U.S.G.S. WATER RESOURCES RESEARCH PROGRAM PROPOSALS

The fiscal year 1990, Water Resources Research program, Section 105 of Public Law 98-242, review process was recently completed. Submitting for research money were 123 public and private institutions for a total of 254 proposals. The total federal funds requested by these proposals was over 29 million dollars (see Table 1).

Table 1

USGS Water Resources Research Proposals: Analysis of Federal Funds Requested

Federal Funds Requested ($):	Number of Proposals	Percent
0-9,999	0	0
10,000 - 49,999	24	9.4
50,000-69,999	32	12.6
70,000 - 129,999	92	36.2
130,000 - 159,999	37	14.6
160,000-189,999	69	27.2

Total Number of Proposals =254
Total Federal Funds Requested = $29,186,528
Mean = $114,907
Minimum Requested = $10,000
Maximum Requested = $175,000

While the total number of proposals submitted and the total requested funding has remained nearly the same as last year, the number of institutions applying for those funds has nearly doubled which may indicate that more researchers are recognizing the significance of water resource problems. This result may also be supported by the fact that institutions in 47 states, the District of Columbia, and Guam requested federal funds (see tables 2 and 3), up from last year.

Table 2 lists the 33 universities that submitted the most proposals; they account for over 60% of the total 254 proposal submissions. Most of the universities listed in Table 2 were included in the 1989 report *(Water Resources Update* #79 p. 5, Table 2). The University of Kentucky, University of Miami, University of Nebraska, University of Nevada, Ohio State, and South Dakota State are all newcomers to this list.

Table 2

Top Institutions in Submission of USGS Water Resources Research Proposals

Institution	Number of Proposals
North Carolina State University	13
Oklahoma State University	10
University of Arizona	8
Pennsylvania State University	8
University of Nebraska	7
University of California	6
Louisiana State University	6
Utah State University	6
University of Kentucky	5
University of Minnesota	5
New Mexico State University	5
University of Oklahoma	5
Colorado State University	4
University of Florida	4
University of Hawaii	4
University of Illinois	4
University of Maryland	4
Massachusetts Institute of Technology	4
South Dakota State University	4
University of Texas - Austin	4
Texas A&M University	4
University of Virginia	4
University of Alaska	3
University of Arkansas	3
University of Colorado - Boulder	3
Cornell University	3
University of Delaware	3
University of Massachusetts	3
University of Miami	3
University of Nevada	3
Ohio State University	3
Virginia Polytechnic Institute	3
University of Wyoming	3

* all other institutions submitted 2 or 1 proposals.

One note of interest is that while the research interest in water resources appears to be growing,

Table 3

USGS Water Resources Research Proposals:

By State

State	Number of Proposals
California	15
Texas	15
Pennsylvania	14
North Carolina	13
Florida	12
New York	12
Oklahoma	12
Arizona	9
Colorado	8
Illinois	8
Kansas	7
Nebraska	7
Virginia	7
Georgia	6
Louisiana	6
Massachusetts	6
New Mexico	6
Ohio	6
Utah	6
Alabama	5
Kentucky	5
Minnesota	5
New Jersey	5
Tennessee	5
Maryland	4
South Dakota	4
Connecticut	3
Delaware	3
Idaho	3
Indiana	3
Missouri	3
Nevada	3
Oregon	3
South Carolina	2
Wyoming	3
Hawaii	2
Iowa	2
Maine	2
North Dakota	2
Washington	2
Wisconsin	2
Alaska	1
Arkansas	1
District of Columbia (DC)	1
Guam	1
Michigan	1
Mississippi	1
Montana	1
West Virginia	1

the amount allocated for funding by the federal government (approximately 4.3 million) dollars has remained nearly constant since 1988.

Types of Research

The research proposals were categorized into 4 major disciplines: Physical Sciences, Engineering Sciences, Biological Sciences, and Social Sciences (Table 4). As in 1989, the physical sciences has the largest number of submissions (53.9%). The biological sciences showed the greatest increase (12) in number of submissions from 1989, the social sciences had the greatest decline: only 27 proposals were submitted out of the total of 254.

Table 4

Federal Funds by Discipline

Discipline	Number of Proposals '89	'90	Percent '89	'90	Requested Funds '89	'90
Physical Sciences	149	137	57.3	53.9	$17,205,328	$15,911,415
Engineering Sciences	47	50	18.1	19.7	$5,074,778	$5,985,079
Biological Sciences	28	40	10.8	15.7	$2,975,000	$4,827,366
Social Sciences	36	27	13.8	10.6	$3,418,812	$2,462,668

Total Federal Funds Requested = $28,673,840 in 1989;
$29,186,528 in 1990

Each of the four categories was further broken down into subdisciplines (Table 5). This allows us to see in which specific areas researchers are concentrating their efforts. Groundwater quality and groundwater hydrology exhibit the majority of the effort (30.7%); this pattern was also true in 1989. There was an increase in requests for microbiology and the plant and soil science disciplines of the biological sciences.

