

OREGON STATE UNIVERSITY

January 1975

Number 19

WATER IN MODERN AGRICULTURE

In modern agriculture, the quality of water is important not only in determining the productivity of animals and plants, but also to the degree it affects the health and livelihood of the farmer and his family. One of the largest consumers of water on the farm or ranch is irrigation. Differences in crop sensitivity to salinity and toxic substances necessitate the need for evaluating water quality criteria for irrigational purposes. Polluted water can be harmful to animal health and to the safety and value of agricultural products. Good water quality is an important ingredient in the health and comfort of rural families needing water for drinking, food preparation, bathing, and laundering.

Some naturally occurring constituents, present in surface and groundwaters, can also adversely affect agricultural uses of water. Among these substances are suspended solids, dissolved organic and inorganic substances, and living organisms such as toxic algae and organisms associated with food spoilage. Where undesirable natural or foreign substances interfere with optimum water use, management and treatment practices must be implemented. Often there are simple but effective things that a farmer or rancher can do to manage and improve the quality of his water supply.

The typical farmstead requires water at point of use, of quality equal to that supplied to city dwellers, especially for household uses, washing and cooling produce, and milk production. Water of such high quality is frequently not readily available to the farmstead and often can be obtained only through water treatment. In the near future, water treatment facilities may be a routine installation in any well-designed farmstead operation. It is not the purpose of this article to elaborate upon treatment alternatives, but satisfactory treatment possibilities do exist for producing from most raw water a supply that will satisfy the quality needed for most agricultural uses.

The task of evaluating water quality requirements and developing recommendations is complicated by the need to consider numerous complex interactions. For example, it is not practical to discuss water quality criteria for irrigation without considering crop responses to climatic and soil factors and their interrelationships with water. Evaluation of water quality requirements for livestock drinking water is also complicated by interactions of such variables as the quantity of water consumed and an animal's sex, size, age, and diet.

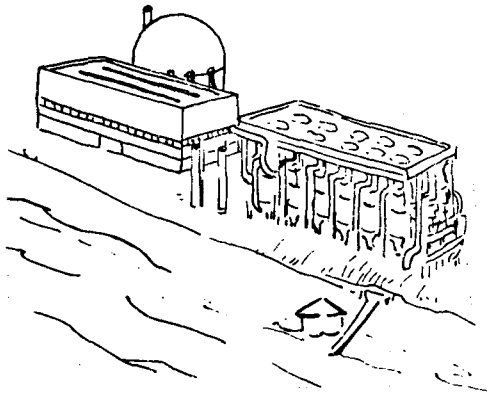
IMPACT OF ESTUARINE THERMAL POLLUTION

The impact of a nuclear power plant on people is mediated by the social and economic setting in which the power plant operates. The perceived environmental impact is in great part determined by the economic impact. If residents feel that they derive economic advantage from the plant, they tend to deny that there is any adverse environmental impact. If residents feel that they are not affected, they will be much more prone to see environmental damage, even where none occurs.

These are some of the conclusions reached in a recent study conducted for the U.S. Department of Interior using the Oyster Creek Nuclear Station at Barnegat Bay, New Jersey, as a research site.

During the first three years of the plant's operation, the respondents saw extensive negative changes in the Barnegat Bay environment. Residents saw changes in both the aesthetic qualities of the bay and also the activities that took place on the bay. Approximately one third of the sample reported that the changes had directly affected their use of the bay. However, respondents attributed the changes not to the power plant but to increased population, crowds of boats, or natural forces. While about one-fifth of the sample spontaneously mentioned the power plant, the power plant was cited less frequently than increased sewage, boats, or housing developments. In general, the respondents accurately perceived the limited effects of the plant. Studies of the environmental impacts indicate that the thermal pollution is highly localized in the Oyster Creek area and at this time has had little ecological effect on the bay as a whole.

