

ARIZONA LAW REVIEW

VOLUME 14

1972

NUMBER 1

THE EFFICACY OF FEDERAL AND STATE CONTROL OF WATER POLLUTION IN INTRASTATE STREAMS

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The law of water pollution control in the United States is in transition. There appears to be wide agreement that present programs, despite some successes, are largely inadequate. The result has been a movement to reorganize federal and state pollution control agencies and to pass new laws and initiate new programs to cope with the problem.¹ There is, however, great disagreement on what precisely should be done. This has produced confusion and open conflict between key federal officials and mutual distrust between federal and state authorities.² Piecemeal amendments of federal and state laws have made them unnecessarily complex and cumbersome. It is ironic that the federal government has found it expedient to cut through the complexity of existing law and mount a program based on the Refuse Act of 1899.³ At this writing the Congress of the United States is considering yet another complete overhaul of the federal program of water pollution control.⁴

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1. See, e.g., Proposed Amendments to the Federal Water Pollution Control Act, S. 2770, 92d Cong., 1st Sess. (1971); H.R. 11896, 92d Cong., 1st Sess. (1971); *Veto Message*, 117 CONG. REC. 17,464 (daily ed. Nov. 2, 1971); *Wall St. Journal*, Nov. 3, 1971, at 2, col. 2.

2. See 2 BNA ENV. REP. CURR. DEV'S 251-53 (July 2, 1971) (remarks of state and federal officials).

3. 33 U.S.C. §§ 407, 408-409, 411-415, 418 (1970). See text accompanying notes 147-181 *infra*, for a discussion of this program.

4. S. 2770, 92d Cong., 1st Sess. (1971), has already been passed by the United

While the literature is replete with many fine descriptive and analytical studies of water pollution control,⁵ very little has been written from an empirical standpoint. Using information gathered from selected streams in the piedmont district of North Carolina, this analysis will take an empirical and case-study approach to a critical examination of the operation and effectiveness of the federal and state legal and administrative processes for water pollution control in intrastate streams. This article will, in turn, examine the major water pollution control laws applicable to the streams under study: the Federal Water Pollution Control Act (FWPCA)⁶ which empowers the federal government to proceed directly to abate water pollution and has required the states to create and enforce stream standards; the North Carolina Water and Air Resources Act of 1967⁷ which authorizes state officials to set and enforce standards approved by the federal government; the Refuse Act of 1899 which prohibits the discharge of any refuse into the navigable waters of the United States;⁸ and the proposed amendments to the FWPCA which seek to strengthen the present federal-state regulatory scheme.⁹ Alternative approaches to water pollution control will then be discussed and evaluated, culminating in a recommendation for future action.

The streams selected in order to evaluate the effectiveness of water pollution laws were the lower Haw River from below Saxapahaw, North Carolina and the New Hope River, a tributary of the Haw.¹⁰ Both these streams are located in the Cape Fear River basin. About four miles downstream from the point at which the New Hope flows into the Haw River, the Cape Fear is formed from the confluence of the Deep and the Haw Rivers. From July, 1966, to February, 1970, the water quality characteristics of these streams were intensively studied by qualified scientists to estimate the probable water quality of New Hope Lake, a proposed reservoir now under construction by the United States Army Corps of Engineers. The monitoring program carried out, based on systematic sampling programs at 16 stations and involving 19 water quality parameters, was far superior to monitoring else-

States Senate. See 117 CONG. REC. 17,464 (daily ed. Nov. 2, 1971). H.R. 11896, 92d Cong., 1st Sess. (1971), has been approved in principle by the House Public Works Committee. See note 182 *infra*.

5. See, e.g., Barry, *The Evolution of the Enforcement Provisions of the Federal Pollution Control Act: A Study of the Difficulty in Developing Effective Legislation*, 68 MICH. L. REV. 1103 (1970); Hines, *Controlling Industrial Water Pollution: Color the Problem Green*, 9 B.C. IND. & COM. L. REV. 553 (1968).

6. 33 U.S.C. §§ 1151 *et seq.* (1970).

7. 12 N.C. GEN. STAT. §§ 143-211 to -215 (Supp. 1971).

8. 33 U.S.C. §§ 407, 408-409, 411-415, 418 (1970).

9. See notes 1 & 4 *supra*; text & notes 182-203 *infra*; note 122 *infra*.

10. See FIGURE 1, p. 20 *infra*, for a diagrammatic representation of the lower Haw and New Hope river systems.

where in the state.¹¹ The researchers who carried out the study were nonlawyers, and the study was conducted for nonlegal purposes, but nevertheless the study produced valuable raw material which can be profitably considered in relation to the law of pollution control.¹²

The New Hope and Haw Rivers receive both industrial and municipal discharges¹³ as well as pollution from non-point sources in the form of agricultural pollution and runoff from construction activities in the watershed. The principal discharges into the New Hope come from the city of Durham (about 3 million gallons per day [3 MGD]), the town of Chapel Hill (about 2 MGD), as well as 0.43 MGD from the primary oxidation ponds of the Research Triangle Industrial Park. The Haw River receives major industrial and municipal loads from the cities of Greensboro, Burlington and Graham, as well as lesser municipal discharges from the small communities of Bynum and Pittsboro.¹⁴

It is conceded that no claim of complete generality can be made with respect to this study. Obviously, it assumes too much to say that the way the water pollution control system operates on selected streams in central North Carolina typifies the way it operates all across the United States. The particular streams were chosen solely on the basis of their proximity to the writer, and because an extensive monitoring program had been conducted on those streams over a period of several years. Nevertheless, it is believed that the operation of the regulatory system upon those streams demonstrates the mechanics of that system, illustrates its ineffectiveness, and typifies many of its limitations. It is reasonable to believe that many of the concepts developed here will undoubtedly have application elsewhere in North Carolina and other parts of the United States.¹⁵

FEDERAL WATER POLLUTION CONTROL ACT

A thorough description of the provisions of the FWPCA is beyond the scope of this article and is readily accessible elsewhere.¹⁶ Consideration will accordingly be limited to the enforcement provisions of the Act and their effect on the rivers studied. The enforcement jurisdiction

11. See text accompanying notes 94-95 *infra*.

12. The study can be found in C. WEISS, WATER QUALITY CHARACTERISTICS OF THE NEW HOPE AND LOWER HAW RIVERS, JULY 1966-FEBRUARY 1970 WITH ESTIMATES OF THE PROBABLE WATER QUALITY OF NEW HOPE LAKE (Univ. N.C. Water Resources Res. Inst. Rep. No. 48, Env. Sci. & Eng. Pub. 257, 1971).

13. *Id.* at 8. See FIGURE 1, p. 20 *infra*.

14. C. WEISS, *supra* note 12, at 8.

15. See text & note 40 *infra*.

16. See Barry, *supra* note 5.

of the FWPCA extends to all navigable and interstate waters in the nation, and their tributaries.¹⁷ Navigable intrastate waters are included, therefore, even if they are not tributary to interstate waters. Although the term "navigable waters" is not defined by the Act, the waters of the Haw and the New Hope river systems are all either navigable or tributary to navigable waters under the general doctrine of "navigability in fact."¹⁸

The Administrator of the Environmental Protection Agency¹⁹ may institute federal enforcement proceedings under the FWPCA by calling a conference at which federal officials consult with state and local pollution control officials regarding the nature of the problem and the steps necessary to correct the situation. The conference is concluded with the presentation of formal recommendations to the state officials by the Administrator.²⁰ After a minimum period of six months following the termination of the conference stage, the Administrator may call a public hearing if he determines further action is necessary. The hearing stage is a formal procedure at which the government may present its case to a hearing board through expert witnesses, and the alleged polluters can make a full statement of their views.²¹ Polluters can also be required to file a report concerning the character and quantity of their discharges and the use of facilities or other means to prevent or reduce the discharges.²² At the conclusion of the hearing, the board makes findings of fact. If the board finds that pollution is occurring and that effective progress towards abatement is not being made, it is required to make recommendations for correction of the problem to the Administrator who must transmit the recommendations to the polluters and state officials.²³ The third stage of a federal enforcement proceeding is federal court action, which cannot be commenced until at least six months after the hearing stage has been completed. The initiation of court action is entirely within the discretion of the Administrator and the United States Attorney General.²⁴ This three-step abatement process may be instituted, however, only where the health and welfare of individuals are endangered and, unless the pollution is interstate, international or causing injury to shellfish, the

17. 33 U.S.C. § 1160(a) (1970).

18. For a discussion of this doctrine see Barry, *supra* note 5, at 1113.

19. In 1970 President Nixon transferred responsibility for administering the FWPCA from the Secretary of the Interior to the newly created Environmental Protection Agency. Reorganization Plan No. 3 of 1970, 84 Stat. —, 116 CONG. REC. H6523 (1970).

20. 33 U.S.C. § 1160(d)&(e) (1970).

21. *Id.* § 1160(f)(1).

22. *Id.* § 1160(f)(2).

23. *Id.* § 1160(f)(1).

24. *Id.* § 1160(g).

Administrator can only act with the concurrence of the governor of the state involved.²⁵

The FWPCA also requires the states to set water quality standards for all interstate waters within their boundaries.²⁶ "Interstate waters" are defined as all rivers, lakes and other waters which flow across or form a part of state boundaries, including coastal waters.²⁷ In setting the water quality standards, the states must take into consideration the value and use of the waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industry.²⁸ If a state fails to act, the Federal Administrator can set the standards.²⁹ Once the standards have been set, a "streamlined" federal abatement proceeding can be used. Any discharge into interstate waters or their tributaries which violates the water quality standards established can be attacked through a direct court action by the Federal Administrator after 180 days notice has been given to the discharger.³⁰ If the discharge is endangering persons only in the state in which the discharge originates, the written consent of the state governor must still be obtained.³¹

When these federal enforcement capabilities are considered in the context of the Haw and New Hope Rivers, their ineffectiveness may be fully appreciated. Although these streams constitute the chief tributaries of one of the principal rivers of the Eastern United States, the Cape Fear, they would probably be categorized as navigable but intrastate waters under the FWPCA since the Cape Fear is wholly within North Carolina. Thus the federal streamlined procedure would not be applicable.³² Only the cumbersome conference-hearing-court action procedure would be available and this would be subject to the concurrence of the Governor of North Carolina. The practicalities of the situation ensure that this procedure will never be used and, indeed, it should not be. Such heavy-duty enforcement machinery is totally inappropriate to the situation. In light of these factors, it is not surprising that there has been almost no federal enforcement activity with regard to pollution of navigable intrastate waters.³³

Federal enforcement under the FWPCA has been relatively inef-

25. *Id.* § 1160(d)(1).

26. *Id.* § 1160(c)(2)&(3).

27. *Id.* § 1173(e).

28. *Id.* § 1160(c)(3).

29. *Id.* § 1160(c)(2).

30. *Id.* § 1160(c)(5).

31. *Id.* § 1160(g)(2).

32. Only about 14 percent of the waters of the nation are interstate waters covered by federally approved water quality standards. 2 BNA ENV. REP. CURR. DEV'S 209 (June 25, 1971) (remarks of acting deputy assistant administrator of the Environmental Protection Agency).

33. See Barry, *supra* note 5, at 1119; S. REP. No. 92-414, 92d Cong., 1st Sess. 5 (1971).

fective even where federal initiative is possible—for example, in the areas of interstate pollution and pollution causing damage to shellfish. The reasons for this are well known: the enforcement proceeding is too cumbersome and time-consuming; the Federal Administrator tends to rely on voluntary compliance rather than court actions; federal enforcement is duplicative of state enforcement and is unrelated to any comprehensive plan; and the judicial standard for entering an enforcement order is unclear.³⁴ Lack of sufficient water quality monitoring even on interstate waters³⁵ results in enforcement on an ad hoc, hit-or-miss basis.

Defenders of the FWPCA may argue that section 10(c),³⁶ added in 1965, had the effect of inducing the states to adopt higher and more uniform water quality standards by requiring the submission of a specific plan, satisfactory to federal officials, for the attainment and maintenance of standards.³⁷ As a result many states have upgraded their water quality standards, especially their criteria for temperature and dissolved oxygen, but the aim of the amendment, the establishment of national water quality standards, has not been accomplished. State and federal officials have devoted an extraordinary amount of time and energy to the standard-setting process over the past 6 years, but since the actual enforcement of the standards has remained primarily with the state,³⁸ no real national program has emerged. Moreover, only interstate waters are covered by the standards provision of section 10(c); intrastate tributaries of interstate waters are not subject to the standard-setting requirement.³⁹ Intrastate rivers, which constitute the great majority of the nation's water resources, are subject only to standards promulgated under state law. Thus, it may be concluded that the federal enforcement procedures of the FWPCA have little practical application to or effect on intrastate streams such as the Haw and New Hope.

