

Great Lakes Water Pollution Control: The Land Use Connection

by J. F. CASTRILLI* and A. J. DINES**

Introduction

Since modern regulatory efforts at water pollution control began in the 1950's in North America they have been largely focused on the factory whose drainpipe discharges contaminants into a stream, or the town that dumps its untreated sewage into the handiest body of water.

The strategy for control of this type of pollution — variously called “end of pipe” or “point source” — has been relatively simple. Control what comes out of the pipe, and you stop water pollution. Unfortunately over the last decade we have realized that water pollution is a problem more complex than this simple strategy can solve.

Far less obvious, but no less serious, is what has come to be known as “non-point” or “diffuse” source water pollution. It is characterized generally by the conveyance of polluting materials to bodies of water by natural runoff, ground water flow and atmospheric deposition.

When it rains in a city or in an area undergoing development, various things are flushed into stormsewers and in turn to receiving lakes and watercourses. These things include — besides litter and street debris of every persuasion — road salt, oil and gas spilled from cars, various industrial chemicals that have settled out, or been washed out from the air, including lead or other components of automobile exhaust, and sediment runoff from construction sites.

Agriculture also contributes to non-point pollution. When ploughing and tilling accelerates soil erosion, when manure from livestock operations is inadequately handled, when a farmer

uses more pesticide than needed, or more fertilizer than can be taken up by crops, then sediments, pesticides and nutrients can be carried to surface and ground waters.

The effects of pollution from these myriad sources can combine to degrade not only local waterways, but important regional and international waters as well.

Canada — U.S. Focus on Great Lakes Water Pollution from Land Use

One of the most important bodies of water to both Canada and the United States now threatened by non-point pollution is the Great Lakes System.

The Great Lakes contain approximately 20 per cent of the world's fresh surface water supply. With 37 million residents of Canada and the U.S., the Great Lakes Basin is also the industrial heartland of both countries. A major portion of the gross national product of each nation is generated in the Basin.

Non-point pollution of the Great Lakes has been the subject of investigation by a Canada—U.S. international study group as part of the requirements of a 1972 Great Lakes Water Quality Agreement. The agreement generally called for the restoration and enhancement of Great Lakes water quality. The study group, known as the Pollution from Land Use Activities Reference Group (PLUARG) was required to report to the International Joint Commission (IJC), a Canada—U.S. body established by 1909 treaty. Based on PLUARG findings, the IJC is to make recommendations to both governments.

PLUARG's responsibility was to determine whether the Great Lakes are being polluted by land drainage sources (for a full listing of areas investigated see Table 1); if so, from which land uses and by what contaminants; and what remedial measures should be adopted and at what cost. In its final report to the IJC, in July 1978, PLUARG found that the Great Lakes are being

polluted from land drainage sources by phosphorus, sediments, industrial organic compounds (e.g. PCBs), pesticides previously in use (e.g. DDT, chlordane) and heavy metals (e.g. mercury, lead). The report implicated urban, agricultural and atmospheric sources as key areas of concern and outlined generally that a strategy of planning, regulation, fiscal assistance and education would be necessary to solve the problem.¹

Public hearings to discuss the PLUARG findings were held by the IJC at the end of 1978 in eleven Canadian and U.S. cities. The IJC is now in the process of preparing its own report and recommendations for action to the Canadian and U.S. Governments in the context of a new Great Lakes Water Quality Agreement signed in November 1978.

A summary of law and policy findings for key land uses follows. In addition a review is provided of (1) PLUARG recommendations, (2) public reaction to them and (3) the new agreement's land use provisions. Because the problem of non-point or land use pollution has implications for other major international water resources, such as the Mediterranean, Canadian and U.S. experience on the Great Lakes can provide valuable lessons to other jurisdictions.

Adequacy of Current Canadian and U.S. Laws and Programs: A Summary Comparative Review

As part of the PLUARG study, the authors were asked to review the institutional aspects of the problem including what laws and programs exist in both countries to control non-point pollution, how effective they are, and what reforms might be necessary.²

Certain features of the Canadian and U.S. political systems deserve mention. Control approaches to pollution problems in both Canada and the U.S. are in part a reflection of differing constitu-

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TABLE 1 Land use categories, activities and potential contaminants to lakes, streams, and surface waters of the United States at least for the purposes of pollution control.

