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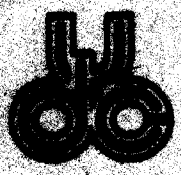

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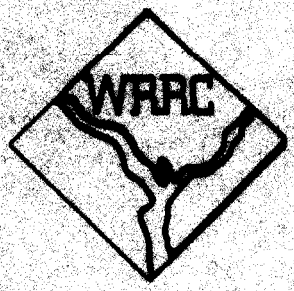

water
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WASHINGTON, DISTRICT OF CaL0MB1A

D.C. Water Resources Research FY 82 PROGRAM PLAN

Dr. M. H. Watt, Director

D.C. WATER RESOURCES RESEARCH CENTER FY 1982

PROGRAM PLAN

OUTLINE

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I. INTRODUCTION/SUMMARY

The FY 82 activities of the D.C. Water Resources Research Center will be programmed as continuation of activities started in the FY 1981. This is due to the budget situation of the Office of Water Research and Technology of the Department of the Interior. At this writing, no funds have been appropriated for the institutes program. Because of the budget constraints and other limitations, the activities of the Water Resources Research Center will be directed towards the continuation of the projects started during the fiscal year 1981 and to the development of new projects with new funding sources. The bulk of the effort will be directed to market new projects with other federal, local government and private sources (See Table 1).

Nine projects were started during the fiscal year 1981. Three of these were funded under the FY 80 Annual Cooperative Program (ACP). They are: "Evaluation and Data Base Development Related to Regional Recreation Use Estimating Models for Water Resources Planning", with Dr. R. C. Waters as principal investigator, "Water Supply Management in the District of Columbia: An Institutional Assessment", with Dr. D. Beard as principal investigator, and "Photosynthetic Pigments as Indicators of Algal Activity in the Upper Potomac Estuary", with Dr. P. Sze as principal investigator.

The FY 1981 ACP funded the following projects: "Urban Planning Criteria for Non-Point Source Water Pollution Control", with Dr. G. K. Young as principal investigator; "The Effect of Copper on Spat Settlement of the Oyster Crassostrea virginica", with Dr. H. Phelps as principal investigator and "Analysis of Inorganic Anions in the Potomac Water, Sediment and Floc by Ion Chromatography", with Dr. J. Girard as principal, investigator.

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ACP - 81 Projects Young Phelps Girard	- -
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Technology Transfer/Info. Dissemination Newsletters Seminars Library	
Program Development Contacts Concepts Proposals Awards	?

Three projects were started under the Director's office. The Five Year R&D Phase II which is a continuation of the Phase I, started in the preceeding year; "The D.C. Water Related Publications" and "The Directory of Organizations concerned with D.C. Water Resources" were begun in 1981. In addition to these two information documents, the Center will publish the Directory of Water Resources Expertise in Washington, D.C.

All these projects are well underway, but are not yet completed. The principal investigators have requested extensions ranging from two months to six months. The reasons for the extensions include the delay period in starting the projects, the difficulties in acquiring equipments and other technical difficulties inherent to the projects themselves. The "Five Year R&D Phase II" project which is designed to update the Phase I include most of the new events and activities related to the water resources of the Dis trict and also new data on precipitation, water flow, new standards of D.C. water quality and new organizational structure of the D.C. water resources. Because of the numerous changes that the Administration introduced at the federal government level, the "Directory of Organizations" project was put on hold awaiting the final decisions concerning the budget cuts and the phasing out of many of the federal agencies. During the 1982 fiscal year the direction of the federal Administration would become clearer and new agencies designed to carry out the new programs will be identified.

Plans have been made to increase the level of activities of the Technology Transfer/Information Dissemination Program. A schedule of the seminar series has been developed. Experts on D.C. water resources research programs will be invited to make presentations on a regular basis.- Wide distribution of the programs will permit a diverse and large attendance to the seminar series. Another aspect of the Technology Transfer/Information Dissemination concerns

the availability and the utilization of the Center`s documents. Promises have been obtained from the University of D.C. Learning Resources Center to house all the Center's documents. These documents are received from the other water resources research institutes or centers around the country or from the major water resources agencies such as U.S. Geological Survey, the U.S. Environmental Protection Agency, the Army Corps of Engineers, the Inter state Commission on the Potomac River Basin and the Metropolitan Washington Council of Governments...

The curriculum for water resources research training will be completed. The document will serve as a basis for training students and. also for market ing new training. programs. A few of the projects designed to increase the knowledge of the water resources situation of the District and to promote a better understanding of the water resources of the District will be initiated and completed.

As indicated earlier, the main efforts of the Center during the fiscal year 1982 will be to develop new programs and to find new funding sources. It has been indicated in the OWRT Mailgram to the Center that all the centers/ institutes should try to find new funding sources. The D.C. Water Resources Research Center finds itself in a favorable position in Washington, D.C. to accomplish such an endeavor. Many private, government, federal and inter national agencies are located in Washington-, D.C. or in its vicinity. That fact alone reduces the cost of marketing and increases the chances of communicating with these agencies to identify how best the Center can be of service to them. Furthermore, the Center has not taken advantage of its relationship with the Department of Environmental Services. The Center could provide technical support for the D.C. Department of Environmental Services,

the D.C. City Council and the D.C. Soil Conservation Service. Marketing efforts that have been already started with international agencies will be stepped up.

With sufficient backing from the University of D.C., the Center can profit from this situation of tight budget policies to vigorously develop new projects and turn itself into a strong and viable research institution.