34. Barry, *supra* note 5, at 1117-25. From 1956 to 1970, the Federal Water Quality Administration convened 50 enforcement conferences of which only four went to the hearing stage, and only one culminated in court action. By June of 1970, only 11 actions had been instituted under the 180-day streamlined procedure added in 1965. None of these have gone to court. COMPTROLLER GENERAL'S REPORT TO THE CONGRESS: CONTROLLING INDUSTRIAL WATER POLLUTION—PROGRESS AND PROBLEMS 37 (1970) [hereinafter cited as COMPTROLLER GENERAL'S REPORT].

35. COMPTROLLER GENERAL'S REPORT, *supra* note 34, at 27-29, 40-41. See text accompanying notes 94-95 *infra*. See also Brown & Duncan, *Legal Aspects of a Federal Water Quality Surveillance System*, 68 MICH. L. REV. 1131 (1970); Rodgers, *Industrial Water Pollution and the Refuse Act: A Second Chance for Water Quality*, 119 U. PA. L. REV. 761, 764 (1971).

36. 33 U.S.C. § 1160(c) (1970).

37. *Id.* § 1160(c)(1).

38. *Id.* § 1160(b).

39. See U.S. DEP'T OF INTERIOR, GUIDELINES FOR ESTABLISHING WATER QUALITY STANDARDS FOR INTERSTATE WATERS 10 (1966). Forty-four states have voluntarily adopted standards applicable to intrastate waters. S. REP. NO. 92-414, 92d Cong., 1st Sess. 4 (1971).

STATE WATER POLLUTION CONTROL LAWS

Modern North Carolina legislation regulating water quality, which is fairly typical of state regulatory programs,⁴⁰ dates essentially from 1951. In that year the General Assembly created a State Stream Sanitation Committee within the State Board of Health to deal with the problem of water pollution.⁴¹ In 1959, the committee was transferred to the new Department of Water Resources,⁴² which was charged with initiating and planning long-range water resource development programs.⁴³ Thus when the federal government, in 1965, required the states to adopt a standards approach to water pollution control, North Carolina already had a well-developed, though largely ineffective, program in existence. While the new federal law had some effect, it did not change the basic pattern of regulation in North Carolina. In 1967 the General Assembly passed the North Carolina Water and Air Resources Act, which substantially re-enacted existing legislation on water pollution.⁴⁴ The Stream Sanitation Committee was abolished and its authority was transferred to two newly created bodies, the Board of Water and Air Resources, and the Department of Water and Air Resources.⁴⁵ In 1971 both the board and the department were placed under a new agency, the Department of Natural and Economic Resources.⁴⁶ Despite these administrative reorganizations, there has been little substantive change in the pattern of water quality regulation since 1951.⁴⁷ North Carolina adopted the water quality standards approach for all surface waters in the state and attempted to establish a comprehensive legal regime for the control of water pollution.

Usage Classification

The first step, carried out largely in the 1950's, was to survey the surface waters of all 16 river basins in the state in order to compile in-

40. Among the best accounts of state water quality programs are Hines, *Nor Any Drop to Drink: Public Regulation of Water Quality, Part I: State Pollution Control Programs*, 52 IOWA L. REV. 186 (1966); Comment, *State Control of Water Pollution: The California Model*, 1 U.C. DAVIS L. REV. 1 (1969).

41. For an analysis of this legislation see 29 N.C.L. REV. 365-69 (1951). See also Aycock, *Introduction to Water Use Law in North Carolina*, 46 N.C.L. REV. 1, 27 (1967).

42. For an account of this change see Long, *Water Pollution Control in North Carolina*, 28 POP. GOV'T 11 (Mar.-Apr. 1962).

43. Aycock, *supra* note 41, at 27.

44. N.C. GEN. STAT. §§ 143-211 to -215 (Supp. 1971).

45. For a more complete discussion of these changes see Aycock, *supra* note 41, at 27-37.

46. This was accomplished by the Executive Organization Act of 1971, ratified by the North Carolina General Assembly on July 14, 1971. N.C. GEN. STAT. §§ 143A-1 *et seq.* (Supp. 1971).

47. For an account of the few substantive changes that have been made see Aycock, *supra* note 41, at 27-37.

formation about resources, stream conditions, usage patterns and pollution sources, and to recommend use designations for the waters of each basin.⁴⁸ Subsequent to the completion of each survey report, the State Stream Sanitation Committee, after holding public hearings,⁴⁹ classified the various stream segments of each river basin in conformity with the highest acceptable usage⁵⁰ as follows: *A-I* and *A-II*, public water supply; *B*, bathing; *C*, fishing; *D*, agriculture, industrial cooling and processing supply; and *E*, navigation and disposal of sewage and other wastes. Tidal saltwater was classified as: *SA*, shellfishing for market purposes; *SB*, bathing; *SC*, fishing; and *SD*, navigation.⁵¹ In 1968, in response to the federal government's guidelines under the 1965 amendments to the FWPCA, the *E* and *SD* classifications for navigation and disposal of sewage and other wastes were eliminated.⁵²

There are many problems in this classification system and its administration. First, this system is a form of stream zoning which emphasizes the refereeing of various conflicting uses, rather than the protection of water quality. The focus is on the particular stream segment, as opposed to the river basin or hydrologic unit.⁵³ This narrow viewpoint ignores the effects which pollution of the immediate stream segment may have on downstream waters, ground water, estuaries and oceans.

Second, the bulk of these waters have been assigned the two lowest classifications, class *C* (suitable for fishing and fish propagation) and class *D* (suitable for agriculture, and industrial cooling and process water).⁵⁴ In assigning these classifications only the then-current uses of the various stream segments were considered,⁵⁵ again state au-

48. N.C. GEN. STAT. § 143-214.1(a) (Supp. 1971). The survey results for each of the 16 river basins were published separately and are available from the Water Pollution Control Division of the North Carolina Department of Water and Air Resources.

49. Transcripts of the public hearings held regarding each river basin may be obtained from the North Carolina Office of Water and Air Resources.

50. Classifications for the waters of each river basin in the state may be obtained from the North Carolina Office of Water and Air Resources. See FIGURE 1, p. 20 *infra*.

51. N.C. GEN. STAT. § 143-214.1(d)(3) (Supp. 1971).

52. NORTH CAROLINA BOARD OF WATER AND AIR RESOURCES, REPORT OF PUBLIC HEARING ON ADOPTION OF PROPOSED AMENDMENTS TO THE CLASSIFICATIONS AND WATER QUALITY STANDARDS AND RULES AND REGULATIONS APPLICABLE TO SURFACE WATERS OF NORTH CAROLINA — (Nov. 16, 1967) [hereinafter cited as N.C. WATER QUALITY HEARING]. Most of the surface waters which formerly carried the classification *E* were reclassified *D* in 1970 and 1971.

53. The referee idea is inherent in N.C. GEN. STAT. § 143-214.1 (Supp. 1971). In adopting classifications the Board of Water and Air Resources must "give effect to the need for balancing conflicting considerations as to usage and other variable factors . . . and . . . each classification and the standards applicable thereto should be adopted with primary reference to the best usage to be made of the waters to which such classification will be assigned." *Id.* § 143-214.1(b).

54. See FIGURE 1, p. 20 *infra*, for a diagrammatic presentation of the stream classifications.

55. Interview with D.L. Coburn, Chief of the Water Pollution Control Division

thorities ignored the fact that these are the principal tributaries of the Cape Fear River, which forms an estuary and flows into the Atlantic Ocean. Effluent discharged into the Haw and New Hope Rivers contributes, of course, to the condition that renders the lower Cape Fear one of the most polluted rivers in the East and precludes shellfishing for commercial purposes in the estuary.⁵⁶

Third, the assigned classifications are illogical. Although the New Hope itself is assigned a *C* classification, every tributary has been designated a *D* stream.⁵⁷ It is difficult to conceive a group of wholly *D* streams combining to become *C* waters. Furthermore, the Haw River is a *D* stream until it is joined by Dry Creek, a small feeder stream also classified *D*, from which point the Haw suddenly achieves a higher classification and becomes an *A-II* stream. It continues as an *A-II* stream for several hundred yards before once more becoming a *C* stream.⁵⁸ There is no reason for these illogical changes in classification although the portion of the Haw River designated *A-II* is used to supply domestic water to the town of Bynum, North Carolina.⁵⁹

Fourth, although the process of making stream surveys and classifying stream segments was completed in 1963, relatively few sections of streams have been reclassified. Interested municipalities, seeking to protect public water supplies, have requested most of the few reclassifications that have been made. The Board of Water and Air Resources has never exercised its power to initiate the reclassification or upgrading of a stream.⁶⁰ Thus the present classification system essentially reflects the number and kinds of beneficial uses that were considered important in the 1950's and early 1960's. It protects the beneficial uses enumerated in the original language of the 1951 Act: transportation, domestic water consumption, industrial water consumption, bathing, fishing, fire prevention and the disposal of sewage, industrial and other wastes.⁶¹

In sum, it is evident that the highest beneficial use of each stream segment was determined without considering in any way the impact on

of the North Carolina Department of Water and Air Resources in Raleigh, North Carolina, Dec. 9, 1969.

56. Interview with Thomas L. Linton, Director of the North Carolina Bureau of Sport and Commercial Fisheries, in Raleigh, North Carolina, Feb. 25, 1970.

57. See FIGURE 1, p. 20 *infra*.

58. *Id.*

59. See NORTH CAROLINA DEPARTMENT OF WATER AND AIR RESOURCES, CLASSIFICATIONS AND WATER QUALITY STANDARDS ASSIGNED TO THE WATERS OF THE CAPE FEAR RIVER BASIN INCLUDING THE DRAINAGE AREAS OF THE HAW, DEEP AND CAPE FEAR RIVERS (rev. ed. 1969); NORTH CAROLINA BOARD OF HEALTH, THE CAPE FEAR RIVER BASIN 37-38 (Stream San. Comm. Poll. Rep. No. 6, 1957).

60. Interview, *supra* note 55. The Board of Water and Air Resources has power to initiate reclassification under N.C. GEN. STAT. § 143-214.1 (Supp. 1971).

61. Ch. 606, § 1, [1951] N.C. Sess. Laws 530, *repealed*, N.C. GEN. STAT. § 143-214.1(d)(3) (Supp. 1971).

the ecosystem supported by the surface waters, and little or no investigation was undertaken to determine the carrying capacities of the streams. The stream classification system emphasizes the industrial and commercial uses of surface water; recreational, aesthetic and ecological values are minimized if not totally ignored. In many cases the right of the general public to enjoy and use a stream has been sacrificed to the right of special interests to pollute.

That a greater number of beneficial uses should be considered in classifying North Carolina's waters was acknowledged by the General Assembly when wildlife propagation, in 1967, and scientific or research uses, in 1969, were expressly recognized as new categories of beneficial use.⁶² But corresponding revision of the classification system has not accompanied these changes in the law.⁶³

Water Quality Criteria and Characteristics

The second step, mandated by the 1965 amendments to the FWPCA, was the establishment for each use classification⁶⁴ of water quality criteria that express the minimum quality of the receiving-water (the body of water into which the effluent discharges) that is to be maintained for each use classification. In order to be effective, they must be strict enough to protect the beneficial use for which they were designed, be capable of quantitative evaluation by acceptable analytic procedures, and lend themselves to definitive resolution.⁶⁵ Water quality criteria for surface waters are, however, extremely difficult to define with precision. They must be functions of biological systems, human health and aesthetics, and are only approximations arrived at by experts in the context of committee review.⁶⁶ They must be regarded, therefore as tentative, flexible, and subject to periodic review.⁶⁷ There is evidence, however, that state water quality criteria, once adopted, are regarded as holy writ, valid for all time. North Carolina first adopted water quality criteria in 1953, but they have been amended only twice since that time, in 1968 and 1970, in response to federal pressure under authority of the 1965 amendments to the FWPCA.⁶⁸

62. N.C. GEN. STAT. § 143-214.1(d)(3) (Supp. 1971).

63. North Carolina's stream classification system should be further revised to give appropriate weight to recreational and ecological values, but it is clear that no benefit is derived from changing the statutory law if it is not implemented. See text & notes 119-142, 231-254 *infra*.

