

OREGON STATE UNIVERSITY

October 1972

Number 8

RURAL PROBLEMS

A recent national conference on rural development and strategies for regional councils developed the following ideas:

. . . Problems of Local Government - Small town and country government is faced with severe operational and financial problems. These problems are compounded by the proliferation of special districts. As a partial remedy, special districts should be consolidated into regional agencies (e.g. multi-county water districts) and coordinated with the umbrella regional council. In addition, the federal government should take a systematic look at the problems, organization, interests and needs of local government in rural areas. Those states without a strong technical assistance program for local government should adopt one. There was a general agreement that the consolidation of counties, some small municipalities, and counties with their municipalities would come in time.

. . . Inadequate Public Services - Local government expenditures per person in many rural jurisdictions are disproportionately high for frequently inadequate levels of service. Regional councils can enable local governments in these areas to combine resources and promote a higher level of services at reasonable cost.

. . . Funding for Regional Councils - Larger and more flexible grants to assist community development are needed by regional councils.

. . . Funding Incentives - New sources of credit and incentives are needed to stimulate industrial development in rural areas.

. . . Assistance for Site Development - Some type of package financial assistance from the federal government is required to enable regional councils and the local public and private agencies working with them to put together a complete industrial site development, including land purchase access roads, and utilities.

(From Regional Community Report, No. 18, December 1971 - January 1972).

PLASTIC POLLUTION

Scientists are examining some compounds found in plastics because of recent evidence that these materials may be harmful to human beings. The compounds are called phthalate esters and the principal one used is the di-2-ethylhexyl phthalate, or DEHP for short.

DEHP is widely used in plastics to include pipes and building materials, bio-medical devices, floor tile, paint, shoes, upholstery, and a variety of other purposes. Apparently, it escapes from some of these products. It has proven to be a real problem in space craft, and contamination has been detected in blood and blood products from banks which store blood in pastic bags. The phthalate esters have been found in water, soil, and of course in air. However, the biological significance of all this has not been established.

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WORLD - WIDE PROBLEMS

The National Wildlife Federation took a poll of 18 leading world ecologists at the recent UN Conference in Sweden and discovered that the major environmental problems facing the world are:

- 1) Too many people, creating impossible demands on all natural resources.
- 2) Pollution of waters of the world with far-reaching effects on human health, marine and freshwater fisheries, economic and aesthetic values.
- 3) Pollution of the air, with resultant diseases and maladies for man and animals, as well as pollution of the atmosphere by noise.
- 4) Absence of really significant, long-lasting research on food production.
- 5) Lack of workable programs to protect endangered wildlife species.
- 6) Inability to limit indiscriminate use of persistent toxic substances.
- 7) Inability to recycle valuable raw materials effectively.
- 8) Failure to research and plan for alternative sources of energy.
- 9) Inability to invest wisely public and private monies that are available to improve the general environment, both physically and aesthetically.
- 10) Inability of nations and their political subdivisions to develop workable systems of control and cooperation in ecological matters, and difficulty in establishing effective ecological programs.

RESEARCH HONORED

A research publication from Oregon State University has been selected to receive an annual award from the American Agricultural Economics Association as one of the outstanding research projects completed during 1971. The research was conducted by Dr. Emery N. Castle, Dr. William G. Brown, Bruce Beattie, and Ward Griffin. The report, entitled "The Economic Consequences of Interbasin Water Transfer", detailed the findings from a three-year study of the many factors involved in proposals such as those suggesting diversion of Northwest water to the Southwest.



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EPA GRANT - The City of Astoria during the month of August received from the Environmental Protection Agency (EPA) a grant of \$1,226,400 for construction of interceptor sewers, lift stations, a force main, a sewage lagoon, a polishing pond, and an outfall sewer. It was one of only 20 cities or special districts to receive an award of over \$1 million from the agency.

