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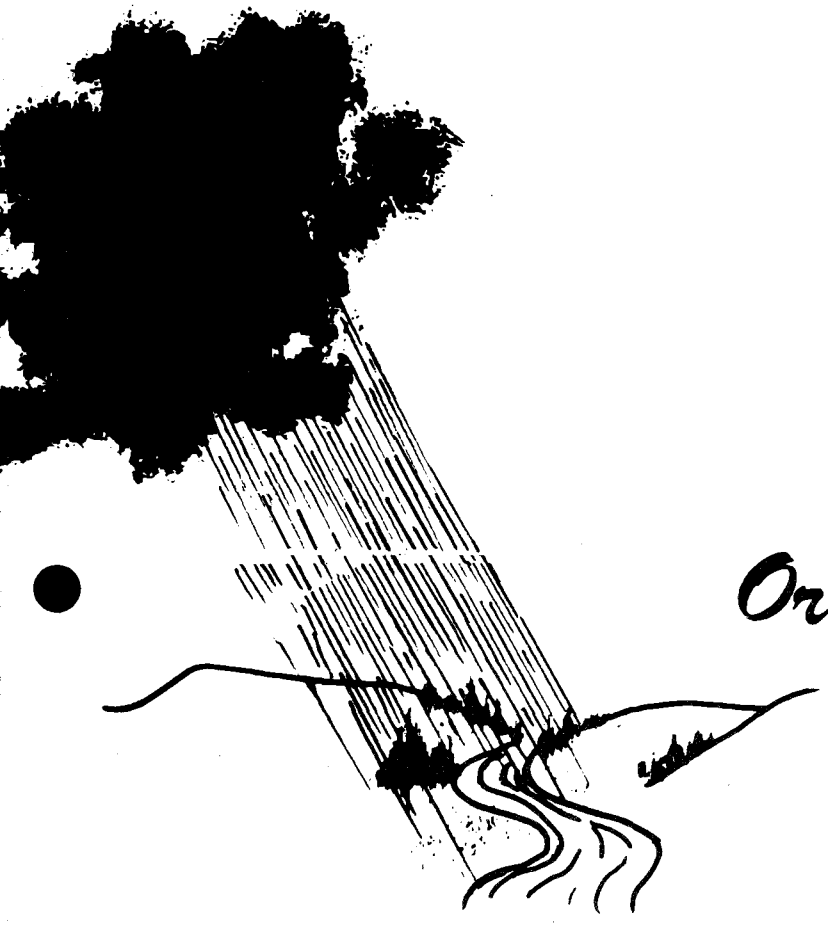

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REGIONAL RESEARCH NEEDS

Seven major regional issues and related research needs have been identified by the Pacific Northwest River Basins Commission in coordination with the directors of the Northwest water institutes. The issues are identified as: (1) How should the Columbia River system be managed?; (2) How can the electric energy needs of the region best be met? (3) How can the loss of the unique fish resources of the region be avoided? (4) What is the proper role of water conservation?; (5) How should the region's land resources be managed?; (6) What aspects of the natural environment require protective measures?; and (7) How can institutional arrangements be improved?

These issues and needs are being considered in current efforts by the Commission to develop a comprehensive, coordinated joint plan for the northwestern states.

STREAM PROTECTION COSTS

What is the cheapest way to protect streams during logging? Dennis Dykstra and Henry Froehlich, Department of Forest Engineering, OSU, compared three alternatives: conventional felling with channel cleanup, cable-assisted directional felling, and buffer strips. These alternatives were tested on ten deeply-incised headwater channels in Western Oregon. None was clearly cheaper than the others on a majority of study areas; topography and timber type influenced which was cheapest.

Preliminary analysis revealed that buffer strips averaging 150 feet in width were never the cheapest, but on four of the 10 study units, buffer strips averaging 55 feet wide resulted in the lowest cost. Cable-assisted directional falling was cheapest on three units where timber breakage was at least 10% less than for conventional falling. Conventional falling and a stream cleanup was preferred on three of the study units.

Stream cleanup cost studies by Dykstra were compared with values provided in interviews with 20 western Oregon loggers. The results compared favorably and lead to the formation of a rule-of-thumb that stream cleanup by hand costs $60.00 per ton of debris per 100 feet of channel. The average debris removal by hand cleaning was estimated to be 5 tons per 100 feet of channel.