Land use category	Land use activity	Contaminant type
1. Urban areas	- residential, commercial and industrial construction site runoff - stormwater runoff	- sediments, chemicals, nutrients and pesticides
2. Agriculture	- application of pesticides - application of fertilizers - feedlot operations/animal wastes - erosion from general farm practices - drainage	- sediments, nutrients, chemicals and pesticides
3. Liquid, solid and deepwell disposal areas	- solid wastes from residential, industrial, and institutional sources - liquid sewage sludges - private sewage disposal systems - liquid industrial wastes	- primarily leachates from disposal sites, and chemicals
4. Shoreline landfilling	- land or construction excavations - dredging activities	- primarily sediments and chemicals
5. Transportation corridors	- runoff from construction use and maintenance of - highways and roads - railroads - airports - pipelines - hydro rights-of-way	- primarily sediments, chemicals, and pesticides
6. Extractive operations	- pits and quarries - mining - brines requiring disposal from oil and gas operations	- primarily sediments and chemicals
7. Forested areas	- timber production (including cutting operations, and construction, maintenance and use of roads) - woodland grazing - wildlife management - recreation (i.e. construction, maintenance and/or protection of recreation sites, forest roads and trails)	- primarily sediments, nutrients and pesticides
8. Recreational areas	- hiking - skiing - snowmobiling - riding - all-terrain vehicle use - pesticide use - private waste disposal systems associated with vacation homes	- primarily sediments, nutrients, pesticides and chemicals
9. Lakeshore and riverbank erosion		- primarily sediments

States at least for the purposes of pollution control. The states may regulate water pollution and land use under their authority to exercise the police power.

A comparative review of institutional controls on key land uses appears below followed by selected policy observations.

A. Review by Land Use

1. Urban Areas. Construction site and stormwater runoff

Neither federal government requires water quality approvals for control of erosion, sedimentation or storm water discharges from new or existing urban developments. In states without state erosion and sediment control regulation, few localities have in fact voluntarily elected to adopt their own soil erosion control programs. Whatever the reasons for the lack of independent local action in this area, it appears reasonable to conclude that without additional incentive a great increase in local controls is not to be reasonably expected. In 1972, Michigan enacted a sediment control law which requires local government to develop and manage state approved local sediment control programs. Michigan's experience suggests that construction site erosion control can be done without imposing onerous costs on the regulated or the regulator.

A key difference between the approach taken in the U.S. and Ontario is that in the former case, the impetus for state control has originated under explicit environmental (normally sediment control) law. In the latter case, Ontario efforts to get local government to control sedimentation have been undertaken through laws mainly designed to facilitate the planning of development not protection of the environment.

The principle difficulties with the Ontario approach include (1) agencies with the greatest environmental expertise have the least legislative authority under the municipal development planning process; (2) the growth-development pressures on, or predilections of, local governments frequently serve to inhibit effective and systematic implementation of sediment controls; (3) municipal by-laws and engineering practices traditionally have tended to be contrary to silt and storm-water controls; (4) the province's own pro-development policies frequently conflict with its newer efforts at environmental

tional development as well as traditional notions of which institutions are best equipped for day-to-day decision-making in areas broadly affecting the public welfare.

In Canada, the allocation of legislative powers through the British North America Act of 1867, though not explicitly addressing water quality and land use, grants the provinces the principal authority for control of such matters, which has generally been upheld in the courts. However, federal authority for certain activities (e.g. navigation and shipping, fisheries, selected interprovincial transportation matters, concurrent jurisdiction over agriculture) makes it evident that land

use water quality decision-making can be influenced by federal responsibilities.

In the United States, the Constitution defines the powers which may be exercised by the federal government and establishes the basis for the relationship between the federal government and the states. Those powers not specifically delegated to the United States nor prohibited to the states are reserved to the states or to the people. The authorization for all environmental pollution control programs at the federal level is derived primarily from the Commerce Clause of the Constitution. Under this section it is generally held that the federal government may regulate activity affecting

tries where research results in the development of less persistent pest control chemicals, or in alternatives to chemical pest control, these may replace older, more problematic pesticides.

3. Fertilizers

Laws in both Canada and the U.S. regarding fertilizers are directed at health and consumer protection objectives. There are no controls on fertilizer use or application rates as would be responsive to water quality control objectives. Existing controls address manufacturing, registration, labelling and distribution issues.

Current trends suggest no significant departures from the present situation. New regulatory measures appear unlikely. Continued emphasis on educational and advisory programs is anticipated with occasional prosecutions of farmers in the event of a dramatic instance of water quality impairment. It is also likely that more extensive use of farm demonstration plots to prove the efficacy of proper fertilizer application rates will be undertaken by the appropriate agencies.

Many officials in both the U.S. and Canada are of the opinion that fertilizer control beyond the present arrangements cannot be justified on water pollution control grounds unless convincing new evidence is put forth. To whatever extent problems are perceived to exist, these officials note that rising market prices for fertilizers will tend to effectively reduce future instances of misuse since farmers will be more likely to assure only the required amounts of fertilizers are purchased and that all fertilizer is put to use by the crop. However, there is evidence that overuse of fertilizer occurs notwithstanding recent price increases.