TECHNOLOGY SHOW IN CLACKAMAS

An Environmental Technology Show will be held at Clackamas Community College, Oregon City, October 25-28. Compactors, burners, crushers, air emission control devices, and numerous other machines and equipment will be displayed. The show, to be held in conjunction with the Northwest Pollution Control Association's regional meeting in Portland, will be open to the public.

Exhibitors from throughout the U.S. are expected to be represented. Many Oregon firms have played important roles in the development of technologies for improving the environment and many will participate. Equally important has been the expertise applied on campuses in the state to harness technology in overcoming pollution problems.

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- ▲ 1,900 cities discharge 65 bgd of sewage and 875 chemical plants dump 10 bgd of waste water directly into fresh water sources.

Forest Environmental Engineering Research at OSU

How can we improve the efficiency of timber harvesting practices and lessen the impact of road building and logging on the environment, especially on soil and water values? This objective is shared by a team of researchers at Oregon State University's School of Forestry. The group, made up of forest engineers, hydrologists, a forest climatologist and an economist, was constituted by Dean Carl H. Stoltenberg two years ago and a coordinated research program of "forest environmental engineering" was launched.

The importance of Oregon's number one industry---timber production and processing---is well known. But the values associated with the State's water, recreation, and fish and wildlife resources are also outstanding. Everyone is anxious to maintain or even expand the social and economic benefits that flow from wise use of all of these resources. Finding out how best to develop coordinated use with a minimum amount of conflict is the problem. These scientists of the School's research arm, the Forest Research Laboratory, are conducting studies which will provide some of the answers.

Two major, closely linked approaches are being developed in this new program: (1) To conceive, develop and test improved timber harvesting methods and evaluate the efficiency of alternative systems: (2) To determine how logging and road building activities affect soil, water and other non-timber resources; how these resources may be protected during and after logging; and how to establish comparative costs and benefits of alternative practices. All of the research is being carefully coordinated with related investigations by other agencies in Oregon and adjacent states. Some of the specific studies underway that bear on the second major phase of the program are described in the following paragraphs.



WATER QUALITY

Timber harvesting can affect water quality in a number of ways. Roads improperly located and constructed can trigger soil slippage from steep slopes, causing site deterioration or stream sedimentation. Removal of timber adjacent to streams sometimes may cause water temperature to rise and damage fish habitat. Logging debris that accumulates in stream channels can deplete the dissolved oxygen as it decomposes, again affecting aquatic environment. Sometimes debris can trigger "flush-outs" during rainy seasons and cause severe channel damage, destruction of roads and bridges, and other downstream effects. The research team is attacking all of these problems.

Water Temperature

Scientists have essentially completed studies of the effect of timber removal on stream temperatures. We now have simple formulas with which the land manager can prescribe the stream-margin shading requirements necessary to maintain desirable water temperature standards. Prediction equations have been refined to apply to a wide variety of headwater stream conditions.

The researchers have found that one of the most effective means for preventing water temperature change is with a buffer strip of uncut timber left along the stream. The configuration of this strip (width, density, species composition) depends on the stream's orientation to the sun, stream width, solar angle, and tree height. On small streams, riparian brush is often sufficient to provide necessary shade. Wider streams require taller trees. In many instances buffer strips are inappropriate, as for southerly-flowing streams with little natural cover.

Biochemical Oxygen Demand

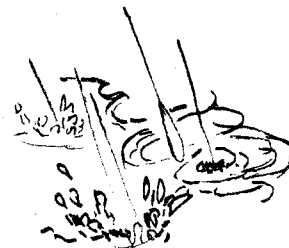
Water quality research has shifted to studies of the effect of logging residues on the biochemical oxygen demand (BOD) in small headwater streams where maintenance of good fish habitat is important. Logging slash, consisting of limbs, leaves, bark and other fine organic materials sometimes gets into streams during the logging operation. These materials are decomposed by aquatic microorganisms and oxygen dissolved in the water is consumed in the process. Such oxygen depletion, BOD, can be damaging to fish populations.