Although no published results of this study are available now, a publication will be announced by the School of Forestry, OSU.

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The subject of Indian hunting and fishing rights is one which is causing an increasing number of problems for the State of Oregon.

CALIFORNIA PLAN

After a decade of struggle by environmentalists, California has passed a comprehensive coastal zone management law designed to protect its coastline from over-development. The legislation signed into law August 23 may well serve as a model for other coastal states faced with similar resource management problems, according to "Conservation News", Oct. 15, 1976, National Wildlife Federation.

The bill establishes a state Coastal Zone Conservation Commission, with six regional commissions composed of citizens and local government officials. The commissions will establish goals and policies regarding development, public access, recreation, protection of the marine environment, appearance and design, and will have veto power over all development schemes proposed along the 1,072-mile coastline. These policies will apply to coastal zones extending 1,000 yards inland and to certain inland intrusions, such as estuaries, wetlands, or natural development areas which extend back to mountain ridges.

The law is considered by many to be one of the most comprehensive land-use management measures in the nation, and purports to protect some of the state's most scenic and unusual natural resources from unwise development.

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LAKE RESTORATION

Commonwealth Lake, in Washington County west of Portland, is under consideration along with other Northwest lakes for federal funds. EPA has a program designed to turn some polluted lakes into playgrounds for water-oriented recreation. All of the lakes require dredging to remove nutrients and sediment, and some need engineering to change water levels and control concentrations of phosphorous by alum treatment.

FUTURE WATER ISSUES

What will be some of the central issues regarding the future of water resources in the West? The following forces and factors have been identified in a publication by the Virodyne Corporation:

1. New Supplies. New projects will be built as an extension of past policies, related to perfection of water rights in order to accommodate new growth in various regions.
2. Reallocation. New urban and industrial growth will probably be accommodated by transfers of water from agriculture when "new water" is not adequate.
3. The Allocation System. The water rights system will continue to be the mechanism for allocating water. Water has been too well-recognized as a scarce socially-important resource belonging to and controlled by the state to permit a pure market system as a substitute.
4. Federal Reserve Water Rights. Pressures will increase to test the concept of federal reserve water rights. Motivations for this relate to the federal government's role in such larger social issues: a) maintenance of minimum streamflows in National Parks and National Forests for preservation of natural scenic and ecological values; and b) the attainment of social equity by Indian tribes.
5. Environment. Environmental and growth questions will continue to be key constraints on further water resources development. Existing laws will continue providing for interdisciplinary approaches, evaluation of secondary effects and consequences, full disclosure and public participation. Both the National Environmental Policy Act and the Water Resources Planning Act will continue as major forces. Questions relating to the basic wisdom of new projects will come about, as will also debates as to how a project is to be built.
6. In-Stream Use. The concept of in-stream beneficial use will be expanded to other states--and strengthened. Again, the water rights system will be the mechanism. Senior water rights will be purchased or even perhaps donated in order to maintain minimum streamflows.
7. Energy. Unless technological breakthroughs appear shortly, energy producers must find ways to acquire water rights for oil shale, coal, and coal gasification projects.

The existing trends and forces in the region will determine the future character of the area. Whether existing urban areas are to grow still further, whether the remaining rural West is to be transformed by further urban expansion and energy developments will be also significantly determined by the availability of water and by how it may be reallocated among competing and conflicting demands. (From *"Technology Assessment for New Water Development Projects"*. August 1976. Virodyne Corp., 5601 S. Broadway, Suite 400, Littleton, CO 80121)

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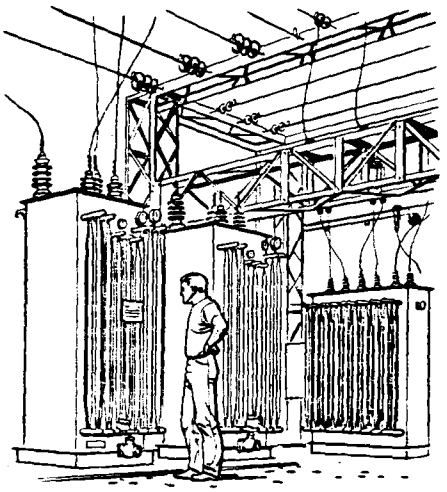
In the past 27 years, researchers have made significant progress in understanding the complexities of the Alaskan forests. The research picture is by no means complete and perhaps never will be. However, the gaps in basic understanding of the ecosystem are gradually being filled in.

