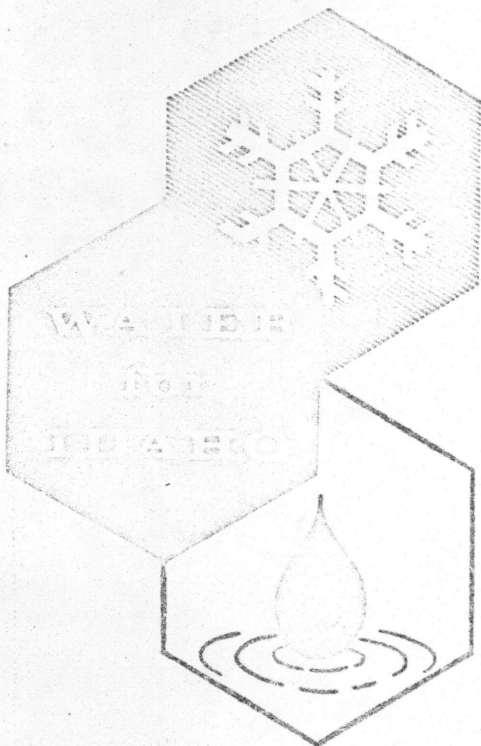


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**Some Implications of
the Federal Water
Pollution Control Act
Amendments of 1972--
P.L. 92-500.**

By John S. Gladwell

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"SOME IMPLICATIONS OF THE FEDERAL WATER POLLUTION CONTROL
ACT AMENDMENTS OF 1972--P. L. 92-500

by

John S. Gladwell¹

With the passage by the United States Congress of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) the national goal of the elimination of the discharge of pollutants into navigable waters has been established. Whereas in the past it was apparently acceptable to downgrade portions of our environment in order to enrich on economic lives, the times and the priorities are clearly changing. The role of science and engineering, although being severely tested by public opinion, has never been more necessary than today. However, total impacts-- including social and environmental as well as technical and economic-- must be evaluated and alternatives considered using more than conventional criterion. Whether or not the results of the new program of water quality will equal the intentions must await a genuine commitment of time and money.

Agriculture and other non-urban interests will be vitally affected by this Act. No longer will enforcement agencies be looking only at concentrative point sources of polluting, although they will be given the first

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consideration. Among the non-urban problems to be considered are those caused by: irrigation conveyance and application systems and inefficient cropping practices; confined animal production operations; inefficient forestry and logging operations; non-sewered rural domestic wastes; use of agricultural lands for disposal of domestic and industrial effluents and sludges; and those of naturally occurring pollution.

As more and more controls are imposed on agriculture, economic data will grow in importance. Cost effectiveness in operations and pollution control measures will need intensive study. The development of new technology may well be the salvation of smaller operations, for it would appear that everything will be in favor of the larger and more commercial types of operations.

The fact that must be accepted is that social costs will no longer be absorbed by society through a lower quality environment. They will be reflected in prices--and those operations that can efficiently absorb or redirect those added costs will survive.

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INTRODUCTION

Although the intensity of the desire for improved or maintained environmental quality has varied, the concern is clearly not a passing fad. In the United States it is now a national goal. The process of arriving at this goal, however, is not without its difficulties. For example, I would imagine it would be difficult, if not impossible, to find a person or organization who would not be in favor of a clean and healthy environment. But it is another matter entirely to get a consensus on who must give up some "rights" in order to give someone else some "benefits".

And yet, this is the very problem we face whenever we consider problems of the environment. Because the environment is a common good, social choices must be made. Most are difficult ones. Few are easily quantified. Almost every decision will find an advocate with a convincing reason for an exception. And, almost inevitably, we must fall back on the political process for establishing a policy. And because it is a political

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indicators of quality are clearly needed for a better understanding by society of the true costs and benefits of controlling the environment:

As the process of establishing pollution control standards and the schedules for complying with those standards proceeds, there should be (1) a forthright and realistic appraisal of actually what the needs are, (2) an objective analysis of what is and what is not technologically possible (and the associated costs), and (3) a realistic program of research to narrow the gap between needs and possibilities. But we should be honest in our appraisal of the true costs involved. This should include both the energy and resource requirements of the higher standards. The solution of one problem should not, in turn, become a problem in itself.