64. See Hines, *supra* note 5, at 586. Criteria will normally specify appropriate minimums or maximums for such factors as suspended solids, coliform bacteria, salinity, dissolved oxygen and hardness.

65. J. MCKEE & H. WOLF, WATER QUALITY CRITERIA 5 (1963).

66. D. HOWELLS, SUMMARY OF WATER RESOURCE PROBLEMS AND RESEARCH NEEDS IN NORTH CAROLINA 12 (N.C. Water Resources Res. Inst. draft Sept. 15, 1970).

67. J. MCKEE & H. WOLF, *supra* note 65.

68. Relatively minor revisions of the standards were adopted in 1968. New rules

To correct this problem, state law should provide for automatic review of stream standards by a group of specialists at least every five years.

The water quality criteria in effect in North Carolina and in many other states place primary emphasis on a few factors, such as dissolved oxygen, temperature, and alkalinity-acidity balance. They ignore a range of other pollutants as well as the synergistic effects created by pollutants reacting with each other and with natural substances in streams. Whereas some states have adopted criteria which specify in milligrams per liter the maximum permissible concentrations of a wide range of toxic substances such as arsenic, cadmium, fluoride, lead and zinc, North Carolina has only vaguely defined standards relating to toxic substances.⁶⁹ Effective criteria can be adopted only after adequate consideration of factors such as physiography, climate, fish and wildlife species, and the sources and nature of all significant pollutants discharged into the surface water. At present no studies of this type are conducted prior to the adoption of water quality criteria. In the absence of a law requiring dischargers to report the strength, quantity and composition of their effluent,⁷⁰ it is impossible to determine whether the criteria adopted include the spectrum of different pollutants actually discharged into the receiving-waters. Monitoring studies of the New Hope and Haw Rivers, for example, show that many water quality problems are present which are not specifically covered by the North Carolina water quality criteria.⁷¹ It is evident, then, that current North Carolina receiving-water standards are vague, incomplete and inadequate, and demonstrate the inherent difficulties that are present in the receiving-water standards approach.

were added relating to the governing stream flow for the application of the criteria, the minimum possible treatment for all significant waste discharges, the maximum limit for toxic substances in receiving waters, and the granting of variances. Class E, the lowest classification, was deleted, and new criteria were added relating to the maximum permissible level of organisms of the coliform group, stream temperature and radioactive substances. N.C. WATER QUALITY HEARING, *supra* note 52, at 5-27. In 1970 the standards were again amended by the addition of a nondegradation principle pursuant to which waters whose existing quality is higher than the established standards are to be maintained at that quality. See text accompanying notes 144-146 *infra*; NORTH CAROLINA DEPARTMENT OF WATER AND AIR RESOURCES, RULES, REGULATIONS, CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO THE SURFACE WATERS OF NORTH CAROLINA (1970) [hereinafter cited as N.C. RULES].

69. Instead of carefully determining precise limits for toxic substances, North Carolina merely incorporated by reference the "values" recommended for toxic substances in NATIONAL TECHNICAL ADVISORY COMMITTEE, WATER QUALITY CRITERIA REPORT TO THE SECRETARY OF THE INTERIOR (1968). See N.C. RULES, *supra* note 68, at 6.

70. On July 21, 1971, North Carolina enacted the Water and Air Quality Reporting Act of 1971, which requires polluters to monitor wastes discharged and file monthly reports. N.C. GEN. STAT. §§ 143-215.63 *et seq.* (Supp. 1971).

71. FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, MIDDLE ATLANTIC REGION, DEP'T OF INTERIOR, WATER QUALITY SURVEY: HAW RIVER SUB-BASIN, CAPE FEAR RIVER BASIN, SUMMER 1969 (June 1970). See note 141 *infra*.

The Achievement and Enforcement of the Standards

The third aspect of state action, required under the 1965 amendments to the FWPCA, was a precise, detailed plan for achieving and enforcing the water quality criteria established for each use classification. This had to include preventive steps, construction schedules, enforcement actions, surveillance and monitoring.⁷² Consideration will be given here to the manner in which one state, North Carolina, responded to this requirement.

1. *Organizational and Administrative Responsibility.* The water pollution control program of North Carolina is administered by two state agencies: the Water Pollution Control Division of the Office of Water and Air Resources, and the State Board of Health. The former agency has primary regulatory responsibility, while the State Board of Health may disapprove the issuance of a permit by the Board of Water and Air Resources for the disposal of wastes into waters classified for use as sources of public water supply,⁷³ and has exclusive control over the disposal of sewage and waste from public schools, state and local institutions, raw milk dairies, farm slaughterhouses, shellfish processing plants, and food and lodging establishments supervised by the Board of Health under other state laws.⁷⁴ No reason exists for this bifurcation of responsibility⁷⁵ but the probable result is unnecessary duplication of effort and inefficiency.⁷⁶

The operation of North Carolina's water pollution control program is overseen by the Board of Water and Air Resources, a part-time group which has ultimate authority over decisions of the full-time director and the staff of the Office of Water and Air Resources. This board is largely made up of representatives of special interest groups including agriculture, industry and municipal and county government.⁷⁷ There is enormous potential for conflict of interest in the make-up of the board; recent studies have shown that the same pattern exists in other states.⁷⁸ The Water Pollution Control Division of the Office of Water and Air Resources is organized functionally into laboratory, industrial waste, engineering, municipal

72. Hines, *supra* note 5, at 586.

73. N.C. GEN. STAT. § 143-215.1(a) (Supp. 1971).

74. *Id.* § 130-161.

75. In 1959, the State Stream Sanitation Committee, the predecessor of the present Board of Water and Air Resources, was transferred from the State Board of Health to a newly created Department of Water Resources. The split of authority grew out of that reorganization struggle. See Long, *supra* note 42.

76. This is denied by state officials. Interview with D.L. Coburn, *supra* note 55.

77. N.C. GEN. STAT. § 143-214(a) (Supp. 1971).

78. An investigation by the New York Times in 1970 found that this problem existed in 35 states. Raleigh News & Observer, Dec. 7, 1970, § 1, at 1, col. 3.

waste, and stream monitoring sections. The water pollution control program is impeded, however, by a lack of adequate financial support and personnel.⁷⁹ Moreover, North Carolina is missing the opportunity to obtain more federal money to combat water pollution. Under the Clean Water Restoration Act of 1966, the federal administrator is authorized to make grants of from 30 to 55 percent of the estimated construction cost of municipal sewage treatment facilities.⁸⁰ Maximum federal participation, however, is contingent upon the state fulfilling certain conditions, the most important of which requires the state to contribute at least 25 percent of the total cost for each eligible project.⁸¹ North Carolina has not yet appropriated sufficient money to qualify for full federal grants, resulting in forfeiture of needed federal funds.⁸²

2. *Permits and Effluent Standards.* The standards approach to water pollution control is premised on the utilization of the assimilative capacity of a stream for waste disposal. The assimilative capacity is the difference between the natural quality of the water and the receiving-water standards for the designated use classification. This assimilative capacity is apportioned among polluters by means of permits. In North Carolina, for example, the discharge of effluent into surface waters is allowed only after issuance of a certificate of approval or permit by the Board of Water and Air Resources.⁸³ Permits are generally granted only after plans and specifications for waste-water treatment have been submitted and approved by the Water Pollution Control Division.⁸⁴

A permit requirement alone is obviously not sufficient to safeguard the designated receiving-water standards which express only the quality of receiving-water to be maintained; they do not indicate the

79. In fiscal year 1970, the Division operated on a total budget of \$765,260, of which \$499,160 was derived from state appropriations and \$266,100 from federal funds. It had a staff of 56 full-time and three part-time employees. Every indication is that this is totally inadequate. A study commissioned by the U.S. Department of Health, Education and Welfare estimated that the desirable staffing and budget needs for an effective water pollution control program in North Carolina in 1964 required 99 staff members and a budget of \$903,000. Jacobi, Pavia & Ricketts, *Staffing and Budgetary Guidelines for State Water Pollution Control Agencies*, 37 J. WATER POLL. CONT. FED. 8 (1965). This problem also exists in other states. See COMPTROLLER GENERAL'S REPORT, *supra* note 34, at 22-27.

80. 33 U.S.C. § 1158 (1970).

81. *Id.*

82. Interview with E.L. Long, Head of the Engineering Section of the Water Pollution Control Division of the North Carolina Office of Water and Air Resources, in Raleigh, North Carolina, Feb. 25, 1970. On May 6, 1972, the citizens of North Carolina will have the opportunity of voting on a 150 million dollar bond issue which will, if approved, provide state money for the construction of municipal sewage treatment facilities. Telephone interview with E.L. Long, Feb. 28, 1972.

83. N.C. GEN. STAT. § 143-215.1(a) (Supp. 1971).

84. Interview with E.L. Long, *supra* note 82.

extent to which the discharger must treat his effluent in order to comply. This problem can be solved by combining receiving-water standards with effluent standards, which are concerned with the quality of the effluent that is discharged.⁸⁵ Effluent standards either restrict the strength and amount of waste that can be discharged or specify the required degree of treatment or percentage removal of a specific pollutant.⁸⁶ North Carolina, unlike some states,⁸⁷ does impose effluent standards in addition to receiving-water standards. There is a general requirement of secondary treatment for all significant sources of sewage, industrial and other waste.⁸⁸ In addition, the permits granted by the North Carolina authorities specify both the maximum volume of effluent that can be discharged per day and the percentage removal of specific pollutants required.⁸⁹

There are, however, many difficulties with the permit-effluent standard approach in North Carolina and other states. The percentage-removal type of effluent standard is almost always expressed solely in terms of percentage reduction of 5-day biochemical oxygen demand (BOD), which is related primarily to one criteria of water quality, dissolved oxygen.⁹⁰ This parameter does not take into consideration the oxygen demand of many organic wastes and is not applicable at all to a multitude of inorganic and refractory organic wastes.⁹¹ At a minimum, an effluent standard should be tailored to the particular wastes of each individual polluter.⁹²

An effluent standard that allows the use of the assimilative capacity of the stream and permits only the lowering of stream quality to the level of the receiving-water standards requires a fairly complex extrapolation from the receiving-water standard. The state agency must also decide how to apportion the assimilative capacity fairly among different dischargers. Should the entire capacity be initially allocated or should a portion be reserved for future dischargers? Should the allocation be on a first-in-time, first-in-right basis or should the agency order a pro rata reduction of discharges when a new industry comes in? Should the agency refuse to issue permits for certain streams but make

85. J. MCKEE & H. WOLF, *supra* note 65, at 30.

86. *Id.*

87. See the discussion of the two types of standards in Hines, *supra* note 5, at 584 n.163.

88. N.C. RULES, *supra* note 68, at 6.

89. Interview with E.L. Long, *supra* note 82.

90. For a technical discussion of the limitations of conventionally engineered systems in this regard, see P. MCGAUHEY, *ENGINEERING MANAGEMENT OF WATER QUALITY* 264-65 (1968).

91. D. HOWELLS, *supra* note 66, at 12.

92. The author's personal investigation of the North Carolina permit file disclosed that almost all standards are expressed in terms of percentage reduction of BOD even when the effluent involved nondegradable and other wastes.

it known that other streams have unallocated assimilative capacity? These are difficult policy questions which require the state water pollution control agency to make *land use* decisions.

