PUERTO RICO
WATER RESOURCES AND ENVIRONMENTAL RESEARCH INSTITUTE
REQUEST FOR PROPOSAL
FY 2018

U.S. Geological Survey
STATE WATER RESOURCES RESEARCH INSTITUTE PROGRAM

under Section 104B of the
Water Resources Research Act of 1984, as Amended

APPLICATION PACKAGE
CLOSING DATE: DECEMBER 15, 2017, 11:59 PM

INTRODUCTION

This Request For Proposals (RFP) is issued under the provisions of section 104 of the Water Resources Research Act of 1984 (Public Law 98-242), as amended by Public Laws 101-397, 104-147, 106-374, and 109-471. Section 104 of the Water Resources Research Act directs the Secretary of the Interior to administer program grants to Institutes and Centers, established under the provisions of section 104(a) of the Act, for research, education, and training that will assist the Nation in augmenting its water-resources science and technology. Responsibility for administration of this program has been delegated to the U.S. Geological Survey (USGS).

Research proposals submitted under this RFP are intended to address water resources problems of state and regional significance. The research priority areas for Puerto Rico are listed below. Proposals will not be considered in the following cases:

1. Proposals submitted by an applicant that has not met reporting requirements on a previous award by the US Geological Survey (USGS) or PR Water Resources and Environmental Research Institute (PRWRERI).
2. Applications for research on health effects involving human subjects.
3. Applications for research involving oceanography (estuarine research applications are acceptable).

This document provides guidance to the academic community for the preparation of proposals for the Institute's annual research program with the US Geological Survey. The procedure this year will be: (1) to request proposals, (2) to solicit evaluations by the Institute's External Advisory Committee (EAC) for relevance to the stated research priorities and technical contents, (3) to request a numerical rating of the proposals meeting the requirements of priority needs, and (4) selection of best proposals (number of proposals will depend on fund availability).

I. PROGRAM OBJECTIVES

Section 104(b) of the Water Resources Research Act of 1984 requires the Institutes or Centers to:

(1) “plan, conduct, or otherwise arrange for competent applied and peer reviewed research that fosters – (A) improvements in water supply reliability; (B) the exploration of new ideas that address water problems or expand understanding of water and water-related phenomena; (C) the entry of new research scientists, engineers, and technicians into water resources fields; and (D) the dissemination of research results to water managers and the public.

(2) "cooperate closely with other colleges and universities in the State that have demonstrated capabilities for research, information dissemination, and graduate training in order to develop a statewide program designed to resolve State and regional water and related land problems."

(3) The Act also requires each institute to "cooperate closely with other institutes and other organizations in the region to increase the effectiveness of the institutes and for the purpose of promoting regional coordination."

Applications submitted under this Announcement are to be in furtherance of these objectives and promote the national mission and objectives of the U.S. Geological Survey, which are focused on providing water quality and quantity information, understanding water availability, addressing the influence of climate on water resources, and responding to water-related emerging needs. Specific areas of emphasis are at the discretion of the individual Institute or Center Directors.

II. PUERTO RICO WATER RESOURCES RESEARCH PRIORITIES

Research and technology transfer will be concentrated on the following areas, in order of priority:

1. **Research on Natural Disasters:** Effects of hurricanes, extreme rainfalls, earthquakes, or other natural

hazards on natural resources, watershed hydrology, river morphology, the water and wastewater treatment, water distribution infrastructure, landslides, and floods.

2. **Surface Water, Erosion and Sediment Transport Studies:** Morphological studies on gravel and sand extraction and canalizations, Characterization of urban runoff, river restoration. Causes, characterization, control, and management of sedimentation in dams and water reservoirs. Innovative design of water intakes with sedimentation problems, control of sediment transport in construction projects, river banks and channel erosion, and local scour in bridges
3. **Definition, Effects and Prediction of Droughts:** Optimization of water reservoirs and dams operation during extreme dry periods, modeling of droughts, public perception, economic effects, prevention and preparedness.
4. **Drinking Water Quality Research:** Fluoride as a health agent, control of Trihalomethanes and other disinfections byproducts, TMDL procedures and development, epidemiological studies of water borne illness, effectiveness of water treatment processes.
5. **Climatologic Effects on Water Resources:** Global changes and their effects on water resources, local and regional effects (the Antilles), modeling.
6. **Water supply and Distribution Systems:** Implications of the new regulations for disinfections on well in Puerto Rico, impact of withdrawals on nearby water bodies, head water protection, operation and management by communities. Water losses in hydraulic networks, hydraulic modeling of water quality and quantity in distribution systems, pressure distribution, and water demand determination.
7. **Design of water treatment processes for private systems in small communities:** Design and construction of simple, economic and easy to operate systems, disposition of treated water and its effects on effluents.
8. **Groundwater Research:** Availability of water, development of strategies for the north coast unconfined and artesian aquifers, optimization of water withdrawal from aquifers, quantitative management plan for aquifers, salt water intrusion, safe yield, pollutant transport and flow modeling, development of new methodologies for groundwater treatment with high contents of iron and manganese.
9. **Recycling and Reuse of Used Water:** The use of wastewater for irrigation and artificial recharge, recycling of used water for human consumption, characterization of wash flows from water treatment plant filters, and vulnerability of water bodies to assimilate used waters.
10. **Water Infrastructure for Tropical Areas:** Design criteria for storm water and wastewater drainage systems, energy losses, manhole hydraulics.
11. **Watershed and Water Sources Management:** Includes conservation strategies, source protection, optimization of water sources, deforestation and reforestation, and riverine zones among others.
12. **Aquatic Ecosystems:** Flow conditions (quantity, quality, etc.) for aquatic ecosystems support, use of aquatic communities as river quality indicators, ecosystem values and health, and others.
13. **Development of Education Programs:** Water conservation, water resources and environment protection.
14. **Programs and Strategies for Reforestation and Their Effects on Low Flows:** Changes in land management and their effects on low flows.
15. **Estuaries and Associated Wetlands:** Modeling of estuaries and associated wetlands, strip and mixing zones, hydrology and hydraulics, water quality.
16. **Use of sinkholes in the north coast as drainage systems:** Disposal of street and highway runoff and water from other anthropogenic sources, hydraulics, intake capacity, protection structures.