Conclusions

A major concern in the U.S. is the management and planning of our water resources. The recognition that our water resource problems are primarily managerial and/or institutional in nature has long been recognized, dating back to the National Water Commission and numerous studies and reports by task force committees. This is certainly not news among practitioners or researchers in water resources at the local, regional or federal level.

Table S

USGS Water Resources Research Proposals: Analysis by Discipline

Discipline	No. of Proposals		% of Total	
	1989	1990	1989	1990
PHYSICAL SCIENCES	149	137	57.3	53.9
Chemistry/Geochemistry	24	29	9.2	11.4
Water/Groundwater Quality	77	47	29.6	18.5
Groundwater Hydrology	19	31	7.3	12.2
Climate/Hydrologic Processes	25	22	9.6	8.7
Geomorphology/Fluvial	4	8	1.5	3.1
ENGINEERING SCIENCES	47	50	18.1	19.7
Agricultural Engineering	15	3	5.8	1.2
Civil/Urban Engineering	15	7	5.8	2.8
Environmental/Sanitary	17	40	6.5	15.7
BIOLOGICAL SCIENCES	28	40	10.7	15.7
Ecology/Wildlife	8	8	3.1	3.1
Microbiology	4	16	*1.5*	6.3
Plant/Soil Science	2	15	0.8	5.9
Zoology/Physiology	7	1	2.7	0.3
Public Health	7	0	2.7	0.0
SOCIAL SCIENCES	36	27	13.8	10.6
Institutional/Policy Anal.	13	7	5.0	2.8
Economics/Planning	20	10	7.7	3.9
Issue-Specific Management	3	10	1.1	3.9

Total Number of Proposals = 1989: 260; 1990: 254

Also, it is not news that the management problems are intensifying: traditional water allocation schemes are being revisited, new regulations at state and federal levels are being formulated, who pays and how much for additional water supply and water quality is in question, and who establishes standards and how is yet to be determined, etc. The list of these problems is growing, and requires new techniques of analysis and new approaches in arriving at decisions. No longer can water management and planning be the sole responsibility of the local or state engineering offices with advice from a traditional engineering firm. Increasingly, our urban water utilities and regional water districts are struggling with these managerial and planning problems. That struggle has resulted in a non-traditional response: those responsible for the provision of water are being forced to fund research that enables them to gain insight into their problems. Striking, however, is the gap between the kind of research being funded by the USGS and the kind of problems our Nation faces in water management.

Last year, 14 per cent of the 260 proposals submitted to the USGS came from the social sciences; this year the social sciences accounted for only 11 per cent of the total. Last year! speculated on the reasons for the disproportionately low response from the social sciences amidst an environment which cries out for answers in this area.

Are there fewer qualified researchers in the social sciences who have an interest in water resources? Relative to other disciplines there are fewer; however, there is little encouragement for students or faculty to focus their graduate studies on research in this area. Few schools have programs that stress water management and the required social science skills. Also, the paltry amount of research funds likely discourages the competent researchers from even submitting a proposal where the success rate is abysmally low. Eventually, the water management problems in our urban areas will attract the qualified and competent researchers, as is already beginning to occur. But in the meantime, the USGS could provide leadership in this area by simply giving high priority to research on water management problems thereby encouraging the development of a new generation of researchers.

There are likely to be many obstacles to changing research priorities even though they are of national significance. Foremost would likely be professional bias: the traditional water disciplines too often observe little rigor or contribution from the social sciences researchers. Also, the social scientists as a group are diverse and many lack the requisite analytical skills. Also, the physical, biological, and engineering scientists are not trained to deal with management problems, problems which inherently require research on consumers and institutions, a totally different type of laboratory.

The USGS program could provide the leadership and influence the training of the next generation of researchers. We desperately need the analytical skills and perspective from the social sciences. And, at the same time, we need to break the traditional barriers and promote engineers to become sophisticated in the theory and techniques of analysis and the social scientists to understand the principles of hydrology, engineering, etc.

It is gravely disappointing to observe the waning interest among the social sciences in the USGS water resources research program. An effort could and should be made over the next several years to reverse this trend, and thereby addressing directly our Nation's most prominent water resources problems today and in the future.