State water pollution agencies have avoided these decisions, however, primarily by ignoring them. Effluent standards in practice tend to be crude estimates of the treatment necessary to preserve the receiving-water standards with no real calculations made of the stream's assimilative capacity. Percent-removal of BOD is relied upon to solve all such problems.⁹³

3. *Surveillance, Monitoring and Enforcement.* In addition to their general investigatory powers, state agencies rely heavily on water quality monitoring and waste treatment plant surveillance to determine whether illegal pollution is occurring. The monitoring program in North Carolina is carried out by the Stream Monitoring Section and consists of 102 primary sampling stations that form part of the U.S. Geological Survey's network for determining long-term water quality trends. A secondary network, consisting of approximately 1700 sampling stations located below nearly all significant points of discharge, has been instituted to measure the degree of compliance with stream quality standards.⁹⁴

The adequacy of the system is highly questionable. The funds and personnel currently assigned to water quality monitoring in North Carolina permit stream sampling only about once per month from May to October at each of the 1802 designated sampling points. There is no attempt to standardize the time of day samples are taken, the sample interval, streamflow conditions, or any other factors. Rather than a comprehensive analysis of the stream samples, only a few water quality parameters are checked. Moreover, there is no systematic intra-agency procedure for transmitting information regarding violations of stream standards to the appropriate state officials; at best there is an informal, oral communication.⁹⁵ Pollution discharges and water quality vary from hour to hour. Consequently, sporadic and irregular sampling precludes accurate monitoring of stream conditions.⁹⁶ The situation

93. Hines, *supra* note 5, at 584-85.

94. Interview with J.R. Taylor, Head of the Stream Monitoring Section of the Water Pollution Control Division of the North Carolina Office of Water and Air Resources, in Raleigh, North Carolina, Feb. 17, 1970. See also 5 N.C. DEP't OF WATER AND AIR RESOURCES BIENNIAL REPORT 113-15 (1968) [hereinafter cited as BIENNIAL REP.].

95. Interview with J.R. Taylor, *supra* note 94. Plans exist, however, for the institution of a computerized system for the storage and retrieval of monitoring data. Telephone interview with J.R. Taylor, Feb. 28, 1972.

96. Interview with Professor David H. Howells, Director, Water Resources Research Institute of the University of North Carolina, in Raleigh, North Carolina, Feb. 17, 1970. There is an excellent discussion of the techniques of water quality monitoring in J. McKEE & H. WOLF, *supra* note 65, at 25.

appears similar in other states. In a recent article advocating the establishment of a federal water quality surveillance system, two commentators stated that "it is in the area of detection that present law and practice are most lacking, for there are simply no systematic procedures for detection."⁹⁷ In addition to improved stream monitoring, a greater emphasis should be placed upon continuous monitoring at the source, and a requirement of periodic reports on discharges from polluters.

Waste treatment plant surveillance in North Carolina is conducted by the Municipal Waste and the Industrial Waste sections. An inspection normally includes a complete inventory of plant components, operating condition and performance of component sections, and the effect on the receiving stream.⁹⁸ Owing to staff shortages, however, inspections are conducted sporadically and many facilities have not been visited by regulatory officials for years.⁹⁹ Even adequate waste treatment plants are not operated properly because of poorly trained and unqualified plant operators. In North Carolina in 1969, the General Assembly passed legislation requiring the examination and certification of waste treatment plant operators, but no funds were provided for operator training programs.¹⁰⁰

In North Carolina, when illegal pollution is discovered, a conference is held with the individual entity or industry involved to seek voluntary abatement.¹⁰¹ If voluntary compliance is not forthcoming, the board is empowered, after notice and a hearing, to issue a special order directing such action as it deems necessary under the circumstances.¹⁰² An affected party may obtain judicial review of any special order issued by the board.¹⁰³ There are many reasons why only a very few dischargers have been subjected to enforcement proceedings. Current surveillance and monitoring practices make violations of the law

97. Brown & Duncan, *supra* note 35, at 1164. See the discussion of monitoring in the COMPTROLLER GENERAL'S REPORT, *supra* note 34, at 27-29. At a United States Senate Subcommittee hearing on water pollution, Dr. James B. Shrewsbury of Murray State University stated that current water sampling procedures are "so completely unacceptable that their use provokes disbelief." 1 BNA ENV. REP. CURR. DEV'S 25-26 (May 8, 1970).

98. 5 BIENNIAL REP., *supra* note 94, at 116.

99. Okun, *Editorial*, Univ. N.C. WATER RESOURCES RES. INST. NEWS 1 (Mar. 1971). Dr. Daniel A. Okun is Head of the Department of Environmental Sciences and Engineering of the University of North Carolina.

100. N.C. GEN. STAT. §§ 90A-35 *et seq.* (Supp. 1971).

101. N.C. GEN. STAT. § 143-215.2(e) (Supp. 1971); 5 BIENNIAL REP., *supra* note 94, at 111.

102. N.C. GEN. STAT. § 143-215.2(b) (Supp. 1971).

103. *Id.* § 143-215.5. Failure to comply with a special order, or discharging into a stream without a permit or in disregard of a permit, is a misdemeanor punishable by assessment of a fine of not less than \$100 and not more than \$1000. If the violation is willful, the court may treat each day during which the violation continues as a separate offense. *Id.* § 143-215.6.

almost impossible to detect; massive fish kills are often required before state officials are even aware of a problem. Most violations of the standards are ignored,¹⁰⁴ however, and even when enforcement proceedings are instituted, primary reliance is on voluntary abatement.¹⁰⁵ In North Carolina only 29 pollution abatement orders were issued from 1964 to 1968. Most of them were not vigorously contested and only one went to court.¹⁰⁶ Lack of adequate surveillance renders alleged violations almost impossible to prove with respect to an individual discharger and no attorney is available to work full time on enforcement.¹⁰⁷

4. *Sedimentation, Agricultural and Groundwater Pollution.*

Notwithstanding the defects in the laws with respect to municipal, industrial and other point sources of pollution, neither federal nor state law has yet adequately embraced essentially non-point sources of pollution, such as sedimentation and agricultural pollution.¹⁰⁸ Sedimentation is caused primarily by erosion from the misuse of land and water, and is increased by the removal of vegetation from topsoil. Poor agricultural practices, construction, highway building, urban development and altered drainage patterns all contribute to the problem. Sedimentation in surface waters causes turbidity which results in the scattering and absorption of light in the water. Excessive turbidity impairs light penetration into the water, thereby reducing photosynthesis by plant life in the stream and in turn lowering the oxygen content of the water. In addition, silt may serve as collecting points for chemical pollutants, and sediments may fill the interstices between gravel and stones on river and lake bottoms, thus eliminating fish spawning grounds and the habitat of many aquatic insects and other invertebrate animals. Eventually, the entire chain of life dependent upon these species may be affected.¹⁰⁹

In North Carolina and most other states, virtually no attempt has been made to deal with the sedimentation problem. No standards have been set for turbidity, and the Water Pollution Control Division has not been given adequate authority or resources to cope with the problem.¹¹⁰ Instead, the sedimentation has been tackled by soil conservation districts which encourage voluntary improvement in soil manage-

104. Interview with J.R. Taylor, *supra* note 94.

105. Interview with D.L. Coburn, *supra* note 55.

106. 4 N.C. DEP'T OF WATER RESOURCES BIENNIAL REP. 58 (1966); 5 BIENNIAL REP., *supra* note 94, at 111.

107. Interview with J.R. Taylor, *supra* note 94.

108. Recently federal laws have been strengthened with respect to oil pollution and pollution from watercraft. See, e.g., 33 U.S.C. §§ 1161-1163 (1970).

109. WATER QUALITY CRITERIA, *supra* note 69, at 46.

110. Interview with D.L. Coburn, *supra* note 55.

ment.¹¹¹ As Professor Hines has pointed out, however, this has been largely ineffective.¹¹² The control of sedimentation can be accomplished only by the regulation of land use patterns and practices, but up to the present time land use planning has been considered outside the realm of agencies created to deal with water pollution problems.

Agricultural pollution is another neglected water quality problem. In addition to sedimentation, the main sources of agricultural pollution are animal feedlot wastes, excessive salinity, and agricultural chemicals, including fertilizers and pesticides.¹¹³ Federal and state governments are just beginning to face the problem of feedlot wastes¹¹⁴ and there is no regulation of chemical fertilizers.¹¹⁵ Pesticide regulation on both the federal and state levels has emphasized controls on use,¹¹⁶ with little application to the water quality problem. In North Carolina, for example, there is no water monitoring for pesticides.¹¹⁷ Finally, excessive salinity has not been responsive to regulation.¹¹⁸

Groundwater pollution has also been largely ignored in North Carolina and most states. Because the hydrologic cycle involves a constant interchange between ground and surface waters, any legal distinction between them is artificial. Although pollution of groundwater is at present a serious problem only in certain areas of the United States, plans should be developed for a program of comprehensive regulation of groundwater quality.

A Case Study in the Effectiveness of the Law: The Lower Haw and New Hope Rivers of North Carolina

The ultimate test of the law of water pollution control is its effectiveness. This requires extensive monitoring, but the data collected by the state and federal governments for this river system could not be used because of its sporadic nature¹¹⁹ and because it is not available in usable form. On the other hand, the monitoring study by Professor Weiss is comprehensive, detailed, and objective.¹²⁰ From July 1966 to February 1970 water samples were collected twice monthly, and for many periods weekly, at ten sampling stations on the New Hope River and six stations on the lower Haw.¹²¹ The samples were tested for 19

111. Hines, *Agriculture: The Unseen Foe in the War on Pollution*, 55 CORNELL L. REV. 740, 756 (1970).

112. *Id.* at 756-57.

113. *Id.* at 741.

114. *See id.* at 741-47.

115. *Id.* at 749.

116. *See* van den Bosch, *Insecticides and the Law*, 22 HAST. L.J. 615 (1971).

117. T. SHEETS, M. JACKSON & L. PHELPS, A WATER MONITORING SYSTEM FOR PESTICIDES IN NORTH CAROLINA 1-3, 44-53 (1970).

118. Hines, *supra* note 111, at 758.

119. *See* text accompanying notes 94-95 *supra*.

120. C. WEISS, *supra* note 12. *See* text accompanying notes 11 & 12 *supra*.

121. *See* FIGURE 1, p. 20 *infra*, for the assigned classifications and the location of testing stations.

water quality parameters,¹²² but only the principal parameters will be discussed here. The river system and test stations are shown on the map in *Figure 1*.

There was no significant heat input into the river systems studied. Thus the measured temperature changes were the response of the flowing stream to changes in the ambient weather.¹²³ Consequently there was no violation of the standard for this parameter, which is fixed at a maximum of 5 degrees Fahrenheit above the natural water temperature.¹²⁴

There is no standard in effect in North Carolina relating to suspended sediment and turbidity except the general statement that only those amounts of floating solids, settleable solids and sludge deposits are permitted which will not impair the best usage established for the particular classification involved.¹²⁵ The Committee on Water Quality Criteria of the Department of Interior recommended in 1968, however, that in order to protect fish and other aquatic life, turbidity in receiving-water due to a discharge should not exceed 50 Jackson turbidity units (JTU) in warm water streams.¹²⁶ The data compiled in the Weiss report shows that *average* turbidity over the four year period was 53.4 JTU at New Hope testing station number 4 and 55.3 JTU at New Hope testing station number 5.¹²⁷ The central 75-percentile range, describing the data that represents 75 percent of the samples centered on the median value of the distribution curve described by all the samples from the 16 stations, showed turbidity in excess of 50 JTU with respect to all but four of the testing stations.¹²⁸ Two of the testing stations showing little or no turbidity were on streams used for control purposes since they receive no direct pollution.¹²⁹ These two streams, White Oak Creek and Beaver Creek, are classified *D*, while the New Hope River itself, although its turbidity is much greater, is classified *C*.

In North Carolina the minimum permissible dissolved oxygen content of class *A-II*, class *B* and class *C* waters is 4.0 mg./l. (milligrams per liter); the minimum for class *D* is 3.0 mg./l.¹³⁰ The central 75-

122. C. WEISS, *supra* note 12, at 5-10. The parameters were: temperature, filtered residue, turbidity, electrical conductivity, dissolved oxygen (mg./l.), dissolved oxygen (percent saturation), 5-day biochemical oxygen demand (BOD₅), total nitrogen, organic nitrogen, the chemicals NH₃-N, NO₂-N, NO₃-N, total phosphorous, total inorganic phosphorous, soluble orthophosphate, chlorophyll, acidity (pH), total coliform and fecal streptococci.

123. *Id.* at 13.

