UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED AEC733
https://doi.org/10.32473/edis-WC394-2021

Integrating "Connectedness to Water" into Water-Related Extension Programs[1]

Laura A. Warner, John M. Diaz, Jamie L. Loizzo, Nicole Pinson, Lorna Bravo, Peyton N. Beattie, and Caroline P. Barnett[2]

Introduction

Engaging communities in protecting and preserving water resources is one of the most important contexts in which Extension professionals work. Extension organizations around the world conduct programming for audiences such as residents, agricultural producers, elected officials, and horticultural personnel to promote stewardship of this limited resource. Florida Cooperative Extension, for example, recognizes the importance of water through a high-priority initiative focused on water quantity, quality, and supply (UF/IFAS, 2024). Educating key Extension audiences such as policymakers, residents, educators, and youth on the importance of water conservation and protection is an essential part of Florida Cooperative Extension's mission as identified in the Florida Cooperative Extension Pathway. A significant challenge associated with successful water-related programming is the lack of strategies and tools available to analyze the Extension audience and measure potential changes (e.g., behavior changes) brought about by a program. To address this challenge, we developed the *Concise Connectedness to Water Scale* (CCWS), a tool that can be used for both planning and evaluation. This publication describes the research used to develop the tool, discusses our findings, provides recommendations for using the tool, and shares the tool itself. This document is intended for Extension professionals and other practitioners who work on water issues.

Extension's Role in Protecting Water

Extension has traditionally provided water education programs that teach residential, agricultural, landscape, urban, and rural best management practices, energy efficiency, and water conservation. Such programs are critical for addressing population projections that 6.5 billion people (more than half of the global population) will live in urban areas by 2050. This statistic is particularly salient for Florida's expanding population, which puts pressure on water supplies through increased demand on different water sectors. Specifically, more people will need access to limited water resources for basic needs as the population increases.

Recently, a new role has emerged for Extension educators to serve as facilitators to help participants forge relationships among each other and the resources that need protection (Diaz et al., 2017). Research has demonstrated links between people's interactions with water and their taking action to protect it (Warner et al., 2019; White et al., 2016). In the context of human activities influencing water resources, this relationship has implications for efforts to help participants experience and develop relationships with waterways such as rivers, bays, lakes, canals, streams, oceans, springs, and stormwater ponds. By fostering relationships between Extension audiences and water resources, Extension professionals can encourage participants to be more inclined to protect water, with broad implications for tourism, quality of life, industry, land use, and agriculture. The challenge for Extension educators who conduct these types of program activities is establishing baseline characteristics among audience members, documenting related outcomes, and quantifying and reporting impacts to stakeholders. There is a need for an evaluative instrument to measure the efficacy and impacts of these efforts.

As Florida's population continues to grow and increase its demand on water resources, Florida's consumers, businesses, and decision-makers will play an increasingly vital role in future water demand, presenting unique challenges and opportunities for Extension programming. The planning of water-conservation programming with these challenges in mind is essential when exploring new ways to connect stakeholders to their local water bodies. Residents, agricultural producers, elected officials, horticultural personnel, and other decision-makers need to appreciate and feel connected to water bodies before they will become engaged in protecting this natural resource. Extension can facilitate this stakeholder engagement and involvement. Ultimately, Florida Cooperative Extension's goal is to conserve and protect limited water resources for residents, agriculturalists, natural areas, and future generations (UF/IFAS, 2024).

Exploring Connectedness to Water

Extension professionals must have subject-matter expertise along with specific program planning, implementation, and evaluation competencies. They also need to understand the challenges associated with complex issues, their stakeholders' perspectives on these issues, and the communities in which they reside (Scheer et al., 2011). In addition to acquiring knowledge and mastering specific competencies, Extension professionals need evaluation tools that can measure clients' emotional connection to water when planning water conservation programs are valuable. By understanding the Extension audience better, Extension professionals can reframe the problems to encourage audience connection and program adoption.

