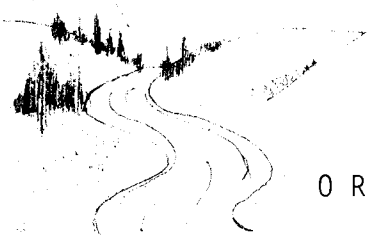
Oregon's Environment



OREGON STATE UNIVERSITY

Number 22

WATER AND COMMERCIAL CANNING

One of the most important operations in commercial canning is thorough cleaning of the raw foods. The procedures of cleaning vary with the nature of the food, but all raw foods must be freed of adhering soil, dried juices, insects, and chemical residues. This is accomplished by subjecting the raw foods to high-pressure water sprays while being conveyed on moving belts or passed through revolving screens. The wash water may be fresh or reclaimed from an in-plant operation, but it must contain no chemicals or other materials in concentrations that adversely affect the quality or wholesomeness of the food product.

Washed raw products are transported to and from the various operations by means of belts, flumes, and pumping systems. These involve major uses of water. Although the freshwater makeup must be of potable quality, recirculation is practiced to reduce water intake. Chlorination is used to maintain recycled waters in a sanitary condition.

Another major use of water is for rinsing chemically peeled fruits and vegetables to remove excess peel and caustic residue. Water of potable quality must be used in the final rinsing operation.

Green vegetables are immersed in hot water, exposed to live steam or other sources of heat to inactivate enzymes and to wilt leafy vegetables, thus facilitating their filling into cans or jars. Blanching waters are recirculated, but makeup waters must be of potable quality. Steam generation, representing about 15 percent of water intake, when used for blanching or injection into the product must be produced from potable waters free of volatile or toxic compounds. Syrup, brine, or water used as a packing medium must be of high quality and free of chlorine.

After heat processing, the cans or jars are cooled with large volumes of water. This water must be chlorinated to prevent spoilage of the canned foods by microorganisms in case cooling water is aspirated during formation of a vacuum in the can.

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Organize a cleanup campaign for your neighborhood, school, park or recreation areas . . . anywhere it's needed.

ZONING TECHNIQUES

There are new zoning techniques available which deal more efficiently with some of the problems of traditional zoning. Two of the most important are the planned unit development (PUD) and the special purpose district.

The PUD technique is seeing increased use across the country, particularly in communities at the urban fringe. Usually embodied as part of the local zoning ordinance, it provides increased flexibility for the design and siting of residential development. Under the PUD technique, the builder is permitted to aggregate the total density permitted for his tract into clusters of higher density development. The specific plan is determined through negotiation between the developer and the planning board, working within broad legislative guidelines. For the developer this results in savings in building costs. For the community, it preserves relatively large unbroken areas of open space (usually 10-20 percent of the total) and reduces many of the costs caused by typical sprawl development.

The PUD technique can apply equally well to luxury developments or moderate priced housing. Some of the most desirable housing in many communities is located in the PUD's where savings in housing costs are applied to better community facilities. Or the cost savings can be used to provide a greater diversity in housing to serve better the individual needs and economic capabilities of potential residents. Smaller units for elderly residents, for example, can be interspersed with larger residences.

The second innovative technique is the special purpose district. Like the PUD, the special district is typically a part of the local zoning ordinance, designed generally to give greater leeway in development and to break traditional zoning's inflexible focus on the single lot. Whereas the PUD is designed for new developments, the special purpose district generally is created to protect existing desirable uses in particular areas of social, cultural, or historical importance that are threatened by pressures for redevelopment. The special purpose district is subject to controls on design and use, and it provides various incentives and bonuses to complying developers.

The technique has been used most often in the preservation of historic districts, such as New York City's Greenwich Village. But it has found application as well in other areas of that city, where it has helped to revitalize the Broadway theatre district, to encourage the continued existence of luxury shops along Fifth Avenue, and to preserve low income housing.

Special purpose districts and PUD's attempt to come to terms with the problems and potentials of a specific area. Both techniques grow from a recognition that normal zoning ordinances are often too clumsy to deal with the delicate process of preserving and enhancing environmental quality.

(From *"Environmental Quality"*, Fifth Annual report to the President by the CEQ, December 1974.)

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Use public transportation. Ride a bicycle or walk to school or work. Why ride when you can walk?

IRRIGATION RUNOFF

Agricultural experts are doubtful that irrigation runoff can be "managed" as called for in the Clean Water Law, P.L. 92-500. This was the prevailing sentiment expressed in a March 13 meeting held in Salt Lake City for the benefit of Western irrigation specialists and federal pollution authorities.