124. N.C. RULES, *supra* note 68.

125. *Id.*

126. WATER QUALITY CRITERIA, *supra* note 69, at 47.

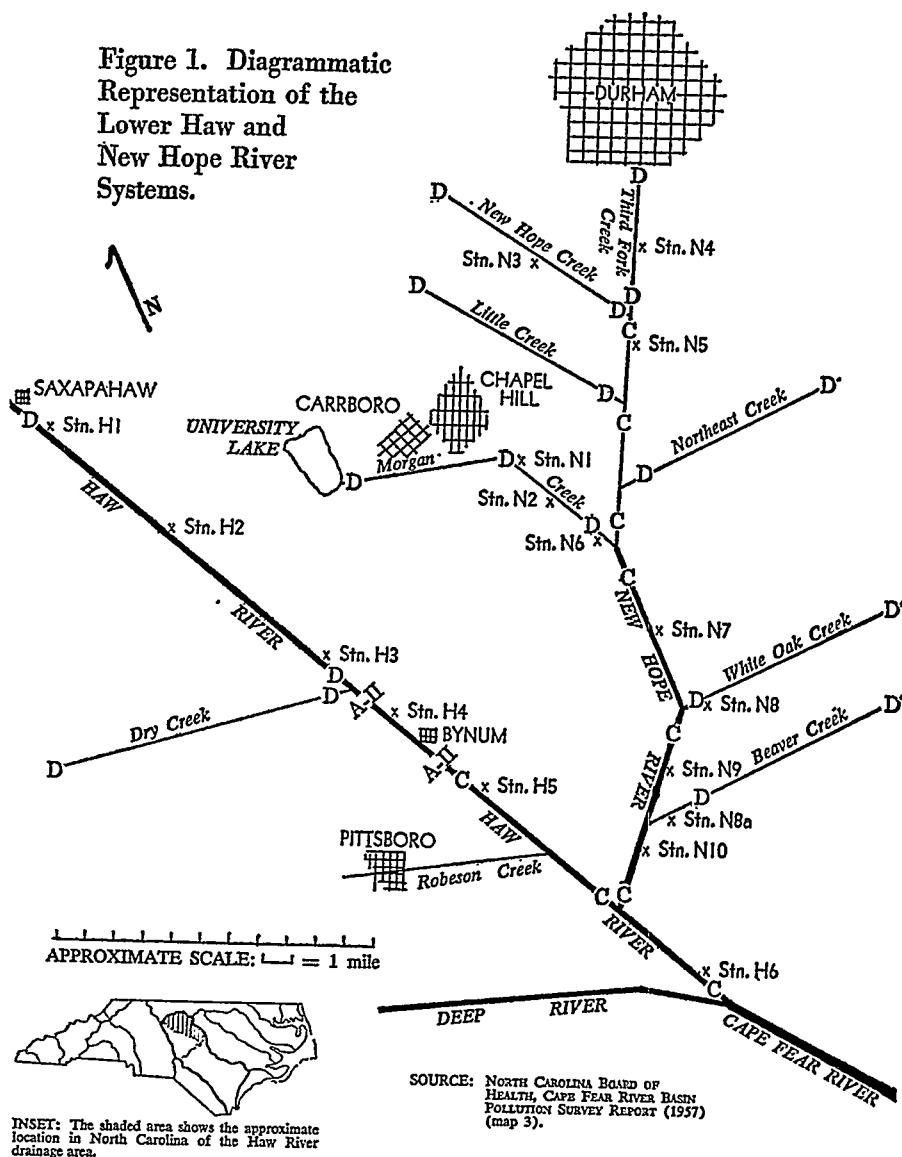
127. C. WEISS, *supra* note 12, at 123.

128. *Id.*

129. *Id.* at 7.

130. N.C. RULES, *supra* note 68.

Figure 1. Diagrammatic Representation of the Lower Haw and New Hope River Systems.



EXPLANATION:

Stn. H1: Weiss test stations. Different number sequences are used for the New Hope (N) and Haw (H) River systems. The North Carolina test stations are not shown.

"C"—Letters on streams: Represents the use classification in effect at the time of the Weiss study (1966-70). The classification *supra* covers the portion of that stream between identical letters. See text & notes 48-63 *supra*.

Pollution sources: The townsites indicate most of the point-source pollution in the river system.

percentile range of the samples analyzed over the 4-year period by Professor Weiss showed that this standard was consistently infringed at eight of the 16 testing stations.¹³¹ Again the results showed that many of the *D* streams had a higher dissolved oxygen content than the *C* streams.

Biological processes as well as many of man's activities produce wastes containing abundant amounts of plant nutrients such as nitrogen and phosphorus. In many habitats an abundance of these nutrients will cause degradation of water quality through eutrophication, a process characterized by a "bloom" of biological activity, of algal and bacteria growth.¹³² The North Carolina stream standards are devoid of specific criteria for plant nutrients. Allowable amounts for nutrient concentrations in surface waters vary with the particular local conditions, but in general it is believed that a desirable guideline is 0.1 mg./l. for rivers. A good guideline for the nitrogen-phosphorous ratio in natural waters is 10:1.¹³³ The study of the New Hope and Haw Rivers by Professor Weiss showed that total concentrations of plant nutrients were more than 10 times the acceptable value for the avoidance of excessive algal growth.¹³⁴ Again, streams designated *D* were of higher quality than *C* water.¹³⁵

Acidity and alkalinity are measured by *pH* which is a measure of hydrogen ion activity.¹³⁶ In North Carolina the stream standards provide for the maintenance of a *pH* that is normal for the area, generally ranging from 6.0 to 8.5.¹³⁷ The central 75-percentile range of the samples tested by Professor Weiss showed consistent violation of this standard at only one of the testing stations; in general, the *pH* range was normal on the Haw and New Hope Rivers.¹³⁸

Testing for the presence of index organisms such as coliform bacteria and fecal streptococci is used to determine the probable presence of human fecal wastes and to establish guidelines for various human uses for water. It is impossible to compare the data compiled by the study to the North Carolina standards, since the standards require more frequent testing than that done by Professor Weiss.¹³⁹ There is a high probability, however, that the standards for coliform bacteria were be-

131. C. WEISS, *supra* note 12, at 125.

132. WATER QUALITY CRITERIA, *supra* note 69, at 53.

133. *Id.* These guidelines are apparently accepted in North Carolina since the "values" recommended in WATER QUALITY CRITERIA, *supra* note 69, are incorporated by reference in the North Carolina rules. See N.C. RULES, *supra* note 68, at 6.

134. C. WEISS, *supra* note 12, at 58.

135. See FIGURE 1, p. 20 *supra*; C. WEISS, *supra* note 12, at 128, 133.

136. WATER QUALITY CRITERIA, *supra* note 69, at 40. In this system, a *pH* of 7.0 is neutral, below 7.0 is acidic, and from 7.1 to 14.0 is alkaline or basic.

137. N.C. RULES, *supra* note 68.

138. C. WEISS, *supra* note 12, at 137.

139. N.C. RULES, *supra* note 68. The North Carolina stream standards are based on five consecutive water samples during a 30-day period. Professor Weiss did not test with this frequency; neither does the state. See text accompanying note 95 *supra*.

ing consistently violated at several of the test stations.¹⁴⁰

Comparing Professor Weiss's data with the stream standards in effect in North Carolina compels the general conclusion that the state law of pollution control is not effectively enforced. In addition, several more specific observations can be made. First, the water quality criteria and stream standards in effect are deficient in that specific criteria have not been adopted for many actual water quality problems. Not only have plant nutrients and turbidity problems been ignored, but no specific toxic materials standards have been adopted.¹⁴¹ Second, many of the surface waters studied were of significantly lower quality than the minimum standards required by law. State officials either did not know of such violations or could not or would not act to correct the situation.¹⁴²

Nondegradation Policy

Paradoxically, many of the surface waters in the rivers systems under study, especially small feeder streams, had actual water quality characteristics greatly exceeding the minimums specified by law. This indicates that the stream standards and classification system in North Carolina is out of harmony with existing conditions, and raises the issue of the need for a nondegradation policy which would require all waters to be maintained at least at their existing level of quality even though they had been given a lower water quality classification. In the absence of a nondegradation policy, a polluter would be free to degrade the stream to the minimum standards of the classification.¹⁴³

On October 13, 1970, a nondegradation regulation became effective in North Carolina.¹⁴⁴ The new regulation provides that waters with existing quality better than the established classification will be maintained at that existing high quality. Notwithstanding this policy, the State Board of Water and Air Resources can approve a project or development that would constitute a new or increased discharge into high-quality water, but only if it has been affirmatively demonstrated that a change is justifiable to provide necessary economic and social

140. Very high coliform bacteria counts were consistently recorded by Professor Weiss at several of the testing stations. C. WEISS, *supra* note 12, at 138.

141. Toxic substances are present; small amounts of lead, zinc, copper and chromium have been found in two samples drawn from the Haw River. FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, *supra* note 71, at 10.

142. See text accompanying notes 95-107 *supra*.

143. Only a permit would be required under state law. N.C. GEN. STAT. § 143-215.1(a) (Supp. 1971).

144. N.C. RULES, *supra* note 68. This issue had been a source of disagreement between federal and state authorities in North Carolina and elsewhere. Interview with D.L. Coburn, *supra* note 55. One of the exceptions taken to North Carolina's stream classification and standards system by the Department of the Interior under authority of the Water Quality Act of 1965 was that no nondegradation policy had been adopted by the state.

development.¹⁴⁵ The weakness of this regulation is obvious. State authorities may still, without public hearings, quietly issue permits which have the effect of lowering existing water quality levels. At a minimum, this nondegradation policy should be supplemented by reclassifying upward all streams presently under-classified so that their new classification would approximately coincide with existing water quality. If this were done, degradation of these streams would be permitted only by reclassifying them downward, which could occur only after notice and a public hearing.¹⁴⁶ This would more adequately safeguard the public interest and the quality of the streams.

THE REFUSE ACT PERMIT PROGRAM

The Nixon administration, unwilling to await new congressional legislation before attacking the water pollution problem, activated the Refuse Act of 1899¹⁴⁷ and made it the primary federal tool for the control of industrial pollution. It is unnecessary to deal exhaustively with the Refuse Act in this article since this has already been done in several excellent studies.¹⁴⁸ It is sufficient to examine its potential for dealing with pollution of the nation's intrastate streams, such as the Haw and New Hope Rivers.

The Refuse Act is striking in its simplicity. It prohibits the discharge or deposit of any refuse into the navigable waters of the United States or their tributaries,¹⁴⁹ with the sole exception of refuse "flowing from streets and sewers and passing therefrom in a liquid state," which has generally been interpreted to mean discharges from municipal sewers.¹⁵⁰ "Refuse" has been broadly construed as including commercially valuable gasoline,¹⁵¹ suspended solids,¹⁵² and even thermal discharges.¹⁵³ Criminal penalties, injunctive relief, declaratory relief and civil damages are available under the Act,¹⁵⁴ which is enforced by the

145. N.C. RULES, *supra* note 68.

146. N.C. GEN. STAT. § 143-214.1(e) (Supp. 1971).

147. 33 U.S.C. §§ 407, 408-409, 411-415, 418 (1970).

148. See Eames, *The Refuse Act of 1899: Its Scope and Role in Control of Water Pollution*, 1 *ECOLOGY L.Q.* 173 (1971); Hildreth, *Federal Control of Water Pollution: The Refuse Act Permit Program*, 27 *BUS. LAW.* 567 (1972); Rodgers, *supra* note 35; Tripp & Hall, *Federal Enforcement under the Refuse Act of 1899*, 35 *ALB. L. REV.* 60 (1970); Note, *The Refuse Act of 1899: New Tasks for An Old Law*, 22 *HAST. L.J.* 782 (1971); Note, *The Refuse Act: Its Role Within the Scheme of Federal Water Quality Legislation*, 46 *N.Y.U.L. REV.* 304 (1971).

149. 33 U.S.C. § 407 (1970).

150. It is not entirely clear whether all discharges from municipal sewers are exempt. See Tripp & Hall, *supra* note 148, at 67-73.

151. *United States v. Standard Oil Co.*, 384 U.S. 224 (1966).

152. *United States v. Republic Steel Corp.*, 362 U.S. 482 (1960). See *United States v. City of Asbury Park*, 40 U.S.L.W. 2571 (D.N.J. Feb. 17, 1972) (sludge resulting from sewage treatment is not sewage "in a liquid state" and not subject to exception).

153. The new permit program will be applied to heat discharges. See *Permits for Discharges or Deposits into Navigable Waters*, 36 *Fed. Reg.* 6564, 6565 (1971) (to be codified at 33 C.F.R. § 209.131(d)(1)).