III. APPLICANT ELIGIBILITY

Awards are available only to faculty members or affiliates at institutions of higher education in Puerto Rico pursuant to the provisions of Section 104 of the Water Resources Research Act of 1984, as amended.

IV. CONFLICT OF INTEREST

An applicant may not permit any federal employee to use his or her position for a purpose that is or gives the appearance of being in conflict of interest, either by giving the applicant an unfair advantage or by a desire for private financial gain.

V. APPLICATION DUE DATE

The applicant shall submit its application to the PR Water Resources and Environmental Research Institute at https://niwr.net/ no later than **December 15, 2017, 11:59 pm.**

VI. PROPOSAL DELIVERY INSTRUCTIONS

All proposals must be delivered by Internet. You may access the National Institutes on Water Resources' home page by going to http://niwr.net/. You must be registered as a researcher associated with the Puerto Rico Water Resources and Environmental Research Institute before entering any information concerning your proposal. Registration is done through the link "Register" on the first screen (left side menu under "Tools" heading) and is required only the first time you access the system. nAfter registering, scrolling down to "Log in to OPMS subsystems (104B, 104G, Annual Report, Annual Survey...)." Once logged in, go to "§104(B) Subsystem" on the left side menu of the new screen. Then follow the on screen instructions.

Each application shall be prepared and submitted in accordance with the specific instructions provided at the website. Submission will require two distinctly different actions: (1) submission of specified information as text directly into a web form and (2) "depositing" at the website document files containing detailed descriptions of the work being proposed. These files may be prepared using the word processing software of choice, but must be translated to PDF format prior to being deposited (detailed instructions for preparing and submitting these files, and verifying their submission are provided at the website).

Please note that the due date for proposals submission is **December 15, 2017, 11:59 pm** (Puerto Rico time). The Institute will NOT accept hand delivered proposals. You may call the Institute for clarification of these instructions at (787) 832-4040 ext. 3753 or email to prwreri@uprm.edu.

VII. FUNDS

As of the date of this Announcement, federal funds have not yet been appropriated for this program. The Government's obligation under this program is contingent upon the availability of appropriated funds. The Puerto Rico Water Resources and Environmental Research Institute reserves the right to adjust in any way necessary these requirements to meet those of the U.S. Department of Interior and/or of the U.S. Geological Survey.

A. The amount available in FY 2018 for this RFP is anticipated to be approximately $20,000 annually by project.
    A. Proposals should be for research and information transfer projects 12 to 36 months in duration and shall not request federal funding exceeding $60,000 ($20,000 per year).

B. **Multiyear projects will be funded a year at a time**. Funding in subsequent years will be contingent upon availability of funds and satisfactory performance. **No guarantee is made upon funds availability and continuation of a project. A new proposal must be submitted for renewal.**

C. Projects begun with prior year funds may be continued provided that each year is based on a revised proposal that incorporates a report of progress to the date of revision. A concise statement including data and analysis of research progress in the previously funded period, which demonstrate acceptable progress on the research project (not to exceed 10 pages single spaced), should be submitted within 30 days preceding the close of each 12 month budget period.

D. Matching Funds - The non-federal share must be $2.00 for every $1.00 federal. If the applicant requests academic release time (faculty members only), the proposal must be accompanied by a commitment letter from the department head or authorized university official. Any other in-kind share must be accompanied by a commitment letter from an authorized university official. The 1:2 Federal:non-Federal fund matching ratio must be met on each grant award period.

E. Funds available to the applicant from other sources (both Federal and State appropriations) may be used as matching funds as long as the proposal is accompanied by an official letter from the granter confirming the shared amount. In the event that State appropriations are not adequate to cover the non-Federal share, other contributions must be generated.