One problem attendant to any voluntary program is that factors facing the farmer in deciding how much fertilizer to apply tend to create a "when in doubt, fertilize more" strategy. In this situation, the cost of reduced yield is potentially high and accrues entirely to the farmer, yet the marginal cost in dollars to the farmer of extra fertilizer to assure high yields is small and the environmental costs accrue mainly to society. In addition, representations by the fertilizer industry may contribute to farmer decisions to overfertilize notwithstanding what an advisory government—university soil test report might recommend to the individual farmer.

Indeed, despite the use of voluntary soil test programs, Ontario farmers have been known to disregard soil test recommendations. For example, a 1972 study found that 56% of farmers canvassed in one county made changes in soil test report recommendations that researchers regarded as ill-advised. A 1975 study of the Thames River Basin, Ontario, also found that fertilization of cropland beyond recommended rates was a general practice. A 1977 PLUARG survey of Canadian farmers found while approximately 90% of the farmers were aware of soil testing services, only 60% had ever had their soil tested for fertilizer needs. In addition, in the agricultural watersheds monitored by PLUARG farmers were found to use on average twice as much fertilizer phosphorus as necessary.

The use of voluntary programs in lieu of a more preventive regulatory scheme places a premium on prosecution and abatement of dramatic instances of pollution, such as fish kills or high nutrient loadings, in a situation characterized by general pollution from many diffuse farm sources. Such reactive control tools (e.g. selected prosecutions) are cumbersome because of the large number of farms where violations might occur. It is difficult to evaluate whether this approach will have the desired educative/deterrent effect on the agricultural community. Moreover, use of selective prosecutions has frequently left agencies in both countries open to charges of arbitrary use of regulatory enforcement tools.

4. Feedlots and animal wastes

In both countries feedlot operations and animal waste management practices are essentially unregulated because of either limited (U.S.) or non-existent (Canada) permit requirements as well as unsystematic enforcement. Water quality protection is primarily dependent on voluntary farmer compliance with good farm practices and codes in conjunction with government technical and fiscal assistance.

Farmers in Ontario are not exempt from broad water quality impairment prohibitions, but these—where they are enforced—tend to be less effective against the more subtle, diffuse sources of pollution than against well-defined point sources. The variety of factors which combine to constrain the effectiveness of current enforcement options and the frequency of their use include

(1) Runoff from agricultural lands is frequently so diffuse in nature, that identifying the main farm source from among many similar sources becomes difficult, if not impossible. Thus, the utility of prosecutions diminishes.

(2) Given scant field resources and no requirement that all farm operators identify themselves and the nature of their operation to the province abatement efforts tend to concentrate on the more dramatic pollution instances such as fish kills.

(3) The province tends to support a cooperative voluntary approach with the agricultural community.

An additional issue of considerable import is the way a permit program is used as a preventive control strategy. For example, in the U.S., permits required for feedlots only address point source discharge to surface waters. Federal regulations cutoff many feedlots from the permit requirement if the number of animals fall below a certain number. Thus, only a small percentage of the total number of feedlots have permits.

Implicit in the concept of a cutoff is the notion that numbers are determinative of seriousness. Yet there are factors (e.g. slope, proximity to streams, poor management practices) which can result in feedlot pollution regardless of the number of animal units. Under these circumstances, it would appear that the U.S. regulatory mechanisms for controlling those operations which fall below the permit cutoff are essentially the same as those in Ontario (i.e. selected abatement of dramatic instances of pollution, advisory assistance and voluntary farm codes).

5. Soil erosion

Neither federal, state nor provincial governments require approvals, permits or licences of farmers to control soil erosion from ploughing and tilling practices. The principle government involvement in this area is through technical and fiscal assistance.

In Ontario, increased education and demonstration projects are likely through provincial and Conservation Authority programs. (Conservation Authorities are organized on a watershed basis generally for purposes of preservation and restoration of natural resources). These programs may be constrained by level of farmer interest and limited funding as federal-Ontario agreements since 1970 have generally downplayed soil and water conservation

control. This is especially to be expected when attempting to implement environmental controls through development laws administered by non-environmental agencies. Ontario's general water pollution control laws are directed primarily to control of point source pollution only.

Federal involvement in both countries, has been limited to both funding studies on urban non-point control, as well as to fiscally stimulating urban development. Ironically, in the latter instance, for example, in Canada, federal funding to stimulate urban development and point source controls (e.g. municipal sewage treatment) has frequently ignored the need to ensure that such federal monies were not being used to subsidize urban non-point pollution.

Regulatory officials in both countries are in substantial agreement that control of stormwater pollution from existing cities or built-up areas presents far more formidable problems than control of non-point pollution from new urban or suburban construction.

While some municipalities have adopted or investigated the feasibility of systematically implementing stormwater runoff pollution controls, it is by no means evident that all or even most are considering or implementing them. Municipalities have traditionally been interested in facilitating rapid drainage; i.e. moving runoff out of a built-up area as quickly as possible. Even in municipalities where stormwater runoff control is supported, serious financial and other constraints may exist to minimize the effectiveness of such policies and procedures. In one Ontario city, for example, while stormwater control was approved, the major conclusion of the report upon which the approval was based indicated that due to the high space requirements for major detention facilities detention should only be considered for minor stormwater runoff events in combination with flood plain management unless a detailed engineering study of a watershed can economically justify a higher degree of protection. In effect, the amount of land necessary to institute major upstream detention devices and the cost involved could make that approach difficult, if not impossible, in many instances.

