

THE PROGRAM OF THE GEORGIA WATER RESEARCH INSTITUTE

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THE PROGRAM, PAST AND PRESENT

The network of State Water Research Institutes was founded under the Water Resources Research Act of 1964, PL 88-379, as a cooperative program between the Federal and state governments to manage water resources research, promote dissemination and application of the results, and train scientists and engineers through such research in a statewide university program. The program must be developed in close consultation and collaboration with the director of the state water agency, and with other leading water resources officials in the state and interested citizens. Each state has one institute. The law has been renewed at intervals, most recently in PL 98-242, with continued strong support by Congress. The responsibility for Federal oversight and funding is currently with the U.S. Geological Survey in the Department of the Interior.

The program of the Georgia Institute -- the Environmental Resources Center -- consists of research proposals submitted in response to a request for proposals by the Institute. Researchers at all universities and colleges in Georgia can participate. Upon approval by the Geological Survey, the program is carried out for a 12-month period. At its completion, the principal investigator prepares a brief research synopsis for inclusion in the Institute annual report and a technical completion report that is published in the Environmental Resources Center report series.

Research priorities for Georgia are identified by a Water Resources Research Program Development Committee whose membership is drawn from state and Federal water management agencies, industry, and interested citizens. The current priorities are shown in Table 1. Regional and national research needs and avoidance of duplication are considered in quarterly meetings with directors of other Institutes in the South Atlantic-Gulf region, and in an annual national meeting of Institute directors.

The extent of the program in Georgia is indicated by the more than 180 publications issued in the report series. The program was initially formulated for projects at three levels of funding. In Georgia, a typical program

consisted of five small projects (\$ 10,000-15,000 each), two intermediate projects (\$ 30,000 - 60,000 each), and one large project (approximately \$ 100,000) initiated each year. After 1980, unfortunately, the Federal sponsor eliminated the intermediate and large projects, and quadrupled non-federal matching fund requirements for the small projects.

The Institute attempts to reach as many professionals in the Georgia water resources community as possible, and receives support by many through their participation in its program. Participation includes submission of research proposals, service on the Program Development Committee or the Proposal Review Panel, presentations and attendance at seminars and conferences such as the present one, and responses to Institute reports and newsletters.

Most research participants are at the University of Georgia or the Georgia Institute of Technology, but Georgia State University, Savannah State College, and Georgia Southwestern College each has undertaken a number of projects. Faculty members at several other colleges in Georgia also have been principal investigators of water resources projects.

The research has involved all regions in the state. There are studies of the water balance in the Okefenokee Swamp, well productivity in the Piedmont, water allocation for the Flint River, floodplain forest production at the Savannah River, water conservation by the pulp and paper industry in Bibb and Laurens counties, irrigation water needs in the Daugherty Plain, ecological impacts in the Satilla River estuary, wastewater sludge residues at Savannah and Atlanta, and municipal well use in the Blue Ridge. Many studies were undertaken in the field, at agricultural experiment stations, and at industrial or municipal sites.

The Institute makes an effort to involve principal investigators from many fields. Civil engineering, hydrogeology, agriculture, ecology, analytical chemistry, economics, and law are frequently represented. Certain research themes pertinent to Georgia have been pursued through numerous projects, including topics such as treatment of textile effluent, water use by the pulp and textile industries, groundwater availability, water conservation sources of non-point pollution, and water project planning. The com-

panion paper by North (1989) surveys these research activities.

In accord with Congressional intent for the Institute Program, student training and information dissemination are an integral part of the research projects. A large fraction of the funds is devoted to graduate student support, and more than 200 students have participated in the projects. Many of the students have based their master's or doctoral dissertations on this research, and have entered professions related to water management. Moreover, many researchers, managers and teachers in the water resources field in Georgia were supported as students by this program.

The Georgia water management agency, the Department of Natural Resources, participates closely in developing the research program, maintains contact with those principal investigators whose research directly pertains to state concerns, and receives research results immediately upon project completion. A specific industry may also work closely with the principal investigator of a pertinent study. Results of research are widely disseminated through the report series, technical publications and presentations.

