

Innovation versus tradition in administrative approaches to water quality management,

*by Georg Hagevik, Assistant Professor of Urban Planning,
Rutgers University, New Brunswick, New Jersey.*

Introduction

One who is interested in developing an administrative mechanism for dealing with water quality management in Norway must ask the following questions before deciding on the optimum approach to follow.

1) Is the water quality problem in Norway so unique that special solutions are called for? Critical variables would include:

- a) the nature of existing water quality
- b) types of effluent
- c) rainfall/runoff characteristics
- d) topography
- e) population distribution and density.

2) Is the way Norwegians develop and implement public policy so unique that special solutions are called for? For example, to what extent does industry cooperate with government in the develop of regulations that are applied to the former?

3) Is the legal and governmental structure in Norway organized at the present time in such a way that it points to an optimum approach to environmental quality management? For example, we must consider the historical importance of the permit system in water pollution control, and the existence, since 1965, of the Building Act.

4) What is the rest of the world doing?

In particular, what is neighboring Sweden doing? We must ask this question since pollution problems are increasingly becoming international in scale and solutions to these problems become more likely if there is some common basis for communication and action.

5) What are the financial limitations that might be placed on pollution control? Important aspects of this question deal with the nature of the tax structure in Norway and, most important of all, the willingness of the Norwegian citizen to support pollution control programs which are never inexpensive.

6) Are the water pollution regulations to deal with existing pollution or to anticipate and attempt to avoid future pollution problems? For example, it seems that the Building Act of 1965 will be of most assistance in preventing future pollution problems rather than dealing with existing ones.

The economist's approach

With this introduction, I would like to discuss the viewpoint of the economist on water quality management for he has had considerable influence lately in discussions on the use of effluent fees. Also, even though an economic calculation of benefits and losses is often not sufficient to reach

a good decision, it is nearly always an essential preliminary.

Readings in welfare economics published during the last thirty years commonly mention water pollution as a classic case of what are called negative externalities. Such discussions, however, have been of more value to economists interested in the further theoretical development of welfare economics than to the water pollution control official concerned with actual abatement and control activities. Why is this the case? For one thing, the economic theory requires limiting conditions and large assumptions about the data available, neither of which can be fulfilled in practice. The problems of collecting data on such subjects as water pollution damage and the contribution of each emitter to existing concentrations are rather large to say the least, and economists have not had the interest or the means to tackle the measurements necessary to make definite control proposals until very recently. In any event, the theory has not proved too difficult to master and at the risk of some over-simplification, can be reviewed in a brief manner.

Most economists would state the problem in this way: The discharge of pollutants into the water and the air imposes on some people costs which are not adequately borne by the sources of pollution due to the failure of the market mechanism, resulting in more pollution than would be desirable from the point of view of society as a whole. The economic theorist's distinctive approach to the problem is found in his belief that the objective of pollution abatement programs should be to minimize the total of (a) water pollution damage costs and (b) the costs incurred in any program to alleviate that

damage. Any given level of pollution abatement should be reached by the least costly combination of means available, and the costs of any decrease of pollution should not exceed the benefits obtained by the reduction. Thus, the standard theoretical approach would be to calculate the damage to each receptor from polluted water containing various amounts and kinds of effluents. Such a calculation would permit measurement of benefits to be expected from proposed abatement projects. Next, one would calculate the cost to each pollutant source of abating its emissions in varying degrees. The optimal allocation of the water resource would then require that pollutants be prevented from entering the waterbodies at levels which would cause more marginal damage on receptors than the marginal cost of preventing the pollution.

The operational procedure which economists recommend for achieving this optimal condition would include an evaluation of the damage done by the emission of incremental amounts of pollution into the water at any given location and time and an assessment of a corresponding charge against the emitters. The charge would thus reflect the marginal costs that the sources impose on others. It would be determined by relating water quality to rates of emission, using monitoring networks and simple diffusion models. A detailed description of procedures which could be followed are detailed in the book *Managing Water Quality* by Allen Kneese and Blair Bower. The authors also describe some practical experience with these effluent fees or charges in the *Genossenschaften* or water resources associations in the Ruhr industrial area of West Germany.

The principle advantage from the economist's point of view of «internalizing» the cost by means of a government-levied charge on the source is that the economic units involved can decide on the best adjustment to be made in light of the costs and benefits they perceive. Those firms which can reduce emissions at a cost that would be less than the charge will do so to avoid being assessed the charge. Those firms which cannot reduce emissions at a cost that would be less than the charge would elect to pay the fee but would nevertheless have a continuing incentive to reduce emissions. Thus, it is suggested, the optimal level of pollution abatement will be approached by the method that is least costly to society as a whole.