In the past the people of our country were apparently satisfied to permit a downgrading of portions of our environment in order to enrich their economic lives. At least, there appears to have been a greater reluctance to speak out. However, the times are clearly changing, and with them. . . so are the priorities.

Until only recently it was generally felt that nature had a great deal of reserve assimilative capacity--and that we could use it free of charge. Under such an assumption there was little obvious incentive to minimize the environmental burden. But the needs are now being recognized, and the "free lunch" idea is being quickly done away with. The role of science

and engineering, although being severely tested by public opinion, has never been more necessary than it is today. Technical advances, when combined with effective management and public acceptance, should, if properly coordinated, permit a continued flow of goods in our economy without continuing the environmental insults. This will not come about, however, if engineers continue to accept problems inadequately posed by others. The profession must accept and assess social as well as technical and economic impacts, and evaluate alternatives using more than the conventional criteria. If we are to become truly effective, as engineers we must become a part of the process of problem definition, and if our tools are inadequate, we should work to create acceptable ones.

WATER QUALITY LEGISLATION

It is interesting to review briefly the evolution of national water quality legislation. The process began by a series of acts dealing only with specific concerns of navigation, disease and oil discharges in the territorial sea and other tidal navigable waters. One early law, the Refuse Act of 1899, was much later to be reinterpreted as a water pollution abatement statement, particularly in the years 1970-72 before the enactment of the present legislation.

In 1948 an act with a 5-year authorization recognized both the rights and responsibilities of the states in water pollution control. This view has continued and is still congressional policy. The act provided financial

assistance to states for comprehensive water pollution control programs, research and waste treatment facilities. A program of construction loans and preliminary planning grants was never implemented, however, because the funds required were never appropriated. The enforcement procedures authorized by this act required a series of notifications of violation and that the offending state's consent to a suit. And, thus, enforcement was effectively inhibited--only one hearing was ever held and no suits were ever brought to court. After a 3-year extension to the first 5-year authorization, the first permanent law was passed.

The 1956 act revised the original concept. It authorized federal construction grants; and in fact, gave impetus to municipal waste treatment. It strengthened the research aspect by including research grants, fellowships and technical training. It authorized a program of basic water quality data collection and dissemination. Establishment and maintenance of state water pollution control programs were backed up by grant authorizations, and it continued the authority for comprehensive programs, technical assistance and interstate cooperation. Finally, it established an enforcement procedure in the case of certain interstate pollution of interstate waters which did not require state consent to a suit.

In 1961 the act was amended to extend the enforcement authority to navigable as well as interstate waters, and could then be applied to intrastate pollution cases on request of the governor of the state. By redefining

the term "interstate waters" to include coastal waters, the law was further greatly expanded. Authorizations and dollar ceilings for construction grants were increased; research was accelerated; and regional laboratories were authorized. The amendment also permitted the use of water storage in federal reservoirs for low-flow augmentation to improve water quality, but specifically denied such use as a substitute for adequate treatment or other waste control at a particular source.

In 1965 the act was further amended to provide water quality standards, consisting of water quality criteria, in order to provide water of proper quality for a range of designated uses. States were given the first opportunity to design and adopt these standards (subject to federal approval). Research and demonstration was expanded. Additional grant funds for waste treatment works were authorized, and financial incentives were added for projects conforming to comprehensive metropolitan area plans. With this amendment the national program was elevated and made more prominent with the creation of the Federal Water Pollution Control Administration within the U. S. Department of Health, Education, and Welfare.

