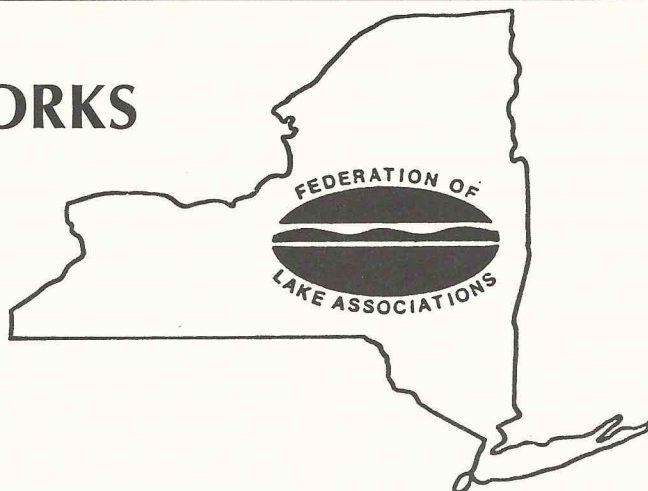


WATERWORKS



WINTER 1988
Volume 4
No. 1

FUNDAMENTAL CONSIDERATIONS FOR COMPREHENSIVE LAKE MANAGEMENT

by

Charles C. Morrison, Director, Land Resources Planning
NYS Department of Environmental Conservation

On June 10th, 11th, and 12th, The Federation of Lake Associations will hold its annual conference at Keuka College. The theme this year will center on comprehensive lake and watershed management planning. The following article summarizes some of the issues which will be discussed.

The Fall 1987 issue of **Waterworks** contained the text of a position paper titled: "Lake Management in New York: Need for a Comprehensive Approach." The paper was prepared by the Scientific Advisory Board of the New York Federation of Lake Associations and was edited by Dr. R. Warren Flint, the board's chairman. Its main message is that comprehensive lake management is an important tool for addressing resource management issues in lake environments, perhaps the only one whose use provides some guarantee that the causes of problems will be addressed rather than the symptoms. It also advises that comprehensive lake management requires the use of ecological principles, recognizing that natural resources and related environmental processes are interactive and interdependent. Most importantly, it specifies that lake management problems should be addressed on a watershed basis. This concept should help to properly identify cause and effect relationships between lake water quality and land use conditions along the shoreline and in the upland areas.

Natural processes and resource conditions are altered, accelerated or otherwise affected by human activities, particularly by development and other activities conducted on the land. Comprehensive lake management recognizes these interrelationships and offers a framework

and orderly process for effectively addressing resource management problems in a broad manner and for the long term.

In general, lake management problems, while interconnected, can be grouped into three categories pertaining to (1) water quality, (2) recreation and (3) land use. Water quality problems most often cited are those of excessive growth of aquatic vegetation and algae, algal blooms, erosion and sedimentation, and polluted beaches and water supplies. It is well known that most of these problems have their origin on the land.

Phosphorus, nitrogen and coliform bacteria coming into the lake can be traced directly to land-based nonpoint sources of pollution such as stormwater and agricultural runoff (including fertilizers, pesticides, heavy metals and other pollutants), failing or overflowing septic systems, and erosion problems at construction, mining, agriculture, and timber harvesting sites. Pollutants can enter lakes by means of sheet runoff or tributary streams.

Recreation problems usually include boating navigation and safety issues, such as reckless operation, excessive motorboat speed and noise, and anchoring, mooring and nuisance issues. Problems often develop when miscellaneous boating activities result in conflicts in the use of the lake. Boating also has water quality impacts in that motor boats can stir up bottom sediments in shallow areas and disperse nutrients. Motorboating has been associated with some oil and gas pollution and occasionally with sanitation problems. Fishery management is a recreational issue, and one that is also closely tied to water quality. Additionally, winter recreation activities, such as icefishing and snowmobiling

on the ice, may have some water quality impacts.

Public access, whether obtained through publicly-owned boat launching facilities or commercial marinas, is a recreational as well as a land use issue. Access to a lake front can be provided by public beaches and community parks on the shoreline. People who manage public or privately-owned shoreline property may help to maintain good water quality by buffering lakes from the adverse effects of upland activities.

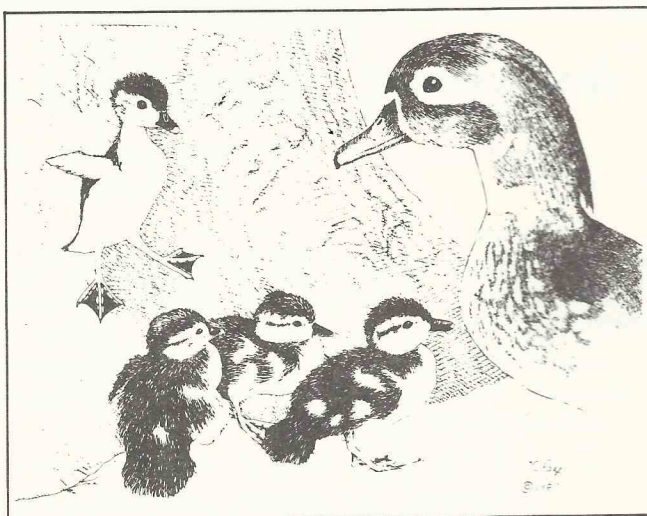
Nonpoint source pollution resulting from ill-considered land development and land use activities is a central issue for lake management. However, these problems and their solutions are inextricably linked to more pervasive concerns about the type, timing, density, quality and location of development. Haphazard, unplanned land development results in serious degradation of lake environments and subsequent loss of property values and recreation opportunities. Remedial action, in the form of redevelopment and infrastructure investments, may be costly to obtain. Insuring that attractive, carefully planned, environmentally and economically sound development occurs during early stages is an important goal for comprehensive lake management. In effect, solving nonpoint source pollution problems inevitably carries one into the larger arena of community planning and growth management.