154. For an excellent discussion of these remedies see Note, *N.Y.U.L. REV.*, *supra* note 148, at 311-14.

Department of Justice.¹⁵⁵ There are also several theories under which private citizens may play an enforcement role.¹⁵⁶

The focus of attention in recent months, however, has been that section of the Act which gives the U.S. Army Corps of Engineers power to permit the deposit of refuse which would otherwise be in violation of the Act.¹⁵⁷ No permit program¹⁵⁸ was ever instituted under the Refuse Act until December 23, 1970, when President Nixon issued Executive Order No. 11,574,¹⁵⁹ initiating a permit program to regulate discharges from new and existing sources. Since the permit program is separate from both the FWPCA and state pollution control laws and could conflict with the programs already in effect under those laws, an attempt was made through the issuance of regulations to integrate the Refuse Act into the FWPCA and state programs. Most of the regulations have been published in final form¹⁶⁰ and the outlines of the new program are now fairly clear, although its validity with reference to nonnavigable streams is now in question.¹⁶¹

To obtain a permit, application must be made both to the Corps of Engineers, on a form provided by them,¹⁶² and to the state water pollution control agency.¹⁶³ Before receiving his federal permit, the applicant must provide the Corps of Engineers with certification from the appropriate state agency¹⁶⁴ that there will be no violation of applicable state water quality standards.¹⁶⁵ The state must act upon the application within one year, or the certification requirement is

155. 33 U.S.C. § 413 (1970).

156. For a good discussion of the Refuse Act and citizen actions see Note, N.Y.U.L. Rev., *supra* note 148, at 342-51.

157. 33 U.S.C. § 407 (1970).

158. A few permits were, however, issued sporadically by the Corps. See Note, N.Y.U.L. Rev., *supra* note 148, at 327.

159. Exec. Order No. 11,574, 3 C.F.R. 188 (1971). See note 161 *infra*.

160. *Id.*; Permits for Discharges or Deposits into Navigable Waters, 36 Fed. Reg. 6564, 6565 (1971) (to be codified at 33 C.F.R. § 209.131(d) (1)); Memorandum of Understanding between the Secretary of the Army and the Administrator of the Environmental Protection Agency Concerning the Enforcement of and Investigation under the Refuse Act, 36 Fed. Reg. 3074 (1971); Regulations Concerning State Certification of Activities Requiring a Federal License or Permit, 36 Fed. Reg. 8563 (1971); Form and Conditions of Permit, 36 Fed. Reg. 13,835 (1971).

161. On December 22, 1971, District Judge Aubrey E. Robenson held that no permits could be issued for non-navigable waters and that an impact statement, see 42 U.S.C. § 4332(2)(C) (1970), detailing the effect of the discharge on water quality must be filed with each application. *Kalur v. Resor*, 335 F. Supp. 1 (D.D.C. 1971). The United States Army Corps of Engineers declared a moratorium on the issuance of all permits following the decision. Applications were still being processed, however, 40 U.S.L.W. 1098. A notice of appeal has been filed by the government. No. —, (D.C. Cir. — 1972), 2 BNA ENV. REP., CURRENT DEV'S 1229 (Feb. 11, 1972).

162. Application forms and instruction booklets are available at the District Offices of the Corps.

163. 33 U.S.C. § 1171(b) (1970).

164. *Id.*

165. See 36 Fed. Reg. 8563 (1971).

waived.¹⁶⁶ If state certification is denied, no permit will be issued by the Corps.¹⁶⁷ If certification is granted, the appropriate district engineer of the Corps will send the application to the regional office of the Environmental Protection Agency (EPA) which has primary responsibility for review and issuance of the permit.¹⁶⁸ The review of the Corps is limited to the effect on anchorage, navigation, and fish and wildlife resources.¹⁶⁹ The Corps must seek opinions regarding the effect of a discharge on fish and wildlife from the Department of Interior and the National Atmospheric and Oceanic Administration of the Department of Commerce.¹⁷⁰

The new permit program can best be evaluated in the context of its application to the Haw and New Hope Rivers. The obvious and incredible effect of the new regulations is to subject any discharge into either of these streams to a double review by state officials—the certification as well as the state law permit process—and to review by officials of the U.S. Army, Department of Interior, Department of Commerce and the EPA. Perhaps we should all rest easier with the knowledge that our waters are being watched over by such a multiplicity of bureaucracies; on the other hand, it is possible that we have created another procedure so cumbersome that it makes the enforcement provisions of the FWPCA look straightforward by comparison. A potentially simple procedure has been transformed into a program of bewildering complexity. One cannot read the mess of applicable regulations without being startled by the multiplicity of concepts, details and procedures which they contain.¹⁷¹

The Refuse Act permit program is, of course, a monument to the failure of the tradition of primary state control over water pollution and to the weaknesses of the FWPCA. It is not really a new departure; instead, it is federalization of the old regulatory approach. EPA has the primary federal responsibility, but the regulations do not provide guidance as to when EPA will override state certification. EPA has announced a policy of deferring to the states, especially with respect to intrastate waters, raising the spectre of another ineffective program.¹⁷² Paradoxically, the permit program actually weakens the pol-

166. 33 U.S.C. § 1171(b) (1970).

167. 36 Fed. Reg. 6566 (1971) (to be codified at 33 C.F.R. § 209.131(d)(11)(i)).

168. *Id.* (to be codified at 33 C.F.R. § 209.131(d)(7) & (8)).

169. *Id.* (to be codified at 33 C.F.R. § 209.131(d)(9)).

170. *Id.* at 6565 (to be codified at 33 C.F.R. § 209.131(c)(3)).

171. Perhaps what is needed is an application of "Ockham's Razor," the principle developed in the 14th century by William of Ockham, which holds that one should not employ a plurality of concepts without necessity. See E. GILSON, *THE SPIRIT OF MEDIEVAL PHILOSOPHY* (1936).

172. For the view that EPA takes regarding its role in the new program see *Answers of the Environmental Protection Agency Regarding the Refuse Act Permit*

lution control powers of the federal government. This stems from EPA's announcement that it will rely on state-set standards and only attempt to fill the interstices of the standards.¹⁷³ The Refuse Act, which was formerly independent of the vagaries and weaknesses of state-set standards for inter- and intrastate waters, has now been tamed and made subject to those standards and all their attendant weaknesses.¹⁷⁴

The state certification requirement duplicates state permit programs already in effect in North Carolina and most other states,¹⁷⁵ and there is a danger that the EPA review will only constitute yet another duplication. This situation is generating animosity between federal and state officials.¹⁷⁶ Moreover, the possibility of inter-agency and federal-state conflict has not been eliminated by the new regulations. Effluent limitations set by EPA may conflict with those set by state authorities, and the different federal agencies involved may have divergent views on what limits should be set, resulting in delay and nonenforcement of the Refuse Act requirements. The administration of the permit program has proved to be more difficult than was originally anticipated:¹⁷⁷ no adequate national water quality monitoring system presently exists,¹⁷⁸ and it is estimated that over 300,000 permit applications will have to be processed under the program.¹⁷⁹

Perhaps the major positive aspect of the Refuse Act permit program is that the Corps of Engineers application form requires effluent monitoring and reporting of the character of the discharge.¹⁸⁰ If this aspect of the program is developed to require continuous monitoring and full disclosure, including strengths and quantities, of all substances being discharged, adequate knowledge would be available for the first time concerning the industrial wastes now threatening the nation's waterways. Such knowledge is critically needed. Furthermore, the information regarding the character of industrial discharges would be

Program, 1 BNA ENV. REP. CURR. DEV'S 1123 (Feb. 12, 1971). See also the discussion in Note, N.Y.U.L. REV., *supra* note 148, at 339-42.

173. See *Answers of the EPA*, *supra* note 172, at 1124.

174. See text accompanying notes 48-146 *supra*, for a discussion of those standards and their weaknesses.

175. On their own initiative, 44 states have adopted intrastate water quality standards. S. REP. NO. 92-414, 92d Cong., 1st Sess. 4 (1971). The permit procedure is a typical tool used by states to enforce their standards. See Hines, *Nor Any Drop to Drink: Public Regulation of Water Quality, Part I: State Pollution Control Programs*, 52 IOWA L. REV. 186, 230-31 (1966).

176. 2 BNA ENV. REP. CURR. DEV'S, *supra* note 2.

177. Many permit applications will take years to process. See 2 BNA ENV. REP. CURR. DEV'S 795 (Nov. 5, 1971).

178. Rodgers, *supra* note 35, at 764.

179. S. REP. NO. 92-414, 92d Cong., 1st Sess. 5 (1971). This estimate was made before the decision in *Kalur v. Resor*, 335 F. Supp. 1 (D.D.C. 1971), which held that no permits may be issued for non-navigable waters. See note 161 *supra*.

180. 36 Fed. Reg. 6567 (1971) (to be codified at 33 C.F.R. § 209.131(g)(1)).

available to the public,¹⁸¹ providing the basis for increased public participation in water pollution control.

THE PROPOSED FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS

The obvious weaknesses of the existing federal-state regulatory model of water pollution control have not gone unnoticed by Congress. The proposed Federal Water Pollution Control Act Amendments¹⁸² would greatly change the approach and represent another effort to create a viable water pollution control program on the national level. The sponsors of the amendments envision that they would eventually supersede the Refuse Act program; the latter would be phased out as the amendments are phased in.¹⁸³ The amendments passed by the Senate provide as a matter of policy that the discharge of pollutants into the navigable waters of the United States would not be a right, and that such discharges should be totally eliminated by 1985.¹⁸⁴ Control of discharges would be accomplished not by setting receiving-water standards as under the present provisions of the FWPCA, but by application of federally established effluent limitations¹⁸⁵ under a two phase program. By the end of phase I on January 1, 1976, all point sources of pollution, except publicly owned treatment works, would be required to have in use the best practicable treatment technology or, if the effluent is discharged into publicly owned treatment works, meet national pretreatment standards set by the EPA.¹⁸⁶ Publicly owned treatment works would be required to utilize secondary treatment either by January 1, 1976, or within four years of the date construction was started on any federal grant project begun prior to June 30, 1974, the date by which all communities would be required to have approved

181. 2 BNA ENV. REP. CURR. DEV'S 303 (Aug. 13, 1971).

182. S. 2770, 92d Cong., 1st Sess. (1971). This bill has been passed by the United States Senate. See note 4 *supra*. A water pollution bill, H.R. 11896, has also been approved by the House of Representatives. 118 CONG. REC. H2774 (daily ed. Mar. 29, 1972). At this writing the actual language of the House bill is unavailable, but it adopts the same general approach as S. 2770. It adopts a more conservative view, however, regarding attainment of the goals of elimination of all discharges of pollutants into U.S. waters by 1985 and the achievement of water quality to provide for the protection of wildlife and recreation by 1981. Before such goals are to be carried out, the House bill would require the National Academy of Sciences to conduct a comprehensive study of the economic, social and environmental costs and benefits. The goals would then be evaluated by Congress in the light of the study. 2 BNA ENV. REP. CURR. DEV'S 1025 (Dec. 24, 1971).

As this issue went to press, the House and Senate versions were in the hands of a conference committee. Because of the substantial differences between them on several points, early agreement is not expected.

183. 117 CONG. REC. 17,445 (daily ed. Nov. 2, 1971) (remarks of Senator Muskie).

184. S. 2770, 92d Cong., 1st Sess. § 101 (1971).

185. *Id.* § 301.

186. *Id.* § 301(b)(1)(A).

secondary treatment construction programs.¹⁸⁷ By the end of phase II on January 1, 1981, point sources of pollution, other than publicly owned treatment works, would be required to eliminate the discharge of pollutants, unless this were not attainable at a reasonable cost. If such a showing is made, an effluent limit would be prescribed based on the best available technology as defined by the federal administrator.¹⁸⁸ Furthermore, the amendments would give the federal administrator the authority to establish standards of performance governing all new sources of water pollution¹⁸⁹ and would require him to set effluent limits for toxic pollutants.¹⁹⁰

The amendments would authorize the federal administrator to issue a permit for the discharge of pollutants into the navigable waters of the United States if the applicable effluent limitations and standards of performance were met.¹⁹¹ A state could also create a permit system under guidelines established by the federal administrator which, if the state program were approved by the administrator, could function in lieu of the federal program. The federal administrator would, however, retain authority over the state program and could reinstitute federal control in the event the state program did not function properly.¹⁹² The enforcement powers of the federal government would be concurrent with those of the states. The cumbersome conference-hearing-court action procedure would be completely eliminated.¹⁹³ Upon discovery of a violation of any effluent limitation, the EPA would be required to provide notice to the polluter and the state and, if state enforcement action were not initiated within 30 days, issue an order requiring compliance or bring a civil suit against the polluter.¹⁹⁴

187. *Id.* § 301(b)(1)(B).