Under this system, management rather than government officials would bear much of the burden of investigation and decision making, and management is said to be better able to evaluate the advantages and disadvantages of the various ways of dealing with the effluent problem and to choose the best mix. This is held to be preferable to being restricted to any one abatement technique. Implicit in the economist's view is recognition that the optimal level of water pollution abatement is closely tied to the technological processes involved, with the least-cost solution being in many cases a complex combination of process changes and treatment of effluent; in some cases, moreover, the least-cost solution might involve partial abatement and payment of the lower effluent fees associated with the remaining emissions. The continuing incentive provided by the effluent fee to search for additional or alternative ways of abating discharges involves a much different response than that required in a straight enforcement

action. For example, such techniques used in the United States as enforcement by the courts through criminal proceeding or by injunction or cease and desist order would provide no real alternative to incurring the abatement costs, whatever they might be. Moreover, enforcement programs that would compel the adoption of specific technology would altogether destroy the incentive to explore alternative abatement techniques or to combine approaches to achieve the maximum efficiency in pollution control.

A system of effluent fees has additional theoretical appeal because of its adaptability to changing or variable circumstances. Fees can be varied up or down in accordance with water conditions, the season of the year, and other factors in order to correlate emitters' costs even more closely with the damage caused. The theoretical advantage of this flexibility may be difficult to realize in practice, however, and indeed may even prove a liability. Given the inadequacy of data and the probabilistic character of the factors that might be reflected in variable fees, the schedule might take on an appearance of arbitrariness that might be difficult to dispel.

The primary problems with effluent fees are simply the shortage of data and the lack of agreement on many of the theoretical problems that are presented. The major information deficiency is in the measurement of damages attributable to particular pollutants, and many problems associated with allocating to individual polluters the share of the total damages for which they are «responsible.» Problems of equity are also presented by the need to allocate damage costs between new and existing industries. There are also doubts that monitoring technology is ade-

quate to permit effective enforcement of a fee system. Especially where there are many small polluters to be monitored, such a system would be costly to administer. There is also the major issue of institutional organization. Successful application of an effluent fee system would require some sort of regional water quality management agency which would be required to make a number of important decisions and would therefore have to have considerable authority. The difficulties is restructuring government in any country suggests that the institutional problems is a major one. Finally, the argument is often raised that effluent fees are little more than a «license to pollute.» Those who advance this argument, in my opinion, lack an understanding of the way which fees would be set. For example, if a factory or a municipality discharged effluent that caused a pollution problem, their fee would be so high that it would be too expensive for them to continue the discharges. Indeed, one can argue that the permit system is more a license to pollute than the effluent fee system is.

In any case, even though effluent fees have a solid theoretical foundation, there seems to be rather widespread feeling that practical problems associated with establishing and enforcing a fee schedule appear so great that immediate adoption of this approach in its pure form seems unlikely. It is my feeling that a regional governmental agency of the sort which Kneese and Bower suggest would be difficult to establish at the present time both in the United States and in Norway. As I will later one, there is also probably no need for such an administrative structure in Norway.

Alternative approaches to control

In addition to the effluent fee approach, payments and direct regulation are other approaches to environmental quality management problems. Direct regulation is somewhat different than the other two in that it is nonfiscal. The payments approach includes not only subsidies but also reductions in taxes that otherwise would be collected. Common examples include subsidization of particular control equipment, accelerated depreciation, and tax credits for investment in control equipment. Direct regulation includes a mixture of licenses, permits, zoning, water quality and effluent standards, and the enforcement of standards through regulatory bodies and the courts.

Payments.

One possible payment system might rely on selective payments to waste contributors for the purpose of motivating them to restrict effluent emissions to an optimum degree. These payments would in principle be equivalent to the off-site costs imposed by increments of waste discharge and would vary with water conditions and effluent emission location, as well as with the quantity and quality of effluent. Since this sort of payment would be similar in theory but opposite in practice to the effluent fee scheme, the criticisms mentioned earlier apply here also.

The more typical proposal, however, relates to tax relief or subsidies. Such proposals are rather popular since there is always less resistance to a program of subsidies than to programs of regulation. They have the purpose of reducing the cost of pollution abatement equipment. But most such equipment is by nature un-

profitable in that it adds nothing to revenues of the industry and does not reduce costs. To reduce the cost of such control equipment cannot induce a company to install it. The most it can do is reduce the resistance of the company to public pressure for installation.