Under the law, the runoff from irrigation is to be managed differently from other agricultural runoff. It is to be classified alongside "discharges" from cities and factories. The consensus was that the framers of P.L. 92-500 did not understand why there are conditions which make this highly difficult, if not impossible, to achieve. The experts doubt the practicability of reaching a uniform "best practicable treatment" for irrigation runoff because of:

...the variety of soils, crops, terrain, climate, and receiving features (from major rivers to intermittent streams) which affect the utility of "discharged" irrigation waters.

...the co-mingling of irrigation water with other waters--both surface and underground--before it becomes navigable water.

...the legal relationship between entities which contract to deliver irrigation water and the users who individually influence the "discharge of pollutants."

...the huge variations in volumes of water handled, the number of points at which measurement and sampling would be required, and the unknowns about what constitutes contaminants as the "integrity" of water changes in and over ground.

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POLLUTION FROM OVERFLOWS

Control and/or treatment of stormwater discharges and combined sewage overflows from urban areas are problems of increasing importance in the field of water quality management. Over the past decade much research effort has been expended and a large amount of data has been generated, primarily through the actions and support of the U.S. Environmental Protection Agency's (EPA) Storm and Combined Sewer Research and Development Program. A recent study presents selected results of a comprehensive investigation and assessment of promising, completed and ongoing projects, representative of the state-of-the-art in abatement theory and technology; a look at recent legislation; and the identification of program needs and emphasis.

Combined sewer overflows are major sources of water pollution problems, but even discharges of stormwater alone can seriously affect water quality. Current approaches involve control of overflows, treatment and combinations of the two. Control may involve maximizing treatment with existing facilities, control of infiltration and extraneous inflows, surface sanitation and management, as well as flow regulation and storage. A number of treatment methods have been evaluated including high rate screening and microstraining, ultra high rate filtration, dissolved air flotation, physical/chemical treatment, and modified biological processes. A swirl flow regulator/solids separator of anular shape construction with no moving parts has been developed. High rate disinfection methods including new disinfectants have been applied.

Promising approaches involve integrated use of controls and treatment. The most disappointing have generally lacked flexibility in their operation and design. Mathematical models have been developed and successfully applied at multiple levels of sophistication and complexity. (From *"Countermeasures for Pollution from Overflows"*, EPA-670/2-74-090, December 1974. EPA, Cincinnati, Ohio, 45268.)

CREEKS NEED PROTECTION

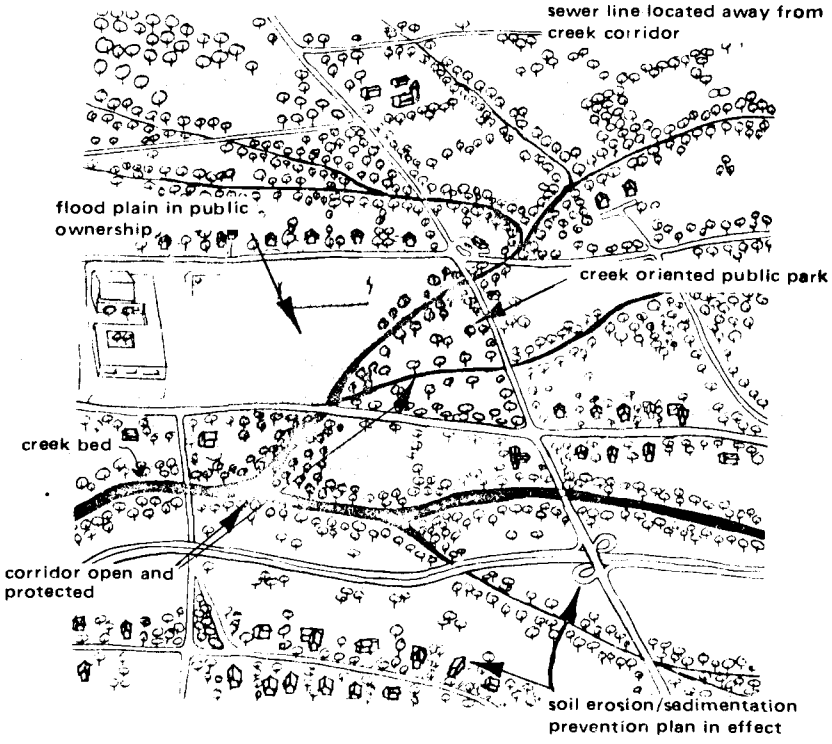
Creeks are the natural sub-units of a larger watershed and, in general, provide many social, economic, and environmental benefits to humans. They are crucial environmental service delivery systems which must be used wisely and protected. A Michigan research project examined small, urbanizing creeks (or "creeksheds") and the relationship between land use decisions in such land areas and their effects on the benefits provided by the stream. A method was developed for integrating water resource considerations into the activities of local planning and management institutions in small urbanizing watersheds. The method involved:

1. Information exchange between project staff and members of communities within an identified creekshed.

2. Use of opinion leaders in the creekshed communities as the barometer of community sentiment. This group included many who were influential in determining policy directions of units of government in the creekshed. Opinion leaders consisted of local government elected officials and legislators (e.g., trustees, councilmen), appointed officials (e.g., planning commissioners), and selected citizens and property owners who were active individually or through citizen groups in community affairs.

3. Tailoring the content and emphasis of material presented to the unique conditions in the community and the concerns of community residents and officials. This took the form of identifying problem areas as they are seen by local residents, from the inside.

4. Keeping the material simple, emphasizing only the most important concepts, presenting them in clear concise language, and avoiding information overload on those asked to respond to issues raised. The method also was keyed to simplicity by utilizing only generally available data and analytic and display techniques.



However, the researchers discovered forces which cause a degrading effect in terms of lost benefits and problems generated in the watershed. Several factors emerge as relevant:

1. No centralized management programs are undertaken on a small watershed basis.

2. Creekshed benefits are usually not recognized as urbanization occurs in an area.

3. Many single purpose agencies (local and state) affect the creek environment and its benefits.

4. Creeksheds (i.e., the small watershed scale) are not the concern of any one particular governmental entity. They are too small for state or regional concern. They have not been viewed as within the purview of a local jurisdiction.

5. Water pollution control laws apply to creeks and streams but noxious pollution is not usually the major problem as urbanization proceeds. The difficulty lies more with aggregate impacts of many separate land use changes over time and in different locations in the creekshed.

6. The effects of land use changes may become evident only after a long time lag. Establishing neat cause-effect relationships that can support policy decisions may be difficult.

(From *"Protecting Creeksheds"*, December 1974. Huron River Watershed Council, 415 West Washington Street, Ann Arbor, Michigan, 48103.)

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MOSQUITO PRODUCTION

All types of water resource projects--such as impoundments, transport systems, channelization, and agricultural developments--have a potential impact upon insect production and insect-borne diseases. This was the essence of a recent warning issued by the Department of Health, Education, and Welfare (HEW). In particular, attention is called to the absence of evaluation of the effects of a proposed watershed project upon mosquito problems.

The planning, construction, and operational phases of water resources projects should include provisions for minimizing mosquito or other arthropod production so as to reduce the risk of vector-borne diseases. The principles and standards for planning water and related land resources established by the Water Resources Council became such a legal requirement in October 1973 (Federal Register Vol. 38 (174) Part III, September 10, 1973), and includes specific mention of mosquito populations when measuring the effects of such projects upon life, health, and safety. Their implementation would avoid situations where such severe mosquito problems seasonally render agricultural, recreational, and even urban areas virtually unusable because of the hordes of mosquitoes and biting flies that have resulted from the lack of insight in planning for vector prevention.

Only a few states have vector control specialists, and the major federal water resources agencies apparently do not have personnel trained in methods for evaluating the potential beneficial or adverse effects of water resources projects upon mosquito or other vector populations. Furthermore, such agencies (e.g., Army Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, etc.) usually do not include in environmental impact statements mention of the potential effects of water resources projects upon vector-borne diseases. Almost every such project has been shown to contribute towards mosquito production. Unfortunately, the people in the vicinity pay the price for mosquito control (or the lack of it) in one way or another, even though the knowledge and technology is available to avoid the creation of such problems.

HEW is involved in determining the impact of water resources projects upon vector-born diseases. However, limited staff and budget permit only a few site

visits each year, to provide general guidelines for the prevention and control of vector-borne diseases that occasionally are requested for some of the projects. Planning for preventive and naturalistic control measures for avoiding vector problems, because of the increasing restrictions upon insecticide usage, the temporary nature of chemical control, and the long-term expense of pesticide control methods, is an essential aspect to be considered.

It has been estimated that there are about 18 1/2 billion dollars worth of authorized but unfunded water resources projects within two government agencies. When one realizes that each state probably has several such projects in the various stages of planning, construction, and operation, it is apparent that some action is needed to organize, support, and coordinate activities for developing and incorporating the technology for preventive vector-borne disease measures into water resources development projects.