II. CONTINUING PROJECTS

a) The FY 80 ACP Projects

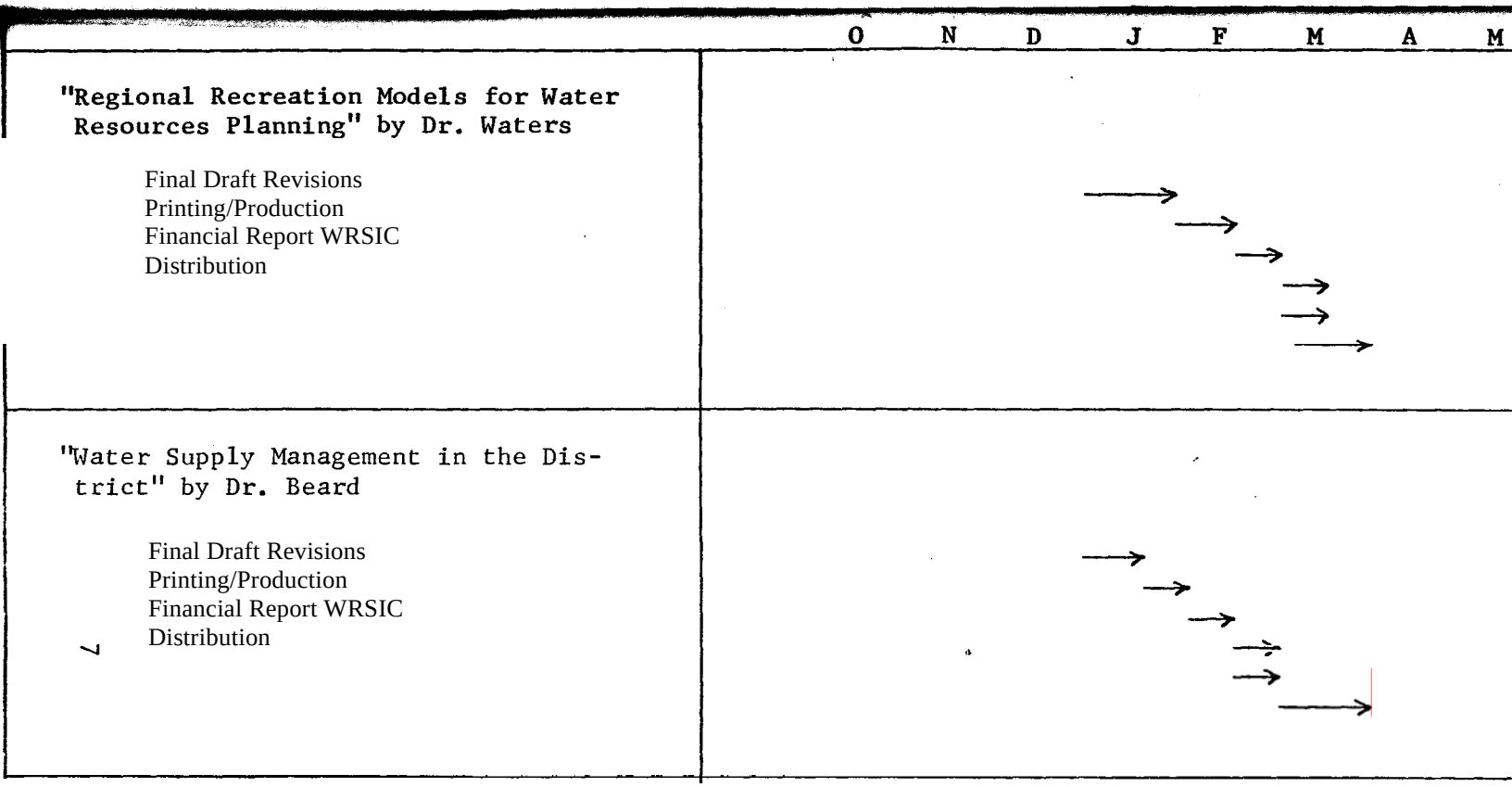
Because of the availability of the carry-over funds from fiscal year 1980, three projects were started in 1981 which used those funds. Dr. Daniel Beard's project entitled, "Water Supply Management in the District of Columbia: An Institutional Assessment" is one of those projects. This project took one of the problems identified in the D.C. Five Year Water Resources Research Pro gram developed by the Center. The need to better define the District's water management structure and responsibility was one of the key problems identified during the study of the Five year Water Resources Research Program. Because the District functions at various times as a city, state, and county, its role in the areawide process for water resources management is unclear at times. Dr. Beard's study proposes to provide a clearer definition of the District's water management structure and responsibilities. The project will examine the structure and its capability to respond to areawide management issues, and meet future management needs of the city.

The second of the FY 80 ACP projects is entitled, "Photosynthetic Pigments as Indicators of Algal Activity in the Upper Potomac Estuary" by Dr. Philip Sze. H

The Potomac River near Washington, D.C. is often discolored by an abundant quantity of algal blooms. The algal blooms tend to occur during periods of low flow in summer. A high diversity of algal species occur in the river including both, planktonic species and washout of benthic population. The project will evaluate the use of chlorophyll A and other photosynthetic pigments as a measure of phytoplankton abundance in the Potomac River. The River will be sampled at Key Bridge from May through September. The follow ing determinations will be performed on each sample of water: temperature, nitrate/nitrite nitrogen, orthophosphate, silica, chlorphylls A, B and C, carotenoids and counts of major algal groups.

