Pre-Proposal Application Form
2019–2020 TWRI Graduate Student Research Programs

Basic Information:
Which program are you applying for (only select one option)?
___ Mills Scholarship Program (Texas A&M, Galveston or Qatar student requesting tuition only)
___ USGS Research Program (any Texas university requesting categorical funds and/or tuition)
_X_ Either program will fit my needs and eligibility

1. **Title of pre-proposal.**

Helping Cities Practice the Water Conservation they Preach: A Case Study of Water Efficiency on Irrigated Municipal Landscapes in Three Texas Cities

2. **Student name, contact information (email and phone number), university, department, degree being pursued as well as degree starting year and expected year of graduation.**

Alan C. Lewis; aclewis@tamu.edu;
PhD in Water Management & Hydrological Science, Texas A&M University
Began in 2017; anticipating graduation in 2020

3. **Faculty advisor or committee chair name, title, contact information (email and phone number), university and department.**

Dr. Ronald A. Kaiser, Professor; rkaiser@tamu.edu; (979) 845-5303
Department of Recreation, Park and Tourism Sciences, Texas A&M University

4. **Would these funds be initiating new research or supporting ongoing research? If ongoing, please briefly explain where you are at in the research and project timeline.**

The purpose of these funds will be to initiate new research.

5. **Abstract: Please provide 200 words or less about your proposed research problem, methods and objectives and describe how your research will address the research priorities.**

Overwatering lawns and landscapes is antithetical to conservation and a waste of drinking water. It is a ubiquitous problem. The EPA estimates that as much as 50 percent of the water used outdoors is lost due to wind, evaporation, inefficient irrigation systems, and watering when lawns and landscapes do not need water. Reducing excess residential, commercial, and public landscape irrigation is a critical issue for Texas as cities seek additional water resources or manage demands to accommodate urban growth. Strategies focusing on irrigation system audits, landscape watering restrictions, and water conservation educational programs can yield substantial savings. Novel water conservation interventions in College Station, Texas, particularly through the use of landscape water budgets, have led 5,500 homes to collectively save over 600 million gallons of water since 2010—equivalent to 2 months of the citywide total water use during the winter. However, to promote conservation among their customers, cities must also practice conservation. Whereas single-family homes have long been a focal point of research on urban landscape water conservation, efficiency on municipal irrigated green spaces, such as parks, areas surrounding public buildings, and golf courses, requires study. The purpose of this research will be to apply the water budget approach to municipal irrigated landscapes in College Station and two other cities in order to develop a protocol which cities can use to assess their outdoor water-use efficiency.

6. **Description of the student's proposed research, emphasizing how it will address water resources-related concerns (particularly how, if possible, it will benefit Texas), including:**

    a. ***Statement of Critical Regional or State Water Problem.*** **Describe how your research will address RFP research priorities and explain the need for the project, who wants it and why.**

Municipal water conservation and drought management are crucial for developing water resiliency in Texas. According to the 2017 Texas State Water Plan, about 204,000 acre-feet per year in municipal conservation strategies is recommended in 2020. Research on residential outdoor water conservation in College Station demonstrates that it is possible for homeowners to conserve substantial amounts of water without compromising the esthetics of their landscapes. In efforts to fulfill the Water Plan objectives, state and regional water resource planners and water utility practitioners would benefit from having a standard practice or protocol for determining water conservation potential on public landscape areas. Lessons gleaned from research in College Station will facilitate this goal.

    b. ***Nature, Scope and Objectives of the Research, including a timeline of activities.*** **This is the major emphasis of your proposal**

The objective of this research will be to develop and test a methodology for assessing landscape irrigation efficiency on municipal landscape areas. The landscape water budget approach will be developed using College Station data and the approach will be applied to two cities of similar size from the Dallas-Fort Worth Metroplex to discern efficient landscape water use. Cities in the DFW area, like College Station and Bryan, have reliable weather data, which are key to developing accurate water budgets. The proposed study period is 2013-2018.

May 2019: Obtain water use and weather data for municipal landscape areas in College Station and two cities in the DFW area; August 2019: Compute water budgets and estimate overwatering on study areas; December 2019: Complete data analysis and interpretation; May 2020: Publish the findings in a peer-reviewed journal article.

    c. ***Methods, procedures and facilities.*** **Provide sufficient information to permit evaluation of the technical adequacy of the approach to satisfy the objectives.**

The major findings from Alan Lewis's journal article published in the *Journal of the American Water Works Association*, were that landscape area can be estimated using property appraisal datasets. His paper was awarded the AWWA 2018 Water Conservation Division Best Paper Award for his contribution to the development of more accurate water budgets. This technique will serve as the basis for quantifying landscape area in this project. His second paper, which focuses on benchmarks for residential irrigation performance, will provide the basis for identifying which landscapes are consistently overwatered. The data from our prior research in College Station, such as daily precipitation and evapotranspiration from a network of 8 weather stations, and monthly water use, will be applied to develop landscape water budgets and use them to determine which properties are being overwatered, by how much and how often.

Lewis, A. C., C. P. Khedun, and R. A. Kaiser (2017), Coefficients for Estimating Landscape Area on Single-Family Residential Lots, Journal: American Water Works Association, 109(8).

    d. ***Statement of expected results or benefits.*** **Specify the type of information that is to be gained and how it will be used.**

This methodology would advance the water conservation field by providing a protocol for water planners and utilities practitioners that would help them determine whether to adopt more efficient irrigation management on public landscapes. We expect that the findings of this research could be extrapolated to other cities with similar park and recreation facilities and landscaping on municipal parcels. They could

also provide benchmarks for long-term planning, both at the statewide and local level, to identify potential pressure points for water conservation. These pressure points will be the focus for tailored policies. Findings will be documented in a peer-reviewed journal article and presented at conferences in 2020, including Texas Water, the World Environmental and Water Resources Congress, and the American Water Works Association Annual Conference and Exposition.

7. **Intended career path the student anticipates pursuing.**

Professor of Water Resources Management and licensed Professional Engineer

8. **Academic qualifications of the student: current degree plan/grades, unofficial transcript <u>or</u> list of courses taken and grades.** ***Note: This item is <u>not</u> included in the 3-page limit.***

Please see attached degree plan and student transcript.

9. **Budget (NOTE: for the TWRI Mills Scholarship, funds are strictly for tuition and fees only. USGS funds can go toward tuition as well as salaries, fringe, supplies, travel and other costs. Indirect costs are not allowed.)**
    a. **Please indicate your specific funding needs (only check one):**
        i. ___ Tuition support is needed
        ii. ___ Other costs (salary, fringe, travel, other) is needed
        iii. _X_ Either source of funds would be applicable to my project.

    b. **Proposed use of funds by category, not to exceed $5,000 requested. Indirect costs are not allowed per the prime sponsor agreement.**

Category	**Request**	**Justification**
Salary	$	
Fringe Benefits	$	
Travel	$	
Supplies	$	
Tuition	$5,000	Towards the student's tuition and fees to 8/20
Other	$	
Total	**$5,000**	*Not to exceed $5,000*