All of these issues--and more--should be addressed within the framework of comprehensive lake management. Where does one start? Lake associations can begin with a well-organized program which identifies problems and solves them from a watershed and ecological perspective. It involves (1) describing the watershed, (2) inventorying and assessing resources and land use, (3) identifying problems relating to resource use and qualities, (4) developing goals in response to the problems and establishing a community consensus about the need to take action on those goals, (5) choosing acceptable solutions, determining their costs, and identifying available assistance, and, finally, (6) implementing these solutions.

It should be anticipated that comprehensive lake management is an ongoing process. New information continually will come to light about the resources, about the problems, and about the possible solutions. Throughout the process, various reports may be issued, the most important of which is a "final" report in the form of an overall plan. This plan will summarize all of the issues and emphasize the major findings and recommendations. Provision should be made for periodic revision of the plan and for subsequent reports to the public about implementation of its recommendations. Development of public support for progressive action and involvement of local officials should be a major focus of the lake management planning process. Continuing

activity is needed in an effective lake management process and committees should be established with this in mind.

Help is available, always in the form of advice, sometimes as technical assistance and, occasionally, in the form of funding. A first rule is to work as closely as possible with local elected officials and local planning boards and conservation commissions. For professional advice, consult with the staff of county and regional planning boards, environmental management councils, Cooperative Extensions and the federal Soil Conservation



Service. The County Soil and Water Conservation District Board may be particularly helpful with erosion control and other nonpoint source pollution problems. Depending on the nature of the problems, various units in the regional and central office of the Department of Environmental Conservation can also provide advice and assistance.

There are a large number of programs and techniques that can be used to address the problems that beset lake environments. They include regulatory measures, voluntary actions by landowners, land acquisition and structural solutions. Financial needs in many cases can be met by the immediate beneficiaries of whatever measures are taken. In other cases, depending on the nature of the action and on program funding, costs may be spread over a larger tax base at the state or federal level.

Comprehensive lake management is neither mysterious nor is it a new invention. It is very needed--and there is all too little of it going on in New York today. The time for your lake association to start is now.

A CITIZENS' STATEWIDE LAKE ASSESSMENT PROGRAM UPDATE

1987 was the second year of the New York Citizens' Statewide Lake Assessment Program (CSLAP). The first year of the Program involved water chemistry sampling at 25 lakes. In 1987 the total number of lakes increased to 34 and, in addition to water sampling, volunteers at each lake also participated in dissolved oxygen profiling, aquatic vegetation sampling, or precipitation gauging. The 1987 Annual Report is presently being written and will be available to the participating lake associations some time in the next few months. Like its predecessor in 1986, the 1987 report will discuss CSLAP in detail and will have a chapter devoted to each lake. Comparisons will be drawn between 1986 and 1987 data (when applicable), and some general conclusions and recommendations will be given.

It is clear that each lake involved in CSLAP, and perhaps each lake represented in the Federation of Lake Associations, possesses some water quality problems. Some of these are relatively minor, but to concerned property owners, each problem is significant. It is, however, important to realize that the water quality in a lake is a reflection of the watershed surrounding it. Solutions to these water quality problems can be complex and may involve a significant expense. The short-term

approach only provides a "cosmetic" solution and does not address the cause of the problem. Unfortunately, it frequently exacerbates the problem and may even spawn new ones. Due to the expense and complexity of long-term, ecologically-sound solutions, it is imprudent to rush into management decisions. Instead, a data base must be carefully constructed, problems must be identified and assessed, and alternatives appropriate to each lake must be considered.

CSLAP is but one piece of the puzzle. At the present time, with only limited data available on each lake, it is impossible to draw any profound conclusions. As the Program expands, however, the data base will develop along with information about watershed activities and nutrient budgeting. Scientifically-based water quality perceptions of each lake can then be made.

Lakes are extraordinarily complex and dynamic. We are only beginning to touch the surface in our understanding of lakes. The water quality problems that we are now seeing did not develop over night. Unfortunately, neither will the solutions.