The third ACP 1980 project by Dr. Robert C. Waters is entitled, "Evaluation and Data Base Development Related to Regional Recreation Use Estimating Models for Water Resources Planning". This project will locate existing

models, develop an abstracting procedure and abstract related studies, enter the results into a computer accessible file, analyze the data base for existing compatibility and develop a plan for data sharing among researchers and agencies. The milestone charts for the ACP 80 projects are indicated in Tables 2 and 2A. b) The FY 81 ACP Projects



"Photosynthetic P~gments in the Upper Potomac" by Dr. 5ze

Final Draft Revisions
Printing/Production Financial Report WRSIC
Distribution

The ACP FY 1981 projects dealt mostly with water quality problems. Table 3 shows the schedule of their remaining activities. The Young/Danner project entitled, "Urban Planning Criteria for Non-Point Source Water Pollution Control" deals with the determination of probalilist measure of water quality impacts. The project will economically evaluate a mix of alternatives and their interrelationship for satifying the effectiveness measure through non-point source controls for the least expenditure. The researc~ will enable the District of Columbia planners and other urban planners to formulate water quality control

O N D J F M A M

"**Distribution ...** of Dissolved ... **Organic Carbon in the Potomac, Phase** II"
by Dr. Champ

Final Draft

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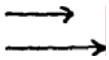

"Upper Potomac Estuary Biota... Phase III" By Dr. Spoon

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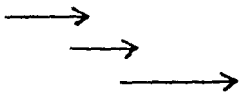

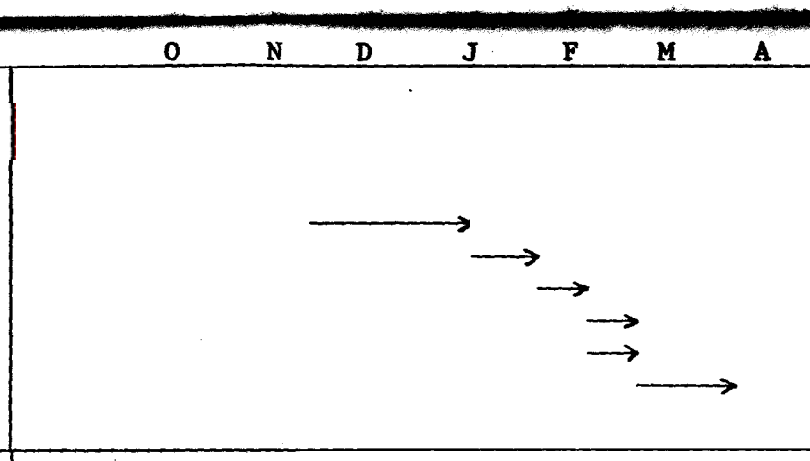

"Urban Planning Criteria for NPS Water Pollution Control" bv.Dr. Young

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Printing/Production WRSIC

Financial Report

Distribution

"The Effect of Copper on...Oysters..." by Dr. Phelps

Final Draft Revisions
Printing/Production WRSIC

Financial Report

Distribution

"Analysis of Inorganic Anions in... Potomac" by Dr. Girard

Final Draft Revisions
Printing/Production Financial Report WRSIC
Distribution

decisions with specific cost/benefit criteria and effectiveness measures. The research product will provide a new working methodology to be utilized in the development of cost effective non-point source pollution control measures for an urban area. This methodology will be in the form of a synthesis of the design and cost functions relating'to street sweeping, sewer separation, settling tanks, and other management practices. A computerized model of the methodology will be developed and calibrated to simulate the process.

The Potomac River Estuary which is the subsystem of the Chesapeake Bay has always been a major contributor to the oyster production of the Chesapeake Bay. However, since 1966 there has been a progressive failure of recruitment in oyster beds reflected in declining oyster harvests. Surveys have found unknown toxic factors at the oyster setting sites. The Washington Metropolitan area, although a major local consumer of the Chesapeake Bay oyster stocks, is the major contributor of wastewater discharge into the Potomac Estuary. Copper, used as an antifouling agent on ship bottoms, is a recognized toxic substance in marine systems. Dr. **Harriette Phelps' project entitled, "The Effect of Copper on Spat Settlement of the Oyster Crassostrea virginica" is testing the hypothesis that copper levels in the natural setting surfaces available to Mid Chesapeake Bay oyster communities is a cause of declining spatfall. The study may indicate whether the control of copper input into the Bay is a water quality management need.**

Dr. **James Girard's project entitled, "Analysis of Inorganic Anions in the Potomac Water, Sediment and Floc by Ion Chromatography" evaluates the most recent advances in ion chromatography and demonstrates its utility for the quantitation of inorganic anions in Potomac watep sediment and floc.** In some

areas of the Potomac, there appear to be tidal influences on the concentration of inorganic anions. This study will provide better understanding of the background level of anions in the water and sediment in the river. It will also help in further understanding the inorganic interaction of collected floc with anions.

e) The Director's Office Projects

Under the Director's office there are three major projects in progress. T first, "The Water Resources Publication Related to the District of Columbia" will facilitate the exchange of information between agencies and researchers interested in the D.C. water resources. The report will briefly describe the nature and the objectives of studies addressing the D.C. water problems. The most recent and most relevant studies will be given higher priority.

The second project, which will be valuable to the D.C. water agencies and officials, is entitled "The Directory of Water Related Organizations in D.C.". The Directory will be an important step in increasing the communication process and cooperation between water agencies in the D.C. area. The project will list all federal, state, interstate, county, city and intercounty agencies concerned with water resources. In addition it will list international organizations, trade associations, advisory bodies and other organizations important in the field. Another directory will consist of compilation of the D.C. area scientists and researchers involved in water resources. Individuals names addresses, phone numbers, affiliations and area of expertise will be indicated.

The Five Year R&D Program which was started in fiscal year 1980 will be revised and updated. New information obtained from publications and interviews with concerned agencies will be included ip the second phase of the

project. A special appendix of new and relevant events and new data will be attached to the revised form of the Five Year R&D project. The Five Year R&D project has assessed the water resources situation of the District, identified and prioritized its major water resource problems. Problems that can be addressed by the D.C. Water Resources Research Center were highlighted. This will permit the principal investigators to select problems relevant and urgent for the Center to consider and it will also allow the Center to rank the proposals according to problems addressed. The schedule of activities of projects that will be conducted under the Director's office is given in Tables 4, 4A and 4B.