The work shared in this document is based on the strongly validated premise that when people feel emotionally connected to nature they are more likely to protect it (Frantz & Mayer, 2014). Existing assessments measuring connection to nature have explicitly omitted references to water, and we wanted to explore how connectedness to *water* might be useful to Extension efforts. Past efforts specifically examined people's exposure to water, and there was a need to go further to see how people emotionally connect to water.

We used an existing, well-established 14-item instrument designed to measure Connectedness to Nature (Mayer & Frantz, 2004) and modified it to measure connectedness to water (CTW). The statements (e.g., *I often feel a sense of oneness with the water around me)* are completed with responses ranging from *strongly disagree to strongly agree*. We pilot-tested the instrument with Master Gardener Volunteer classes in Florida. While we were not surprised to find Master Gardener Volunteers are more connected to water on average compared to other Floridians, we found their connection still increased significantly between the first and last days of their multiweek training program (Warner et al., 2020). This finding demonstrated CTW can change over time.

Following the pilot test, we conducted further survey research with 3,596 Florida residents using our new tool. We found the instrument performed better overall when it was reduced to 11 items (Warner & Diaz, 2020). These items comprise the Concise Connectedness to Water Scale (CCWS; Appendix). We scaled the items from -2 (*strongly disagree*) to 2 (*strongly agree*), and when averaged together, these items result in a mean value that is interpreted as CTW, with mean values closer to -2 representing a strong disconnection and mean values approaching +2 representing a strong connection to water. We tested the new scale along with common constructs that reliably predict behaviors: attitude, perceived behavioral control, and subjective norms (Ajzen, 1991).

What We've Learned

When we added CTW to a model with other factors that influence behavioral intentions (i.e., attitude, perceived behavioral control, and subjective norms), CTW was the best overall predictor of residents' intention to conserve water. This is notable because those variables, and especially subjective norms, are powerful behavioral predictors. We used the CCWS with another sample of Floridians in an audience segmentation study. When a sample of Floridians was grouped according to their current water conservation engagement, CTW provided the greatest practical differences among the resulting subgroups when a series of other characteristics were considered (Diaz & Warner, 2024). Taken together, these findings indicate CTW may be a way to understand the core water-related belief frameworks of Extension participants (i.e., attitude centrality; Eaton & Visser, 2008).

The CCWS tool was also used with youth audiences via The Streaming Science Project, an online platform for sharing college students' science communication products and programs with PK–12 and public audiences (Barnett et al., 2021). In March 2020, middle school students (n = 19) participated in a Streaming Science electronic field trip, titled *The Water Around Us*, about research on water conservation, ecosystems, and manatees. Students completed a retrospective post-then-pre version of the CCWS, and individual CCWS item means were evaluated and compared. A retrospective post-then-pre assessment is a single instrument, delivered after a program, that collects responses linked to respondents' disposition (e.g., to CCWS measures) at the current time (e.g., after the program) and a prior point (e.g., before the program; O'Leary & Israel, 2013). Results showed that after the electronic field trip students felt most strongly connected to the statement *I appreciate the plants and animals that live in the water around me*. They were least connected to the statement *I often feel like I am only a small part of the natural world around me, and that I am no more important than the water in the stream or the fish in the rivers*. These findings helped The Streaming Science Project identify the most impactful changes students experienced by participating in the electronic field trip.

Applications to Extension Programming

The research described here presents CTW as a way to understand emotional connections to water. The CCWS is a tool that can be used to measure CTW. Extension professionals working on water issues might use this tool to better understand their audience, establish reasonable activities, and target appropriate programmatic outcomes.