*by Scott A. Kishbaugh
CSLAP Program Coordinator
NYSDEC*

CORNELL'S BASS AND PANFISH MANAGEMENT PROGRAM FOR PRIVATE WATERS

A year ago Cornell University began a demonstration program of bass and panfish management for private lakes and ponds. The fisheries management is based on three research programs conducted over the past 10-15 years. Research in several states, including New York, has shown that the proper balance of bass and panfish can be achieved through the harvest by anglers of selected sizes of fish. The major expense is determining the status of a fish population so fishery managers will know what sizes of fish should be harvested. Research conducted in a joint study by the NYS Dept. of Environmental Conservation and Cornell showed that fishing records kept by anglers in diaries provided most of the information needed to determine the status of bass and associated

panfish. Another study showed that the average size of zooplankton (a microscopic food organism of fish) reflected the degree of balance that existed between bass and panfish. These two new techniques substantially reduced the cost of determining fish population status.

In the program that started last year, anglers at ten participating lakes record their catch information in diaries provided by Cornell. They also take zooplankton and water samples twice a year with kits which are sent out by Cornell. The samples and catch information are analyzed and harvest recommendations are made to each group to improve the lake's fish population. The program is partially supported by the Dept. of Natural Resources at Cornell,

Cooperative Extension, and the Renewable Resources Extension Program. Each participating lake group also supports the work with payments of \$400 to \$900 annually. Among the current participants are lake associations, private residential communities, fishing clubs, and individuals.

The program will accept a very limited number of lakes for one more year before closing the program to entry. Lakes should be 10 acres to several hundred acres and the group or individual owners should control all or most of the fishing in the lake. Additional information on this program is available from: Cornell Biological Field Station, 5114 Shackelton Pt. Rd., Bridgeport, NY 13030 or call Dave Green or Ed Mills at (315)633-9243.

STATE LEGISLATIVE HIGHLIGHTS

The 1987 Session of the New York State Legislature did not produce any significant changes in the laws which govern the Division of Water. A number of proposals requested by the Division such as water metering requirements and a SPDES Omnibus bill were considered but did not pass. Since the legislative session lasts for two years, all of the bills introduced but not acted on in 1987 are still alive and are being considered again with the 1988 Legislative Session.

There were several bills which passed and were signed into law which are regionally significant. These include the special groundwater protection area law which affects Long Island, and the law which strengthens the Lake George Park Commission. Several other new laws will have some impact on Division programs. A summary of these key laws is given below.

Citizens' Lake Assessment Program

Chapter 72 establishes a program within DEC to use trained volunteers to collect information and monitor water quality in lakes across the state. This formalizes a program which has been operating for two years (S838/A4505).

Sewage Treatment O & M Program

Chapter 86 extends the program of state assistance for the operation and maintenance of sewage treatment works through May 31, 1988. The appropriation of \$33.8 million and an additional \$2 million as a performance incentive is identical to last year (S3814/A4663).

Albany Municipal Water Finance Authority

Chapter 403 amends the Public Authority Law to make the Albany water finance authority consistent with similarly created authorities in New York City and Buffalo. Changes include providing for state presence on the authority and requiring the authority to pay taxes on lands owned outside the city (S6295-A/A8360-A).

Percentage of Lead in Solder

Chapter 412 amends the Executive Law to limit the amount of lead which may be contained in solder used for piping conveying potable water. The new limit on lead is two tenths of one percent. This percentage is consistent with the Safe Drinking Water Act Amendments of 1986 (A7816).

Oil Spill Clean-Up Contactor Liability

Chapter 536 amends various state laws relating to remediation of inactive hazardous waste disposal sites, petroleum spills and hazardous waste spills. Section 72-0402 of ECL is amended to make waste generated from spill clean-up activities by DEC contractors exempt from fees generally required for producers of hazardous wastes. The legislation reconfirms the state's privilege of sovereign immunity for any act or omission of its employees in supervising or monitoring remediation activity as long as such acts or omissions are not unlawful, willful or malicious. Remedial contractors hired by DEC are relieved

from strict liability unless negligent or engaged in willful misconduct (S6448-A).

Study on Petroleum Delivery Systems

Chapter 545 requires the State Energy Office, in consultation with DEC, Agriculture and Markets, and Tax and Finance to prepare a report by April 1, 1988 on the accuracy of present petroleum delivery systems versus metered delivery. The report will also investigate the impact of metered delivery on compliance with the petroleum bulk storage act and will give recommendations on adoption of metered delivery (S3985-A/A5832-A).

Amendment To Water Saving Plumbing Fixtures Law

Chapter 588 adds drinking fountains to the list of plumbing fixtures required to meet water saving performance standards. It requires drinking fountains, as well as sink and lavatory faucets in public buildings to be self closing, and it requires urinals to flush using no more than one gallon of water (S2832/A3708).

Water Supply Emergency Plans

Chapter 590 amends the Public Health Law to require all public water suppliers to prepare a water supply emergency plan which includes criteria to determine critical water levels, an identification of existing and future sources of water and a vulnerability analysis assessment (S2828-B/A3712-B).

Water Resources Institute at Cornell

Chapter 605 establishes an institute at Cornell University to address critical problems of groundwater quality and management. Its purposes include increasing local government officials' awareness of water resource management problems, educating the public regarding the need to protect water resources and assisting in the development of strategies to manage critical recharge areas. It will pursue research programs on water resources and training programs to report on their findings (S5883-A).