III. TECHNOLOGY TRANSFER/ INFORMATION DISSEMINATION

the understanding To that effect,

"Five Year Phase II"

Data/Info Update
Revisions
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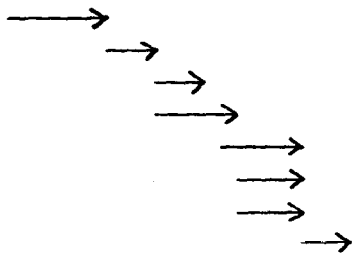
Financial Report



"Training Program"

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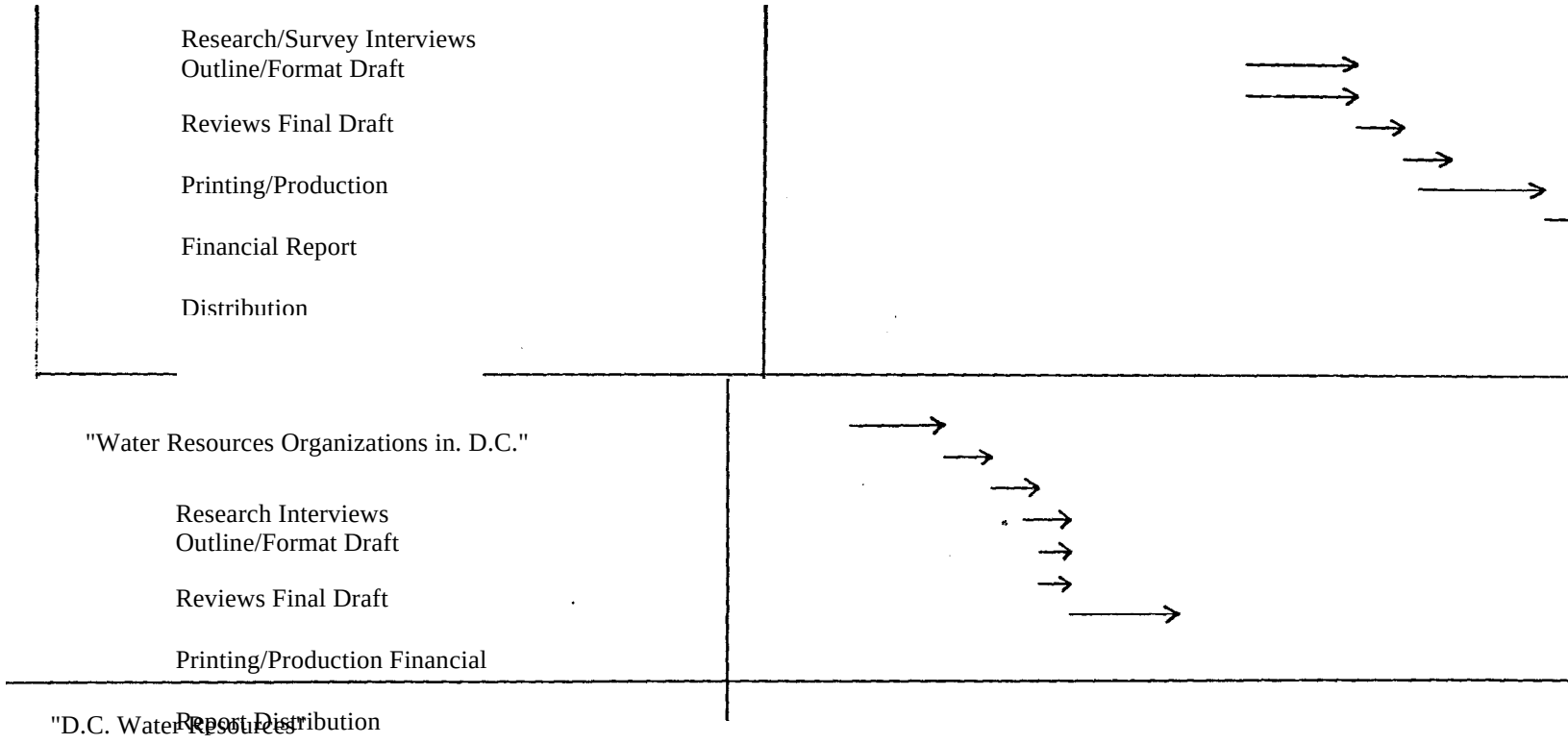
The Technology Transfer program is designed to increase of the

it is important to identify the water information users, e.g. the agencies, the research groups and the decision makers. Once the users are identified the communication between the users must be insured. The Center will develop three courses of action to have an effective program. First, it will publish a newsletter. A newsletter will give highlights of different research projects going on in the Center and in the District. The format of the newsletter is given in Exhibit 1. The major projects will be summarized and reports on their status will be made. The newsletter will also give

and out-of-town conferences, meetings, seminars, etc. A list of publications received by the Center will be included in the newsletter.