188. *Id.* § 301(b)(2)(A). An even more restrictive effluent limit could be set by the federal administrator if necessary to achieve a level of water quality which assured the protection of public water supplies, the propagation of fish, and recreational activities. *Id.* § 302(a).

189. *Id.* § 306. "Standard of performance" would be defined as "a standard for the control of pollutants which reflects the greatest degree of effluent reduction which the administrator determines to be achievable through application of the best available control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants." *Id.* § 306(a)(1). "New source" would be defined as "any source, the construction or modification of which is commenced after the publication of regulations (or, if earlier, proposed regulations) prescribing a standard of performance under this section which will be applicable to such source." *Id.* § 306(a)(2).

190. *Id.* § 307.

191. *Id.* § 402. Any applicant for a federal permit or license which could result in a discharge into navigable waters would still be required to obtain a state certification that the discharge would comply with applicable state water quality standards. *Id.* § 401(a)(1).

192. *Id.* § 402. The federal administrator would have veto power over permits issued by the states. *Id.* § 402(d)(1) & (2). This is one of the most controversial aspects of the legislation. See N.Y. Times, Nov. 8, 1971, § 1, at 1, col. 4.

193. See text and notes 19-25 *supra*.

194. S. 2770, 92d Cong. 1st Sess. § 309 (1971).

Other important changes would be wrought by the amendments. Provision would be made for expanded research and development programs to develop the technology necessary to comply with the new effluent limitations.¹⁹⁵ Regional planning for waste treatment management would be required, and such plans would have to include provisions for controlling non-point sources of pollution such as agriculture, mine waters, construction sediment and salt water intrusion.¹⁹⁶ The federal construction assistance program for municipal waste treatment facilities would be continued and integrated into the effluent-control program.¹⁹⁷ A national water quality inventory would be instituted,¹⁹⁸ and the owner or operator of any effluent source would be required to install and maintain pollution monitoring equipment and disclose the effluents discharged.¹⁹⁹ Public participation in the program would be encouraged in the establishment of control requirements and by allowing citizen suits against violators and the federal administrator.²⁰⁰

This new proposed federal program for the control of water pollution has been criticized for taking away from the states their traditional role as the primary governmental authority responsible for water pollution control.²⁰¹ The amendments give EPA and the federal administrator great powers; they would be granted the authority to set federal effluent limits, to institute a federal permit program, to veto state permits and to take action against a polluter if the state failed to act. Such federal powers are necessary, however, in light of the past failures of the states to enforce viable water pollution control programs.²⁰² The new program would be much stronger and more effective than either the Refuse Act permit system or the federal-state pattern created by the FWPCA. Unlike the FWPCA, it would not rely on unenforceable receiving-water standards and cumbersome procedures, and unlike the Refuse Act, it would not defer to state-set standards. It is unlikely, however, to provide the final answer to the problem of water pollution. The EPA and the federal administrator may be unable to bear the enormous burden of standard-setting and enforcement thrust

195. *Id.* § 304.

196. *Id.* § 209.

197. *Id.* § 204. Applicants for federal construction grant assistance must demonstrate that treatment works conform to applicable river basin and other plans, and a commitment must be obtained from each industrial user that it will repay to the federal government that portion of the federal grant allocable to the user's wastes. User charges must also be made so that all categories of users will pay their share of the operating costs. *Id.* § 204(a) & (b).

198. *Id.* § 305.

199. *Id.* § 308.

200. *Id.* § 505.

201. This criticism has been made by the Nixon administration. See N.Y. Times, Nov. 8, 1971, § 1, at 1, col. 4.

202. See text & notes 141-46 *supra*.

upon them by the amendments. Despite the expanded federal role, ultimate responsibility for enforcement would remain with the states.²⁰³ In light of past experience under the FWPCA, it is questionable whether the states would be equal to the task. Furthermore, the proposed program would largely continue the traditional, overly-narrow approach of considering water pollution as an isolated environmental problem separate from questions of land use, air pollution control, and solid waste disposal.

ALTERNATIVE APPROACHES TO WATER POLLUTION CONTROL

The regulation model has dominated efforts to find a solution to the problem of water pollution. Remedies for defects in the existing programs have been sought by prescribing larger and stronger doses of the same medicine, resulting in the creation of a new form of pollution, law and agency pollution. Clearly there is a need for alternatives to the regulation model. The principal alternatives are citizen actions, tax incentives and subsidies, effluent charges, and regional planning agencies. These will be discussed and evaluated in turn.

Citizen Actions

Since much has already been written concerning the private action as a means of pollution control,²⁰⁴ this section will merely summarize some of the principal ideas involved. Traditional causes of action, such as nuisance, trespass, invasion of riparian rights, and mandamus, have been examined in detail and found wanting in many respects.²⁰⁵ This has resulted in a search for new theories and concepts. The doctrine of standing²⁰⁶ and the public trust concept²⁰⁷ have been signif-

203. Despite the fact that the federal administrator would have veto power over state enforcement, it is intended that the program be administered by the states after a period of transition. S. REP. NO. 92-414, 92d Cong., 1st Sess. 71 (1971).

204. See Hines, *supra* note 175, at 196-201; Katz, *The Function of Tort Liability in Technology Assessment*, 38 U. CINN. L. REV. 587 (1969); Note, *Private Remedies For Water Pollution*, 70 COLUM. L. REV. 734 (1970); Comment, *Water Quality Standards in Private Nuisance Actions*, 79 YALE L.J. 102 (1969). For a discussion of means for handling such problems, see generally Symposium, *The Practice of Public Interest Law*, 13 ARIZ. L. REV. 797, 818, 828, 909 (1971).

205. Note, COLUM. L. REV., *supra* note 204; Comment, *Equity and the Eco-System: Can Injunction Clear the Air?*, 68 MICH. L. REV. 1254 (1970).

206. For the most recent discussion of this doctrine by the United States Supreme Court, see *Data Processing Service v. Camp*, 397 U.S. 150, 152-53 (1970). A notable new state law which expands the enforceable legal interests of private citizens is the Michigan Environmental Protection Act of 1970. MICH. COMP. LAWS §§ 691.1201 to .1207 (Supp. 1970), discussed, Note, *Michigan Environmental Protection Act of 1970*, 4 J. LAW REF. 121. (1970). For other developments in state and especially federal law see Davis, *The Liberalized Law of Standing*, 37 U. CHI. L. REV. 450 (1970); Note, *Standing of Conservation Organizations to Challenge Federal Administrative Action in Federal Court*, 12 B.C. IND. & COM. L. REV. 637 (1971).

207. See Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 473 (1970).

icantly developed, attempts have been made to assert a constitutional right to a clean environment,²⁰⁸ and The National Environmental Policy Act²⁰⁹ has been analyzed for its potential for individual causes of action.²¹⁰ Citizen rights to sue have also been inserted into federal pollution control statutes,²¹¹ and the Refuse Act has been the basis of citizen activity.²¹²

Although citizen suits have had a significant impact on the effort of pollution abatement and their role is not to be minimized,²¹³ it is undeniably true that they can never play more than a supplementary role in pollution control. The problem is too vast and complex and the courts are unsuited for the role of primary pollution abatement authorities. The focus of the individual lawsuit is too narrow and the rules of evidence are too constricting.²¹⁴ In addition, many judges lack the scientific and economic expertise necessary to decide such complex cases.²¹⁵ On the other hand, the courts have an important and complementary role to play. Especially useful is a court's power to enjoin agency action and place a moratorium on the issuance of a permit, license or construction project pending additional investigation of alternatives and the gathering of more facts.²¹⁶

Tax Incentives and Subsidies

Tax incentives usually take the form of authorization of an accelerated depreciation allowance, amortization or a tax credit.²¹⁷ Subsidies involve direct or indirect government loans or grants as an inducement for waste abatement. The inadequacies of these measures

208. See Comment, *Toward a Constitutionally Protected Environment*, 56 VA. L. REV. 458 (1970).

209. 42 U.S.C. §§ 4321 *et seq.* (1970).

210. Donovan, *The Federal Government and Environmental Control: Administrative Reform on the Executive Level*, 12 B.C. IND. & COM. L. REV. 541, 557-63 (1971).

211. The Clean Air Amendments of 1970 authorize private citizens to bring suits on their own behalf in federal court to force compliance with air quality and emission standards. 42 U.S.C. § 1857h-2 (1970). A similar provision is contained in the proposed Federal Water Pollution Control Act Amendments. S. 2770, 92d Cong., 1st Sess. § 505 (1971).

212. Note, N.Y.U.L. REV., *supra* note 148.

213. See *Kalur v. Resor*, 335 F. Supp. 1 (D.D.C. 1971). For a discussion of litigation problems in interstate pollution cases, see Woods, Jr. & Reed, *The Supreme Court and Interstate Environmental Quality: Some Notes on the Wyandotte Case*, 12 ARIZ. L. REV. 691 (1970).

214. Cf. Note, *Interdisciplinary Collaboration in Public Interest Law*, 13 ARIZ. L. REV. 909, 915, 923-32 (1971).

215. See Krier, *The Pollution Problem and Legal Institutions: A Conceptual Overview*, 18 U.C.L.A.L. REV. 429, 452-59 (1971).

216. For a recent case employing this technique see *Environmental Defense Fund v. Corps of Engineers*, 325 F. Supp. 749 (E.D. Ark. 1971). See also *Kalur v. Resor*, 335 F. Supp. 1 (D.D.C. 1971); *Scenic Hudson Pres. Conf. v. F.P.C.*, 354 F.2d 608 (2d Cir. 1965).

217. See, e.g., INT. REV. CODE of 1954, § 169, providing for amortization of pollution-control facilities over a four year period.

are well-known and have been discussed extensively elsewhere.²¹⁸ Tax incentives alone are usually ineffective because, no matter how large a portion of the total cost is compensated, the expenditure of money for pollution control equipment still involves a net loss attributable to the uncompensated portion of the investment cost, the annual operating costs, and the nonproductive nature of the equipment which precludes a return on the investment. Even if used in conjunction with administrative standards, tax incentives may produce undesirable results since they favor waste treatment, when other methods, such as manufacturing process changes, may be more efficient in abating the pollution.²¹⁹ The same arguments apply to government loans and grants.²²⁰

An important indirect subsidy of industrial waste treatment is provided by municipal treatment plants which process large quantities of industrial waste. Municipal sewer service charges are usually levied as a fixed percentage of the water charge, which in turn is based either on historical costs or the average cost of service as determined by metering, and, therefore, bear very little relationship to the full marginal costs of the waste abatement services they provide.²²¹ A few cities have instituted sewer surcharges, but even these have been shown to be grossly inadequate.²²² This system constitutes an indirect subsidy to industry, distorts the free market system for the allocation of resources, and reduces the incentive to engage in pollution abatement practices.²²³

Effluent Charges

Economists have been the most vociferous advocates proposing a system of effluent charges as a solution to water and other pollution problems. The concept holds that there is a divergence between the social costs and the enterprise costs of many human activities. The enterprise costs are those costs actually borne by the person engaging in an activity and included in his cost-benefit calculation of the worth of engaging in that activity. The social costs of the activity, known as "external" costs or diseconomies, are those which are shifted to

218. See especially Hines, *supra* note 5, at 594-604; Krier, *supra* note 215, at 467-70; Roberts, *River Basin Authorities: A National Solution to Water Pollution*, 83 HARV. L. REV. 1527 (1970); Note, *Economic Incentives for Pollution Abatement: Applying Theory to Practice*, 12 ARIZ. L. REV. 511 (1970).

219. Roberts, *supra* note 218, at 1533-36.

220. *Id.* at 1538.

221. *Id.*

222. *Id.* See also Ethridge, *Water and Sewer Charges: Their General Nature and Effect*, in PROCEEDINGS, WORKSHOP ON WATER AND SEWER CHARGES AS RELATED TO WATER USE AND WASTE CONTROL 5 (N.C. Water Resources Res. Inst. 1968).

