

## An Evolving Paradigm for Publication in the Water Resources Management Field

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Research in the field of water resources management has a strong role to play in advancing our knowledge of the coupled natural and human systems that govern water availability and use. The breadth of issues that must be considered when formulating management decisions generally results in such research efforts drawing from a broad range of disciplines, spanning the domains of engineering, hydrology, and economics, among others. Currently many journals focus on fundamental contributions to the state of knowledge within these individual domains, and while these journals play an important role in documenting traditional disciplinary advances, this information constitutes only part of what is required to develop useful strategies for water resource management. Judgments regarding whether or not a manuscript is worthy of publication in these more strictly disciplinary journals are often based on advancements within a singular topical area and are less likely to value interdisciplinary contributions that blend expertise across the multiple domains that impact water resources decision making.

The case for publishing a new piece of academic work has generally been cast in terms of either the collection and interpretation of a new data set (generally the result of experimental or field work), or the development of a novel analytical or methodological approach (usually described within a mathematical framework). While these will always be strong rationales for justifying the value of research primarily intended to contribute to fundamental knowledge, these types of results, by themselves, are often insufficient to advance water resources policy. Both the natural and

socio-economic systems that have bearing on water management need to be considered jointly when developing management strategies that are meaningful to the policymakers that will oversee their implementation. Research at this level, which falls somewhere between the fundamental and purely applied, plays an important bridging role and is critical to the development of “real world” solutions. Nonetheless, it can be more difficult to identify a home for such research in the published literature. While it is certainly important to maintain the traditions of the classical disciplinary bodies of literature, elucidating how water management approaches are impacted by the complex connections and feedbacks between human and natural systems is a critical interdisciplinary research area that needs to be advanced.

Providing outlets for this type of research is important for a number of reasons. First, to the extent that the advancement of any field is dependent on an ability to make its contributions known to a broader audience, an inability to widely disseminate research findings related to water resource management is detrimental to the field. The survival of junior faculty, or young researchers of any kind, is also dependent on the existence of respected journals that can constructively review and publish their work in a timely manner. And, given that these individuals play a critical role in the perpetuation of any field through the energy and new ideas they bring, as well as through the training of new students and researchers, efforts should be made to ensure that they have the opportunity to succeed. Meetings that, in one way or another, are linked to a particular publication

(e.g., *Journal of the American Water Resources Association* and AWRA meetings; *Journal of Water Resources Planning and Management* and ASCE's Environment and Water Resources Institute (EWRI) meetings; *Environmental Modelling & Software* and the International Environmental Modelling and Software Society's meetings) are also important as they serve to foster the types of informal interactions that lead to the transfer of ideas and information. These exchanges often form the basis for collaborative research efforts that lead to interdisciplinary advances, something that is particularly vital to the field of water resource management.

While the benefits of having journals that serve as a forum for interdisciplinary water resources research are manifold, there is always a concern over opening the door too wide, thereby allowing in a class of papers that are either too parochial to provide general lessons (i.e. case studies), or insufficiently quantitative to allow for an objective assessment of results and recommendations (i.e. "soft" science). These are legitimate concerns, and rigorous standards of quality still need to be enforced. However, there are many interesting research questions that fall between those that are concerned with the more traditional contributions associated with generating new data or methodological advances and those that might be considered "too applied." Examples of research that fits within this gap might include the application of existing theories from other disciplines, such as risk management, within an environmental or water resources context. While these fundamental concepts may have evolved within a financial or investment framework, the application of such ideas to water resource management necessarily involves integrating consideration of a range of factors unique to the field, such as the inverse relationship between water supply and water demand or the extremely risk-averse nature of water utilities.

Another example of a research area that does not fit within traditional disciplinary bounds would be new methods for identifying and presenting system design tradeoffs. These types of advances can be invaluable in enhancing group decision making while aiding researchers in responding to policy-makers and stakeholders when confronted

with the ubiquitous question: "What are the tradeoffs?" This simple question is confounding because water resource management requires the joint consideration of uncertain costs, risks and efficiencies, as well as the potential for complex spatio-temporal system conflicts (e.g., trans-boundary tradeoffs or trans-generational sustainability tradeoffs). This is particularly true in the face of climate change, which may bring with it a non-stationary future for terrestrial hydrologic systems where design traditions and historical data no longer reflect management needs or risks to future generations.

These represent just a few illustrations of ideas that fall outside the typical definition of a contribution to water resources research, but which are vital to the practice of water resources management. Not all publications in the field have deemed papers addressing these less traditional topics to be suitable, but an increasing number have broadened their definition of what constitutes new knowledge. The *Journal of Water Resources Planning and Management*, *Environmental Modelling & Software*, and the *Journal of the American Water Resources Association* have sought to provide a vehicle for publishing research that maintains a strong technical basis while giving due attention to the applied aspects of the work. In recent years, it should also be noted that *Water Resources Research*, once the premier outlet for research on water resource management, has recommitted itself to this area through the appointment of a new cadre of editors and associate editors with interests in the field.

Fundamental contributions to advancing water resources, as with other fields, will always be valued and opportunities for publishing such work will always be available. However, as concerns over population growth and the impacts of climate change lead to an increased demand for novel approaches to managing water resources, journals that promote and disseminate research that demonstrates *the value of theory in application*, even if the work does not focus primarily on the development of the theory itself, will become increasingly important. Ensuring that innovative applied work can always find a home within the published literature will be important both to the field of water resources and society as a whole.

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