The research, now well underway, will determine the effect of logging debris on oxygen depletion at the point of accumulation and predict its impact downstream as reaeration takes place. The studies will quantify BOD of logging debris, ascertain the chemical nature of leachates, and determine if such materials are toxic to fish. Coupled with available knowledge of reaeration processes, the new information will enable the forester to predict the impact of slash on oxygen concentrations and pinpoint locations where special debris-handling might be justified. With this information, costly but unnecessary debris removal programs can be avoided and efforts concentrated where they will do the most good.

Researchers are studying the mechanisms by which fine slash materials are incorporated into stream gravels where steelhead and salmon spawn. This research will determine how long these materials will remain and where intrusion into the gravel may be a significant factor in the emergence and survival of fish fry. All of this research, of course, will help put more substance behind the speculations of damage to fish and fish habitat by logging.

Mass Soil Movement

The Alsea Watershed studies provided good information on runoff and sedimentation related to road building, complete clearcutting, broadcast burning, and partial patch cutting in the Coast Range. A more detailed study of the processes of subsurface water movement is now underway. Since Western Oregon's forested watersheds have high infiltration rates, water seldom moves as overland flow. Subsurface phenomena must be determined before foresters can understand how nutrients move or are recycled in the environment, what happens to pesticides or fertilizers that may be added, and what role saturated subsurface water movement plays in mass soil movement.



LOGGING RESIDUES

Loggers and foresters are concerned with the effect of tree tops, broken chunks, and cull logs that fall into or near streams during logging, especially on steep slopes. This material may aggravate downstream damage to roads and other improvements, trigger stream channel scouring, or physically interfere with fish movements. Consequently, we have begun studies to determine how logging techniques may be varied to reduce such debris.

A cable-assisted tree felling system (controlled, directional felling) looks highly promising for reducing breakage and keeping logs out of channels. The research has quantified natural debris that occurs in old growth forests, an amazingly high 10 tons per 100 feet of channel in a strip 30 feet wide. We know that some natural debris and even certain amounts of logging debris in some situations may tend to stabilize channels and form sediment traps.

The question yet to be answered is when does debris stabilize streams and when and under what conditions does debris trigger massive and highly damaging downstream movements. Only then will land managers be able to develop improved standards for stream debris clean-up based on costs and probable benefits to be achieved.

OTHER WATER-RELATED RESEARCH

Methods have been developed for the measurement of evapotranspiration in forests through solar energy balance techniques. The relation of evapotranspiration to such environmental factors as solar radiation, wind, temperature, humidity and soil moisture supply will provide the basis for predicting the effect of timber harvest on water yield.

In connection with studies of cable and tractor thinning our researchers are measuring soil compaction under various logging situations and will evaluate soil changes on the water regime and post-logging tree growth.

While many of the benefits of reduced environmental impacts cannot be measured in dollars, alternative logging systems will be studied and comparative costs, environmental impacts, and relative benefits identified.

RESEARCH SUPPORT

The research program is supported by excellent laboratory facilities in Peavy Hall, the new forestry school building occupied a year ago. The Forestry Research Laboratory building, a separate facility, houses much of the research. The School's 14,000 acre forest provides excellent opportunities for field research, such as stream turbidity and BOD investigations and an ambitious cable thinning study now underway. Work is also done on National Forest experimental areas and other lands provided by cooperators.



The School enjoys excellent cooperation and support from a number of agencies. Research on problems as complicated as environmental engineering is expensive and faster progress can be made if personnel and funding are expanded. About half of the current research is funded through grants from OSU's Water Resources Research Institute, the U.S. Forest Service, the National Science Foundation (as part of the International Biological Program) and other sources. At the present time, the environmental engineering research team is comprised of eight scientists of the Forest Research Laboratory.

The State Water Resources Board is presently engaged in updating its programs, or water use policy statements, for the coastal drainage basins. For the next biennium this will involve the Hood, Deschutes, John Day, Umatilla, and Grande Ronde basins, and a continuation of efforts in the Columbia and Snake rivers.