An analysis was made of the attitudes of respondents toward recreational activity in order to see if the orientation of residents toward recreation could be used to predict the attitudes toward the power plant or pollution. The only attitudinal dimension that had a significant impact on attitudes to the power plant was the degree of feeling toward nature. Those with a greater feeling toward nature had a consistently more negative attitude toward construction of an additional power plant. Other dimensions of recreational attitudes: degree of sociability, physical action orientation, or a comfort orientation were not significant predictors of attitudes to the plant. Geographic areas where residents and visitors are concerned with remoteness, privacy, or wilderness, would make poorer choices for site selection of a nuclear power plant from the point of view of those residents and visitors.



An analysis was made of the relationship between recreational activity and environmental attitudes. In no case did participation in a sport or recreational activity provide a systematic basis for prediction of a favorable or unfavorable attitude to the power plant. The negative finding was unexpected. The actual type or quantity of recreational activity was unrelated to the acceptability of a nuclear plant. (From *"Socio-Economic Impact of Estuarine Thermal Pollution"*, 1974, Metro-Study Corp., Washington, DC).

WATER DISTRICTS IN CALIFORNIA

A study has been made of nine water districts in California to identify political and economic factors at work. The typical director was found to be a white male between the ages of 40 and 59 with a college degree, who is a business executive or professional. His vote is nearly 100 percent of the time in agreement with that of his board colleagues, and positive.

The employees of water districts can be divided into senior staff, i.e., general manager and those who report directly to him, and the rest of the staff. The senior staffer has a substantial degree of professionalism, is relatively well educated, and brings to the districts some considerable experience. For example, 75 percent of the senior staff had some college education, 56 percent had a four-year college degree, and 28 percent have done postgraduate work. In addition 87 percent had significant relevant experience before being employed by the district. One of the burning questions that have concerned observers of water districts is how democratic they are. Specifically, there is the question of how broadly based and representative is the participation in water district elections.

It was found that water district elections were extremely infrequent. Directors are more likely to be appointed than elected. A second finding was that voter turnout is usually light. In irrigation and water conservation districts voter participation is particularly low, i.e., 15 percent and 17 percent, respectively. On the other hand, public utility and municipal water districts have turnouts of 44 percent and 64 percent, respectively. In general, districts performing urban-type services have a higher voter participation than have dis-

tricts providing agricultural services.

A general conclusion is reached that voter participation in water districts is extremely narrow and limited.

The study asserts that enormous subsidies accrue to large landowners because construction of the distribution system in the district is financed by interest-free federal loans. Under Reclamation Law, interest-free repayments begin only after completion of the project and extend over 40 years. Major beneficiaries of the subsidy payments are likely to be large landowners, and especially those who avoid contributing to principal repayment.

But there are additional benefits to landowners, since federal irrigation water is available at lower cost than if it were provided through alternative sources. However, if large landowners are to benefit from the low-cost water, the owners of excess land must sign recordable contracts requiring them to sell excess lands at the end of ten years. Although the Reclamation Law was designed to preserve the family farm, there is much evidence that the administration of the Reclamation Law is such that the small farmer is not the major beneficiary of the lower water costs. (From *"Some Political and Economic Aspects of Managing California Water Districts"*, 1974, Institute of Government and Public Affairs, UCLA, Los Angeles.)

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Conserve lighting -- Clean bulbs and fixtures, used during the day only when natural light is not sufficient, and in the evening only when a room is occupied, help to conserve electricity. Fluorescent lights save both money and watts since they produce more light per watt and produce less heat.

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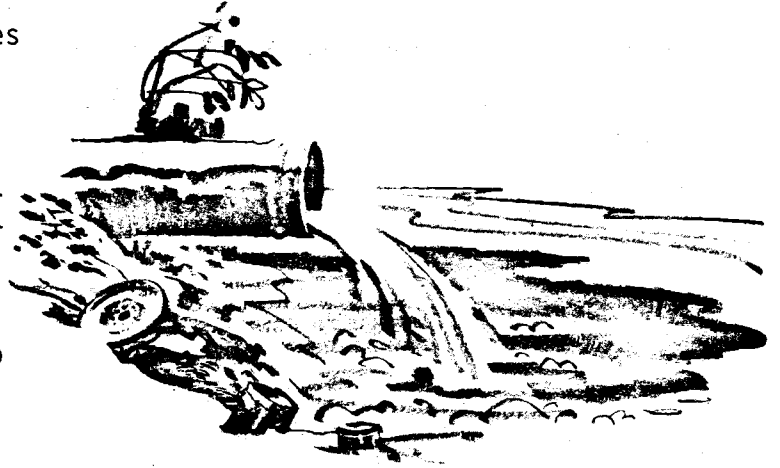
SEPARATION OF STORM AND SANITARY SEWAGE