In 1966 the agency was transferred to the U. S. Department of the Interior, and the program of construction grants was expanded and redirected. It went from \$450 million in FY 1968 to \$1.25 billion in FY 1971, although appropriations in the first 2 years' activity fell far short of authorizations. Cost sharing arrangements, under certain conditions,

were further increased. Also, reimbursement of state or local funds from future federal fund allotments was authorized up to the full federal share if adequate federal funds were not currently available. Research and demonstration grants were authorized in the area of advanced waste treatment and water purification, joint municipal-industrial treatment, and industrial pollution. Authority was also provided that could require alleged polluters to file a report on the character and quantity of their discharges, and the measures being taken to alleviate the situation.

The 1970 amendment added strong oil pollution control provisions to the basic act. It also provided for a study and report to Congress on hazardous substances other than oil. The act also addressed such other aspects of pollution as sewage from watercraft, mine drainage, lake eutrophication, Great Lakes pollution, manpower requirements and pesticides. In addition, the act required that before permits could be issued, state certification that water quality standards would not be violated was required.

In 1972 the Federal Water Pollution Control Act was amended--but in fact was replaced--by what is clearly the strongest commitment ever considered by Congress to end water pollution. The objective of this act is... "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." In order to achieve this objective, the act declares:

- (1) it is the national goal that the discharge of pollutants into navigable waters be eliminated by 1985;
- (2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;
- (3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;
- (4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;
- (5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each state; and
- (6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into navigable waters, waters of the contiguous zone, and the oceans. "

The act goes on to state Congressional policy recognizing, preserving, and protecting the primary responsibilities and rights of states to prevent, reduce, and eliminate pollution. It is also Congressional policy that the President . . .

shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction, and elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws.

(I will not attempt to decipher the real meaning of this policy--to some it may be a genuine gesture toward a world water quality program; to others, it may have a more economic tone. I'm sure to even others it has a nice ring, but little practical value. In any case, I must present the policy with a great deal of genuine humility as it applies to Canada. If this type of legislation really works, perhaps the U. S. water quality program would be enhanced by Canada's adoption of a similar statute.)

But, continuing, the act emphasizes that public participation shall be encouraged, and that regulations specifying minimum guidelines for such participation shall be developed and published.

Finally, the act declares a national policy, without argument, should be adopted as a standard for every piece of legislation in every country of the world:

... It is the national policy that to the maximum extent possible the procedures utilized for implementing this Act shall encourage the drastic minimization of paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless duplication and unnecessary delays at all levels of government.

This is certainly a policy worthy of adoption. The Act is 89 pages of controversial, detailed and all-encompassing water legislation. I wonder how often that last policy is being violated because people like me are asked to attend meetings like this and explain to people like you--just what it means to them! :

Let us look at some of the more important requirements of the 1972 Act, organized by activity or area of concern (and I use freely, here, the U. S. E. P. A., "Report to Congress-1973"):

Industrial Pollution

- * Industries must use "best practicable" water pollution control technology by mid-1977 and the "best available" by mid-1983.
- * Discharges of toxic pollutants will be controlled by effluent standards to be issued by 1974.
- * Industries must pre-treat effluents that are discharged into municipal treatment systems.

Municipal Pollution

- * Federal construction grants up to \$18 billion are authorized over the next three years to help local governments build needed sewage treatment facilities.

- * An additional \$2.75 billion is authorized to reimburse local governments for treatment plants constructed earlier in anticipation of Federal grants.
- * The Federal share of treatment facilities costs is increased to 75 percent (the maximum Federal share was 55 percent under previous legislation). An Environmental Financing Authority is established to help State and local governments raise their share of the cost of treatment facilities.
- * Secondary treatment will be required for plants approved for construction before mid-1974; "best practicable" treatment will be required for plants approved thereafter.
- * Treatment plants must provide a minimum of secondary treatment by mid-1977 and for plants under construction by mid-1978.
- * All plants must apply any higher treatment necessary to meet water quality standards by mid-1977.
- * All treatment plants will have to use "best practicable" treatment by mid-1983.
- * Areawide waste treatment management plans shall be established by mid-1976 in areas with substantial water pollution problems.