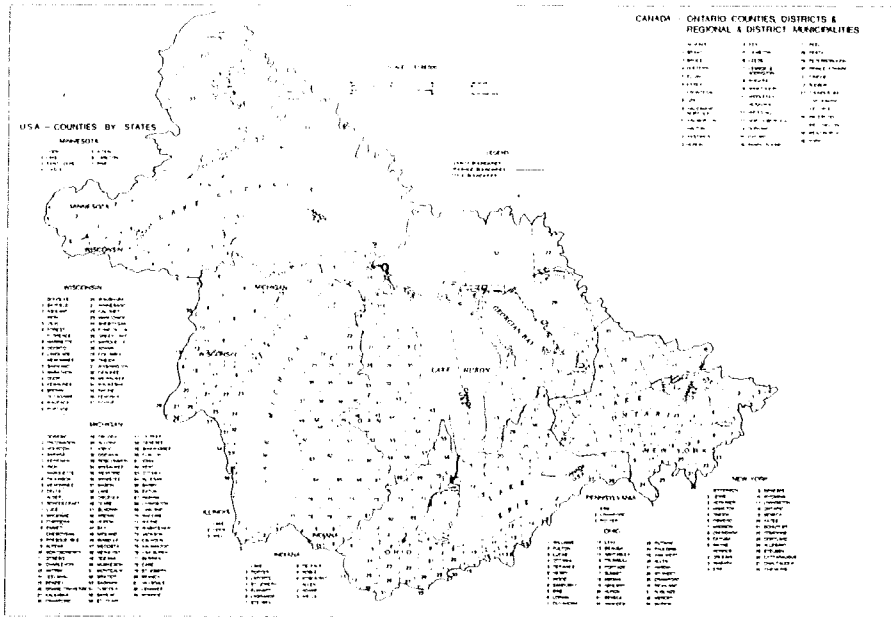
2. Agriculture. Pesticides

In both the U.S. and Canada regulation of pesticides is premised upon pro-

tection of ecological balances and the prevention of accumulation of pesticides which are highly toxic or persistent in the environment. At the federal level in both countries, regulation of the agricultural use of pesticides emphasizes controlling their market availability.

Licence, permit or approval control of how the agricultural community actually uses such products in terms of quantities or rates of application is not part of either federal program. Indeed, a recent survey which included the states of Illinois, New York and Ohio found that officials were uncertain about

example, farmers may use, without licence or permit, pesticides from a schedule which a provincial advisory committee has defined as containing pesticides "that pose a serious hazard to public health and/or the natural environment". Apart from persistence, pesticides in this latter schedule do not appear to greatly differ from those in the more restrictive schedule. Interestingly, the committee indicated that these other pesticides have not been placed in the more restrictive schedule (and thereby subject to greater controls) because of "the lack of less hazardous



Great lakes basin drainage and political divisions.

"what quantities of what pesticides are being used where"³. The closest state or provincial programs come to controlling pesticide usages is their licensing of certain types of pesticide applicators. However, this regulatory approach does not effectively address controlling quantities applied or rates of application. Moreover, Ontario licensing of pesticide applicators does not extend as far as requiring licences of farmers. Yet 60% of all pesticides used in the province are applied by farmers. In contrast, state laws under U.S. federal prodding, do not exempt farmers from needing licences.

A common method both Ontario and the States employ is to place problematic pesticides in more restrictive regulatory schedules thus essentially discouraging their use. Such substances include, for example, DDT, aldrin, and dieldrin. However, not all pesticides that may cause problems are found in the more restrictive schedule. In Ontario, for

control products which could provide adequate protection to agricultural crops".

With some exceptions, it would appear that future regulation of pesticides will continue to emphasize control of their market availability for certain uses. In Canada this control will not include regulation of principal pesticide users (i.e. farmers) in their capacity as user. In the U.S., state certification and training programs for private and commercial applicators conducted by the states may provide assurance that personnel, including farmers, handling pesticides are knowledgeable about application procedures and potential hazards of use. In both countries pesticide bans will be limited to those pesticides with the greatest capacity for persistence in the environment. In the U.S., agency decisions respecting pesticide availability have been and likely will continue to be subject to challenge in the courts. In both coun-

manifest system. In the absence of final federal action, states have been reluctant to update their own laws.

In Canada there is no federal regulation respecting the handling and disposal of toxic or hazardous liquid industrial wastes. Prospectively, under the Environmental Contaminants Act, restrictions are anticipated on the use, handling and disposal of selected substances such as persistent organic chemicals and wastes (e.g. polychlorinated and polybrominated biphenyls).