Hudson River Estuary Management Program

Chapter 612 establishes a Hudson River Estuarine District. It requires the Department to prepare an estuary management program and a long-term strategy for the Legislature by March 1, 1988. The strategy is to outline the development of a 15 year estuary management program. The act appropriates \$200,000 to carry out the purposes of the act. (A7632-A).

Lake George Park Commission

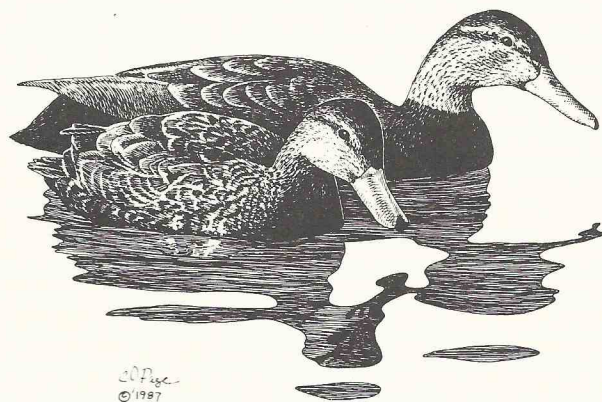
Chapter 617 gives added powers to the Lake George Park Commission. The Park Commission is to adopt regulations on the discharge of sewage and on stormwater management. It creates a trust fund and appropriates \$250,000 to the Park Commission and \$50,000 to DEC (S6373-A/A8423-A).

Sole Source Aquifer Protection

Chapter 628 establishes a procedure for nominating special groundwater protection areas within federally designated sole source aquifers located in counties with a population greater than one million. It outlines the contents of management plans to be developed for each special protection area. It also appropriates \$300,000 to be allocated to designated planning agencies to develop the plans (S2831/A3709).

County Hazardous Material Emergency Response Teams

Chapter 827 requires counties to develop plans for fire service response to hazardous materials incidents. Counties are authorized to establish hazardous materials emergency response teams either on their own or in conjunction with other counties. It also states that volunteers who participate in response teams cannot be held liable for acts or omissions in the course of such service (A6828-A).



There are a number of other bills important to the Department which have been introduced and will be considered by the Legislature in 1988. Among the bills which the Department has proposed are the following:

S2481/A6259

Water Metering - Requires statewide water metering.

S4419/A6257

Use of Waters - Authorizes the regulation of major withdrawals, diversions, and consumptive uses of the Great Lakes and other State waters; also requires registration of all withdrawals over 20,000 gallons per day.

S4499/A6753

Incompatible Use/Upstate Aquifers - Amends incompatible use statute (ECL 15-0514) to add 15 upstate aquifers as primary aquifers.

S3721/A6825

Dam Safety - Strengthens the dam safety laws including requiring permits for off-stream structures, and mandating that state agencies obtain permits for dam construction.

S3736/A6826

Federal Flood Hazard Area Standards - Applies federal flood hazard area standards to public schools as well as to county and local governments.

S3803/A7763A

Oil Spill Program - Transfers the oil spill program from the Navigation Law to ECL and provides for relocation assistance for persons impacted by spills.

S3852B/A7763A

SPDES Omnibus Bill - Authorizes the use of general permits, restricts the confidential information exemption, clarifies the prohibitions against discharge and the SPDES exemption, and updates Article 17, Title 8 to reflect changes in the federal Clean Water Act.

- Robin L. Warrender, DOW
Reprinted from NYSDEC Water Bulletin

WELCOME NEW MEMBERS!

Mrs. W. J. Sullivan
Ecosysem Consulting Service
Department of Parks and Recreation, New York City
Aquarius Systems Division
Honeoye Valley Association
Lebanon Reservoir Lot Owners Association

THE CONTROL OF PHOSPHORUS LOADING AS PART OF A LAKE MANAGEMENT PLAN

In the process of bringing municipalities into compliance with the present phosphorus regulations, questions have arisen regarding the efficacy of point source phosphorus reduction in view of the large contribution from nonpoint sources.

Several forms of phosphorus occur in the aquatic environment. Major forms are orthophosphorus (OP), dissolved or soluble phosphorus (DP), particulate phosphorus (PP), and total phosphorus (TP). Orthophosphorus is the form immediately available for algal growth. Particulate phosphorus is considered to be potentially available. This potential availability indicates that a portion of the PP (50 percent or less based on review of the literature) may be converted to OP.

Water samples taken during routine monitoring are most commonly analyzed for DP and TP. Measurements of DP and TP, in this case, are used to approximate available and potentially available phosphorus.

According to the literature, domestic wastewater and agricultural runoff are major sources of orthophosphorus, although urban runoff is important in some watersheds. Domestic wastewater contains the highest proportion of OP of the three sources; however, levels may be higher in agricultural runoff in spring.

During stream transport, orthophosphorus is likely to become incorporated into the particulate fraction. A portion of the phosphorus bound to the sediment particles can also be released as OP. Upon reaching the lake, exchange between available and potentially available forms continues through processes of sediment and algal uptake and release.