Nonpoint Source Pollution

- * EPA is required to develop information on (1) the nature and extent of nonpoint sources of pollution and (2) means to control such pollution from a range of activities... including agriculture.

- * States are required to (1) submit reports on nonpoint sources of pollution, and (2) recommend control programs.

Water Quality Standards

- * States must have adopted water quality standards for intrastate waters and submitted them by April 1973 to EPA approval. EPA is required to set standards if the states fail to do so.
- * EPA is required to submit a report to Congress by 1974 on the quality of the Nation's waters.
- * The States are required to submit to EPA and the Congress similar reports on waters within their borders by 1975.
- * A national surveillance system to monitor water quality will be established by EPA in cooperation with other Federal agencies and State and local governments.

Permits and Licenses

- * The 1899 Refuse Act permit program is replaced by a new permit system which requires that there be no discharge of any pollutants from any point source.
- * Publicly-owned treatment works, certain other municipality controlled discharge points, and commercial, agricultural and industrial dischargers must obtain permits.

Enforcement

- * The 1972 law supplanted the former enforcement mechanisms with authority to enforce permit conditions and other requirements of the law through court action or administrative orders. Civil and criminal penalties can be applied to dischargers who violate permits.
- * EPA is provided emergency power to seek immediate court injunctions to stop pollution that represents an imminent or substantial danger to health or welfare.
- * Dischargers may be required to keep proper records, install and use monitoring equipment, and sample their discharges.
- * EPA is provided authority to enter and inspect any polluting facility.
- * Any citizen or group of citizens whose interests may be adversely affected has the right to take court action against anyone alleged to be violating an effluent standard or limitation, or an order with respect thereto issued by EPA or a State; or against the Administrator for his alleged failure to perform a nondiscretionary act or duty.

It seems quite clear that the United States has hitched its wagon to a strong water quality program. Whether or not the results will equal the intentions must await a genuine commitment that involves both time and money. There are strong arguments for and against it. It appears that we must adopt a wait-and-see attitude.

In looking at the ultimate goal of the 1972 Act--that is, one of no water pollution--one has to be somewhat skeptical. Nevertheless, in practice it is one with a logical approach. I personally would have rather seen an approach and goal designation which said in effect . . . "let's see what's possible, and how much the various alternative future conditions might cost." In fact, if you look at the act beyond its stated simple goal, that is precisely what it will be doing. The act establishes a National Study Commission (a rather broad-scoped title which even the Commission doesn't like--it calls itself the National Commission on Water Quality) to look at "costs" as well as "benefits" of actually reaching that goal:

"... make a full and complete investigation and study of all of the technological aspects of achieving, and all aspects of the total economic, social, and environmental effects of achieving or not achieving, the effluent limitations and goals set forth for 1983..."

The Commission is charged to report to Congress the results of such investigations and studies, together with its recommendations, not later than three years from the date of the enactment of the Act (October 18, 1972). The main point here is that Congress has established a mechanism for taking a second look at what it has produced. In any case, the real costs and benefits will have been looked at very carefully. I have great faith in the considered opinion of this broad group of highly respected technical and political men and women--more so than I would of a group also charged with implementation. Although I respect the technical abilities of the U. S. E. P. A., I do not believe they are qualified to establish

(or limit) the water quality goals of the United States. I have heard more than one "technician" say that the goal is stupid.

In my opinion, to fail to consider a goal of non-degradation is the ultimate in stupidity--but to accept it without argument would be the apex of incredibility.

WHAT CAN WE EXPECT?

I would like to set the stage for this part of my talk by telling a short story. It involves a former professor of mine--a fine old, very practical engineer who taught me my undergraduate hydraulics course several years ago. He had an expression that he used when dealing with some of the more esoteric aspects of fluid flow. As he would put it:

... sure, you can set up the differential equations on how this works ... but God in heaven couldn't integrate them!'

