and Natural Resources, 2:329-344). The scope and kinds of indicators recommended by these authors may be useful points of departure for us. I apologize for the poor copy, but am unable to quickly locate an original of the journal.

With Best Wishes for the New Year.

Attachments

cc: Paul Bertram, GLNPO
Trefor Reynoldson, CCIW

**Workshop
Summary Report**

JOEL S. O'CONNOR

**Ecosystem Health Indicators:
Lake Ontario Case Study**

May 22 & 23, 1991
SUNY College at Brockport, NY

JOEL S. O'CONNOR

Sponsored by:
Great Lakes Research Consortium and
the Conversation in the Disciplines Program of the
State University of New York

in cooperation with:
The Binational Ecosystem Objectives Work Group

INTRODUCTION

U.S. and Canadian agencies, international organizations and others have recognized a need to adopt ecosystem goals and objectives for the Great Lakes, and to identify indicators of progress toward their attainment. Without measurable indicators of ecosystem health, the concept of ecosystem-based environmental protection and resource management will languish in the realm of highly abstract discourse.

In order to bring the perspective of academic researchers and scholars into the process of defining indicators of ecosystem health and of identifying research needed to support the selection of indicators, the Great Lakes Research Consortium hosted an interdisciplinary working conference May 22-23, 1991, *Ecosystem Health Indicators: Lake Ontario Case Study*. The purpose of the workshop was to discuss appropriate environmental indicators and research approaches using Lake Ontario as a model. Together, Great Lakes researchers, students and resource managers considered the work accomplished to date by the Binational Ecosystems Objectives Work Group (EOWG) and five subcommittees: aquatic communities, human health, benthic communities, habitat, stewardship and wildlife (see Background Reports in Appendix I). Participants discussed alternative approaches to defining indicators and identified research needs for further development of indicators.

To assist them in this task Paul Bertram of U.S. EPA and the Binational Objectives Development Committee presented an overview of the components of ecosystem objectives as presented in *"Ecosystem Objectives for Lake Ontario"* (Ecosystem Objectives Work Group, March 1990). The components include three goals which reflect societal values in and around Lake Ontario, a set of ecosystem objectives for each component which are designed to be descriptions of conditions that must be met in order to ensure the health of Great Lakes ecosystem, and one or more indicators to measure progress toward each objective. Basic criteria for indicators are that they must be measurable and quantitative. A large part of the discussion focused on correlating the descriptive states of the ecosystem objectives such as "self-sustaining and healthy" with particular attributes, and representative elements that could serve as an appropriate indicator.

This report presents a brief overview of the background discussions and the recommendations of each working group. The Ecosystem goals provided by EOWG are presented below. Ecosystem objectives for each working group headline each subcommittee report.

For additional information please contact Jack Manno, GLRC, SUNY-ESF, 24 Bray Hall, Syracuse, New York 13210 Tel. (315) 470-6816.

Ecosystem Goals

1. *The Lake Ontario ecosystem should be maintained and as necessary restored or enhanced to support self-reproducing diverse biological communities.*
2. *The presence of contaminants shall not limit the use of fish, wildlife and waters of the Lake Ontario basin by humans and shall not cause adverse health effects in plants and animals.*
3. *We as a society shall recognize our capacity to cause great changes in the ecosystem and we shall conduct our activities with responsible stewardship for the Lake Ontario basin.*

Samuel H. Sage -- Lake Ontario Informational Strengths

broad public policy

networking, especially citizen activists, LOON

flora and fauna

open space, parks, public lands, historic sites, etc.

coastal zone management especially access, critical areas

wetlands

✓ Sally Lerner University of Waterloo, Ontario, Canada

Lake Ontario informational strengths:

broad environmental sociology

activities of voluntary environmental stewardship (VES) groups

roles of VES groups in Ontario and generally

"sustainable society" parameters and indicators

cross-border network with other environmental sociologists

✓

STEWARDSHIP

Facilitator: Anne Marie McShea

Objective

"Human activities and decisions shall embrace environmental ethics and a commitment to responsible stewardship."