IRRIGATION AND ENERGY

The development of the energy crisis has resulted in close monitoring of depletable energy resources in the United States. Within the agricultural sector, irrigation is a large consumer of energy, with the potential of using several times more energy than all other agricultural field operations. A better understanding of how energy is used by different irrigation systems could facilitate more efficient use of energy by one of the largest energy consumers in agriculture. Research has been conducted on campus to develop more data in this area.



The study which resulted attempts to evaluate realistically the total amount of non-renewable energy resources consumed in the irrigation process. Five portable and permanent sprinkler system types, plus trickle and gravity irrigation systems, were studied. An evaluation of the energy required to manufacture, install, operate, and transport the equipment for an entire irrigation season was included in the analysis. This evaluation was conducted in a variety of operating situations, with varying acreages, consumptive use rates, and total irrigation requirements.

The evaluation of energy consumed by irrigation systems presented in this study was made with the use of a simulation model developed on the Oregon State University OS-3 Computer System. The model predicted energy requirements of an irrigation system by calculating pumping energy from basic hydraulic equations and manufacturing energy from the amounts of basic materials composing the irrigation system. Energy for installation and for field transportation were evaluated by simulating methods of operation and management used in Oregon. Input parameters used in the modeling process closely reproduced operating conditions encountered in Oregon. System types, component depreciation life, irrigation efficiencies and the range of irrigation requirements were ones that could typically be found in Oregon.

For the situations considered, gravity irrigation required substantially less energy than other system types. The energy needed for drip systems was about midway between the energy requirement for gravity and sprinkler systems in most cases considered. The relative order of energy requirements for the various sprinkler systems was dependent upon the prescribed operating conditions.

Research was accomplished by Robert B. Wensink, John W. Wolfe, and Michael A. Kizer -- all of the Department of Agricultural Engineering, Oregon State University. The publication is entitled *"Simulating Farm Irrigation System Energy Requirements"*, WRRI-44, dated August 1976.

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CHETCO RIVER STUDY

A study has been completed recently on the Chetco River in Oregon. The purpose of this study was to provide an understanding of the interrelationships between fresh and salt water circulation, tidal transport and flushing patterns in the Chetco River estuary and its boat basins. The work was conducted under the Ocean Engineering program at Oregon State University with support provided by the Port of Brookings and the Sea Grant Program at OSU.

Field work and water quality measurements were conducted at the entrance of the Chetco River during 1975 and 1976. These results were used for classifying the estuary and for developing and verifying both numerical and physical models.

A one-dimensional numerical model was successfully used to simulate the tide and currents of the Chetco River. The model was calibrated prior to the recent (1976) port expansion and was used to predict the expected changes in tidal response due to the enlargement of the tidal basin. Subsequently, analytical and physical models were applied to predict the flushing ability of the new boat basin. Attempts were made to use a two-dimensional finite element numerical model for calculating currents and simulating the circulation in the boat basins. Results were compared with those taken during seasonal field studies.

Analytical models were found to be economical and effective for estimating the flushing rate in small marinas, when applied with caution. Application of numerical models to small basins seems somewhat impractical because of grid size detail and computational costs. When studying the flushing characteristics of proposed marinas, a reduced-scale physical model is considered to be a most effective tool. For prototype considerations, field studies can be most instructive in providing information for decisions regarding the flushing characteristics of marinas.

