

**Graduate School of Architecture, Planning, and Preservation**  
**Master Class Program 2025**  
**Course Title: A Fluid Matter – Heritage and its Relationship to Water**  
**Instructor: Jonathan S. Bell**

The ancient relationship between humans and water showcases our species' ingenuity in water resource management. From capturing and storing to diverting and releasing, we have long engineered our access to this life-giving substance. As formal disciplines, both heritage preservation and water resource management focus on the implementation of modern engineering solutions to address all water-related needs, often ignoring or replacing pre-existing infrastructure and technologies. The outsized impacts of climate change exacerbated by population growth and greater demand on water worldwide underscore the value of sustainable systems and methods much closer to those of times past. Increasingly, we contend with too much or too little water in communities, at heritage places, and across large landscapes. Historic solutions and enhanced traditional practices provide viable and cost-effective strategies to living with water and sustaining our access to it.

This master class will consist of 6 sessions between Nov 3 and 18, 2025 (exact times to be determined) and consider the complex relationship between humans and water through a heritage lens, highlighting examples of truly inspired historic water infrastructure and modern preservation strategies for responding to water-related needs. The examples and discussions will tackle some of our most daunting global challenges and cast preservation as a relevant and essential element of sustainable resource management and community resilience. The sessions will be thematically structured, accompanied by a relevant reading list, and illustrated with preservation efforts that help expand our modern relationship to water and the broader field.

In addition to attendance, the course requirement will be a final assignment developing a funding proposal for the preservation and/or rehabilitation of water-related heritage that clearly expresses its potential to contribute to community resilience. Potential formats will be shared over the course of the class.

### **Session 1. Water and Society**

An introductory exploration of the relationship between water and humans, including review of the hydrologic cycle and an introduction to human-engineered water resource management and its components.

*Recommended reading:*

- Hein, Carola. "Toward a Research and Action Agenda on Water and Heritage? A First Attempt at Refining Terminologies, Concepts and Priorities." *Blue Papers* 2, no. 1 (2023): 22–33. <https://doi.org/10.58981/bluepapers.2023.1.02>.
- Wang, Guangyu, Shari Mang, Haisheng Cai, et al. "Integrated Watershed Management: Evolution, Development and Emerging Trends." *Journal of Forestry Research* 27, no. 5 (2016): 967–94. <https://doi.org/10.1007/s11676-016-0293-3>.

## Session 2. Water and Governance

A discussion of water ownership and use rights across differing contexts, legal frameworks, conceptual systems.

*Recommended reading:*

- Morris, James D K, and Jacinta Ruru. "Giving Voice to Rivers: Legal Personality as a Vehicle for Recognising Indigenous Peoples' Relationships to Water?" *Australian Indigenous Law Review* 14, no. 2 (2010): 49–62. <https://www.jstor.org/stable/26423181>.
- Pincetl, Stephanie, Erik Porse, and Deborah Cheng. "Fragmented Flows: Water Supply in Los Angeles County." *Environmental Management* 58, no. 2 (2016): 208–22. <https://doi.org/10.1007/s00267-016-0707-1>.
- Williams, Jessica M. "Is Three a Crowd? River Basin Institutions and the Governance of the Mekong River." *International Journal of Water Resources Development* 37, no. 4 (2021): 720–40. <https://doi.org/10.1080/07900627.2019.1700779>.

## Session 3. Traditional Water Management Systems

A survey of various traditional systems and strategies to capture, store, and convey water from around the world with discussion of maintenance and rehabilitation, as well as local impact.

*Recommended reading:*

- Burkett, Meisha Hunter. "Silent and unseen: stewardship of water infrastructural heritage." *Adaptive Strategies for Water Heritage* (2020): 21-39. <https://doi.org/10.1007/978-3-030-00268-8>.
- Boselli, Vladimiro Andrea, Massimiliano Borroni, Jalal Kassout, Muhammad Houssni, Athmane Kettouch, and Simone Cristoforetti. "Qanats: Ancient Innovations Nurturing Sustainable Futures in Water Management." *Blue Papers* 4, no. 1 (2025): 54–64. <https://doi.org/10.58981/bluepapers.2025.1.05>.