Discussion

A general discussion of environmental ethics and stewardship and the appropriate approach to develop stewardship indicators were first pursued. The societal values and attitudes which comprise an environmental ethic were considered as possible stewardship indicators. Recent studies such as Lester Milbrath's research in identifying and tracking societal values toward the environment were considered.

Certain key attitudes can be very revealing in the general populace's commitment to Great Lakes conservation. However, although there was general agreement on the importance of values and attitudes and the need to study them, their use as indicators of ecosystem health was questioned on the basis of lack of sensitivity to short term changes in the environment and water quality, and lack of specificity.

Focus was thus shifted to the realm of actions which comprise stewardship. Referring to the background materials stewardship was defined as, *The process of educating, advocating and making changes on behalf of the environment*. Considering that these actions are linked to environmental ethics, attention was focused on individual and societal actions as indicators of stewardship.

A list of various social activities impacting the environment was drawn up. The many activities were then grouped into traditional sectors of activity including education, recreation/leisure, media, political/legislative, economic, individual, urban/municipal, business, and agricultural.

Based on the general criteria for indicators (quantifiable, scaleability, sensitivity, etc.) activities which may be used to document linkages between ecosystem health and human activities were then selected as possible indicators. Actions driving social change including both top-down regulation and bottom-up activism were considered.

Proposed Indicators by Sectors of Activity and Role in Stewardship

1. Education - Educating

Student/public knowledge: Using sample surveys to document and track ecological understanding and knowledge of Great Lakes issues.

2. Recreation/Leisure - Educating

Attendance: Track nature park/beach attendance.

3. Media - Educating, Advocacy

News and editorial coverage: Track the media's response to Great Lakes problems and issues including the amount and type of coverage on Great Lakes issues.

4. Political/Legislative - Advocacy, Making Changes

New legislation: Quantify and track the number of Great Lakes bills introduced, passed, funded, and implemented.

Voting records: Track and record party and representative voting records on the environment

5. Economics - Making Changes

Development: Examine both residential and commercial development, particularly within ecologically sensitive areas of Lake Ontario.

Zoning regulations: Document and track zoning regulations within Lake Ontario communities.

6. Individual - Making Changes

Per capita resource use: Track changes in annual per capita use of energy, pesticides, water and waste generation.

7. Urban/Municipal - Making Changes

Financial commitments: Bonding to improve the quality of sewage effluent.

8. Business - Making Changes

The greening of business (voluntary or other than regulatory changes).

9. Agriculture - Making Changes

Pesticide use, toxic unit per acre by pesticide category, use per yield.

Society and Natural Resources Volume 2, pp. 329-344
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0094-1929/91 \$3.00 + .00
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Social and Institutional Performance Indicators for Wildlife and Fishery Resource Management Systems

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Abstract *Following a model based on the development and use of social indicators in the field of public administration, the article describes a system of wildlife and fishery resource management indicators for all dimensions of the resource management complex. The system includes a comprehensive series of biologic, social, and institutional dimensions. These dimensions are arrayed with four management system components—inputs, processes, outputs, and impacts—to form a 16-cell matrix containing 377 resource management indicators. Social and institutional dimensions are discussed as being most in need of explicit management attention. The indicator system has utility for improving all phases of the management process, from goal- and objective-setting through evaluation. Use of the indicator system will lead to more comprehensive and explicit resource management decisions and will help identify promising new areas for research, especially in the human dimension.*

Keywords: indicators, evaluation, management system, human dimensions, performance measures.

Concepts of Natural Resource Management Systems

Proposals for creating and thinking about natural resource management systems have grown in abundance in the last several years (Krueger, Decker, and Gavin 1986; Lieberman 1986; Miller, Gale, and Brown 1987). Common to most of these approaches is the desire to focus resource management processes not only on the biologic and physical resource base but also on the social aspects of the entire resource management system. Such a whole-system perspective incorporates the organisms of interest (e.g., fish, wildlife, and trees), the ecosystem or habitat in which the organisms occur, the social structure in which the organisms or habitats are used, and the political and institutional sphere in which management occurs.