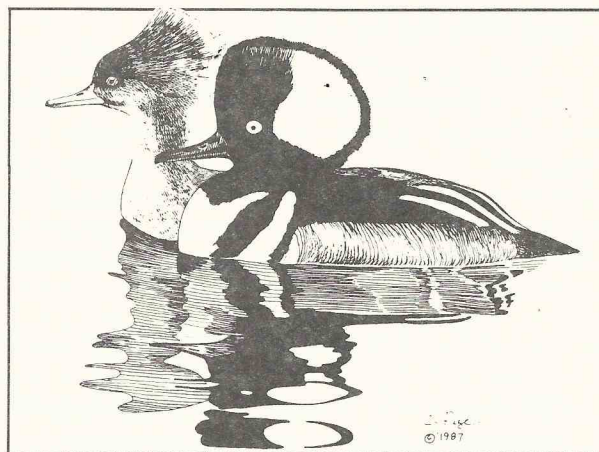
It is recommended that strict control of phosphorus effluent levels from direct and proximal discharges to lakes be maintained because of the high level of OP delivery from these discharges.

Transport distance from phosphorus sources to lakes is recognized as a major factor determining the availability and timing of load delivery. Control of phosphorus in wastewater discharges further upstream from the lake should be based on the distance between the discharge and the lake.

The largest nonpoint source contributor of phosphorus comes from agricultural land. Phosphorus has a high affinity for silt and clay particles. Therefore, most phosphorus from agricultural lands is lost and transported to lakes or reservoirs through the processes of soil erosion and sedimentation.

Many factors interact to determine the amount and rate of phosphorus transport from lake watersheds, including the type of land use, soil type (texture), frequency and intensity of rainfalls, specific watershed characteristics (i.e., land slope, shape), and sediment yields. Due to the complexity of these interactions, annual loading rates vary considerably from watershed to watershed.

Urban and construction site phosphorus loads are generally much smaller than those from agricultural areas, however, their impact upon nearby lakes and streams leading directly to lakes can be extremely damaging. A review of Nationwide Urban Runoff Program (NURP)



studies was used to highlight the effects of urban runoff on receiving lakes. According to the studies, lakes which received urban runoff generally exhibited decreased water quality. Although the degree of detrimental effects varied, the studies concluded that accelerated eutrophication may result, and that phosphorus was often a major contributor to the problem. Annual phosphorus loads could not be consistently correlated with land uses in the watersheds. The NURP final report did conclude, however, that commercial urban areas contributed the larger loads due to more impervious areas. Total loads were strongly influenced by runoff volume.

The magnitude of point source phosphorus loads, both domestic and industrial, is determined by four primary factors. They include: a) population served, b) detergent usage, c) type of industrial waste, and d) extent of municipal waste treatment. Industrial wastewater inputs, especially those associated with the food processing industry, can be very large. Industrial sources of phosphorus include fertilizer manufacturing and metal finishing. The type of wastewater treatment used can also influence the amount of point source phosphorus discharge. The residence time of waste in a system will

affect the settling and biological removal of phosphorus.

Internal as well as external (nonpoint and point) sources of phosphorus must be considered in determining lake trophic status. Inputs of point and nonpoint sources serve to intensify the eutrophic conditions and add to the sediment phosphorus levels. Significant amounts of available phosphorus may be released from lake sediments. The largest release occurs under anaerobic conditions near the sediments; although some phosphorus is released under aerobic conditions, as well. Another internal source of phosphorus is the release of phosphorus from dead and decaying algae and macrophytes.

Most researchers agree that phosphorus is the nutrient whose input must be controlled for control of algal and macrophytic productions in lakes. Excessive phosphorus additions increase plant production which ultimately disrupts the natural oxygen balance of a system. Algae blooms can impart undesirable tastes and odors to the water, interfere with water treatment and cause unpleasant scums. A decline of lake water quality (eutrophication) is the end result.

In the preparation of a lake watershed management plan, Best Management Practices (BMP's) are often examined to determine their effectiveness in reducing agriculturally related phosphorus loads to lakes. It was found that any BMP which reduces soil erosion, water runoff, and/or increases plant nutrient uptake efficiency will, in turn, reduce phosphorus losses.

Best management practice application in urban areas has similarly been examined. The NURP Final Report and several other studies assessed the effectiveness of urban BMP's in controlling urban runoff. They concluded that wet detention basins were highly effective at removing total pollutant masses. Phosphorus reductions of greater than 50 percent were noted. Moderate improvement in urban runoff quality was found in studies of grassed swales. This technique was considered very promising. Streetsweeping was found to be generally ineffective in controlling urban runoff quality. The use of porous pavement to reduce runoff was one of the most effective BMPs at removing available nutrients, along with wet detention basins combined with alum coagulation. Dry detention basins, on the other hand, had much lower removal rates.