## Session 4. Traditional Water Management Systems II

A look at traditional water management technology for water storage, provision and agricultural use with relevance to today's challenges of mounting water scarcity.

*Recommended reading:*

- Lane, Kevin. "Water Technology in the Andes." In *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*. Springer, 2014.
- Morató, Jordi, José Luis Martín, and Olga Lucia Sánchez. "Ancient Hydro-Technologies as a Response to Climate and Food Emergencies: Use of Cultural Heritage to Rescue the Future." *Blue Papers* 4, no. 1 (2025): 44–53. <https://doi.org/10.58981/bluepapers.2025.1.04>.
- Selvaraj, Thirumalini, Prathiba Devadas, Jayashree Lakshmi Perumal, Anastasia Zabaniotou, and Mahesh Ganesapillai. "A Comprehensive Review of the Potential of

Stepwells as Sustainable Water Management Structures.” *Water* 14, no. 17 (2022): 2665. <https://doi.org/10.3390/w14172665>.

- Shakya, Shreeben, Bimala Ghale, Hanik Lakhe, et al. “Hiti System in Bhaktapur: An Evaluation of Its Current Status and Importance.” *International Conference on Engineering & Technology* 5 (2023): 209.

### **Session 5. Too Much Water: Heritage Strategies to Keep Water at Bay**

Traditional preservation has focused on keeping water away from historic structures. Climate change presents new challenges that require mitigation and adaptation strategies related to flood risk mitigation. This session will consider strategies and examples of efforts to do so effectively and sustainably.

*Recommended reading:*

- Lieske, Heiko, Erika Schmidt, and Thomas Will. “Flood Protection for Historic Sites—Integrating Heritage Conservation and Flood Control Concepts.” *Water & Heritage*, 2015, 205.
- Axon, Stephen, Anya Chapman, and Duncan Light. “Climate Impacts on Tangible Coastal Cultural Heritage in the United States: Towards Sustainable and Adaptive Coastal Heritage Management.” *Sustainability* 16, no. 16 (2024): 6800. <https://doi.org/10.3390/su16166800>.

### **Session 6. The Future of Water**

Reliable and managed access to water is intrinsically tied to the success of civilization. Sustainable approaches and technologies that include preservation and rehabilitation of extant viable water infrastructure are likely to play larger roles in the future. As the final session, a look to promising strategies and trends.

*Recommended reading:*

- Bell, Sarah. “Renegotiating Urban Water.” *Progress in Planning, Renegotiating Urban Water*, vol. 96 (February 2015): 1–28. <https://doi.org/10.1016/j.progress.2013.09.001>.
- Meyer, Han. “Toward a Cultural Heritage of Adaptation: A Plea to Embrace the Heritage of a Culture of Risk, Vulnerability and Adaptation.” *Adaptive Strategies for Water Heritage*, Springer Cham, 2020, 401.