F. Matching funds shall be obligated during the period of performance.

G. The matching requirement should be met during each 12-month budget period.

H. Matching funds may contain indirect costs and non-federal salaries and benefits. The applicant's negotiated indirect cost rate (NICR) may be applied to both qualifying federal and non-federal direct costs, and the result used to satisfy part of the matching requirement under the non-federal share. The NICR shall not be applied to tuition and equipment costs. **Federal funds shall not be used to pay indirect costs**.

I. Regulations pertaining to allowable matching funds are provided in the Code of Federal Regulations at 43CFR12.64 and in the following OMB Circulars:

- Circular A-21 for Educational Institutions
- Circular A-87 for State, Local, and Indian Tribal Governments
- Circular A-122 for Private Nonprofit Organizations

a) Costs will be allowable in accordance with OMB Circular A-21, revised, "Cost Principles for Educational Institutions," on file in your university's contract office.

b) The portion of benefits paid to individuals cannot exceed the proportion of their salaries paid from the grant.

c) Indirect costs may not be charged on Federal funds provided by the Department of Interior; however, they are chargeable to the total direct costs (etc.) and should be shown in the non-Federal column of the Budget Breakdown form. Federal funds shall not be used to pay indirect costs. The Geological Survey will accept indirect cost rates approved by the cognizant agency in accordance with OMB Circular A-88. A copy of the approved rate agreement or other approving documentation must be attached to proposals from universities or colleges other than the University of Puerto Rico.

VIII. PROJECT DURATION

Projects may be from one to three year duration. Those with duration greater than one year will be approved for continuation of funding contingent upon: (1) the continued availability of funds to the Institute and (2) a revised proposal that demonstrates satisfactory progress for the previous year toward meeting the project's stated objectives. It is very important, therefore, that each year of multiyear projects stands by itself.

All projects will have a start date of March 1, 2017. Projects may be designed to run beyond February 2019 (multiyear projects), provided that they contain a reportable element with conclusive findings to be included in the FY 2018 program report. Funding in subsequent years will be contingent upon availability of funds and satisfactory performance.

The period of performance for the projects will be March 1, 2018 through February 28, 2019. A short (1-2 pages) semi-annual reports is required, and PIs will submit draft copies of completion reports to PRWRERI no later than April 30, 2019 for Institute review.

IX. PROPOSAL REVIEW AND SELECTION PROCESS

1. Proposals will be received and sent for evaluation to the Institute's External Advisory Committee.

Results of this evaluation will be forwarded to the director of the Institute. A copy of the evaluation standard form is enclosed (Exhibit 1). The External Advisory Committee uses this form in its evaluation and ranking process.

2. Advised by these evaluations, the director will select the top proposals (number of proposals will depend on funds availability).
3. The following criteria will be used:

Technical merit (quality)	40%
Applicability (importance)	30%
Novelty (new approaches)	10%
Competence of PIs	10%
Educational and training opportunities	10%

4. Time line will be as follows:

October 26, 2017	The Institute issues the Request for Proposals.
December 15, 2017	Proposals due at the website.
December 18, 2017	Proposals sent to the External Advisory Committee
December 22, 2017	Local selection process completed.
January 18, 2018	PRWERRI send Institute's proposal to USGS.
March 1, 2018	Projects begin
September 30, 2018	Semi-annual report due in the Institute office.
February 28, 2019	Projects end.
April 30, 2019	Draft project completion reports due for Institute review.
May 20, 2019	Final version of completion report due in the Institute office.
May 31, 2019	Annual program report submission to the USGS.

X. APPLICATION REQUIREMENTS

A. The applicant shall have its matching funds ($2.00 Non-Federal for every $1.00 Federal) committed at time of application submittal to the Institute. Commitment means that the application shall contain an institutional cost-sharing agreement (letter) signed by an official authorized to commit the applicant to all or part of the matching share or a third party, in-kind contribution signed by an official authorized to commit the third party.

B. Matching funds shall be obligated during the period of performance.

C. The matching requirement should be met during each 12-month budget period.

D. Matching funds may contain indirect costs.

E. The length of the project period shall not exceed 3 years, with discrete 12-month budget periods.

F. The Institute will consider research proposals only from faculty members or affiliates at institution of higher education in Puerto Rico.

G. The Institute shall not accept proposals from any applicant who has not met reporting requirements for

projects funded by a prior formula grant administered by the Department of the Interior.

H. INDICATE WHETHER THE APPLICATION IS FOR A NEW OR CONTINUING PROJECT.

XI. APPLICATION CONTENTS

Each application shall consist of the following items:

A. Signed SF 424, Application for Federal Assistance (except UPRM application).

B. Signed Assurances (except UPRM application).

C. Signed Matching Funds Commitment Letter (all aplications)

D. Project Proposals, including a Budget Breakdown (Exhibit 5) and Budget Justification (Exhibit 6) for each Project.

Exhibit 5 (Budget Breakdown) and Exhibit 6 (Budget Justification) should be considered worksheets. During the proposal submission process, data for Exhibits 5 and 6 will be entered into a form on the website. Upon completion of the submission process, the actual Attachments will be generated from these form entries and bundled with your application package.