Under Ontario law, a certificate of approval and a public hearing are required for a waste disposal site for hauled liquid industrial or hazardous wastes. However, Ontario liquid waste disposal policy and regulation appears self-contradictory. Provincial policy calls for both reducing disposal of toxic liquid industrial wastes in (1) deep-wells and (2) surface landfill sites. However, in the face of currently insufficient industrial reclamation of liquid wastes and annually increasing quantities of such wastes, the two policies cannot be carried out simultaneously. Currently, there are no deep-well sites receiving such wastes. As a result, these wastes are going to landfill sites in great quantities as well as to even less environmentally suited areas.⁴

A waybill system has recently been established by regulation under Ontario law to tag waste haulers. Industry spokesmen have called this approach a first step toward better control of liquid industrial wastes, but find that there are "many loopholes in it and it doesn't mean very much unless it's policed". (The problem of policing may also be posed in controlling waste oils meant for application to rural roads. Such oils can frequently contain excess PCB levels as is evidenced by recent Ontario interim guidelines which state maximum PCB concentrations. Approximately 6.5 million gallons of oil are spread annually on about 2,000 miles of unpaved roads in Ontario.)

The problem of policing also has transboundary implications. A recent Environment Canada investigation revealed that substantial quantities of hazardous wastes, including PCB contaminated material, have been transported across the Canada-U.S. border in both directions for disposal. Frequently, no information has been available respecting the toxicity or chemical composition of such wastes. Reasons for this transboundary movement of wastes include (1) it may be

cheaper to dispose of wastes at sites that are geographically closer though in the other country and (2) it may be easier to dispose of wastes in a jurisdiction where regulation is less stringent.

State/provincial provision of adequate facilities for wastes which cannot be safely received locally is a logical means of reducing import/export conflicts. Availability of such a facility could also reduce the enforcement burden on agencies which must assure the exclusion of certain wastes from sanitary landfills.

B. Review by Policy Issue

A major problem in achieving improvement in nonpoint source pollution control is that of reorienting the institutional system to respond to the inherently complex and interrelated nature of pollution from land use activities. The above suggests that there are some institutional patterns which are recurrent across several categories of land use. Adjustment of the institutional system in this respect will require consideration of problems pertaining not only to each land use category but also to several factors which are common to the administrative mechanisms which have evolved to control these problems. The following selected policy issues suggest that a non-conflicting pollution control program on non-point sources has yet to be established in either country.

1. Separation of Agency authority for development planning and water pollution control inhibits the effectiveness of non-point controls

This has been discussed already under urban areas construction. A similar problem may also be found with respect to mining projects. In both countries, with some exceptions, agencies with pollution control responsibility are not the same agencies charged with rehabilitation and reclamation responsibilities. Yet rehabilitation is frequently a key element in non-point water pollution control from extractive operations.

2. The traditional enforcement process for point source pollution control may be inadequate for extension to control of non-point sources

Traditional notions of standards and enforcement designed to solve point source problems may require considerable rethinking if they are to be effectively adapted to non-point control.

Relative to point sources, non-point pollution places a very different demand on the enforcement process. A clear link between the condition of a stream and a specific land use activity is often difficult to document. Where pollution can be documented, identifying the responsible individual may be unlikely since individuals often only make small contributions to a pollution problem without any one individual having a clearly identifiable discharge. Moreover, standards may not be violated because the pollutants may be time or space dependent (e.g. they may not pollute the stream to which they discharge but may later pollute waters to which they are ultimately transported).

Several recent pollution incidents in the Basin involving disposal of toxic wastes and groundwater contamination highlights the imperfect record of point source enforcement. Existing regulatory programs are limited by (1) administrative capability which may function to eliminate many polluting activities from the scope of procedural or substantive requirements and (2) agency procedures to ensure compliance which may preclude enforcement action in some instances of identified violations.

As noted above, regulations for the U.S. permit program exempt the vast majority of feedlots from procedural requirements of the Clean Water Act. This exemption though administratively convenient, deprives the regulatory agencies of a systematic means of monitoring actions which may cause water pollution. In the absence of any other system of mandatory standards or notification, the agency must rely on an ad hoc identification process to determine who should have permits.

For those activities where permits are clearly required, effective legal action to enforce the law may not always be achievable. Enforcement is only one step in a complex series of actions associated with a regulatory program. A 1978 internal task force report on enforcement prepared for Michigan noted several factors which appear to have broad applicability. The report found that too much emphasis on voluntary compliance through informal negotiations, conferences, technical assistance and other "service" oriented efforts served not only to weaken legal actions but also to make future cooperative compliance less likely.