CAMPAIGN TO CLOSE OPEN DUMPS

Two years ago EPA launched a program called "MISSION 5000" to bring about the closing of 5000 open dumps in the U. S. According to a recent news release from EPA, only a third of the goal has been reached and the Pacific Northwest and Alaska lag far behind the rest of the nation in doing their part to close dumps.

James L. Agee, Region 10 Administrator for EPA, observed that the public does not show the "concern about the unsanitary conditions at open dumps that is shown about unsightly litter along highways and parks where people can see it." Open dumps harbor rats, flies, and other disease bearing pests, cause air pollution, and pollute nearby waters as rain runs off and seeps through the dump. Mr. Agee and EPA urge citizens to locate dumps and contact city councils and county officials to demand that action be taken to close the dumps.

In answer to the open dump problem, EPA has prepared a pamphlet entitled "Sanitary Landfill - One Part Earth to Four Parts Refuse," covering such matters as site selection, landfilling method, equipment needs, personnel needs, weather problems, and ultimate site use. The publication may be purchased for 30 cents/copy from the Supt. of Documents, U. S. Government Printing Office, Wash., D.C. 20402 (SW-6 Solid Waste Management Series). A film with the same title is also available on loan from the National Medical Audiovisual Center (Annex), Section K, Atlanta, GA 30324.

DID YOU KNOW THAT -

- . . . 20% of the fresh water in the United States is ground water...
- . . . 95% of the rural population is entirely dependent upon ground water ...
- . . . 20 of the 100 largest cities in the country are entirely dependent upon ground water.

SURCHARGES FOR INDUSTRIAL WASTES

A packet of information about industrial wastewater surcharges is now available to cities and counties advocating charges based on the strength of water-carried wastes. The packet contains three brochures entitled 1) Suggestions to municipalities that are considering surcharges on industrial wastewater, 2) Industrial surcharges in North Carolina, and 3) Guidelines for recovery of waste treatment costs by units of government applying for federal and state grants.

These brochures should be especially useful to water and sewer utilities managers and elected officials responsible for such utilities. The packet is available from: The Water Quality Division Office of Water and Air Resources, Dept. of Natural and Economic Resources, State of North Carolina, P.O. Box 9392, Raleigh N.C. 27603.

STATE EFFLUENT CHARGE SYSTEM

Another report of interest to local governments seeking information on charge systems is entitled the "Development of a State Effluent Charge System. This report is an analysis of Vermont's experience with effluent charges. The Vermont permit and fee system is the first of its kind to be developed in the U.S. and is presently being implemented. The issues of incentive effect on dischargers, relation of dischargers to instream economic damages, equity, constitutionality, economic efficiency, technical and administrative feasibility and income potential are discussed in the context of Vermont law and administrative procedures. This report is available from the Chief, Publications Branch (Water), Research Information Division, R & M, Environmental Protection Agency, Washington, D.C. 20460.

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- . . . The cost of cleaning up one river - the Potomac - has been estimated at \$500 million.

DECISIONS REGARDING RURAL SUB-DIVISIONS

A special report issued by the Oregon State University Extension Service addresses itself to the rising demand for land development. Its introduction states:

"Rising incomes, better transportation facilities, more leisure time, and increasing congestion in our central cities are generating a demand for rural settings for primary and secondary homes. As a result, sub-divisions are developing throughout the rural areas of Oregon. Both in-state and out-of-state investors are subjecting land owners (especially owners of land near streams, rivers, lakes or reservoirs) to considerable pressure to develop their land for home sites.

"This pressure is extended to planning bodies responsible for approving, modifying, or rejecting proposals for this type of development. Considering Oregon's present development rate and the increasing pressure on land resources and public revenues, priorities must be defined and policies initiated that provide adequate guidelines for natural resource development. The reclamation of land once committed to intensified uses (sub-divisions, industrial developments, roads, etc.) is prohibitive.