If we look for difficulties with this approach, as I am doing all through this discussion, we will find that it would be difficult to decide how much to pay to whom for any level of pollution abatement since there is often no clear relationship that one can determine in advance between any level of payments and a resulting level of water quality in the water courses. The taxpayer's feeling of equity might also be violated since the industrial firm, in not having to consider pollution abatement as a cost of production in the same sense that labor and capital are, would rely on payments raised at least partially by higher taxes on other taxpayers.

Payment schemes, tax credits, or accelerated depreciation may also bias the technique used for control in an uneconomical direction because they tend to promote construction of treatment facilities when adjustments in production processes, products, or inputs might achieve the same result at lower cost and might also increase productivity. Tax writeoffs of capital costs are also at a disadvantage because they are not capable of reducing all abatement costs. To use an example from air pollution control, it has been estimated that capital cost accounts for only about 15 % of the air pollution abatement costs for a typical industrial firm. Indeed, fuel substitution alone is estimated to be the least-cost alternative in over 60 % of the cases involved in air pollution abatement.

Direct Regulation.

Direct regulation has the considerable advantage that it avoids most of the sophisticated measurement problems inherent in some of the earlier techniques discussed. The usual view is that direct regulation of polluters can be justified since environmental pollution is so bad that there is little chance of the costs of such a program exceeding the benefits to the country as a whole. It is also argued that a polluter faced with the necessity to comply with a pollution regulation or suffer punishment will generally find the least cost set of controls or have no one to blame but himself. He will pass cost increases along to customers in the form of price increases, or to owners of the company in the form of reduced profit shares. Optimum allocation of the country's funds will be preserved as the public makes new choices about their spending and investing patterns. Administrative costs could be less than for some alternatives as there would be no complicated tax revenue emission charge or payment system to operate.

But, as expected, the economist will be quick to note that relative simplicity is not achieved without certain costs. One objection to direct regulation is its supposedly extreme inflexibility which results in higher costs than more selective abatement. For example, the U.S. Federal Water Quality Administration found in the Delaware River Basin that simple equal-proportional reduction of all waste loads would cost 50 % more than achieving the same quality standard by requiring companies to reduce their waste loads in proportion to their harmful effects. In other words, given the water quality goal

in the estuary, it is much less costly to remove wastes to a higher degree at some outfalls than at others. The savings come from such factors as scale economies in treatment methods and the dynamics of waste assimilation in the estuary related to the spatial pattern of discharges.

Finally, the regulatory system, which is most commonly used at present, has proved reasonably effective with dealing with the grossest forms of water quality impairment, but it does not lend itself to balancing incremental costs and gains in a relatively precise manner. Moreover, it does not provide funds for the construction and operation of measures of regional scope, should they prove economical.

Dealing with Norway's water pollution problem.

This very brief discussion of alternative approaches to pollution control has dealt very heavily with the costs of control. This is because everyone I have talked to in Norway has emphasized that Norway is not a rich country, which of course leads to the conclusion that expensive solutions are not wanted and that there is some merit in searching for a least-cost solution. I have tried to make it clear that there is no simple answer when it comes to governmental administrative structures. With this background, let us go on to a discussion of what Norway might be able to do.

To do this, I would like to review the questions I raised at the first of the paper. First, is the water quality problem unique in Norway? Compared to other countries, stream flow — and therefore dilution capacity — in Norway is relatively constant the year round. Thus, hydroelectric facili-

ties are not designed to be multi-purpose as they are in the United States, where reservoirs are used for low flow augmentation to dilute water pollution during the summer months. Fairly constant stream flow means that similar levels of treatment can be maintained the year round. This can be contrasted with certain parts of the United States, where similar levels of treatment the year round would result in radically different water quality levels.

Population distribution and topography suggest that a system of river basin administrations found in France and Great Britain make little sense in Norway, where Oslo and Bergen are urban regions and the rest of the country non-urban. Clearly, the same administrative solutions cannot be applied all over Norway. While much of Europe and the U.S. worry about dissolved oxygen, Norway can concentrate on toxicity and eutrophication. However, all this really means is that you have one less problem to worry about.

The conclusion that might be reached is that the system of regional water quality management agencies that Kneese and Bower favor should not be used in Norway. Large benefits will not result from the existence of an agency that can vary treatment levels according to varying assimilative capacities.