223. Delogu, *Effluent Charges: A Method of Enforcing Stream Standards*, 19 ME. L. REV. 29, 40 (1967).

others and ignored by the person conducting the activity. Damage to the community from the production of waste is one example of a social or external cost. As Professor Katz has stated, whether a cost is a social or enterprise cost is determined in the final analysis by the legal order.²²⁴ The imposition of an effluent charge is a mechanism by which external costs may be internalized so that they are borne by the enterpriser and included in his cost-benefit analysis, rather than by the community.²²⁵

The concept of effluent charges has been widely misunderstood, however, especially among government officials and legislators. Some have seen it as a mere tax on pollution; if set too low, it grants a right to pollute, and if set too high, it has the effect of absolutely prohibiting discharges and perhaps the associated activity. The tax concept of effluent charge crudely ignores, of course, the economic reason upon which the idea is based: the internalization of social costs. An extremely high, prohibitive tax, in addition, is inefficient since it disregards the assimilative capacity of the stream and the reciprocal nature of the social cost problem; that is, the idea that the problem should be attacked in terms of which group—the polluters or receptors—will incur the least cost in avoiding the problem.²²⁶

The effluent charge can also be regarded as a supplement to the standards approach; the standards place a ceiling on the level of pollution that will be allowed and the effluent charges are set at a level which will maintain that ceiling.²²⁷ Professor Krier has made the appealing suggestion of an auction model which would eliminate the necessity for government to set the effluent charge level. Stream standards would be set and the assimilative capacity of the stream would be auctioned off as pollution rights. Since such rights would be freely transferable, the optimum allocation of the resource would be attained.²²⁸ The problem with this system, however, is that it subjects the effluent charge system to all the loopholes, vagaries and inconsistencies of the standards system.

Still another proposal for an effluent charge system is to eliminate stream standards and deal with the problem solely in terms of external-

224. Katz, *supra* note 204, at 593.

225. An effluent charge is just one of many possible ways of dealing with the social cost problem. See Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960); Katz, *supra* note 204; Krier, *supra* note 215, at 431-38; Note, *Economic Incentives for Pollution Abatement: Applying Theory to Practice*, 12 ARIZ. L. REV. 511 (1970).

226. Coase, *supra* note 225.

227. This has been tried on a limited basis in Vermont with mixed results. See Comment, *Water Pollution Control in Vermont: A System of Effluent Charges*, 4 J.L. REF. 135 (1970). See also Delogu, *supra* note 223.

228. Krier, *supra* note 215, at 472-73.

ities. Under such a system the effluent charge would be set equal to the social cost of pollution. The harm caused to downstream users would be calculated and translated into an optimum pollution price which would be apportioned among dischargers according to their responsibility for the social cost.²²⁹ The major shortcoming of this proposal is calculating the social cost. Increased treatment costs to downstream users can be calculated with reasonable accuracy, but the loss of aesthetic values and recreational opportunities, and damage to fish and wildlife do not lend themselves to quantification. Other difficulties are presented by the need to consider seasonal and geographic variations, stream conditions of relatively short duration,²³⁰ and the costs of monitoring and administering such a system. Proponents of this scheme offer no solution to these problems but merely dismiss the all-important consideration of price determination as a technical question.²³¹

CONCLUSIONS AND RECOMMENDATIONS

There are three underlying reasons for the failure of the existing laws and regulations for the control of water pollution: over-reliance on standards; the difficulties inherent in the traditional pattern of state-federal cooperation; and overemphasis on agency specialization. The last narrowly views water pollution as a problem distinct and separate from the larger, all-embracing problem of disposing of and recycling all the many forms and kinds of wastes generated by an industrial society.

Present law overemphasizes the traditional regulation model and the standards approach, which is rooted in the philosophy that the best way for the law to deal with any human activity which has both good and bad public consequences is to subject the activity to "standards" which are enforced against the particular entities involved through the issuance of privileges, licenses or permits. Since standards must be flexible and the granting of licenses must be done on an individual basis, regulation usually requires the creation of an administrative agency. This type of governmental response to societal problems can be traced to the earliest days of the republic,²³² and as Professor Reich has shown, Congress has tended to apply this single model to every type of societal problem.²³³ It has great appeal because it appears to avoid

229. Johnson, *An Optimal State Water Law: Fixed Water Rights and Flexible Market Prices*, 57 VA. L. REV. 345, 369-71 (1971).

230. See the criticisms of this system in Roberts, *supra* note 218, at 1554-55.

231. Johnson, *supra* note 229, at 370.

232. W. GELLHORN & C. BYSE, *ADMINISTRATIVE LAW CASES AND COMMENTS* 2 (5th ed. 1970).

233. Reich, *The Law of the Planned Society*, 75 YALE L.J. 1227 (1966).

planning, which some believe to be inconsistent with a free market economy, but ad hoc, unconscious planning is its natural result.²³⁴ Regulation may work well in some areas, but it is not suitable to the solution of environmental problems.

Similarly, the present pattern of federal-state cooperation has not worked well in pollution control. There is an inherent contradiction in the premise that although a problem such as water pollution is a national problem requiring a national policy solution, the states should be primarily responsible for developing and enforcing the national policy.²³⁵ Recent months have witnessed the breakdown of this system, in the form of increasing federalization of the water pollution control program under the authority of the Refuse Act,²³⁶ and the resulting outcry of mutual distrust and recrimination among state and federal officials.²³⁷

Agency specialization in the law of pollution control results from the traditional model for agency action which emphasizes agency independence and expertise above other values. Thus, different aspects of environmental problems have been apportioned among different agencies or at least among entirely separate divisions of the same agency. Programs for air pollution control, water pollution control, pesticide regulation, solid waste disposal and other environmentally related measures are viewed as separate and distinct. There is, of course, some level at which policy coordination is to take place, but it is usually at the cabinet or equivalent level, so that coordination in any practical sense is impossible. As a result, each operating entity is independent and may show disdain and open rivalry toward related agencies. There is absolutely no incentive to treat their area of responsibility as just one aspect of a larger problem, and to respond to the needs and demands of the entire ecosystem.

The pollution authority of the future must be given a mandate that its primary function is to evaluate the quantity and type of wastes which are and will be produced and to plan for the optimum disposal and recycling of those wastes. Professor Roberts has embodied this approach in a proposal for the creation of river basin authorities, each of which would be responsible for integrated water quality planning and treatment plant operation in its region.²³⁸ The standards approach

234. *Id.*

235. Cf. 33 U.S.C. § 1151(a) & (b) (1970); Woods, Jr. & Reed, *The Supreme Court and Interstate Environmental Quality: Some Notes on the Wyandotte Case*, 12 ARIZ. L. REV. 691, 701-15 (1970).

236. See 33 U.S.C. § 407 (1970); text & notes 19-39, 147-180 *supra*.

237. See 2 BNA ENV. REP. CURR. DEV'S, *supra* note 2.

238. Roberts, *supra* note 218, at 1544.

would be eliminated entirely by requiring all dischargers to join the system and only the authority would have the "right" to pollute.²³⁹ All users of the centralized treatment agency would be charged for all services rendered, thus providing the discharger with an incentive to reduce his discharge through process changes or other techniques. The fee for each discharger could be based on the marginal cost of abating its pollution to the level established by the agency as appropriate in light of local conditions.²⁴⁰ The proposed amendments to the FWPCA utilize this approach to a certain extent by establishing a policy which requires the elimination of pollution discharges by 1985²⁴¹ and that industrial users of public waste treatment works pay their share of the cost of operating and maintaining the treatment works.²⁴² The zero-discharge policy is not, however, self-executing; it is only a statement of policy. Moreover, there are no adequate mechanisms for requiring industries to use public treatment facilities.

Respected scholars have long advocated the formation of political authorities along regional lines.²⁴³ Many regional bodies have been created, but they have not been given sufficient legal powers and tools to displace state and federal decision-making.²⁴⁴ What is needed is the creation of new regional structures with centralized control over matters whose control is presently divided among federal, state and local governments. It is, perhaps, of relatively little importance whether they are state regional agencies, federal-state commissions, federal regional agencies or agencies created by interstate compact.²⁴⁵ Regions should be defined through careful consideration of ecosystems, natural features such as river basins, and the interaction and interdependence of human populations. Each regional authority should be given sufficient power and authority to maintain the ecological integrity of the area. The proposed FWPCA amendments would require a regional approach to waste treatment management which could provide the basis for the creation of strong regional authorities. This legislation would require each state to designate waste management regions pursuant to guidelines developed by the federal administrator. The re-

239. *Id.* at 1550.

240. *Id.* at 1550-54.

241. S. 2770, 92d Cong., 1st Sess. § 101.

242. *Id.* § 204.

243. H. ODUM & H. MOORE, *AMERICAN REGIONALISM: A CULTURAL-HISTORICAL APPROACH TO NATIONAL INTEGRATION* (1938); Hines, *supra* note 5, at 608-09; Frankfurter & Landis, *The Compact Clause and the Constitution*, 34 *YALE L.J.* 685 (1925).

244. For discussions of the principal regional authorities and their powers see Hart, *Creative Federalism: Recent Trends in Regional Water Resources Planning and Development*, 39 *U. COLO. L. REV.* 29 (1966); Hines, *supra* note 5, at 609; Runge & Church, *New Directions in Regionalism: A Case Study of Intergovernmental Relations in Northwestern Wisconsin*, 1971 *WIS. L. REV.* 449.

245. Hines, *supra* note 5, at 609.

gional plan to be developed would require the establishment of construction priorities for treatment works, the coordination of waste treatment facilities, and planning for the control of non-point sources of pollution.²⁴⁶ This effort to establish regional planning is commendable but should be even more strongly emphasized.

Problems of waste disposal, water pollution, air pollution and solid waste, are essentially interconnected,²⁴⁷ and are in turn related to land use planning and the regulation of pesticides. There has been recognition of the need for multipurpose agencies,²⁴⁸ but no clear proposals have emerged. Pending legislation still treats land use as a separate problem from water pollution control.²⁴⁹ The need for integrating land use powers as well as water pollution abatement powers into one authority is clear when one ponders the implications of Professor Robert's suggestion.²⁵⁰ He implies that the authority will be making land use decisions since the potential site of a new plant would be limited by the necessity of discharging wastes in the authority's waste treatment center. The authority should therefore be given sufficient land use planning powers to enable it to function.

Research, including study of regional models currently in use in the United Kingdom,²⁵¹ Germany,²⁵² and Australia,²⁵³ as well as the United States,²⁵⁴ is needed to determine the optimum legal form of multipurpose regional planning authorities and the appropriate legal powers which should be delegated to them. It would seem appropriate for such an authority to have control of ground and surface water resources of a region and be responsible for the allocation of water uses as well as the construction and operation of treatment facilities. The authority should have some power to control land use through the police power, eminent domain and taxation. Some veto power over fed-

246. S. 2770, 92d Cong., 1st Sess. § 209 (1971).

247. It is well known that air pollution abatement may aggravate problems of water pollution control and solid waste disposal and vice-versa. See COMPTROLLER GENERAL'S REPORT, *supra* note 34, at 11.

248. The creation of the Environmental Protection Agency on the federal level, on July 9, 1970, by Reorganization Plan No. 3 of 1970, 84 Stat. —, 35 Fed. Reg. 15,623, represents a small victory for the multi-purpose agency approach. Moreover, President Nixon in his Budget Message to Congress on January 29, 1971, proposed the creation of a new Department of Natural Resources combining land, water resources, energy and marine resources and technology, [1971] U.S.C. CONG. & ADMIN. NEWS 26.

249. See discussion of pending national land use policy act proposals in 2 BNA ENV. REP. CURR. DEV'S 214-16 (June 25, 1971).

250. See text accompanying notes 238-240 *supra*.

251. See Trelease, *New Water Laws for Old and New Countries*, in CONTEMPORARY DEVELOPMENTS IN WATER LAW 40, 41-43 (C. Johnson & S. Lewis eds. 1970).

252. O. HERFINDAHL & A. KNEESE, *QUALITY OF THE ENVIRONMENT* 20-22 (1965).

253. Davis, *Australian and American Water Allocation Systems Compared*, 9 B.C. IND. & COM. L. REV. 647 (1968).

254. See Weinberg, *Regional Land Use Control: Prerequisite for Rational Planning*, 46 N.Y.U.L. REV. 786 (1971).

eral land use decisions should be available, although some land use powers should remain vested in municipal governments. Finally, in addition to its power to control water pollution, the authority should have primary responsibility for air pollution control and solid waste disposal, including not only the power to require recycling, but also the power to ban or restrict the use of pesticides and to plan for and put into effect biological and other substitutes for controlling insects and other pests. The environment can be protected only through a regional approach to the management of natural resources and the planning of development in light of the environmental limits in the particular region.