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WATER MODEL DEVELOPED

A dynamic water model has been developed for the Council on Environmental Quality (CEQ) by the Systems Research Center at Case-Western Reserve University. It was designed as a tool to (1) assess the available supply, use, and fate of water resources, (2) answer questions concerning the impacts of population growth, economic development, and various management practices on water systems, and (3) indicate the influences of water scarcity on the growth and development of human society.

It is basically a model of the hydrologic cycle, analyzing both water supply (from precipitation, groundwater, surface water, oceans, and water recycling) and demand for domestic, industrial, agricultural, and cooling uses.

It has been used to project, for the United States and Latin America, man's need for and impact on water availability under alternative future scenarios. The scenarios are based on different assumptions about population and economic growth, water management, and other important variables. The projections have analyzed the future adequacy of domestic, agricultural, industrial, and power plant cooling, as well as the effects of desalination and various strategies of land management, artificial augmentation of precipitation, and wastewater reuse.

Modeling of global and regional ecosystems is a new focus of intellectual inquiry and one which is highly complex. The construction of models requires vast amounts of data and careful validation and testing, and as yet their results can only be considered preliminary. But such models are promising tools for comprehending the complex interactions of global systems, and it is important that efforts to improve and validate them continue to go forward.

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MAKE THE MOST OF YOUR HEATING AND COOLING SYSTEMS. A well-insulated home or apartment, plus equipment that is clean and well-maintained, are important. In addition, draw the blinds or drapes on windows to keep the sun out in summer and the cold out in winter.

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Write your Congressman. Make your feelings known on bills affecting the environment.

LAND DISPOSAL OF WASTEWATER

Land disposal of wastewater was the subject of a year-long research study in Missouri. During this period, emphasis was placed on the potential development of land disposal wastewater treatment sites within the St. Louis Standard Metropolitan Statistical Area. The phases covered were:

1. A thorough understanding of the background of land disposal of wastewater was developed.

2. A land-use forecasting model, previously developed for the U. S. Army Corps of Engineers, was used to make forecasts of potential land disposal wastewater management sites, for the St. Louis Standard Metropolitan Statistical Area, over a fifty year time horizon. A set of nineteen potential sites was delineated.

3. Technical and cost/benefit data was collected for each of the potential land disposal wastewater treatment sites.

4. A mixed-integer programming model was derived, using all of the data collected for the potential land disposal wastewater treatment sites. This model was then structured in computerized form.

5. The computerized version of the mixed-integer programming model was solved, using IBM's MPSX(MIP) software package.

6. The solution to the mixed-integer programming model was then used as the basis for a regional plan for land disposal wastewater treatment site development, over the fifty year time horizon.

The findings indicated that a regional plan for the development of land disposal wastewater treatment sites could be derived, using a mixed-integer programming methodology.

(From *"A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment"*, December 31, 1974. University of Missouri-St. Louis, St. Louis, MO.)

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Editor's Note: One of the principal purposes of this newsletter is to bring to your attention research efforts and reports regarding environmental matters. We provide complete addresses for the sources of the publications so that you can write for a copy if you desire. If you seek information regarding research efforts in a particular problem area, drop us a line and we will attempt to be of service.

Oregon State University
WATER RESOURCES RESEARCH INSTITUTE
AIR RESOURCES CENTER
Covell Hall 115
Corvallis, Oregon 97331

SEDIMENTATION STUDIED

A study has been completed in Illinois on the problem of controlling sedimentation. Alternative policies for reducing the level of erosion and sedimentation are evaluated with a linear programming analysis of farms in a selected watershed. Three conservation practices and three tillage practices are considered in combination with six crop rotations on approximations of nine actual farms located in representative sections of the watershed. The impact of these practices on crop production costs and yields is considered, as is the impact on the off-site damages to the drainage system and the reservoir. Policies considered included subsidization of the cost of adopting conservation practices and subsidies to induce removing land from production, several forms of regulations and an effluent tax. Where appropriate the policies were analyzed assuming implementation at both the watershed and the farm level.

This analysis indicates that soil conservation practices should be increased substantially in order to reduce the gross soil loss in the watershed from over 20 to approximately 6 tons per acre per year. This reduction is most efficiently accomplished by modifying conservation practices, tillage practices, and crop rotations. An important finding is the indication that several alternative policies can be applied at either the watershed or the farm level and without regard to the farms' proximity to the reservoir, with very little difference in results. (From *"Evaluation of Agricultural Policy Alternatives to Control Sedimentation"*. Research Report No. 99, University of Illinois, Water Resources Center, Urbana, Illinois, 61801.)