The second course of action for this program will consist of a seminar a

"Water Related Expertise in D.C."
Directory

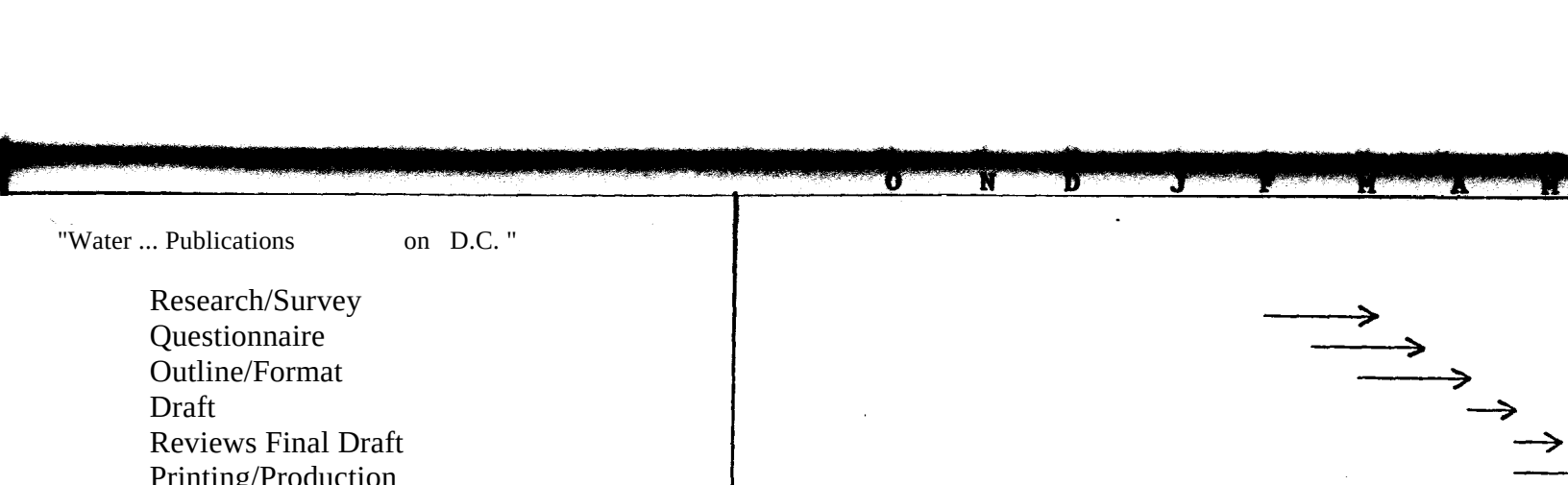


"Water Resources Organizations in. D.C."

"D.C. Water Resources"

Outline/Format
Photography
Interviews
Text/Graphics
Draft
Review Final Draft
Printing/Production
Financial Report
Distribution

"Water ... Publications on D.C. "



Research/Survey
Questionnaire
Outline/Format
Draft
Reviews Final Draft
Printing/Production
Financial Report
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Exhibit 1

The DC WRRC Newsletter

-Format

I. Research Proiect_Feature Summary

II. Water Research Studies

II. Announcements: conferences, meetings, workshops, symposia...

IV. Publications: Received by the DC WRRC and available at the UDC/VNC library.

F

experts will be invited to give lectures on those topics (See Exhibit 2). Most of the seminar°series will be held during the academic year when most ,students are present and can attend. There are many speakers of high caliber in the Washington area. The speakers have a broad range of experience in the water resources fields such'as, water quality, water quantity, management, economics of water problems, international water problems, etc. The seminars will be organized in such a way that large participation from the D.C. community and the research community can be obtained, but also topics will be varied to reach a more diversified group of persons.

The third aspect of the Technology Transfer Program is the distribution

of the documents published by the Center and the availability for use of documents received from other water research centers/ institutes around the country and water research agencies such as the Department of the Interior, the U.S. Geological Survey, the Environmental Protection Agency, the Metropolitan Washington Council of Governments and the Interstate Commission on the Potomac River Basin. Exhibit 3 shows a sample of documents received. Arrangements have been made with the University of D.C. Learning Resources Center to

house most of the Center's documents.

The documents will be housed in building the library of the Learning Resources more accessible and could be used on the to use the-on-line-information retrieval system will perfectly complement the

39, B level at the former location of

Center. At the library, they will be spot.

Arrangements will also be made system

which is in the library.

researchers can draw upon,

documents since some data bank, such as Watstore, have already been programmed in computers. (Appendix A)

Depending on the funding level more actions can be programmed. It would be of great interest to the D.C. community to have a well developed, well

D.C. Water Resources Research Center

1981-82 Seminars - Tentative Schedule

As part of its Technology Transfer/Information Dissemination Activities the D.C. **Water Resources Research Center** will **hold a series of seminars during the period 1981-82. The seminars will address various topics including water quality and quantity, management and institutional problmes and basic research... The speakers will be selected from federal and local agencies and universities... A tentative schedule of speakers and topics is given 'below.**

Unless otherwise indicated all the seminars will be held at the University **of the District of Columbia, Building** 39, Room , **Van Ness Campus, 4200 Connecticut Avenue, N.W., Washington, D.C. 20008. For more information please contact.**

SPEAKERS	TOPICS
M. H. Watt, Director **D.C. Water Resources Research Center**	**Water Resources Research Program**
Paul Eastman, Executive Director **Interstate Commission on the Potomac River Basin**	**The Potomac River Basin**
M. Champ **American University**	**Basic Research on Water Quality**
D. Spoon **Georgetown University**	**Ecology of the Potomac River**
Dan Sheer, Planning Engineer **Interstate Commission on the Potomac** **Alt - Corps of Engineers**	**Regional Water Management Simulation River Basin Bloomington**
D. Beard **George Washington University** **Alt - H. Lieber**	**D.C. Water Management** **Institutional Arrangement**
B. DeCicco **Catholic University** **Alt - Young/Danner**	**Water Quality Research** **Non-Point Sources**
H. Ways	**D.C. Water Supply**
F. Carson **American University**	**Basic Research Measurement Techniques.** **Algal Activity in the Potomac y.River**
J. McDermott/K. Mountford **Alt - Ort.** Villa	**D.C. Water Treatment** **EPA Region III Program**

~nyder, Herbert J., CHRONICLE OF RESEARCH 1957-1980; California Water Resources Center, University of California, Davis, Ca. 95616. Report No. 48

'U**hinks,** Robert W., J. Herbert Snyder, October 1980, FIVE YEAR WATER RESOURCES 4ESEARCH PLAN FOR THE STATE OF CALIFORNIA, California Water Resources Center, University of California, Davis, Ca. 95616. Report No. 49

",S',

Sriffler, William D., Diana C. Fitz, September 1980, APPLICATIONS OF REMOTE SENSING IN HYDROLOGY.' Colorado Water Resources Research Institute, Colorado 1°' State Universitv, Fort "thomsen, Anton G., William D. Striffler, September 1980, A WATERSHED INFORMATION SYSTEM; Colorado Water Resources Research Institute, Colorado State University, **`fort** Collins, Co. 80523. Completion Report No. 100