Various methods of wastewater treatment exist which help meet existing phosphorus discharge standards. The most common method of reducing wastewater phosphorus concentrations is the addition of a precipitation-flocculation material such as aluminum salts, iron salts, or lime. Costs involved vary with the chemical utilized and the extent of existing facility modification. Removal of phosphorus by increased uptake of sludge biota has also been investigated. From 70 to 90 percent of the TP from influent waste can be removed by these

SIXTH ANNUAL FEDERATION OF LAKE ASSOCIATIONS CONFERENCE

JUNE 10, 11, 12, 1988

Keuka College

Plans are now taking shape for the sixth annual conference of the Federation of Lake Associations. The Conference will be held on June 10th, 11th, and 12th, at Keuka College in Keuka Park, New York.

The theme of the conference this year will center on a comprehensive approach to lake and watershed management. Guest speakers will present information on topics concerning the effects of land usage on lake watershed management planning, methodologies for land use characterization (including inventory and assessment), and methods of watershed protection. Commissioner Jorling from the Department of Environmental Conservation will give the keynote address. Additional presentations will cover the status of legislative support for a comprehensive, statewide lake management program, and an update on the Citizens' Statewide Lake Assessment Program.

In addition to these presentations, the conference activities include an informal rap/brainstorming session on Friday evening and a wine and cheese party hosted by the Keuka Lake Shore Property Owners, Inc. on Saturday evening. The Keuka College campus will provide an attractive setting for the conference, and the Finger Lakes region offers opportunities for tours at local wineries in addition to shopping at outdoor craft and produce markets. Housing and meals will be provided by Keuka College and conference participants will have the use of many college facilities.

We hope you will join us in June for this enjoyable and informative weekend. The program outline and registration material will be mailed to the Federation of Lake Association members in early spring. Additional information may be obtained by contacting either Ms. Pam Mahan at Keuka College (315)536-4411, Mr. Bob Canfield, (607)292-3800, or Dr. John Colgan, (716)271-0372.

methods if managed properly.

Another useful approach to phosphorus control is diversion of wastewater to less sensitive stream reaches distant from lake inflow.

by Gayle D. Garman, Gregory B. Good, Linda M. Hinsman

LAKE MANAGEMENT THE LONG & SHORT OF IT

Bodies of water offer a variety of leisurely activities and practical uses ranging from relaxation on or near the water, to swimming and boating, to domestic water supply. This is especially the case for those fortunate enough to reside on the lake shore. Therefore, people have been willing to pay a premium for housing near water in order to readily enjoy the above benefits.

Lake shore residents, however, are sometimes surprised to find that a lake or pond is not a static body of water requiring little care or maintenance. Rather it is found to be another type of environment which, just like yards or gardens, will need to be looked after and managed to some degree to maintain its attractiveness and allow normal usage with little or no degradation.

Lake management includes development of goals, strategy planning, and implementation. Management can be applied to the lake itself or to the watershed as a whole. Implementation in the lake is usually a matter of treating symptoms of a larger problem, and is usually effective for only one or two seasons. In-lake activities are straightforward and fairly inexpensive.

In contrast, techniques applied to the watershed as a whole can correct causes of in-lake problems and can be very effective for a long period of time. Implementation on a watershed scale, however, is much more complicated since political and regulatory units are involved, as well as a diverse public constituency. In addition, the overall expense will be greater, but costs can be distributed over a longer time period and to a larger group of land managers. Lake shore owners may see greater benefit at less cost where comprehensive management is applied to the entire watershed. This, of course, is often a point of contention between lake shore owners and other watershed owners, but it is a problem which cannot be ignored in a truly successful lake management plan.

Siltation is the process of soil or silt particle mobilization by rainfall or moving surface water, its transport to a standing body of water, and then its settling out of the water column and accumulation on the bottom as sediment. Sediment is simply underwater soil and all lakes have some. A small amount doesn't hurt anything but greater amounts encourage algae growth, directly stimulate rooted aquatic plant growth, cover fish spawning areas, and of course, decrease water depth and lake size.

One major management goal in almost all lakes is the reduction of sediment inputs. Conceptually, this is accomplished by keeping all parts of the ground surface covered at all times by plants or ground covers so that rainfall does not directly strike soil particles and surface water is not allowed to move rapidly downhill. When this is not done, erosion occurs and sediment is added to the lake.

Numerous publications have been produced by the NYSDEC Division of Water. The partial list found below contains publications which cover several surface and groundwater topics. These are available to the public at no charge. To place an order or to receive a complete list of publications, contact:

The Bureau of Information and Bulk Storage
Room 310
50 Wolf Road
Albany, N.Y. 12233-3501
or call (518)457-7463