(IMPORTANT) - Proposals submitted to USGS must include a supplementary document of no more than two pages labeled "Data Management Plan" (DMP). This supplementary document should describe how the proposal will conform to USGS policy on the dissemination and sharing of research results and associated data. A valid DMP may include only the statement that no detailed plan is needed (e.g. “No data are expected to be produced from this project”), as long as the statement is accompanied by a clear justification. This supplementary document may include:

- the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;
- the standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
- policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
- provisions for re-use, re-distribution, and the production of derivatives; and
- plans for archiving data, samples, and other research products, and for preservation of free public access to them.

Additional guidance on data management plans is available from the USGS Data Management web site here:

http://www.usgs.gov/datamanagement/plan/dmplans.php

XII. APPLICATION INSTRUCTION

The contents of the application shall be prepared in accordance with the following instructions.

A. **Research Proposals**. (Includes research, education, information transfer, and information management system proposals. "Graduate Fellowship" and "Seed Grant" projects must each be entered as **separate** research proposals if they support research.)

Each proposal shall consist of the following 20 elements. Items numbered 1 through 12 are to be entered in the web form provided at the website (see example at Exhibit 2).

1. Title. Concise but descriptive.
2. Project Type. Choose from the following: Research, Information Transfer, Information Management System, Education, or Other (please specify).

3. Focus Categories. Choose a maximum of three focus categories from the list provided (Exhibit 3), with the most preferred focus category first.
4. Research Category. Choose from the following the one category that most closely applies: Social Sciences, Ground-water Flow and Transport, Water Quality, Biological Sciences, Engineering, or Climate and Hydrologic Processes.
5. Keywords. Enter keywords of your choice descriptive of the work (Exhibit 4).
6. Start Date. Enter the actual beginning date for the project.
7. End Date. Enter the estimated end date for the project.
8. Principal investigator(s). Provide name, academic rank, university, email address and phone number of the principal investigators.
9. Congressional District of the university where the work is to be conducted.
10. Abstract. Provide a brief (one-page) description of the problem, methods, and objectives in the space provided at the Internet site.
11. Budget Breakdown, as requested by the Web form (See Exhibit 5).
12. Budget Justification, as requested by the Web form (See Exhibit 6).

Items Items 13 through 20 are to be "deposited" as a file document in PDF format at the website. Note: This document shall not exceed 10 single-spaced pages - 12 point font, exclusive of résumés (item 20). Upon submission of your application components, the entire package will be available in PDF format for your inspection and final approval. You are responsible for verifying the approval, including compliance with the 10-page limit. If editing is required, you must edit the problem document(s) using your word processor and resubmit that application component.

13. Title. Please use the same title as was entered in the web form under item 1, above.
14. Statement of regional or State water problem. Include an explanation of the need for the project, who wants it, and why.
15. Statement of results or benefits. Specify the type of information that is to be gained and how it will be used.
16. Nature, scope, and objectives of the project, including a timeline of activities.
17. Methods, procedures, and facilities. Provide enough information to permit evaluation of the technical adequacy of the approach to satisfy the objectives.
18. Related research (Research projects only). Show by literature and communication citations the similarities and dissimilarities of the proposed project to completed or on-going work on the same topic.
19. Training potential. Estimate the number of graduate and undergraduate students, by degree level, who are expected to receive training in the project (see Exhibit 7).
20. Investigator's qualifications. Include résumés of the principal investigator(s). No résumés shall exceed two pages or list more than 15 pertinent publications.

B. **Budget Breakdown**. Submit a detailed budget as presented in the form of Exhibit 5. The budget shall include the line items presented below. Indicate the amount of cost sharing for each element: If the applicant is proposing a project of more than one year duration, include lump sum costs for other years at the bottom of form. The applicant will submit the budget using the web form provided in the website.

C. **Budget Explanation**: Submit a detailed description of each budget item in the corresponding web form. **Include calculations** on how your figures were arrived at and any information necessary to understand your budget (see Exhibit 6).

1. Salaries and wages for PIs. Identify the individuals, title/position and categories of salaries and wages, estimated hours or percentage of time, and the rate of compensation proposed for each

individual. If the rate of pay shown is higher than the current institution's rate of pay, include an explanation.

2. Salaries and Wages for Graduate Students. Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)

3. Salaries and Wages for Undergraduate Students. Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits.)

4. Salaries and Wages for Others. Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.

5. Fringe benefits (FB). Propose rates/amounts in conformance with normal accounting procedures. Explain the cost and the basis of the rate computations. Provide a breakdown of FB. Include FB for PIs, Graduate Students, Undergraduate Students, and Others separately.

6. Tuition. Provide rates and total proposed tuition separately for Graduate and Undergraduate Students.

7. Supplies. Indicate separately the amount estimated for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.

8. Equipment. Identify non-expendable personal property having a useful life of more than 1 year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and material required for each, and show costs separately from the other items. Furniture is not allowed. A detailed breakdown is required.