As I look at the new water quality act, I am, and I sure others are, tempted to recast his expression in terms of the aspect of its implementation. My only reluctance to do so is that many of those very differential equations my former professor was talking about have now been successfully integrated. I'm not sure how much use some of them are getting--but they've been integrated. As I see it, then, we had better not bank too highly on the new act not being implemented, because you may find yourself eating your works ... as well as your sludge.

To begin with, it is evident that everyone will be affected by this legislation--directly and indirectly. States are expected to play a major role. If they fail, the federal government will step in. Municipalities will certainly be involved. Industries will be quickly involved. And agriculture will not be without impact.

In the development of effluent limitations and guidelines, almost everybody is to be involved. The act specifies a number of different industries which will be individually assigned effluent limitations. The list will surely be expanded with time. Likewise, the standards will change with time. Because of this, it is to industries' advantage to take the initiative in this area. It should definitely expect that the provisions of the act and the standards established will be followed through by the enforcing agencies.

States will be busier than ever. Each will be required to classify all river segments as either being water-quality limited or effluent-guidelines limited. (A segment that is effluent guidelines limited would meet established water quality standards with the application of "best practicable" technology for an industry, or secondary treatment for a municipality.) Plans will then be required which will (1) assess the need for publicly owned works, (2) inventory and rank individual discharges, (3) assess nonpoint-source pollution and the necessary control measures, and (4) schedule compliance and effluent requirements for point discharges.

Nonpoint sources of water pollution is an area in which a major program of R & D will be applied. Efforts will be directed primarily toward filling in a wealth of ignorance on the nature and means of controlling pollution from at least mining, construction, forestry and agricultural activities. In the process it may well be discovered that the point sources of pollution are not nearly as important as they appear now.

Obviously, many parts of the new act will affect agriculture and the rural sectors of the country. The following summary is taken from "Outlook 73, U.S. Agriculture--Environmental Controls and Economics", by V.W. Davis, et al. :

1. Authorizes comprehensive studies of pollution in estuaries and estuarine zones of the United States. Studies will be cooperative efforts of Agriculture, Army, Water Resources Council, et al.
2. Authorizes comprehensive study and research programs to determine new and improved methods, and better application of existing methods, for reducing and eliminating pollutants from agriculture, including the legal, economic, and other implications of the use of such methods.
3. Authorizes a comprehensive program of research, investigation, and pilot project implementation to eliminate pollution from sewage in rural areas.

4. Authorizes grants, in consultation with Secretary of Agriculture, for R & D for new and improved methods of reducing, eliminating, or preventing pollution from agriculture and rural sewage and to disseminate information and encourage adoption of these methods.
5. Encourages waste treatment management facilities that provide for recycling of potential sewage pollutants through agriculture and forestry.
6. Authorizes development of areawide waste treatment management plans that include identification of nonpoint sources of pollution from agriculture and forestry, and procedures and methods to control such sources.
7. Specifies that the President, acting through the Water Resources Council, shall complete Level B plans for all basins in the United States by January 1, 1980. Priority is to be based on areawide needs.
8. Specifies that point sources of pollution must apply the "best practical" control technology by July 1, 1977.
9. Specifies that effluent limitations for categories and classes of point sources shall use the best available technology, economically achievable, by July 1, 1983.
10. Specifies that EPA shall enter into agreements with the Secretaries of Agriculture, Interior and Army to maximize the utilization of appropriate programs to achieve objectives of the Act.

11. Specifies that EPA shall develop, in consultation with appropriate agencies (including Agriculture), appropriate guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollution and processes, procedures and methods to control pollution from agriculture and forestry, including runoff from fields.
12. Requires a list of categories of sources that, at minimum, will include feedlots and 26 agriculture-related industries. Regulations establishing standards of performance will be published in 1 year.

There are a number of agricultural and rural type problems that must be addressed. Some of these problems require a great deal more research, others, the application of known technology.