When these enforcement problems are combined with the inherently different nature of nonpoint pollution, it

The single most significant program is that conducted by the U.S. Soil Conservation Service (SCS) where technical assistance is made available to farmers through local Soil Conservation Districts (SCD). By signing a cooperative agreement with a district, a farmer may have a conservation plan prepared for his farm. The plans have traditionally addressed soil conservation and erosion control measures to protect and enhance the natural productivity of the land, to an extent many of these measures have provided water quality benefits. In the last few years there has been increasing interest by SCS in water quality implications of farm conservation measures with results that now many plans include measures aimed more exclusively at water quality protection.

Considerable attention has been devoted to approaches to providing additional technical direction and educational programs for farmland management practices. In some states, such as Ohio, this interest has been in anticipation of possible federal regulations.

The strong commitment to voluntarism by SCS/SCD and, indeed, the effectiveness of voluntarism with some portions of the farm community, has led to a general attitude that a program requiring permits for general farm operations is neither desirable nor necessary. The administrative burden that such a program could impose has also served to discourage many officials from supporting the permit approach. On the other hand most involved officials are quick to concede that with only voluntary programs many serious problems will continue to go unaddressed. Several state legislatures are considering passage of measures that would either provide additional enforcement authority to the SCDs or set standards which would increase the likelihood of implementation of sound farm management practices as recommended by the SCDs. A long term formal agreement for implementing farmland best management practices appears to be an important element.

Canada has no institutional relationship comparable to the SCS/SCD programs which exist in the United States. Conservation Authorities have objectives comparable to those of SCDs (i.e. generally conservation and restoration of natural resources) but their influence on the soil conservation practices of farmers appears, with some exceptions, to have been marginal. To the extent

that soil conservation is more entrenched in theory and in practice in the Basin states, one could argue that the absence of a comparable SCS/SCD arrangement in Ontario has been detrimental to the systematic development of agricultural soil conservation in the province. Without SCS, the success of SCDs in promoting soil conservation might be indistinguishable from the situation of Ontario's Conservation Authorities.



DUNAGIN'S PEOPLE by Ralph Dunagin © 1978. Field Enterprises, Inc. Courtesy of Field Newspaper Syndicate.

(This is quite apart from the other priorities of Conservation Authorities such as flood control management, or more recently recreational landfilling, which may compete for funds that might otherwise go to soil conservation initiatives.)

Information and education programs will continue to be actively promoted. Cost share funds made available through the 1977 Clean Water Act specifically for implementing management practices directed at water quality improvement will speed the voluntary process. This funding is contingent on existence of approved water quality management plans prepared under the Clean Water Act (section 208). These water quality management plans must address a variety of non-point pollution problems and where appropriate, identify solutions (including land use controls).

In both the U.S. and Canada there are a large number of fiscal assistance programs available to the farmer through various federal programs for all aspects of farm operations. It should be noted that an option for encouraging wider use of farm management practices based upon protection of water quality would be to make individual participation in any fiscal assistance program (e.g. crop insurance, farm loans, price supports) contingent upon a farmer's

demonstration that his farm is being managed in accordance with practices appropriate to agricultural pollution abatement as determined for his area. Such a program could be implemented through federal action without initiatives at the state/provincial or local level.

6. Toxic and hazardous wastes

Quantities of toxic industrial wastes requiring disposal are rapidly growing and are likely to increase in the future. Rising environmental standards and increasing awareness of long-term impacts of even low level concentrations of certain wastes is resulting in the closing off of many traditional disposal options, (landfills, seepage lagoons, deepwell injections). Despite this there has been no consistent regulation of these wastes from the point where they become wastes until the time they are either destroyed or safely disposed of.

Subtitle C of the U.S. Resource Conservation and Recovery Act (RCRA) of 1976 provides for a national program of hazardous waste management which will require the identification and tracking of wastes through a manifest system as they move from point of generation to final disposal. Regulations to be published by U.S. EPA will cover all persons responsible for generating, hauling, treating, storing or disposing of any identified hazardous waste. No treatment, storage or disposal facility will be allowed to accept hazardous wastes except with a permit to do so. States with hazardous waste management programs which meet U.S. EPA standards may administer their own program within the state jurisdiction.

At the state level, programs for licensing industrial waste haulers exist in several states and requirements that industries which handle specified critical materials file pollution incident prevention plans have been adopted in others.

Local land use authority is used through zoning regulations to limit storage and disposal, within certain zoning districts, of certain classes of waste that are particularly noxious or hazardous. These regulations are generally motivated by the desire to protect neighboring property owners from negative land use externalities rather than protection of water quality.

A major problem in the U.S. in hazardous and toxic waste management has been the slow implementation of rules under RCRA to establish the

U.S. and Canadian Public Views on the Report

At the end of 1978 the IJC held eleven hearings in both Canada and the U.S. to receive the views of the Great Lakes public on the PLUARG report. Public reaction was mixed. Most submissions supported the PLUARG report as an important international effort. However, frequent criticism was offered for PLUARG recommendations that either (1) lacked specificity (and thereby invited government inaction); (2) over-emphasized voluntary methods of control (particularly in agriculture); (3) arbitrarily eliminated problem land uses by calling them "local" not "Great Lakes" problems (e.g. forestry, private waste disposal systems, current pesticides) or (4) inadequately supported public participation (especially as it related to court or administrative hearing initiatives).