1. Services or consultant. Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.

1. Travel. All estimated costs should be itemized showing the number of trips required, type of trip (field, scientific meeting, or conference attendance), the destination, the number of people traveling, the per diem and local reimbursement rates allowed by the applicant, and any miscellaneous expenses for each trip. (Note: All travel is to be in accordance with the established travel policy of the applicant's institution. A copy of the applicant's institutional travel policy may be attached). A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).

2. Other direct costs. Itemize the costs not included elsewhere, e.g., shipping, telemetry, computing, equipment use charges, age dating, publication costs, or other services. Provide breakdowns showing how the cost was estimated, e.g., computer time should show the type of computer, the estimated time of use, and the established rates.

3. Indirect costs. Specify the indirect costs rate in the non-Federal column only based on the applicant's approved rate agreement. An amount equivalent to what the indirect costs would have been under the Federal portion may also be included as match under the indirect cost in the non-Federal portion.

XIII. SPECIAL TERMS AND CONDITIONS

1. Adherence to reporting requirements. A recipient's failure to submit the required reports/documents in

a timely manner may result in the withholding of payment, in termination of the award, and/or in the delay or non-issuance of a new award.

2. Adherence to the Original Research Objectives and Budget Estimates. Any commitments or expenditures incurred by the Recipient in excess of the funds provided by this award shall be the responsibility of the Recipient. Expenditures incurred prior to the effective date of this award cannot be charged against award final funds unless provided for in this award.
3. Dissemination of Results. The Recipient is encouraged to disseminate research result promptly to the scientific community. The Institute encourages the Recipient to publish project reports in scientific and technical journals. The Institute and the US Government may publish, reproduce, and use all technical data developed as a result of this award in any manner and for any purpose, without limitation, and may authorize others to do the same.
4. Violation of Award Terms. If the Recipient has materially failed to comply with the terms of this award, the Institute may suspend, terminate, or take such other remedies as may be legally available in the circumstances.

Exhibit 1

Page 1

PUERTO RICO WATER RESOURCES AND ENVIRONMENTAL RESEARCH INSTITUTE

UNIVERSITY OF PUERTO RICO AT MAYAGÜEZ

P.O. BOX 9000

MAYAGUEZ, PUERTO RICO 00681-9000

FY 2016 PROPOSAL EVALUATION FORM

Proyect Number: _____ Amount Requested:_____

Principal Investigator(s):

Title:

1. Is the water problem addressed significant? (30%) Score_____
(Excellent 30, Very Good 25, Good 20, Average 15, Fair 10, Poor 5, Unacceptable 0)

Comments:

2. Is the research proposal of high quality? (40%) Score_____
(Excellent 40, Very Good 34, Good 28, Average 22, Fair 15, Poor 8, Unacceptable 0)

Consider the following points in your evaluation (1) clarify of objectives, (2) methodology to conduct the research, and (3) reasonableness of the scope of the project for the time and budget allotted.

Comments:

2. Does the proposal contain new approaches
or a novel solution to the water problem addressed? (10%) Score_____
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments:

Exhibit 1
Page 2

PRWRERI Proposal Evaluation Form (continued)

4. Is the principal investigator and/or his research team qualified to carry out the proposed research? (10%) Score_____
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments:

5. Does the proposal make appropriate provision for the training of future water resources professionals? (10%) Score_____
(Excellent 10, Very Good 8, Good 6, Average 5, Fair 3, Poor 1, Unacceptable 0)

Comments:

OVERALL EVALUATION (sum of section scores) Score_____

ADDITIONAL COMMENTS (continue on reverse if necessary)

REVIEWERS SIGNATURE_____

REVIEWERS NAME_____ PHONE_____

ORGANIZATION_____

ADDRESS _____ DATE_____

Exhibit 2

RESEARCH PROPOSAL (Example)

1. **Project Number:** **leave blank**
2. **Title:** Aromatic Degrading of Bacterial Population and Bioremediation of Contaminated Groundwaters
3. **Focus Categories:** GW, TRT, WQL
4. **Keywords:** Bacteria, Biodegradation, Biological Treatment, Treatment, Bioremediation
5. **Duration Period:** March 1, 2018 – February 28, 2019
6. **FY 2002 Federal Funds:** $20,000
7. **FY 2002 Non-Federal Funds:** $40,000
8. **Principal Investigators:**

John Dow 1, Department of Biology, University of Puerto Rico at Mayaguez.

John Dow 2, Department of Civil Engineering, University of Puerto Rico at Mayaguez.

John Dow 3, Center for Microbial Ecology, Michigan State University, East Lansing.