CTW can be incorporated into Extension programming in the following ways:

- Needs Assessment: CTW can be measured among target audience members (including residents, youth, volunteers, and decision-makers) to plan for a program. Audiences with weaker CTW might need activities designed to raise their awareness of water issues and connect to their emotions, while those with stronger CTW might benefit from more complex trainings.
- Program Planning: This information may be used to guide local and regional water-focused programs, place-based educational efforts (such as youth projects and river clean-ups), individual contact teaching (Seevers & Graham, 2012), and community engagement.
- Program Evaluation: The CCWS provides a means to capture data and report outcomes. Using the tool as a pre- and post-workshop or course assessment would provide data about participants' perceived connectedness to water and whether their connectedness increases, decreases, or remains the same as a result of participating in Extension programs).
- Program Evaluation: Increased CTW could be used as a target outcome for water-focused Extension programs for adults and youth. Example objective: After a four-part Water Steward series, 60% of participants will demonstrate increased CTW as measured by pre/post CCWS scores.
- Program Evaluation: CTW could be combined with different landscape and green building certification programs. These existing programs are an important component of conservation-minded development, but they are not directed at the resident's or other decision-maker's behavior. The CCWS could be used to better understand CTW (and changes to CTW as they relate to participants in these types of programs.)
- Communicating Impacts: Impacts may be better reported when the CCWS is combined with participant testimonials and the observation of participants' skills, behaviors, or engagement in activities that protect water quality, quantity, or supply.
- Decision-making: Policymakers might consider using CTW to understand their constituents and guide initiatives supporting increased CTW. Perhaps CTW could be coupled with GIS data to determine where water-based programming is needed.
- Self-assessment: CTW could be used by Extension professionals, other practitioners, and decision-makers to identify and better understand as a community leader one's own personal connections with water.

Summary

Extension professionals and other practitioners may be hindered by a lack of tools and strategies that support meaningful programming in the context of human activities influencing water resources. Connectedness to water, as measured by the CCWS, is a tool that can be used to measure clients' emotional connections to water. The CCWS has practical applications for both program planning and evaluation activities. This tool is available in the Appendix of this document and also as a pdf and Word download. See Diaz and Warner (2024), Warner and Diaz (2021), Warner et al. (2020), and Barnett et al. (2021) to read about the CCWS research referenced in this publication.

Acknowledgment

This work was supported by USDA National Institute of Food and Agriculture Hatch project 1018367.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Barnett, C. P., Suits, T. E., Sheppard, T. D., Beattie, P. N., Loizzo, J. L., Warner, L. A., Diaz, J. M., Reisinger, A. J., & Siders, A. C. (2021, February). *Youth's connectedness to water through a manatee-focused electronic field trip* [poster presentation]. Southern Region American Association for Agricultural Education Conference, virtual conference.

Diaz, J. M., Bardon, R. E., Hazel, D., Bruce, J., & Jayaratne, K. S. U. (2017). Role of extension in building sustainable partnerships with multiple stakeholders for land conservation. *Journal of Human Sciences and Extension*, *5*(3). https://scholarsjunction.msstate.edu/jhse/vol5/iss2/16

Diaz, J. M., & Warner, L. A. (2024). Evaluating connection to water as a driver for change: a multi-dimensional assessment to inform residential landscape conservation social marketing. *Journal of International Agricultural Education and Extension*, *31*(1), 50–73. https://doi.org/10.4148/2831-5960.1379

Eaton, A. A., & Visser, P. S. (2008). Attitude importance: Understanding the causes and consequences of passionately held views. *Social and Personality Psychology Compass, 2*(4), 1719–1736. https://doi.org/10.1111/j.1751-9004.2008.00125.x

Florida Cooperative Extension. (2024). *Florida Cooperative Extension: Pathway to Creating Engagement Through Innovation & Excellence*. University of Florida. https://extadmin.ifas.ufl.edu/pathway/

Frantz, C. M., & Mayer, F. S. (2014). The importance of connection to nature in assessing environmental education programs. *Studies in Educational Evaluation, 41*, 85–89. https://doi.org/10.1016/j.stueduc.2013.10.001

Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*(4), 503–515. https://doi.org/10.1016/j.jenvp.2004.10.001

O'Leary, J. L., & Israel, G. D. (2013). Capturing change: Comparing pretest-posttest and retrospective evaluation methods. *EDIS, 2013*(1). https://doi.org/10.32473/edis-wc135-2013

Scheer, S. D., Cochran, G. R., Harder, A. M., & Place, N. T. (2011). Competency modeling in extension education: Integrating an academic extension model with an extension human resource management model. *Journal of Agricultural Education, 52*(3), 64–74. https://doi.org/10.5032/jae.2011.03064

Seevers, B., & Graham, D. (2012). *Education through cooperative extension* (3rd ed.). Fayetteville, AR: University of Arkansas.