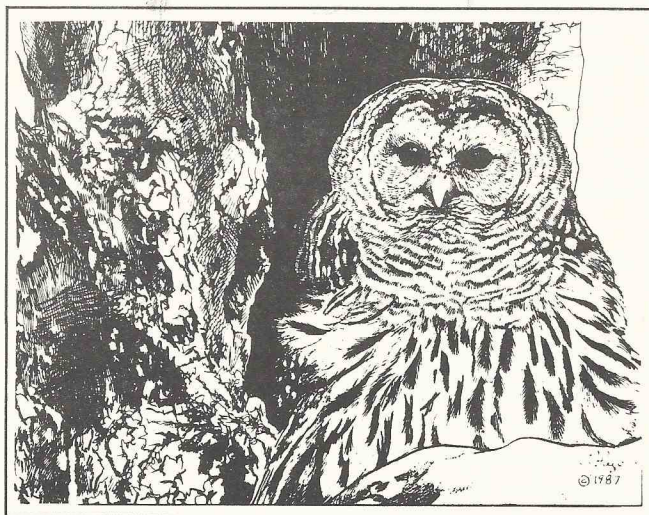
Title	No. Pages	Year Produced or Updated
Coastal Erosion in NYS	8	1984
Coastal Erosion in NYS - Great Lakes	8	1984
Water Bulletin	20	1987
Snapshot of NY's Water Resources	1	1987
Water Sticker "I Love NY's Waters"		1986
Clean Water Tip Strips	1	1987
Long Island Groundwater Management Program	250	1986
Upstate Groundwater Management Program	230	1987
Upstate New York Groundwater Management Program	1	1986
Citizens' Statewide Lake Assessment Program	6	1986
Mechanical Control of Aquatic Weed Guide for Lakeshore Owners	13	1983
NY Citizens' Statewide Lake Assessment Program Sampling Protocol	36	1986
Characteristics of NYS Lakes	120	1987
NYS Lakes - A Morphometric Atlas of Selected Lakes - Vol I	81	1986
NYS Lakes - A Morphometric Atlas of Selected Lakes - Vol II (cost \$2.50)	60	1986
Water Conservation At Home	-	1987

Practically speaking, the application of effective erosion control principles to the watershed is not easy. Land owners, agencies and regulatory boards with a wide range of goals and agenda must cooperate in planning and implementation for this to happen on a watershed basis.

At the lake itself, sediment inputs can be decreased by building settling basins on the major streams or in the lake just off the stream mouth. Sediment would then settle out before the water reached the lake proper. The basins require cleaning periodically.

Other major problems are excessive algae and aquatic plant growth. Again, a small amount of growth is good, even necessary for a balanced lake production. Therefore, we should never try to eliminate all growth in the water. Such efforts to eradicate plants are often expensive, will not succeed, and would damage the aquatic environment.

Algae and plant growth require light, nutrients, water at a minimum temperature of about 50° F (10° C), and for the plants, a suitable rooting medium. Algae use only dissolved nutrients, such as nitrogen (N), phosphorus (P), and potassium (K) from the water column. These come from rainfall, stream runoff and septic systems. We're lucky in algae control because the most important limiting nutrient, P, is very slightly soluble in water. Unless there is a direct source of untreated human, animal, or industrial waste or urban runoff flowing into the lake, algae growth is generally not a major problem. Septic fields, unless they are grossly malfunctioning, are not important contributors of P.



Rooted aquatic plants are just like rooted plants in our lawns and gardens. Their nutrient supply comes from the sediment they root in. Sediments promote rooted growth because the particles carry adsorbed nutrients (N,P,K,) from the landscape. Most of these nutrients do not dissolve in the lake water, so they are not available to algae. They are, however, available to the roots of aquatic plants.

In thinking about the reduction or control of plant growth, we immediately see the importance of sediment control. This is the key not only to plant growth, but also to many lake management problems. It should be pursued.

These ideas on the nutrition of aquatic plants also leads us to the conclusion that even if all inputs were stopped tomorrow, there could still be excessive plant growth because of the nutrient-carrying soil already on the lake bottom.

We see a need for a long and a short term management scenario to be developed in most lakes. In-lake implementation usually has a short term effect and treats or corrects symptoms of a larger problem. It can be cheaper and easier, but not always. The removal of sediment from a lake bottom is an in-lake measure, but is certainly not easy or inexpensive. Also included in the in-lake category would be water level manipulations, harvesting, herbicides and light attenuation.

At the watershed level, the most effective preventative measures are those applied to near-shore areas, so lake-shore owners should not hesitate to manage their own property as outlined above even if the rest of the watershed does not. Lake shore erosion, tree and other plant debris inputs, and malfunctioning septic systems on the shore are major potential causes of lake problems. Individuals who properly manage these inputs on their own property will have taken a large step towards successful lake management implementation. Attention can then be turned to the major stream inputs from the watershed.

Treating or correcting these causes of lake filling and/or plant growth on the total watershed basis will carry long-term benefits, but will generally be expensive and complicated. These techniques include reduction of nutrient and sediment inputs and require management of the sources, including erosion, septic system and other waste inputs.

*John H. Peverly
Cornell University*

(This article was also printed in the October/November issue of "Lakewatch")

TWITCHELL LAKE - A SUCCESS STORY

Several years ago, the residents living around Twitchell Lake became concerned with decreasing lake water quality. In 1985, the Twitchell Lake Fish and Game Society president, John V. Miller, and an eight member Pollution Control Committee decided to tackle the problem. They developed and implemented a successful campaign to control the non-point pollution from faulty septic systems which was a contributing cause of their lake's poor water quality and subsequent weed problem.

The project was approved and conducted by the Fish and Game Club as a community effort. For the past two summers, each of the seventy-seven homes on Twitchell Lake were visited and dye tests were performed to identify septic system leakage. Existing sewage disposal systems and grey water (kitchen and bath water) disposal were also examined in each home.