Indeed, more than one submission argued that the PLUARG report was not a management strategy at all but rather a recommendation that somebody develop a management strategy.

The New Agreement

In November 1978, a new Great Lakes Water Quality Agreement was entered into force by both countries, replacing the 1972 Agreement. The 1978 Agreement generally reaffirms the common determination of Canada and the U.S. to restore and enhance Great Lakes water quality, as well as the Great Lakes ecosystem generally.

Under Article VI of the new agreement, programs are to be established or continued requiring controls to be placed on the use of pest control products to limit their input into the Lakes; control of pollution from animal husbandry

operations and from the hauling and disposal of liquid and solid wastes; review of road salting and storage practices; control of soil loss from urban, suburban and rural areas; improvement in land use planning and management; and related initiatives to abate and control Lake inputs of nutrients, toxic substances and sediments derived from land use activities.

It is expected that IJC recommendations arising out of the PLUARG report and public reaction to it will further refine government efforts in this area.

Conclusions

Governmental conflicts, programs that work at cross purposes, and inefficient use of available mechanisms are not new problems. But non-point pollution, because it arises from such a wide range of activities, many of which were not previously considered pollution hazards, has drawn many agencies, including non-environmental ones, into attempting to seek solutions. However, our analysis suggests that a new orientation is necessary.

Development of this orientation should be based on recognition of the following:

- 1 *Environmental Management Strategy for the Great Lakes System*. Final Report to the International Joint Commission from the International Reference Group on Great Lakes Pollution from Land Use Activities (PLUARG) July 1978, Windsor, Ontario, Canada.
- 2 Castrilli, J. F. and A. J. Dines, *Control of Water Pollution from Land Use Activities in the Great Lakes Basin: An Evaluation of Legislative and Administrative Programs in Canada and the United States. Joint Summary Report*. Prepared for International Joint Commission - Pollution from Land Use Activities Reference Group (IJC - PLUARG) Task Group A. Windsor, Ontario, Canada. March 1978. 109 pp. This report was based on detailed background studies prepared for each country.
- 3 Hill, G., "Wide Disparity Found in Control of Pesticides Around the Nation", *The New York Times*, 6 May 1979, p. 1.
- 4 See, for example, "Waste disposal sites called inadequate", *The Toronto Globe and Mail*, 2 June 1977; "Toxic waste dumped in fields, sewers", *The Toronto Globe and Mail*, 8 June 1977; and, "Minister agrees that liquid waste being dumped illegally", *The Toronto Globe and Mail*, 6 July 1977.

• Voluntary guidelines for the private sector and for government itself, while of value, cannot take the place of legislated environmental standards;

• Traditional enforcement techniques, such as the occasional prosecution, are not adequate to cope with a problem as pervasive and geographically broad as non-point pollution;

• Rather than being thought of as obstacles to administrative efficiency, citizens should be granted a greater role in environmental protection efforts.

The battle against point source pollution should not be slackened. However, traditional abatement technologies and control approaches designed to deal with point sources are largely irrelevant to the land management and stewardship problems posed by non-point pollution.

The PLUARG report is an important start in recognizing this. However, its scientific and technical findings support stronger, more detailed institutional actions than it provided. □

Views expressed are those of the authors and not necessarily those of the Basin states, Ontario, the Canadian and U.S. governments or IJC-PLUARG.

International Symposium on Natural Environment

The International Institute of Studies, Documentation and Information for Protection of the Environment, established in Milan in 1978, held an international symposium on "The protection of the natural environment" in Gossensass-Colle Isarco, Italy, from June 21 - 24, 1979.

The Symposium was attended by technical experts and lawyers from Italy, Austria and the Federal Republic of Germany. The reports concerned *inter*

alia the establishment of antipollution control by aerial reconnaissance, new methods of garbage disposal and of the improvement of the water quality of lakes. At the end of the Symposium a resolution was adopted which among other things recommends to grant associations a right to sue for the protection of the environment; to grant to judges the right to issue injunctions in summary proceedings; to adopt special penal laws for the protection of the envi-

ronment and to co-ordinate the efforts of all authorities concerned with the protection of the environment on the national as well as on the international level.

The laws should provide criteria establishing the responsibility in cases where the administration by its inactivity had contributed to a deterioration of the environment. The resolution, moreover, recommends the establishment of a duty to make environmental impact statements. On the international level, States should collaborate energetically in order to improve also the protection of the environment across national borders. S.H. □

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becomes evident that a simple extension of the current approach for point source regulation deserves careful attention. Use of other regulatory techniques either in lieu of or in addition to traditional enforcement may prove effective. Techniques which warrant further study include use of an effluent charge system, use of expanded environmental right of action statutes or the use of general permits contingent upon use of best management practices.