The higher levels of sewage treatment being required to meet state water quality standards are making it increasingly important to keep groundwater, rainwater and clean industrial processing and cooling water out of the sanitary sewer system. That part of the sewer system connecting building plumbing to the public sewer is often a source of unwanted water unless the side sewers (building sewers) are built to conform to acceptable standards. In addition, unwanted water will be received if roof drains and other sources of ground or surface water are connected to the side sewers.

To assure proper installation of the side sewers, cities are requiring permits for sewer connections, establishing standards for the installation of side sewers, and inspecting installations for compliance with the standards. Standards for installation of building sewers are contained in the state plumbing laws. Plumbing and drainage installations in buildings (or serving buildings) must conform to state statutes and administrative regulations. ORS 447.020.

State plumbing laws require that portions of the drain system built to receive storm water be separate from the regular building drain system. See particularly, Administrative Rule sections 44-172, 44-230, and 44-232. State rules do not prohibit use of combined sewers where these are permitted locally, but the rules specify that a pipe in or near a building, carrying storm, ground or surface water, shall connect with the pipe carrying sanitary waste only at or outside the property line and at a point that is over 10 feet from the building. Such connection must be made with express permission of the city.

In the past, most cities have dealt with the matter of storm sewer connections indirectly rather than by direct requirement that certain areas be connected to the storm sewer system. As illustrations of the indirect provisions, it is common to prohibit the introduction of storm water into the sanitary sewer system, and it is common to prohibit the flow of water from private land across sidewalks. This leaves the property owner with the choice of 1) finding



some method of absorbing the storm water from his property on his own property, 2) making a connection to a storm sewer or 3) installing a drain line through the curb to the gutter in the street. (From "*Local Government Notes and Information*", No. 34, November 1974. Bureau of Governmental Research and Service, University of Oregon, Eugene, Oregon 97403.)

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Operate the kitchen range for peak efficiency. Well-designed cookware, used on the proper settings, helps to conserve energy. Never use the range as a space heater.

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REGIONAL GOVERNMENTS EXAMINED

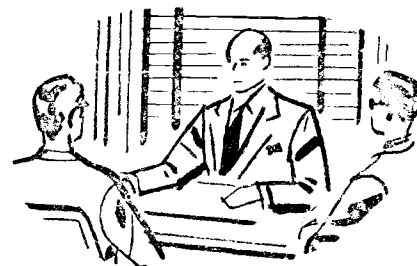
Regional governmental structures in the United States are governmental structures still in the process of evolving. Thus, it would be unwise to take the present structure as definitive, and plans to establish or encourage a particular kind of regional structure should consider the need for continued modification, according to a January 1974 report from EPA. A number of other observations are made.

The core of what are called regional governmental structures in the United States is the county, usually with a modernized structure and urban powers. There are no multi-county regional governments. The durability of county boundaries and the adaptability of the county to urban government appear to be the most practicable basis for metropolitan governmental reform in the immediate future. Although it has been offered as one model for metropolitan reform for many years, the multi-purpose multi-county special district does not exist in the United States for all practical purposes, and no example of such a district that was successfully operating major programs in a multi-county area was identified, the report states.

One of the more interesting and innovative developments in government in metropolitan areas is the Twin Cities Metropolitan Council, which is a state agency with authority over some multi-county special purpose agencies, but no authority over local governments in the area. This agency holds promise as a coordinating and issue-raising mechanism representing state and metropolitan-wide interests.

All of the regional governmental arrangements that were studied have the problem of not being able to make their boundary coincide with the boundaries of regional problems. The boundaries are a better fit than they are in those other metropolitan areas characterized by a multiplicity of municipalities, but the boundary problem is by no means solved.