Second, is there something unique about the way Norwegians develop and implement public policy? You will remember that one of the advantages of effluent fees is that they place much of the responsibilities for decision making on the firm rather than on a government agency since the company has to decide how to treat their wastes. But, unlike the United States, a large percentage of industrial research in Norway is done in associative

institutes that have government support and funding. Also, like in much of Europe, industries seem able to work closely with government agencies in developing rather good regulations. In the U.S. there is a strong feeling by conservationists — or environmentalists as they are now called — that industry representation on pollution control commissions means that every effort will be made by these people to keep control requirements at a minimum. At least this has been the feeling until the very recent past. This must be viewed in the context of the rather widespread feeling in the United States that the country is becoming polarized. By this I mean that the country is becoming so diverse, with special groups looking after their own interests, that broad cooperative support for public policies is hard to generate and maintain.

In Norway, on the other hand, there is a lack of strong dissent and very much emphasis on obtaining broad agreement on public policy. This involves not only a high importance given to consensus, which reduces the need to search for any common ground after expressing radically different views. More important, it seems to involve a stress upon reconciliation of men of different interests and the treating of even opponents as colleagues. This means that Norwegians, more than any other people in the world, make very large use of the committee form of government. There are committees for everything and the arrival of a new problem means that a new committee will be formed. Most significantly, these committees seem to operate effectively, and their recommendations have an impact on public policy. In the U.S., committee recommendations are often ignored and certain indi-

viduals with strong personalities sometimes impose their will on the group. This does not seem to happen in Norway.

Foreigners note this emphasis on committees, but fail to realize that to the Norwegians it would be a psychological absurdity to impose an institution of cooperation. They are just not necessary. In the U.S., on the other hand, administrative policy almost always includes the formal requirement that a committee be set up. My point here is that detailed administrative structures are not a solution to the water pollution problem. In the U.S., a recent study showed that there is no close relation between the quality of state pollution control legislation and the effectiveness of the control programs. In the final analysis, we are talking about people and not about laws.

Third, does the legal and governmental system point to an optimum approach to environmental quality management? Observers note that Norway has a strong legal tradition and Norwegians are not merely law-abiding, but in a sense addicted to defining formal-legal rules and to their strict observance. You value legal experts highly and until recently political science was large legal study. Within this tradition, the permit system, a form of direct regulation, has had a long history. But you will remember that it has some disadvantages. My suggestion would be that you try to give some fiscal properties to what is essentially a legal tool. By this I mean that an industry or municipality should not only pay for the investigations necessary to evaluate the application for the permit, but should also continue to pay to the state a yearly fee for the permit even if they are using advanced chemical treatment. This fee would be

based on the fact that pollution is still being put into the environment, but would not be based on sophisticated measurements. Rather, it would be a tax to fund the government control program. The fee would be much higher if the emitter were only using mechanical treatment and still higher if there was no treatment at all. This is a rather crude proposal, but it is simple and should suggest the importance of a cleaner environment.

Fourth, what is the rest of the world doing? This is something I leave up to you to investigate. Obviously, technical processes from abroad should be watched closely. But, as I hope I have implied, legal and administration approaches developed in other countries should not be adopted without question in Norway.

Five, what are the financial limitations? This question relates to most of my discussion so far. A very important factor here is that Norwegians expect what can be called a high level of «quality of life.» Of course an aspect of this is not only clean water but clean water close to their homes. High standards of quality in the long run inevitably will have considerable costs. There seems to be a general feeling in Norway that the quality of the environment should be protected at almost any cost. You might anticipate, however, that eventually there will be complaints from rural area taxpayers that their tax money is being spent for pollution control in the cities (where the problems are) and that the wealthy cities should pay for it themselves.

Finally, are we dealing with existing problems or anticipating future ones. In the short run, the most difficult problems in Norway will arise in dealing with existing sources of pollution. Thus, much

of my talk really is a discussion of how one might deal with these polluters. But I think the most exciting thing that will be coming up in Norway is the attempt under the new act to relate water quality management to urban and regional planning. Unfortunately, there is little valuable experience in other countries that you can rely up. A close working relationship has been developed between planners and water pollution officials in the *Genossenschaften* in the Ruhr. But most of the land is already developed, so there is little new growth. The legislation setting up the Delaware River Basin Commission gives broad powers to relate regional planning to pollution control. Mainly for political reasons, these powers have not been used. Thus, Norwegians should be proud of their recent legislation, but must also realize that the task ahead is not an easy one. Much responsibility rests with the planners to develop procedures that can be used in day-to-day practice. Possibly more importantly, people having more restricted responsibilities in government and industry must realize that planning is both an imperfect art and an imperfect science, and that it is always easy to point to a weak point in the system. Planners need not only criticism but also support in their efforts. Given the nature of Norwegian society, I am hopeful that you will set an excellent example for the rest of the world .