"Decision makers often do not have at hand a system to correctly assess the benefits and costs, both economic and social, of a particular proposal. This study demonstrates a method of examining the effects of a sub-division on local government financing and property tax rates under conditions existing in 1970-71 tax year."

(Ask for Special Report 365, entitled "Local Tax Impact of Recreational Sub-Divisions," July 1972, Oregon State University Extension Service.)

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COMMUNITY ORGANIZATION

A study conducted at Mississippi State University reveals that in any watershed project the bulk of the construction of flood control structures lies in the upper edges of the drainage basin. This poses a problem in creating an understanding of the goals of the proposed development.

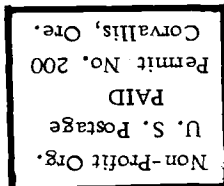
Dissemination of project information seems greatest at the center of the project area and among organizations whose members reside at the county seat. "Being less likely to participate in community organizations, and apparently less likely to utilize existing alternate forms of information such as newspapers, those rural residents most directly affected by watershed construction are those least likely to be familiar with the project," the report states. Without direct contact with the project, these rural residents are apt to have less information about the project and to have more negative attitudes towards the project.

This lack of knowledge would seem to be related to the form of dissemination, the lack of rural organizations, and geographical distance. The report recommends that special forms of dissemination be directly aimed at the rural audience, in the absence in many cases of organizational participation. (From "Community Organization Programs and Relationships in Watershed Development" by Peterson and Friery, 1972. Water Resources Research Institute, Mississippi State University, State College, Miss. 30762.)

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OREGON'S CONGRESSMAN Wendell Wyatt recently released the results of his 1972 survey on political issues. The poll showed that 60.4% of those answering the questionnaire favored the use of monies from the Highway Trust Fund (derived mainly from federal taxes on gasoline, oil and tires) for the development of mass transit systems in Oregon. Close to 65% also favored the escalation of federal efforts to combat air, water, and other environmental pollution.

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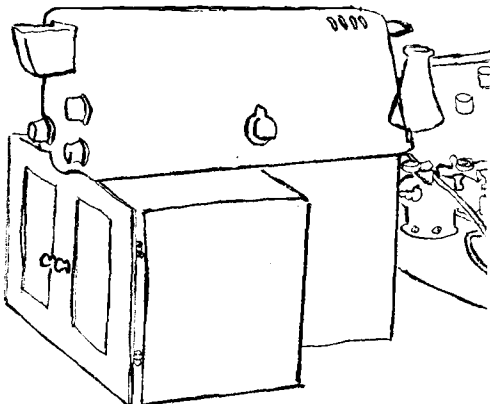
Oregon State University
WATER RESOURCES RESEARCH INSTITUTE
AIR RESOURCES CENTER
Cove 11 Hall 115
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FORECASTING CARBON MONOXIDE IN CITIES

The Stanford Research Institute of Menlo Park, California has developed a mathematical model to forecast carbon monoxide concentrations in city air. Tests show that the model can calculate carbon monoxide concentrations within 3 ppm of actual conditions in large and medium size cities. According to Stanford, the model can be used by any city that has access to conventional airport weather observations.

INSTRUMENTS TO MEASURE AIR POLLUTION

Standards have been set to control emissions which pollute the air. However, there is still the problem of developing new or refined technologies to measure pollutant concentrations in order to monitor and enforce standards. An article in the 25 August 1972 issue of "Science" advances the opinion that "air pollution measurement appears to be characterized by an abundance of promising ideas for new monitoring techniques, a modicum of laboratory work toward development of these techniques, and a dearth of field work to prove the effectiveness of the instruments in use."



The author points out that there are over 200 different instruments using at least a dozen varying techniques for monitoring gaseous pollutants. These are available commercially and many are of questionable accuracy. In addition, most will probably become obsolete by 1980.