Federal agencies interested in adequate regional organization at the local level should focus on obtaining a significant local commitment to regionalism. This requires local governments adequate to perform the functions needed at the local level. Politically, it appears most practical to build on the base of the urban county and the larger cities, both of which are structural elements in regional governmental arrangements accepted by the voters in the past twenty years. They can be the building blocks for a locally based regional council, strengthened by state legislation. Membership in the regional council would be compulsory; reporting of planned local activities to the council would be required, but participation in regional programs would be voluntary.



Taxing powers sufficient to sustain the council would be granted, so that it would exist independently of local contributions, and independently of federal funds. Within this framework, a local commitment to regional activities might become possible. But the final decision on local regional programs must remain with the local governments concerned if the region is to be meaningful to them. The region must be free to reject federal programs that offer support for local activities. The state might use the regional councils as agents for state enforcement, just as they now use counties and cities to enforce state regulations. But in any true local-based region, enforcement of federal regulations must work through the state or be done separately by federal officials. (From *"Regional Governmental Arrangements in Metropolitan Areas: Nine Case Studies"*. EPA 600/5-74-024, January 1974, EPA, Washington, DC 20460.)

WASTE FLOW REDUCTIONS FROM HOUSEHOLDS

A number of recommendations have resulted from a study of conservation of water in the home conducted by General Dynamics for EPA. In brief, the recommendations are:

1. In order to promote greater public awareness of both the need for and benefits of water conservation, as well as the availability of flow reducing devices for both toilets and showers, broad-based educational/demonstration programs should be considered in selected areas. The water saving customer education and appliance test program recently completed by the Washington Suburban Sanitary Commission is an excellent example of the utilization of both software (water saving handbooks) and hardware (toilet inserts, flow limiting shower heads, and inlet pressure reducing valves) in a comprehensive effort aimed at promoting water conservation by the general public. More demonstrations can serve to stimulate further development and mass production of water conservation devices.

In implementing such broad-based programs, a particularly fruitful approach might be to induce participation by the major toilet manufacturers in adapting one of their standard models for use as a dual cycle toilet. The development of such toilets would preclude any compatibility problems which may exist between certain toilet inserts and some of the current toilet models, provide much greater exposure for this approach to water conservation, and assure professional installation by an experienced plumber.

2. The extension of the wash water reuse concept to multiple family dwellings should be investigated in order to determine its potential attractiveness for water conservation and waste flow reduction. Reuse on a multiple-dwelling basis should be more economical than for a single dwelling. Scale-up of the system developed for single family dwellings should not only permit substantial reductions in both initial and operating costs, on a per capita basis, but also allow significant improvements in recycle system design and performance with minimal impact on total system costs. The need for installation of a separate distribution system for toilet flushing should not alter the economics in a decisive manner. All of the foregoing presumptions need to be assessed in the light of further detailed design and cost analyses. In addition, public attitudes toward the reuse of waste wash water on a communal basis will have to be further explored.

3. The results of this project show that reuse of waste wash water at the single household level for toilet flushing and lawn sprinkling can be applied successfully. Also the projected economics look marginally favorable for high user charge areas and where septic systems are flow limited. Further work on fixing the cost of a mass produced reuse system for **single family** dwellings could make the economics more favorable. It is therefore recommended that a larger-scale demonstration program be considered, for single family dwellings, which would incorporate as an initial phase the development and detailed costing of a prototype unit suitable for mass production. Such a program would (a) result in a cost and performance optimized system, (b) clearly establish the acceptability and safety of this approach to the homeowner, and (c) could lead to the availability of a marketable unit.

4. The previous recommendations regarding home water conservation are justifiable on the basis of cost savings to the individual homeowner. On the larger scale of net cost savings to the community, however, there may be more effective ways of conserving water and reducing waste flow. Technological concepts related to wide

scale reuse, reduction of infiltration and integration of utilities could be more important than home water saving. User attitudes and rate structures could also have a determining influence. It is therefore recommended that a broad study be made of the technological, economic, public health, aesthetic and sociological factors relative to water conservation and waste flow reduction, in order to determine where the most incentive exists for further research, development and demonstration. (From "Demonstration of Waste Flow Reduction from Households", September 1974, NERC, EPA, Cincinnati, Ohio, 45268.)