Considered here are some of the current and future water research needs in Georgia and possible responses by this Institute. Is the existing Institute program adequate, or can changes be introduced to meet such needs?

WATER RESOURCES NEEDS

Georgia is fortunate in its water resources. It receives approximately 50 inches of rain per year throughout the state. Numerous rivers traverse the state and empty into the Atlantic Ocean or the Gulf of Mexico, and vast aquifers underly the coastal plain. Dramatic growth, however, has brought water supply and water quality problems for municipalities, industry and agriculture. One response has been extensive planning and construction for water supply and water quality maintenance. These have been accompanied by wide-ranging legislative and regulatory efforts to manage water effectively.

A number of approaches are being considered to meet increasing water demand. These include reservoir construction, interbasin transfers, search for ground water in the Piedmont, examination of ground water capacity, extent, and flux in the coastal plain, conservation measures, control of withdrawals, matching water demand to basin availability and changes in utilization of existing reservoirs. Adequate water supply presents a particular problem in the rapidly growing Atlanta metropolitan area, but many other locations in the state also face limits to growth due to finite water supplies. Recent droughts have highlighted this problem.

A parallel and related set of problems is encountered in attempting to maintain or better water quality. Considerable improvements have

been made in limiting pollutant discharges into surface waters by municipalities and industries and further limitations can be expected. Surface runoff from fields and forests continues as a major contributor of suspended and dissolved solids in rivers. Groundwater pollution from point sources such as landfills and leaking tanks is currently a focus for corrective action. The pollution potential of distributed sources such as agricultural chemicals is also recognized. Saline water intrusion due to overpumping is a problem near the coast. The impact of acid rain on aquatic and terrestrial biota has received considerable attention. Response to these problems in many cases is control at the source by process changes or effluent treatment; if the pollutant already is in the environment, however, direct countermeasures must be developed.

Effective water resources management is clearly crucial to public health, economic wellbeing, and environmental protection. Its importance also makes any significant management action, or even non-action, highly controversial. Action is demanded when wells run dry or fish float to the surface. Someone will inevitably be affected adversely by a limit on water use, construction of a reservoir, or water transfer from a basin. Water quality regulations cost someone money. Any change will affect the environment to some extent.

Research support for state water resources management is needed to develop the scientific and technical basis for making appropriate decisions for these important and far-reaching water management responses. Research is, of course, only one of several sources of guidance to water managers, who can also obtain information from monitoring programs, their technical staffs, and consultants. In the realm of research, much is performed beyond the Institute program, by government agencies and industry, either internally or sponsored at universities.

The Institute program contributes by virtue of its central relation to the state and Federal water agencies and the water resources research community. This coordinating function was intended by the Congress; it enables the Institute to identify crucial information needs, bring them to specialists best qualified to respond to these needs, sponsor the research, and provide the resulting information to the user.

PROGRAM PLANS

To respond to the water resources research needs in Georgia on a timely basis over the foreseeable future, the Program Development Committee has recommended to the Institute that sponsored research funding be expanded ten-fold, to approximately one million dollars per year. With such funds, the program would return to supporting research projects at several levels and greatly expand its information dissemination function. The extent and magnitude of research

needs to be met by this program is suggested by the contents of Table 1.

A plan for research, training, and information transfer has been developed to meet these needs at the recommended funding. Many Institutes in the country, including several from this region, provide examples of operation with enhanced state support at this level. Once under way, the program would be adjusted to meet current needs under the guidance of the Program Development Committee.

It is proposed that larger projects be devoted to combining efforts by researchers from multiple fields and schools for periods of several years. Topics that must be addressed include water availability in the Piedmont, benefit-cost balances of major water projects, and data bases for water basin planning.

Intermediate-level projects would be undertaken by principal investigators with one or more graduate students for periods of several years. Wastewater treatment, industrial and agricultural process changes for water conservation, and the behavior of pollutants in surface and ground water must be considered in this category.