9. **Congressional District:** PR-098
10. **Statement of the Critical Problem**

11. **Statement of Results or Benefits**

Exhibit 3

FOCUS CATEGORIES

ACID DEPOSITION	ACD
AGRICULTURE	AG
CLIMATOLOGICAL PROCESSES	CP
CONSERVATION	COV
DROUGHT	DROU
ECOLOGY	ECL
ECONOMICS	ECON
EDUCATION	EDU
FLOODS	FL
GEOMORPHOLOGICAL	GEOMOR
GEOCHEMICAL PROCESSES	GEOCHE
GROUND WATER	GW
HYDROGEOCHEMISTRY	HYDGEO
HYDROLOGY	HYDROL
IRRIGATION	IG
LAW, INSTITUTIONS, & POLICY	LIP
MANAGEMENT & PLANNING	M&P
METHODS	MET
MODELS	MOD
NITRATE CONTAMINATION	NC
NONPOINT POLLUTION	NPP
NUTRIENTS	NU
RADIOACTIVE SUBSTANCES	RAD
RECREATION	REC
SEDIMENTS	SED
SOLUTE TRANSPORT	ST
SURFACE WATER	SW
TOXIC SUBSTANCES	TS
TREATMENT	TRT
WASTEWATER	WW
WATER QUALITY	WQL
WATER QUANTITY	WQN
WATER SUPPLY	WS
WATER USE	WU
WETLANDS	WL

Exhibit 4 Page 1

Keywords

Note : The keywords describe areas of interest as related to water; e.g. "Cooling" refers to water as used in cooling. "Fertilizers" implies the effect of fertilizer on water characteristics, etc.

A
1. Acid Deposition
2. Acid rain
3. Activated Carbon
4. Activated Sludge
5. Adsorption and Exchange
6. Aeration
7. Agriculture
8. Algae
9. Alkaline Scale
10. Anaerobic Treatment
11. Animal Waste
12. Aquaculture
13. Arid Climates
14. Aquatic Plants
15. Aquifer Characteristics
16. Aquifer Parameters
17. Atmospheric Models
18. Atmospheric Processes
B
19. Bacteria
20. Basalt Hydrology
21. Base Flow
22. Bays
23. Beaches
24. Benefit-Cost Analysis
25. Benthos
26. Biodegradation
27. Bioindicators
28. Biological Control
29. Biological Treatment
30. Biomonitoring
31. Biotechnology
32. Birds
33. Boating
34. Brackish Water
35. Brines
C
36. Cartography
37. Channels
38. Chemigation
39. Chlorination
40. Climate
41. Cloud Seeding
42. Coastal Engineering
43. Coastal Zone
44. Computers
45. Conflict Managements
46. Conjunctive Use
47. Conservation
48. Contaminant Transport
49. Conveyance Systems
50. Cooling
51. Crop Water Use
52. Crustaceans
D
53. Dairy Waste Management
54. Dams
55. Data Analysis
56. Data Storage and Retrieval
57. Decision Model
58. Demand Management
59. Denitrification
60. Desalination
61. Developing Countries
62. Disinfections
63. Distillation
64. Distribution System
65. Drainage
66. Drilling
67. Drought
68. Dynamic Programming
E
69. Earth Dams
70. Economics
71. Ecosystems
72. Education
73. Energy Budget
74. Energy Use and Conservation
75. Environmental Sanitation
76. Epidemiology
77. Estuaries
78. Estuarine Modeling
79. Eutrophication
80. Evaporation
81. Evapotranspiration

Exhibit 4 Page 2

Keywords

F
82. Fertilizers
83. Fish Ecology
84. Fisheries
85. Flood Control
86. Flood Plain Management
87. Fluid Flow
89. Fluid Mechanics
G
90. Geochemistry
91. Geographic Information Sys.
92. Geomorphology
93. Geophysics
94. Geothermal Power
95. Glaciers
96. Great Lakes
97. Groundwater Hydrology
98. Groundwater Management
99. Groundwater Modeling
100. Groundwater Movement
101. Groundwater Quality
102. Groundwater Recharge
H
103. Hazardous Waste
104. Health Effects
105. Heal Budget
106. Heavy Metals
107. Herbicides
108. History
109. Hydraulic Structures
110. Hydraulics
111. Hydrobiology
112. Hydrogeology
113. Hydrologic Models
114. Hydropower
115. Hypothermia
I
116. Ice
117. Impoundments
118. Indian Water Issues
119. Industrial Wastewater
120. Infiltration
121. Information Dissemination
122. Insecticides
123. Insects
124. Institutional Relationships
125. In-stream Flow
126. Inter-basin Transfers
127. Invertebrates
128. Ion Exchange
129. Irrigation
130. Irrigation Management
131. Irrigation Scheduling
132. Irrigation System
133. Isotopes
K
134. Karst Hydrology
L
135. Lagoons
136. Lakes
137. Land Use
138. Landscape Management
139. Land-Water Interactions
140. Law
141. Leaching
M
142. Marketing
143. Marinas
144. Marine Resources
145. Marshes
146. Mathematical Models
147. Membranes
148. Microclimatology
149. Mineralogy
150. Mining
151. Model Studies
152. Moisture Uptake
153. Mountain Lakes/Streams
154. Multiple-Objectives Planning
N
155. Navigation
156. Nitrogen
157. Numerical Analysis
158. Nutrients
O
159. Oil-Water Interfaces
160. Open Channels
161. Operation Research
162. Optimization
163. Organic Compounds
164. Osmosis
165. Oxidation
166. Ozonation