The study results show that the Port of Brookings marina flushing ranges from four to eight tidal cycles (two to four days). The new marina flushing rate depends on the range of tide and the strength of the ambient river currents. Water quality studies indicated that the Chetco River area has satisfactory water quality throughout all seasons; the only possible exception being when continuous dry summer months might occur along with high recreational use of the marina. (From *"Chetco River Tidal Hydrodynamics and Associated Marina Flushing,"* Ocean Engineering, OSU)

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COLUMBIA RIVER

The Oregon Department of Fish and Wildlife is planning to introduce a measure regarding the Columbia River for consideration by the 1977 Legislature. This proposal would repeal the existing compact law between the states of Oregon and Washington and, pending ratification by Congress, substitute a compact that would include the state of Idaho. The three states would jointly set recreational and commercial fishing rules on the main stem of the Columbia River to its confluence with the Snake River and on the main stem of the Snake up to the Salmon River.

Each state would have one vote except that Idaho could vote only on rules which might have a substantial impact on anadromous fish destined for Idaho waters. Membership from the three states would include: Idaho Dept. of Fish and Game, Oregon Dept. of Fish and Wildlife, Washington Dept. of Fisheries, and Washington Dept. of Game.

POWER PLANTS ON THE COAST

A recent publication addresses itself to the problem of siting power plants on the coastal zone. Field methods, data analyses, and calculations are presented exemplifying procedures for oceanic dispersion prediction as a tool for forecasting power plant effects on the coastal zone.

Measurements were made of dye, drogues and temperatures near Pilgrim Station's discharge (Plymouth, Massachusetts), and of currents and other variables across Masachusetts Bay. Analysis of current data illustrates separation of tidal, wind-driven and inertial constituents and their significance for dispersion. Dye and temperature dispersion are compared with the currents study, and diffusion coefficients estimated.

Current data from coastal sites (New Jersey and Massachusetts) are analyzed to determine field requirements for dispersion estimates. Methods to calculate expected precision of estimates based on brief current records are developed. Use of historical wind data to generalize current statistics from shore records is shown. A procedure is recommended to synthesize current data preserving observed current statistics for model calculations and study of infrequent events.

Model calculations predicting dispersion based on observed ocean currents are described. Formulae are derived to estimate the spatial distribution of impact from a discharge. A numerical model to calculate discharge dispersion in more detail is discussed and used to study time variations of discharge effects. Model predictions are compared with field observations. (From *"Forecasting Power Plant Effects on the Coastal Zone"*. EG & G, Environmental Consultants, 196 Bear Hill Road, Waltham, Mass. 02154)

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ZONING ORDINANCES

Traditionally, the municipal method for regulating growth has been through zoning ordinances. Technically, zoning is a land-use control; it is one means that governments use to regulate private land and building development within their jurisdictions, according to a U.S. Department of the Interior study.

Typically, States adopt enabling legislation permitting municipalities to perform the zoning function; local governments are sometimes empowered to undertake zoning through home-rule charters. Zoning is made law through the adoption of a zoning ordinance by the local government, which may amend it as well.

The normal zoning ordinance divides the jurisdiction of the local government into zoning districts; e.g., residential, commercial, industrial, public facilities, agriculture, etc., and then sets forth for each district the types of land uses which are permitted or prohibited in that district. Sometimes the districts are further defined to indicate, for instance, the housing densities which are permitted in different kinds of residential districts, the various types of businesses which are permitted in different commercial districts, or the types of industries permitted in different industrial districts.

(Continued→→)

The practice of using local zoning ordinances as the primary land use control has recently come under strong attack.

Land development controls such as zoning are useful chiefly to carry out a specific set of development policies. Without effective application of a clearly formulated set of policies, the usefulness of zoning is severely limited. It is further impaired by the buffeting it receives as a result of society's reluctance to establish the primacy of the public interest over that of the private interest. Locally applied zoning simply cannot withstand the impact of market forces which are generally regional and sometimes national in character. And many American localities suffer from an appalling lack of quality in zoning administration.

There are many abuses and inadequacies in the zoning methods. However, despite its drawbacks, zoning will be the decisive land use force in the long run. This likelihood means that change must be sought in the zoning scene. (From *"Protecting Nature's Estate: Techniques for Saving Land"*. December 1975. Superintendent of Documents, U. S. Govt. Printing Office, Wash., D.C. 20402. Price $3.25. Stock #024-016-00082-0.)