The current program of small projects, each supporting one graduate student under the supervision of a principal investigator for one year, would be continued. These examine innovative ideas, survey a field to identify the potential for improvements, and undertake brief tests of principles.

Plans for the enhanced program envision expansion of Institute operations to a number of participating schools and addition of specialists to guide coordination with state, municipal and industrial water resource managers. The existing close cooperation in program management between the Environmental Resources Center at the Georgia Institute of Technology and the Institute for Natural Resources at the University of Georgia can be expanded to other universities and colleges in Georgia that develop strong water research programs. Staff professionals dedicated to working with the producers and users of research results would be expected to develop a much more responsive program than is otherwise possible.

The proposed information dissemination program includes an annual statewide water resources conference, topical seminar series and occasional conferences, a monthly newsletter, topical bulletins and guides, maintenance of a computerized abstract service for information and research related to Georgia water resources, and projects to provide technology transfer to users in the state. All of these activities have been developed but all can not be maintained concurrently with the present limited funding.

Initiation of these research, training and information transfer activities is especially desirable to fill the void left by a serious reduction in Federal funds formerly devoted to state water resources developments, particularly

in structural projects such as dams and wastewater treatment plants. Spending a small fraction of the cost of major projects on applied research can avoid serious deficiencies, particularly when problems are site-specific so that information is not directly transferrable from other projects.

An order-of-magnitude increase in water research support will expand the availability in the state of water resources expertise -- the teachers, researchers, and consultants -- beyond the direct support given specific projects. The Institute has supported several researchers who have utilized the results of small projects to obtain major funding from the National Science Foundation or mission-oriented Federal agencies such as the Department of Energy. Moreover, the continuing availability of research funding will encourage employment of faculty in areas that are now not strongly represented in the state. Finally, the increased number of students trained by participation in the expanded program will give state agencies a wider selection in employing professionals.

CONCLUSION

The Federal Institute program provides the opportunity for a rational effort to assist statewide water management by research at the university system. The Institute in Georgia during 25 years of operation has contributed to the support of several hundred research projects that cover the whole range of water resource concerns and disciplines. Each project is selected for its concern with local needs, its capability to train students, and its potential for contributing to water resources knowledge. In response to reduced Federal support, the Institute is now seeking specific state support, and has developed plans for expanding services accordingly.

Efforts to obtain such increased funds from the Federal and state governments are strongly supported by the administrations at the University of Georgia and the Georgia Institute of Technology. In view of current problems in balancing budgets and ongoing competition for funds from many worthy causes, success is uncertain, but development efforts will be continued. Support of water resources management is so important to Georgia that we must develop as strong and pertinent a research program as possible.

All interested persons are urged to add recommendations for developing a program that meets the need of the state. We want an Institute that enhances water resources activities throughout Georgia by stimulating basic research for understanding the water cycle and applied research for putting the water cycle to optimum use, and acts as a meeting point for persons in the many disciplines with the varied responsibilities that contribute to this field.

LITERATURE CITED

North, R.M., 1989. Summary of Water Resources Research under the Georgia Water Resources Program. These Proceedings.

Table 1
Georgia Water Resources Research Program Development Committee
Priorities for FY 1990

Water management	- watershed protection
	- surface/groundwater interactions
	- conservation
Water supply and waste water infrastructure	- development needs assessment
	- resources allocations
Groundwater supply estimation	- computationally efficient methods for flow parameter evaluation
Groundwater supply development	- locating well sites and estimating yields
	- improved well utilization
Groundwater quality protection	- well-head protective area design
	- transit time estimation
	- subsurface pollutant interactions
Surface water quality protection	- determine release rates of pollutants from sediments
	- biotic assessment of streams
	- urban stormwater management
	- non-point pollution assessment and control
	- in-stream monitoring methods
Irrigation	- estimating agricultural demands
	- optimum water use
	- impact on groundwater supplies and stream flow
Wastewater treatment	- efficacy of land application
	- water reuse