1. The problem of irrigation conveyance and application systems, and inefficient cropping practices: U. S. streams carry at least a billion tons of sediment each year. Sediment from farm lands is probably a major contributor of phosphorus to streams and lakes. Over-fertilization results in runoff pollution of millions of millions of tons annually. Pesticide runoff must be further investigated; we must use less toxic pesticides whenever possible and control their movement toward watercourses. Irrigators must be required to make more effective use of water. The

result will eventually be the development of enforceable water quality standards applicable to agricultural activities.

2. The problems of confined animal production operations:

Ineffective or non-existent waste treatment practices permit some "slug" feedlot runoffs with BOD₅ in the 10,000-50,000 mg/l range. In addition to the nutrient runoff problem there are those of soil contamination and odors. An industrial approach is required with treatment and recycling of effluents. Use of land disposal systems as secondary and tertiary systems looks inevitable. This may cause problems for lots not located near usable recycling sites. In the long run systems should consider recycling as a means of producing animal feeds or commercial products.

3. The problem of inefficient forestry and logging operations:

Logging practices can increase suspended sediment considerably. What are the best techniques--what about clear cutting, controlled burns? What is the future of forest fertilization, irrigation? Organic leachates can severely reduce D. O. in reservoirs and lakes. Can we control benthic toxicity from log storage? There needs to be a concerted movement toward management techniques that minimize the environmental effects.

4. The problem of non-sewered rural wastes: Wastes are largely

untreated, septic systems at best. Few long-term effective

systems have been demonstrated. With poor techniques pollution of surface and ground waters are definite possibilities.

5. The problem of using agricultural lands for disposal of domestic and industrial effluents and sludges: The technology appears to be available, but needs further development and demonstration. Need to develop principles for quantifying soil loading capacities-- we cannot afford to pre-test every site in the world. We need also to study very carefully the concentration of hazardous elements from effluents and sludges in food crops. We need to study various pretreatment procedures for various kinds of effluents and sludges.
6. The problem of naturally occurring pollution: We need to characterize the nature and extent of runoff from natural mineral and biological sources. Evidence is clear that fecal coliform may not be a good indicator of man-caused pollution. What is the BOD of forest cover? Is sediment control possible, or desirable, in the long run? Are forest fires unnatural? What is the effect of natural salt-bearing geologic strata? What would the natural quality of a water body be in the absence of man?

There is little doubt that the implementation of some aspects of the new act will result in substantial additional costs to many farmers and agricultural processors. No longer will the application of pesticides or disposal of manure be permitted without regard to the environment. The social cost

will no longer be absorbed by society through a lower quality environment.
They will be reflected in prices--and those operations that can efficiently
absorb or redirect those added costs will survive. It would appear that
everything will be in favor of the larger and more commercial types of
operation.

As more and more controls are imposed on agriculture, economic data
will grow in importance. Cost effectiveness of various control measures
will need to be more intensively studied. Educational, training and re-
search activities of all levels of government will have to be more closely
integrated. The development of new technology may well be a major factor
in the economic survival of smaller operations. This will be particularly
important if techniques for absorbing large increases in recycled wastes
can be developed and marketable byproducts be made available to lessen
the pressure on primary product prices.

CONCLUSION

I think of the arguments for and against the new act as not altogether
dissimilar to a TV commercial that has been making the rounds recently.
In the commercial we find a pilot and co-pilot in an evidently heavily
damaged airplane. Both men are seemingly in trouble, and the airplane
appears to be the worst of the three. But the pilot seems to be having some
rather special problems. Coming to his rescue, the co-pilot reaches over

and slaps the pilot's face with some obviously refreshing after-shave lotion. The response is, of course, "Thanks, I needed that"... The scene fades to a discussion of the lotion.

The similarity is that we have been slapped across the face with a water quality statute--and a good number of people are going around saying the equivalent of "Thanks, I needed that!" But the fact remains that the plane may still be going down. The problem is still very real, and unless we agree to implement the provisions (not just a sweet smelling lotion) there will be no solutions.

We all need to face the hard facts regarding the feasibility and cost of water pollution abatement technology. When we have, some of the emotionalism will surely begin to fade for there is no such thing as a "free lunch". The public must be willing to pay.