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WILLAMETTE STUDY

A study conducted by an Oregon State University research team has been published by EPA under the title "Restoring the Willamette River: Costs and Impacts of Water Quality Control". It represents the first phase of a continuing analysis of what it took to turn the tide of pollution. The expectation is that the data and conclusions will prove helpful on a nation-wide basis where river systems need to be restored. Team members were E. Scott Huff and Peter C. Klingeman of civil engineering; Herbert H. Stoevener of agricultural and resource economics; and Howard F. Horton of fisheries and wildlife. The report, designated EPA-600/5-76-005, September 1976, is available through the National Technical Information Service, Springfield, Va. 22161.

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SEWER FUNDS

Among recent grants made by EPA were three awards totaling more than two-and-one-half million dollars to recipients in southern Oregon to help them get started on the construction of improved sewerage service. The largest of the three grants--$2,185,481 --was awarded to the Redwood Sanitary Sewer Service District in Josephine County. Most of the Federal funds will go toward the actual construction of a new treatment plant and interceptor, with some of the money used to reimburse the district for planning and design costs. In Douglas County, EPA awarded $411,942 for the development of plans and specifications for upgrading the Green-Winston sewerage system, and $92,134 for facilities planning for metropolitan Roseburg. Other grants awarded by EPA include:

ALASKA. Haines, $17,895; Cordova, $15,000.

IDAHO. Meridian, $128,625.

OREGON. Hermiston, $105,284; Unified Sewerage Agency of Wash. County $79,500; Clatsop County,$24,075; Umatilla, $19,875; Hammond, $18,975; Yamhill, $10,823; Monroe, $10,338; Arlington, $7,440; and The Dalles, $5,625.

WASHINGTON: Long Beach, $30,619; Colville Confederated Tribes, Nespelem, $18,675; Jefferson County, $14,880

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RESEARCH ON WETLANDS

While coastal zone management legislation pertains, in part, to the protection of coastal wetlands, a broader concern for the integrity of wetlands is incorporated in Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Under this section, the Army Corps of Engineers may issue permits for the discharge of dredged or fill material into navigable waters at specified disposal sites. Guidelines for the specification of disposal sites are to be developed by the Administrator of the EPA in cooperation with the Army Corps of Engineers. Furthermore, the Administrator in cooperation with the Corps is authorized to prohibit the specification of any defined area as a disposal site and to deny or restrict use of any defined area for specification as a disposal site when he determines that material discharged will have an unacceptable adverse effect on municipal water supplies, shellfish beds, fishery areas, wildlife or recreational areas.

In order to implement its role in developing guidelines for the discharge of dredged and fill material and the specification of restricted disposal sites, EPA in cooperation with the Corps must be able to define areas considered as contiguous wetland to a navigable water and therefore an area contributary to the general productivity of the estuarine system.

To aid in this task, Dr. Robert E. Frenkel, Department of Geography, OSU, has been awarded $48,632 by EPA to conduct an 18-months study on wetlands in Oregon and Washington. General purpose is to determine the pattern of vegetation in the transition zone between intertidal marsh and upland vegetation with the ultimate goal of providing data upon which guidelines may be based for the specification of coastal wetlands.

Approximately 15 marshes in coastal estuaries and the Puget Sound will be selected based on a classification and criteria developed in the project. Selected marshes will be sampled floristically using line transects in order to determine marsh zonation patterns. The transition zone will be characterized by floristic analysis including, but not limited to, ordination and Braun-Blanquet tabular analysis. Vegetation criteria for defining the upper and lower boundaries of the transition zone will be developed and will be validated by application to other intertidal marshes in Oregon and Washington. Selected environmental measures will be taken including salinity and substate texture. Coordination with the National Ocean Survey, providing leveling to datums, and with the Environmental Protection Agency Remote Sensing program, will extend the value of this research. Pilot research in defining upper limit of marsh in four Oregon intertidal marshes is underway. Proposed research will involve the principal investigator and three assistants.

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Bangor, Maine, is turning sewage sludge into compost for use as a soil conditioner and mulch on the city's parks, municipal golf course, and other public lands. In the composting process, which was developed by USDA, sludge is mixed with waste wood bark and wood chips to create air spaces in the mixture. The mixture is then piled on two parallel sections of four-inch perforated pipe which are attached to a blower. The blower draws air through the pile and the oxygen stimulates growth of high-temperature. The high temperature kills all disease-bearing bacteria.