Warner, L. A., & Diaz, J. M. (2021). Amplifying the theory of planned behavior with connectedness to water to inform impactful water conservation extension program planning and evaluation. *Journal of Agricultural Education and Extension, 27*(2), 229–253. https://doi.org/10.1080/1389224X.2020.1844771

Warner, L. A., Diaz, J. M., Bravo, L., Pinson, N. D., Clem, T., & Thralls, E. L. (2020, February). Do Extension program participants feel more connected to water following a multi-week program? Results from a pilot test of the connectedness to water scale. *HortScience, 55*(9), S395. https://doi.org/10.21273/HORTSCI.55.9S.S1

Warner, L. A., Diaz, J. M., & Gusto, C. (2019). Exploring blue space as a tool for promoting good fertilizer practices among Florida residential fertilizer users. *Journal of Applied Environmental Education and Communication, 19*(3), 274–286. https://doi.org/10.1080/1533015X.2019.1586597

White, M. P., Pahl, S., Wheeler, B. W., Fleming, L. E. F., & Depledge, M. H. (2016). The 'Blue Gym': What can blue space do for you and what can you do for blue space? *Journal of the Marine Biological Association of the United Kingdom*, *96*(1), 5–12. https://doi.org/10.1017/S0025315415002209

Appendix

The Concise Connectedness to Water Scale

(For a formatted version of this scale, please see the PDF version of this article.)

Using the following scale, answer how you honestly feel. There are no right or wrong answers.

The **water around you** refers to the lakes, rivers, canals, streams, oceans, springs, and stormwater ponds that you may see.

Question	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
I often feel a sense of oneness with the water around me.					
I think of the water around me as a community to which I belong.					
I appreciate the plants and animals that live in the water around me.					
I think of humans as part of the water cycle.					
I feel a kinship with the animals and plants that live in the water around me.					
I feel as though I belong to the water around me as equally as it belongs to me.					
I have a deep understanding of how my actions affect the water around me.					
I often feel a part of the water cycle.					
I feel that everyone and everything connected to the water around me shares a common energy.					
Like a drop of water can be part of the ocean, I am connected to the water around me.					
I often feel like I am only a small part of the natural world around me, and that I am no more important than the water in the streams or the fish in the rivers.					

Note. Adapted from Warner and Diaz (2021).

[1] This document is AEC733, one of a series of the Department of Agricultural Education and Communication, UF/IFAS Extension. Original publication date August 2021. Revised February 2025. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

[2] Laura Warner, professor and Extension specialist, program evaluation and social marketing, Department of Agricultural Education and Communication, and UF/IFAS Center for Land Use Efficiency; John Diaz, associate professor and Extension specialist, program development and evaluation, Department of Agricultural Education and Communication, UF/IFAS Gulf Coast Research and Education Center; Jamie Loizzo, associate professor and e-learning coordinator, Department of Agricultural Education and Communication; Nicole D. Pinson, former Extension agent II, M.S., residential horticulture, UF/IFAS Extension Hillsborough County; Lorna V. Bravo, county Extension director and Extension agent II, M.S., urban horticulture, UF/IFAS Extension Broward County; Peyton Beattie, Extension assistant professor, Extension education, Department of Agricultural Education and Communication; Caroline Barnett, graduate assistant, Department of Agricultural Education and Communication; UF/IFAS Extension, Gainesville, FL 32611.