°'tugrens, Paul, July 1980, THE EFFECT OF ALGAL INHIBITORS ON HIGHER PLANT TISSUES; ,Colorado Water Resources Research Institute, Colorado State University, Fort **Collins,** Co. 80523. Completion Report No. 98

'Danielson, Robert E., et al, WATER REQUIREMENTS FOR URBAN LAWNS IN COLORADO, Colorado Water Resources Research Institute, Colorado State University, Fort "Collins, Co. 80523. Completion Report No. 97

Howe, Charles W., et al, June 1980. DROUGHT INDUCED PROBLEMS AND RESPONSES OF SMALL TOWNS AND RURAL WATER ENTITIES IN COLORADO: THE 1976-1978 DROUGHT, ``Colorado Water Resources Research Institute, Colorado State University, Fort Collins, Co. 80523. Completion Report No. 95

Vlachos, Evan C., et al, May 1980. CONSOLIDATION OF IRRIGATION SYSTEMS PHASE II ENGINEERING, ECONOMIC, LEGAL AND SOCIOLOGICAL REQUIREMENTS, Colorado Water Resources Research Insititue, Colorado State University, Fort Collins, Co. 80523. Completion Report No. 94

Cermak, J.E., July 1,1979. Publications List: Fluid Mechanics and Wind Engineering Program; (Department of Civil Engineering) College of Engineering Colorado State University, Fort Collins, Colorado 80523. I.D. 79-80-2

Walsh, Richard G., et al,'October 1980. M;ASURING BENEFITS AND T1{E ECONOMIC VALUE OF WATER IN RECREATION ON HIGH COUNTRY RESERVOIRS, Colorado Water Resources Research Institute, Colorado State University, Fort Collins, Colorado 80523. Completion Report No. 102

Hamdy, M. K., January 1980. TRANSFERENCE MECHANISM OF POLYCHOLORINATED BIPHENYLS BY AQUATIC ORGANISrLS, (College Experiment Station) University of Georgia, Athens, Georgia 30602. Project No A-073-GA

J'ftipped information center. The information center will provide basic fltfarmation to the D.C. residents, to students,. and to researchers. Other iftivities may also be programmed. Those will include exhibits, conferences i `symposia, etc.

The fact that many of the advisory committee members are representatives *6f* the major water resources agencies in the District, allows the Center to *hkve* the first hand information on the water resources activities of the District. Conversely, the Director of the D.C. Water Resources Research Center, it a Commissioner to the Interstate Commission on the Potomac River Basin, participates in all of the I.C.P.R.B. meetings and in many other local meetings. This exchange of information facilitates the program of the information dissemination and also allows the Center to keep abreast of the new informa tion from the D.C. water agencies. There is still a need to develop credi bility with the D.C. water agencies. and its role increased therefore its responsibility and The Center can see funding increased. (Appendix B) Transfer Program, a Still as part of the Technology will number of brochures be prepared. The brochure will address job opportunities in water resources, educational opportunities in water resources, the water resources in Washington, D.C. and their related problems...

IV. PROGRAM DEVELOPMENT

Because of the Administration's decision to cut the budget of the Office of Water Research and Technology Programs, the fiscal year 1982 will be critical to all water resources research centers/institutes, in particular to the D.C. Center. The majority of the other centers have been receiving funds from their respective states and the private industry for a number of years. These funds

are well over the $115,000 federal share. For example, during the fiscal year 1980, the state of Wisconsin water research center received $1,106,500 in state funds and $250,975 in private funds. Whereas, during the same year, the D.C. Center received 51,311 in state funds and $14,417 in private funds. Certainly these two states are different in size but their water problems are equally important. If federal funds are cut, the other centers will be affected only to a minor degree. But, the D.C. Center whose budget is more than two-thirds from federal monies, will be heavily affected. This situation can be remedied only if the D.C. Center launches a strong development program and obtains funding from sources other than federal.

a) Target Organizations

There are many particularly favorable circumstances the D.C. Center can take advantage of. The proximity and good working relationship with local state and interstate agencies is the first evident advantage. These agencies have research needs the D.C. Center could support. The target agencies include: the Department of Environmental Services (DES), the Interstate Commission on the Potomac River Basin (ICPRB), the Metropolitan Washington Council of Governments (MWCOG), the Environmental Protection Agency (EPA), etc. Additionally, there is a large concentration of international agencies and organizations and private groups with interest in water research.

b) Research Services

The D.C. WRRC can offer a number of research services. They relate to technical and management problems on one hand and to training and technology transfer on the other hand (See Table 5, Research Services Matrix). The "District of Columbia Five-Year Water Resources $esearch Program Plan" prepared by the Center, gives an assessment of the water resources and their

Of .

Research "evvices								
	X		X	X	X	X	X	
		X				X	X	
	X			X		X		
y Council	X			X				
	X				X	X	X	.
						X	X	
		X	X					
	X				X			
					X			
ional Agencies					X	X		X
Groups			f X	I X		X		

uses, the current water related activities and the water resources problems. Of the 26 problems

major and ranked in order of their priority by a research sub-committee. The funding with Center can attempt to obtain concerned agencies to perform problems that are not being addressed (Exhibit 4).

Additionally, a number of the D.C. water resources agencies have their own long range research plans. The plans may address either government requirements or growth related problems. Most of the water agencies need technicians training, water quality monitoring, and technology transfer. The close involvement of the Center in the D.C. area water resources activities has given to the Center a first hand knowledge of the agencies research needs and a way to approach these needs.