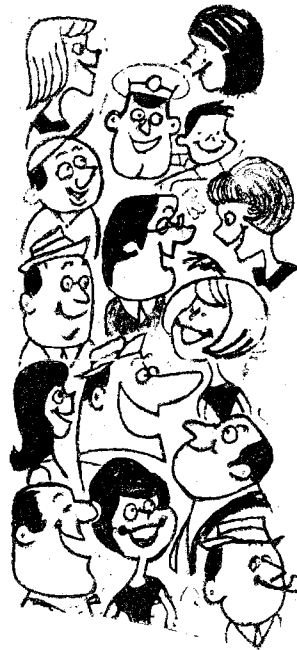
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WHO IS THE PUBLIC?

It has been recognized in communications research that there are many audience segments for communications. Similarly, the concept of market segments is used in marketing consumer and industrial products. The same concept applies in water resources planning; the public is not a unitary mass, but rather is comprised of many segments (publics) of the general public.

Identification of publics includes locating the publics, determining their interests and their social and demographic characteristics, and learning how to communicate with the various publics. Publics are identified not so much to yield a complete, comprehensive list of relevant publics so as to be considered representative of the entire general public, but rather to increase the range and richness of issues and concerns brought to salience in the planning process.

Techniques are divided into three groups, self-identification, third-party identification and staff iden-



tification. Self-identification is done through petition, appeal, public hearing, election, suit, protest, and publicity. These processes may be enhanced by staff efforts to provide structures for self-identification. Third-party identification is done by asking some person or group to identify those groups or individuals who should be involved in the planning process. Staff identification includes analysis of associations, geographic analysis, demographic analysis, historical and comparative analysis, the use of general lists, field interviews, and analysis of affected publics.

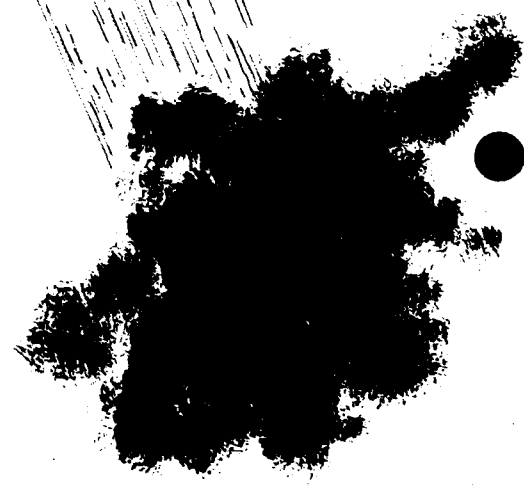
Assembling the various techniques into a package must be done with a view toward the planning situation, the persons doing the planning, and the social and cultural patterns of the area. No general procedure can be set, except that some combination of all three general approaches would probably be found appropriate, in almost all planning situations. (From "Identification of Publics in Water Resources Planning", ERC-1776, September 1974, Environmental Resources Center, Georgia Institute of Technology, Atlanta, GA 30332.)

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STATE LAND USE POLICIES

Citizens often expect more from governmental policies than is possible. This situation is likely to be true in the case of state-wide land use planning, according to two political scientists at Oregon State University. Their views are expressed in a November 1974 publication entitled "State Land Use Policies: Winners and Losers".

R. Kenneth Godwin and W. Bruce Shepard state that land use is determined by economic and social forces as well as governmental policies. In fact, governmental forces more often reflect these forces than control them.

The authors feel that economic and social interest groups participating in the policy process have not, and probably will not, produce the necessary political coalition to force implementation of priorities between the often conflicting goals of conservation and development. They foresee that "the accomplishments of state land use planning will be relatively modest". A situation may be produced in which the position of the lower, and the lower middle, classes will be further weakened as regulatory policies increasingly take on the characteristics of distributive policies. In particular, the availability of adequate housing for these persons may be severely reduced. Unless measures are taken to reduce this trend, Godwin and Shepard assert, the "progressive" state land use policies will further reduce the level of social justice in the society.

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