As Decker, Brown, and Mattfeld (1987) noted, however, many barriers inhibit this whole-system perspective, especially the integration of the social sphere with biologic and institutional elements. Attention to the human component of management has indeed

Table 1
Numbers of Indicators Identified for Each Resource Element

System component	Resource dimension				Total
	Organism	Environmental	Social	Institutional	
Inputs: 1	4	3	8	8	
2	3	3	6	2	
3	4	8	2	3	
4	2	5	4	2	
5			4	3	
Totals	13 (2)	19 (5)	24 (3)	18 (13)	74 (23)
Processes: 1	4	3	4	5	
2	5	4	13	2	
3	8	4	7	3	
4	5	5	5	2	
5	3	7	2	4	
6	4		10	7	
7			4		
Totals	29 (22)	23 (16)	45 (30)	23 (16)	120 (84)
Outputs: 1	11	6	5	3	
2	6	4	9	4	
3	6	3	10	2	
4	3	5	3	7	
5	2	3	3	5	
6		5	9		
Totals	28 (8)	26 (9)	39 (7)	21 (11)	114 (35)
Impacts: 1	2	7	6	3	
2	4	2	8	2	
3	5	2	2	3	
4	2	9	2		
5	3		5		
6			2		
Totals	16 (7)	20 (8)	25 (3)	8 (6)	69 (24)
Grand	86 (39)	88 (38)	133 (43)	70 (46)	377 (166)

Notes. Numbers in parentheses indicate numbers of highly available and highly appropriate indicators in each cell matrix. For actual inputs, processes, outputs, and impacts, see fig. 1.

Availability of indicators for matrix cell 3C (social outputs) is quite variable (Table 2). Two characteristics, consumptive use quantity and user knowledge, contain highly available indicators that were found in many sources, demonstrating a great interest in these data. Indicators representing the rest of the resource elements in this cell are relatively unavailable. These indicators address general and nonconsumptive recreation opportunities.

Resource Management Indicators

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Table 2
Recommended Social Management Indicators
and Categorizations Regarding Appropriateness and Availability

Matrix cell and element ^d	Indicator	Appropriateness and availability ^e
Inputs		
3A-1	a. Population purchasing a harvest license (%)	M/H
	b. Population donating to the nongame program (%)	M/H
	c. Population engaging in some form of resource use or enjoyment, determined by survey (%)	M/M
3A-2	a. Resource users in each age group (%)	H/H
	b. Resource users in each gender (%)	H/H
	c. Resource users in each region of state (%)	H/M
3A-3	a. Resource users by reason for participation (%)	H/L
	b. Resource users in each attitude class (%)	M/L
3A-4	a. Population preferring a given experience (%)	H/L
	b. Population desiring resource use opportunities within a given distance of residence (%)	H/L
3A-5	a. Cost of harvest license, by type (\$)	H/H
	b. Average annual expenditure per user for fisheries and wildlife recreation (\$)	H/L
Processes		
3B-1	a. Workshops conducted for educational instruction (#)	H/H
	b. Speaking requests received from schools (#)	H/H
	c. Hunter education programs ratings	H/H
	d. Personnel time spent preparing curriculum development materials (%)	H/H
3B-2	a. News releases written (#)	H/H
	b. Audiovisual productions completed (#)	H/H
	c. Information publications prepared (#)	H/H
	d. Information programs presented (#)	H/H
	e. Personnel time spent on information and education activities (%)	H/H
3B-3	a. New access areas acquired or constructed (#)	H/H
	b. Access areas maintained or under lease (#)	H/H
	c. Budget spent on access site acquisition and development (%)	H/H
	d. Miles (km) of road controlled and maintained (#)	H/H
	e. Acres (ha) accessible through cooperative agency contracts with landowners (#)	H/H
	f. Population living within a specified distance of recreation opportunities (%)	H/M

(Table continues on next page)

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Barbara A. Knuth and Larry A. Nielsen