The Center has maintained a strong interest in the international water energy resources development. This period is particularly interesting, due to the fact that this decade has been declared the "International Drinking Water Supply and Sanitation Decade" by the United Nations. Several organizations

are getting ready for in the decade activities. There will be many water projects The Center has foreign countries. already made contacts with some interwill increase its marketing efforts. national agencies and c)

The D.C. Water Resources Research Center is a joint federal-state agency :engaged in

lems. The Center is one of the 54 centers/institutes in the country under the responsibility of the Office of Water Research and Technology (OWRT), the U.S. Department of the Interior. Established at the V.niversity of the District of Columbia under provisions of the Water Resources Research Act of 1964

the Center serves these primary functions:

- It conducts studies on the District water and related land use problems including their technical, ecological, political, economic, institutional, =legal and social implications.
- It sponsors and administers projects dealing with these problems.
- It collects and disseminates information about water resources research and technology.
- It provides training opportunities in research for future water scientists enrolled at colleges and universities in the District.

The Center operates under the direction of a full-time director. He holds a doctorate in Fluid Mechanics with several years of experience in water and energy resources. The Center's Director reports to the Dean of the College of Life Sciences.

The Director is assisted in the research aspects by a research associate; in the administrative matters, lie is assisted by a research assistant and appropriate clerical help. A staff assistant provides support for the pro

The faculties of the College of Life Sciences and Engineering provide the technical support. The Center's research capability is strengthened and broadened through its liaison with the D.C. area universities, namely: The American University, The George Washington University, Georgetown University, The Catholic University, Howard University, and University of the District of Columbia. These universities have qualified scientists and experts in-the field of water resources.

The Center has two advisory committees whose members are selected from the local, state, regional and private water related agencies and universities. The Research Advisory Council advises the Center o n its mission, goals and objectives, program development and research priorities. The Technical

recommendations on proposal reviews, project priorities, reports. and
. An organizational relationship is given on Table 6.

d more than 25 research projects, 2 symposia and held many exhibits.

d quantity, conservation and management, mathematical modeling,
ppendix C)

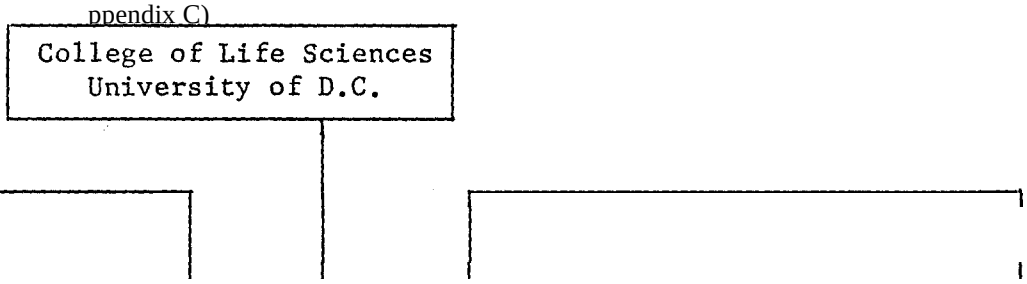
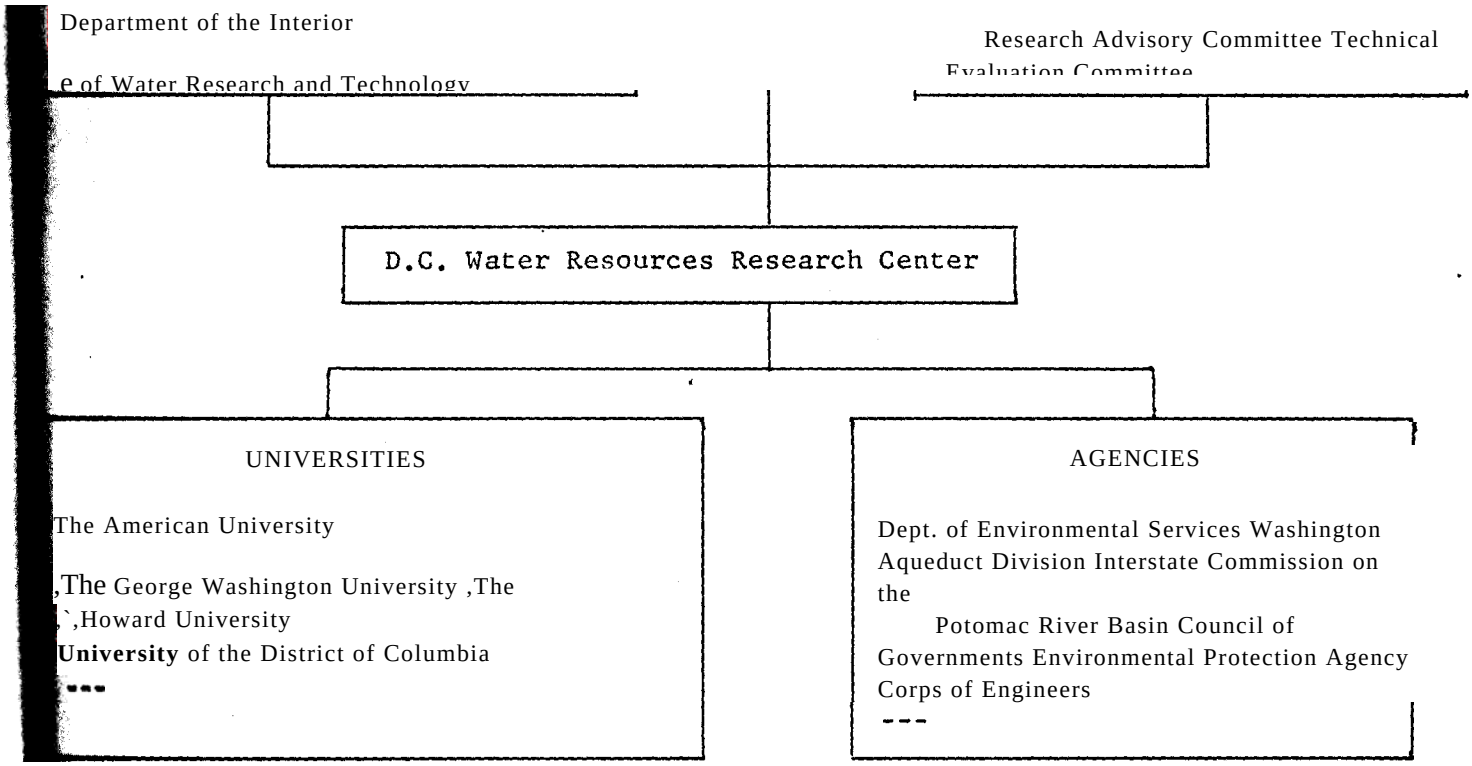