3. Intensified voluntary efforts may not be sufficient to adequately control non-point source urban and agricultural pollution

Improved management of non-point sources will depend upon the effectiveness of individual and local government initiatives. This situation has most application to farmers and to local government. Mechanisms available to precipitate individual/local action involve on the one hand voluntary measures (e.g. fiscal assistance programs, technical and planning assistance and public information efforts) and on the other hand regulations and sanctions. It appears that, with even the best of voluntary programs, segments of the population will be unresponsive.

In Ontario, for example, despite voluntary Agricultural Code of Practice, recommendations against farmers spreading manure on frozen fields in winter, the PLUARG Agricultural Practices Survey found that between 32 and 42 percent of Ontario livestock farmers spread manure during winter months. Water pollution resulting from agricultural practices generally has no adverse effect on the farmer's operation, thus provisions for loans, cost-sharing, or voluntary codes to control such water pollution are under-utilized.

The strong similarity between the position of the farmer in control of agricultural pollution and the position of the municipality in control of urban stormwater and construction site runoff suggests that reliance upon purely voluntary efforts by municipalities to control these sources of pollution would be similarly limited. Experience in the U.S. suggests that municipal action in areas which are not in their immediate self-interest is unlikely without the encouragement of sanctions. The 1968 Housing and Urban Development Act created a program of federally subsidized flood insurance. Under this Program individual property owners in participating communities can purchase

insurance at subsidized rates. In order to participate in the program, communities were to adopt certain floodplain management measures. A 1977 Congressional report notes:

"As a voluntary measure, however, the flood insurance program did not become a significant part of the Federal disaster relief effort. Its lack of effectiveness led to the Flood Disaster Protection Act of 1973, which expanded coverage available under the program and new sanctions introduced by the statute made it virtually compulsory for communities designated as flood prone."

The addition of sanctions is bringing about local action that may not otherwise have occurred.

4. The importance of an advocacy role for the public in the administrative process should be recognized

The public can provide a valuable supplement to administrative agency control of non-point pollution through involvement in: (1) public or administrative hearings; (2) advisory committees; or (3) court actions.

Public hearings can be important forums where proponents of various land use projects can outline the nature of their proposals and their implications for water quality. Similarly, government agencies can explain details of their policies of approval and enforcement in relation to such uses.

However, public hearings under the laws of both countries currently apply to few of the types of land uses that may be water quality problems, thus limiting the comprehensiveness of this tool.

Citizen groups have utilized the courts, both to prosecute violators of environmental legislation and to seek injunctions halting particular activities where government agencies, for whatever reasons, have failed to act. While prosecutions are limited in their effect, injunctive actions and judicial review by citizens may provide a valuable supplement in halting potentially harmful activity. Experience in Ontario, however, suggests that several barriers exist to citizen's groups effectively using these injunctive and related remedies. These barriers include standing, discretionary agency powers, and costs.

However, where "citizen suit" statutes have been established, (e.g. Michigan), the experience has been that the instrument can expeditiously resolve environmental disputes; there has been

no flooding or burdening of the court system; and the law's provisions have frequently been turned to by agencies themselves to supplement their traditional regulatory powers.

PLUARG Report Recommendations

In presenting its final recommendations, PLUARG noted that management of non-point sources will require a dramatic departure from the traditional approach followed for point source pollution control. The report goes on to indicate that across the board measures for non-point pollution control which would impose uniform requirements in all portions of the Basin are neither necessary nor appropriate. The PLUARG recommendations call for development of a comprehensive strategy for management of the Great Lakes Ecosystem and adoption of a methodology to identify priority management areas to be treated.

Unfortunately, when it came to specific recommendations the report presented little that could be considered a dramatic departure from present practices. The study recommends that each governmental jurisdiction prepare a comprehensive management plan. The plans should include:

- (1) A timetable for implementation;
- (2) Identification of responsible agencies;
- (3) Formal arrangements for cooperation;
- (4) Identification of existing programs and funding;
- (5) Estimation of anticipated pollution reductions and costs;
- (6) Provision for public review.

PLUARG recommended that management plans emphasize four items:

- (1) *Planning* to ensure that agencies consistently consider PLUARG recommendations and that developments affecting the Lakes are planned to minimize pollution.
- (2) *Fiscal Arrangements* to ensure rapid implementation of programs, including the availability of grants, loans and cost-sharing arrangements.
- (3) *Information, Education and Technical Assistance* to increase awareness, interest and concern of individual citizens. Technical assistance and extension programs regarding rural and urban land management practices should be expanded.
- (4) *Regulations*. The PLUARG study heavily emphasized voluntary programs, but indicated that regulations be developed for use where voluntary programs do not achieve desired results.