At the beginning of the project, very high levels of fecal E. coliform bacteria had been detected in the lake water. This type of bacteria is an indicator of human fecal waste and high levels often imply inadequate septic systems. Of the seventy-seven homes which were visited, twenty-two were found to be in violation of local ordinances. Many of these violations were minor problems which were easily corrected. Several of the older homes had antiquated systems or were otherwise in poor repair. While some septic systems were polluting the lake directly, others posed only a potential pollution threat.

The Committee addressed the problem by preparing a special pollution control packet of information which educated homeowners on a variety of topics including how to construct a proper septic system, leach field or out house, alternate gas-fired toilets, and efficient methods of grey water disposal. Homeowners were encouraged to repair or replace their failing septic systems. In addition, Committee members volunteered to help older or low-income people with repairs and minor aspects of system installation.

To date, almost all of the violations on Twitchell Lake have been corrected and lake water samples tested in early September showed coliform bacteria levels well below defined safe levels.

A monitoring program has since been implemented whereby lake homes are checked on a regular basis in order to avoid septic system deterioration in the future. The entire project was conducted as a private community effort at a total expense of approximately \$100 for water sample tests. Hats off to the the Twitchell Lake Fish and Game Society and the local community in coordinating their efforts to develop this successful program!

Inquiries concerning the Twitchell Lake project have been made by several other lake associations across the state. As a result, a "Procedural Guide" and a "Pollution Control Packet" have been prepared by the Twitchell Lake Fish and Game Club. This information is available, free of charge, by contacting Mr. John V. Miller, President, Twitchell Lake Fish and Game Club, 8 Crescent Street, Ilion, New York, 13357. (315)895-7502.

*We could use your input! **Waterworks** can be a way to share your lake issues and experiences with other lake associations throughout the state. The next issue will continue to concentrate on lake watershed management planning. If you have stories, artwork, or photography to contribute, please contact the editor.*



A CHANGING OF THE GUARD

The FLA Board of Directors is pleased to announce the arrival of Anne Saltman as consultant to the Federation of Lake Associations, Inc. Anne comes to us with a Master's degree in Water Resources from the New York State College of Environmental Science and Forestry where she studied both surface and groundwater topics. Her FLA responsibilities will include serving as editor of **Waterworks**, participating in the Citizens' Statewide Lake Assessment Program, and providing writing and editorial assistance to the New York State Department of Environmental Conservation.

Anne is replacing Tracey Clothier of Lake George, New York, who devoted her time and expertise to FLA business since 1983. In addition to acting as editor for **Waterworks**, Tracey served as the original founder and Executive Director of the Federation from 1983 to 1985. Over the past several years, she has also assisted the NYS Department of Environmental Conservation staff in the design and implementation of the Citizens' Statewide Lake Assessment Program. Many thanks to Tracey for a job well-done and we wish her the best of luck at her new position with the Lake George Park Commission.

With the arrival of 1988, welcome aboard, Anne, and smooth sailing, Tracey.

John W. Colgan, President

1987 CONFERENCE PROCEEDINGS

The FLA Proceedings are available for \$12.00 and checks should be made payable to the Federation of Lake Associations, Inc. Requests for the Proceedings, along with your return address, should be directed to Dr. John Colgan, President, 273 Hollywood Avenue, Rochester, New York 14618.

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CONFERENCES AND SEMINARS

February 18, 1988

A PROPOSED GOVERNANCE STRUCTURE FOR THE GREAT LAKES.

Presented by Lester W. Milbrath, Director Environmental Studies Center, State University of New York Center at Buffalo.

Location: State University of New York College at Oswego

February 23

HABITAT ENHANCEMENT OF THE SPORTFISHERY NEAR BUFFALO, N.Y.

Presented by James R. Spotila

Location: SUNY ESF

March 3, 1988

THE FUTURE OF BIOLOGICAL CONTROLS IN GREAT LAKES MANAGEMENT.

Presented by R. Warren Flint, Associate Director OF THE Great Lakes Program, State University of New York at Buffalo.

Location: Clarkson University

March 18 and 19, 1988

ENVIRONMENTAL DISPUTE RESOLUTION IN THE GREAT LAKES BIOREGION: A CRITICAL APPRAISAL.

Sponsored by The Great Lakes Program at the State University of New York at Buffalo

Location: the Center for Tomorrow, State University of New York at Buffalo

Contact: Margaret Wooster, (716) 636-2088.

June 10-12, 1988

FEDERATION OF LAKE ASSOCIATIONS ANNUAL CONFERENCE

LAKE AND WATERSHED MANAGEMENT

Location: Keuka College, Keuka Park, New York

Waterworks is published four times a year. Individuals who wish to submit articles, artwork, or photography to **Waterworks** are welcome to contact the editor, Anne Bregy Saltman, 2175 Ten Eyck Avenue, Cazenovia, New York 13035. For additional copies of **Waterworks** and address changes, contact Dr. John Colgan, President, 273 Hollywood Avenue, Rochester, NY 14618 (716)271-0372. Please note that all mail should be sent to the Rochester office.

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