TABLE 6

RELATIONSHIP CHART



Appendix A The DC WRRC Publications

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Appendix B

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Mr. William Colony

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YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR
1976	Persistence Modeling for the Potomac River	O.W.R.T.	G. K. Young
1976	Distribution, Transport and Cycling of Dissolved and Particulate Organic Carbon in the Potomac River in the Vicinity of Washington, D.C.	O.W.R.T.	M. Champ
1976	Analysis of Ammonia and Primary Amines in Water	O.W.R.T.	F. W. Carson
1976	Effect of Rainfall Frequency on Small Urbaniz ing Watersheds	O.W.R.T.	L. Robinson -
1976	Organic Identification in Physical-Chemical Treatment Effluent Characterization of Tract Organics in D.C. Raw Wastewater	O.W.R.T.	M. H. Aldridge
1977	Removal of Eutrophic Nutrients from Wastewater and their Bioconversion to Bacterial Single Cell Protein for Animal Feed Supplements, Phase I	O.W.R.T.	B. T. Decicco
1978	Removal of Eutrophic Nutrients from Wastewater and their Bioconversion to Bacterial Single Cell Protein for Animal Feed Supplements, Phase 11	O.W.R.T.	B. T. Decicco Catholic U. 12,500

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YEAR	PROJECT TITLE	FUNDING SOURCE	PRINCIPAL INVESTIGATOR
1978	Enzymatic Analysis of Nutrients in Water, Phase I	O.W.R.T.	F. W. Carson
1978	Institutional Arrangements for Area-wide Water Resources Management Planning in the Washington D.C. Area Under the Federal Water Pollution Control Act Amendment of 1972	O.W.R.T.	H. Lieber
1979	Removal of Eutrophic Nutrients from Wastewater and their Bioconversion to Bacterial Single Cell Protein for Animal Feed Supplements, Phase III	O.W.R.T.	B. T. DeCicco
1979	Enzymatic Analysis of Nutrients in Water. Phase II	O.W.R.T.	F. W. Carson
1979	Urban Aquaculture of the Rainbow Trout (Salmo Gairdneri)	O.W.R.T.	A. J. Jones
1980	An Objective Evaluation of Urban Run-off Models	O.W.R.T.	K. Mahmood
1980	Five-Year R/D and Supporting Studies	O.W.R.T.	M. H. Watt D. Darden
1980	Water Supply Interconnections	O.W.R.T.	M. H. Watt H. Sveinbjorsson
980	Water Resources Training Program Design	O.W.R.T.	M. H. Watt D. Swarup

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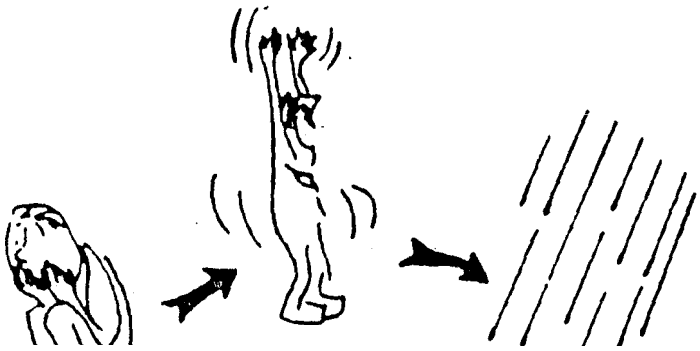
1980	Evaluation and Data Base Development Related to Regional Recreation Use Estimating Models for Water Resources Planning	O.W.R.T.	R. Waters
1980	Water Supply Management in the District of Columbia: An Institutional Assessment	O.W.R.T.	D. Beard
1980	Photosynthetic Pigments as Indicators of Algal Activity in the Upper Potomac Estuary	O.W.R.T.	P. Sze
F1980	Five-Year R&D (Phase II)	O.W.R.T.	M. H. Watt
1980	DC Water Publications	O.W.R.T.	M. H. Watt WRRC/U
1980	Directory of Organizations	10.W.R.T.	M. H. Watt
1981	Urban Planning Criteria for Non-Point Source Water Pollution Control	O.W.R.T.	G. K. Young
1981	The Effect of Copper on Spat Settlement of the Oyster Crassostrea virginica	O.W.R.T.	H. Phelps
1981	Analysis of Inorganic Anions in the Potomac Water, Sediment and Floc by Chromatography	O.W.R.T.	J. Girard



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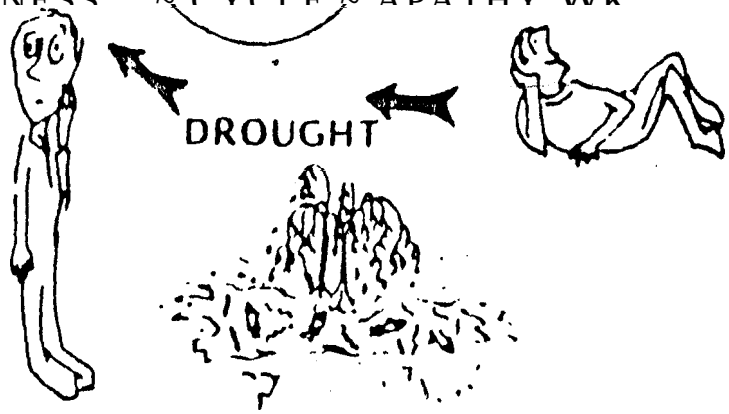

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