Table 2 (Continued)
Recommended Social Management Indicators
and Categorizations Regarding Appropriateness and Availability

Matrix cell and element ^a	Indicator	Appropriateness and availability ^b
3B-4	a. Contacts with landowners for technical assistance (#)	H/H
	b. Short courses offered to landowners regarding management practices (#)	H/H
	c. Agency-landowner cooperative agreements for private land management (#)	H/H
	d. Management plans produced for landowner cooperators (#)	H/H
	e. Personnel time devoted to landowner assistance (%)	H/H
3B-5	a. Formal public meetings held (#)	H/H
	b. People attending public meetings (#)	H/H
3B-6	a. Licensed hunters and anglers per full-time enforcement officer (#)	H/H
	b. Public contacts by law enforcement officers (#)	H/H
	c. Arrests or citations issued (#)	H/H
	d. Convictions obtained per arrest (#)	H/H
	e. Fines collected as a result of violation convictions (\$)	H/H
	f. Agency employees who are enforcement officers (%)	H/H
	g. Agency budget spent on law enforcement activities (%)	H/H
3B-7	a. Money committed to human dimensions research (\$)	H/H
	b. Personnel time spent on human-related research (%)	H/H
Outputs		
3C-1	a. Population participating in fisheries- and wildlife-related opportunities (%)	H/M
	b. Privately owned fish and wildlife recreation enterprises (#)	H/M
	c. Rank of direct fisheries and wildlife recreation among all recreation pursuits in terms of participation	H/L
3C-2	a. Population participating in consumptive resource use, determined by harvest license sales (%)	H/H
	b. Consumptive users measured by license sales (#)	H/H
	c. Boats participating in commercial fishery (#)	H/H
3C-3	a. Unsolicited public requests received for agency information and education materials (#)	H/H
	b. Subscribers to agency magazine (#)	H/H
	c. People attending agency presentations (#)	H/H
	d. People trained or certified by agency (#)	H/H
3C-4	a. Fisheries- and wildlife-related recreation in each activity type (%)	H/M
	b. Recreation days spent in each area type (%)	H/L

Resource Management Indicators

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Table 2 (Continued)

Matrix cell and element ^a	Indicator	Appropriateness and availability ^b
3C-5	a. Consumptive recreation participation measured as (%) recreationists who hunt only, fish only, or hunt and fish	H/M
	b. Consumptive effort (user days) devoted to a particular species or group of species (%)	H/M
3C-6	a. Visitors to wildlife refuges or reserve areas where consumptive use is not allowed (#)	H/M
	b. Visitors to fish hatcheries (#)	H/M
	c. Nonconsumptive users in state, measured by survey (#)	H/M
	d. Population participating in nonconsumptive activities, determined by survey (%)	H/M
Impacts		
3D-1	a. Expenditures of recreationists for fisheries- and wildlife-related opportunities (\$)	H/M
	b. Contributions to economy by recreationists per dollar spent by agency (\$)	H/M
	c. Value of commercial fisheries and wildlife products (\$)	H/M
3D-2	a. Congressional inquiries regarding agency activities (#)	H/H
	b. Ratio of positive to negative unsolicited public comments received regarding management activities	H/M
	c. Ratio of positive to negative press for an agency	H/M
3D-3	a. Clubs and organizations receiving an agency newsletter (#)	H/H
	b. Current memberships in local, state, or national nature clubs, recreation groups, conservation organizations, or animal welfare societies (#)	H/M
3D-4	a. Resource users experiencing each type of personal benefit (%)	H/L
	b. Resource users returning to same site of previous use (%)	M/L
3D-5	a. Resource users experiencing each type of societal benefit (%)	H/L
	b. Resource-related outings arranged for special social groups (#)	M/M
	c. People satisfied with their fisheries and wildlife resource use and/or knowledge (%)	M/L
3D-6	a. Hunting accidents reported per season (#)	H/H
	b. Editorials or articles in newspapers addressing user conflicts (#)	H/M

^aSee Figure 1.^bH, high; M, medium; L, low.