Keywords

P
167. Perched Water Table
168. Percolation
169. Pest Management
170. Pesticides
171. Phosphorus
172. Photosynthesis
173. Phreatophytes
174. Physical Chemistry
175. Planning
176. Plant Growth
177. Plant Pathology
178. Plant Stress
179. Plant-Water Relationships
180. Policy Analysis
181. Pollutants
182. Pollution Control
183. Ponds
184. Port Facilities
185. Power Plants
186. Public Health
187. Pumps
R
188. Rainfall
189. Rainfall-Runoff Models
190. Rainfall-Runoff Processes
191. Range Management
192. Recreation
193. Reefs
194. Regulatory Permits
195. Remote Sensing
196. Reservoir Management
197. Reservoir Modeling
198. Resource Development
199. Resource Planning
200. Reverse Osmosis
201. Riparian Vegetation
202. Risk Analysis
203. Risk Management
204. River Basin Development
205. River Beds
206. Rivers
207. Runoff
S
208. Saline Soils
209. Saline-Freshwater Interfaces
210. Salinity
211. Sanitary Landfills
212. Saturated Flow
213. Seawater
214. Sedimentation
215. Seismology
216. Septic Tanks
217. Sewer Systems
218. Shellfish
219. Shipping
220. Shore Birds
221. Shore Protection
222. Sludge
223. Snow
224. Socioeconomic Issues
225. Soil Chemistry
226. Soil Erosion
227. Soil Microbiology
228. Soil Physics
229. Soil-Water Relationships
230. Solar Energy
231. Solute Transport
232. Springs
233. Statistics
234. Stochastic Hydrology
235. Stochastic Processes
236. Storm Water Management
237. Streams
238. Subsidence
239. Subsurface Drainage
240. Surface Drainage
241. Surface-Groundwater Relationships
242. Suspended Sediments
243. Synthetic Hydrology
244. Synthetic Organics
245. Systems Analysis
246. Systems Engineering
T
247. Thermodynamics
248. Tideland
249. Time-Series Analysis
250. Tourism
251. Toxic Substances
252. Trace Elements
253. Trace Organics
254. Tropics
U
255. Underground Storage Tanks
256. Unsaturated Flow
257. Urban Drainage
258. Urban Hydrology

Exhibit 4 Page 4

Keywords

259. Urban Planning
260. Urban Water Systems

V

261. Viruses

W

262. Waste Disposal
263.Wastewater
264. Wastewater Irrigation
265. Wastewater Treatment
266. Water Chemistry
267. Water Demand
268. Water Harvesting
269. Water Law
270. Water Levels
271. Water Quality
272. Water Quality Control
273. Water Quality Management
274. Water Quality Modeling
275. Water Quality Monitoring
276. Water Quality Standards
277. Water Resources Development
278. Water Reuse
279. Water Rights
280. Water Softening
281. Water Treatment
282. Water Treatment Facilities
283. Water Use Data
284. Water Use Efficiency
285. Water Use Monitoring
286. Watershed Management
287. Waves
288. Weather Data Collection
289. Weather Forecasting
290. Weather Modification
291. Weeds
292. Well Hydraulics
293. Wetlands
294. Wildlife Management

Z

295. Zooplankton
296. Zoning

Exhibit 5

Budget Breakdown

Project Number:

Project Title:

Cost Category	Federal	Non-Federal	Total
Principal Investigator(s) Salaries and Wages:	$3,919	$15,576	$19,495
Graduate Student(s) Salaries and Wages:	$12,000	$0	$12,000
Undergraduate Student(s) Salaries and Wages:	$1,000	$0	$1,000
Others: 0	$0	$0	$0
Total Salaries and Wages:	$16,919	$15,576	$32,495
Principal Investigator(s) Fringe Benefits:	$361	$5,096	$5,457
Graduate Student(s) Fringe Benefits:	$0	$0	$0
Undergraduate Student(s) Fringe Benefits:	$16	$0	$16
Others: None	$0	$0	$0
Total Fringe Benefits:	$377	$5,096	$5,473
Graduate Student(s) Tuition:	$0	$2,466	$2,466
Undergraduate Student(s) Tuition:	$0	$0	$0
Total Tuition:	$0	$2,466	$2,466
Supplies:	$1,485	$0	$1,485
Equipment:	$0	$0	$0
Services or Consultants:	$0	$0	$0
Travel:	$520	$0	$520
Other Direct Costs:	$699	$0	$699
Total Direct Costs:	$20,000	$23,138	$43,138
Indirect costs on federal share:	XXXXX	$10,000	$10,000
Indirect costs on non-federal share:	XXXXX	$10,336	$10,336
Total Estimated Costs:	$20,000	$43,474	$63,474
Total Costs at Institute host College of Engineering:	$20,000	$43,474	$63,474
Total Costs at other University Name of University: None	$0	$0	$0

Exhibit 6

Budget Justification

Project Number:

Project Title:

Salaries and Wages for PIs. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
Federal: Salary is included for 2 weeks (summer time) of compensation at a rate of $7,838.67/month x 0.50 = $3,919 Non-federal: Salary is calculated for three credits release load per semester for two semester. Three credits comprise 22.08% of the annual work load for a faculty member, which is $70,548 x 0.2208 = $15,576/year provided by UPRM as a in kind match.
Salaries and Wages for Graduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
Federal: Salary is included to support one master student in the form of graduate assistantship or stipend at a rate of $1,000/month x 12 month/yr = $12,000/yr. Non-federal: None
Salaries and Wages for Undergraduate Students. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual. (Other forms of compensation paid as or in lieu of wages to students performing necessary work are allowable provided that the other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work. Also, note that tuition has its own category below and that health insurance, if provided, is to be included under fringe benefits).*
Federal: Salary is included to support one undergraduate student in the form of an hourly student at a rate of $7.25/hr x 4.6 hr/wk x 30 wk/yr = $1,000/yr. Non-federal: None
Salaries and Wages for Others. *Provide personnel, title/position, estimated hours and the rate of compensation proposed for each individual.*
NA
Fringe Benefits for PIs. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Federal: Fringe benefits are calculated based on the current approved rate for UPRM. This rate is 9.2% for faculty during summer period. Therefore, $3,919 x 0.092 = $361.

Exhibit 6 (continued)

Non-Federal: The non-federal fringe benefits are $5,096. this is computed as follows: Social Security: 0.2208 x 0.062 x $70,548 = $965.72 Medicare: 0.2208 x 0.0145 x $70,548 = $225.85 Retirement: 0.2208 x 0.152 x 70,548 = $2,367.58 Health Insurance: 0.2208 x 9.03 x $649.46 = $1,295.17 State Insurance Fund: 0.2208 x 0.0155 x $70,548 = $241.43 Total Fringe benefits = $965.72 + $225.85 + $2,367.58 + $1,295.17 + $241.43 = $5,096
Fringe Benefits for Graduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Fringe Benefits for Undergraduate Students. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
Federal: Undergraduate student Fringe Benefits FB = $1,000 x 0.0155 = $16 Non-federal: None
Fringe Benefits for Others. *Provide the overall fringe benefit rate applicable to each category of employee proposed in the project. Note: include health insurance here, if applicable.*
NA
Tuition for Graduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
Federal: None Non-federal: 9 credit/sem x 2 sem x $137/cred = $2,466
Tuition for Undergraduate Students. *Provide personnel, title/position, and amount of tuition remission proposed for each individual.*
NA
Supplies. *Indicate separately the amounts proposed for office, laboratory, computing, and field supplies. Provide a breakdown of the supplies in each category.*
Federal: $1,500 is requested to cover costs of lab chemicals, reagents, bottled media, jab supplies and materials. The breakdown for this category is as follows: (a) Lab chemicals, reagents and media: $1,000 (b) Lab supplies (glass instruments, gloves, etc.) = $485 Non-federal: None
Equipment. *Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items. A detailed breakdown is required.*

NA
Services or Consultants. *Identify the specific tasks for which these services, consultants, or subcontracts would be used. Provide a detailed breakdown of the services or consultants to include personnel, time, salary, supplies, travel, etc.*
NA
Travel. *Provide purpose and estimated costs for all travel. A breakdown should be provided to include location, number of personnel, number of days, per diem rate, lodging rate, mileage and mileage rate, airfare (whatever is applicable).*
Federal: $520 is requested to cover costs associated to attend the 2016 AIChE annual conference, which will be held in San Francisco, CA on November 13-18, 2016. The requested budget is distributed as follows: (a) per diem: $40/day x 6 day = $240 (b) other (i.e. ground transportation): $280 Airfare and lodging costs will be supplied by other sources to be determined. Non-federal: None
Other Direct Costs. *Itemize costs not included elsewhere, including publication costs. Costs for services and consultants should be included and justified under Services or Consultants (above). Please provide a breakdown for costs listed under this category.*
Federal: Registration at the 2016 AIChE annual conference: $699 Non-federal: None
Indirect Costs. *Provide negotiated indirect (Facilities and Administration) cost rate.*
Federal: Indirect costs are 50% of the modified total direct cost not including equipment costs [$20,000 x 0.5 = $10,000]. Non-Federal: Indirect costs are 50% of the modified total direct cost not including equipment costs nor tuition [(23,138 - 2,466) x 0.5 = $10,346]

Exhibit 7

TRAINING ACCOMPLISHMENTS

ACADEMIC LEVEL

FIELD OF STUDY	Undergraduate	Master's Degree	Ph.D. Degree	Post Ph.D.	Total
Chemistry					
Engineering: Agricultural					
Civil					
Environmental					
Chemical					
System (industrial)					
Other*					
Geology					
Hydrology					
Agronomy					
Biology					
Ecology					
Social Sciences					
Computer Science					
Geography					
Law					
Resources Planning					
Other (specify)					

_____ **TOTAL**

* Less than 5 students in any one field of study.