## Reference Bibliography

- Augustijn, Marlies, Mila Avellar Montezuma, Beate Begon, Jean-Paul Corten, and Carola Hein. "Designing For Extremes: Heritage Strategies for Rising Sea Level Adaptation in The Hague." *Blue Papers* 4, no. 1 (2025): 158–71. <https://doi.org/10.58981/bluepapers.2025.1.11>.
- Awale, Sarik. "ASSESSING HITI SYSTEM AS A NATURE BASED SOLUTION IN ADDRESSING WATER SECURITY IN KATHMANDU VALLEY." I.O.E. Pulchowk Campus, 2023. <https://hdl.handle.net/20.500.14540/21750>.
- Axon, Stephen, Anya Chapman, and Duncan Light. "Climate Impacts on Tangible Coastal Cultural Heritage in the United States: Towards Sustainable and Adaptive Coastal Heritage Management." *Sustainability* 16, no. 16 (2024): 6800. <https://doi.org/10.3390/su16166800>.
- Bell, Sarah. "Renegotiating Urban Water." *Progress in Planning*, Renegotiating Urban Water, vol. 96 (February 2015): 1–28. <https://doi.org/10.1016/j.progress.2013.09.001>.
- Boselli, Vladimiro Andrea, Massimiliano Borroni, Jalal Kassout, Mhammad Houssni, Athmane Kettouch, and Simone Cristoforetti. "Qanats: Ancient Innovations Nurturing Sustainable Futures in Water Management." *Blue Papers* 4, no. 1 (2025): 54–64. <https://doi.org/10.58981/bluepapers.2025.1.05>.
- Boyd, David R. *The Rights of Nature: A Legal Revolution That Could Save the World*. ECW Press, 2017.
- Dai, Tianchen, and Carola Hein. "Exploring the Descriptions of World Heritage Properties through the Perspective of Water Using a Narrative Approach." *International Journal of Heritage Studies* 29, no. 12 (2023): 1315–38. <https://doi.org/10.1080/13527258.2023.2252792>.
- Douet, James. "The Water Industry as World Heritage." *The International Committee for the Conservation of the Industrial Heritage: Paris, France*, 2018.
- English, Elizabeth C., Meiyi Chen, Rebecca Zarins, Poorna Patange, and Jeana C. Wiser. "Building Resilience through Flood Risk Reduction: The Benefits of Amphibious Foundation Retrofits to Heritage Structures." *International Journal of Architectural Heritage* 15, no. 7 (2021): 976–84. <https://doi.org/10.1080/15583058.2019.1695154>.
- Ghaderian, Massoud. "Collaboration Between Nature and Humans in the Desert: The Qanat System in Iran." *Blue Papers* 1, no. 1 (2022): 139–49. <https://doi.org/10.58981/bluepapers.2022.1.14>.
- Goralnik, Lissy, Jessica Brunacini, Michelle Rutty, and Emily Finnell. "Restoring Relationships: Water Heritage, Sense of Place, and Community Engagement." *Journal of Great Lakes Research* 48, no. 6 (2022): 1375–86. <https://doi.org/10.1016/j.jglr.2022.08.018>.
- Gray, Summer. *In the Shadow of the Seawall: Coastal Injustice and the Dilemma of Placekeeping*. Univ of California Press, 2023.
- Heathcote, Isobel W. *Integrated Watershed Management: Principles and Practice*. John Wiley & Sons, 2009.

- Hein, Carola, ed. *Adaptive Strategies for Water Heritage: Past, Present and Future*. Springer International Publishing, 2020. <https://doi.org/10.1007/978-3-030-00268-8>.
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- Hunter, Meisha. "Water Infrastructural Heritage: Management and Governance." *Infrastructure Asset Management* 9, no. 4 (2021): 170–79. <https://doi.org/10.1680/jinam.20.00031>.
- Janssen, Joks, Eric Luiten, Hans Renes, and Jan Rouwendal. "Heritage Planning and Spatial Development in the Netherlands: Changing Policies and Perspectives." *International Journal of Heritage Studies* 20, no. 1 (2014): 1–21. <https://doi.org/10.1080/13527258.2012.710852>.
- Jiménez, Alejandro, Panchali Saikia, Ricard Giné, et al. "Unpacking Water Governance: A Framework for Practitioners." *Water* 12, no. 3 (2020): 827. <https://doi.org/10.3390/w12030827>.
- Joshi, Padma Sunder. "Delving into the Hiti System: The Traditional Water System of the Kathmandu Valley." In *Living with Water*. Routledge, 2025.
- Lane, Kevin. "Engineered Highlands: The Social Organization of Water in the Ancient North-Central Andes (AD 1000–1480)." *World Archaeology* 41, no. 1 (2009): 169–90. <https://doi.org/10.1080/00438240802655245>.
- Lane, Kevin. "Water Technology in the Andes." In *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*. Springer, 2014.
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- Lizarzaburu, Javier. "The Canals of Lima: Landscape and Memory." *Blue Papers* 1, no. 2 (2022): 150–65. <https://doi.org/10.58981/bluepapers.2022.2.15>.
- Macfarlane, Robert. *Is a River Alive?* W. W. Norton & Company, 2025.
- Madani, Said. "An Ingenious Heritage System for Collecting and Distributing Flood Water in the M'zab Valley of Algeria." *Blue Papers* 1, no. 2 (2022): 100–110. <https://doi.org/10.58981/bluepapers.2022.2.10>.
- Morató, Jordi, José Luis Martín, and Olga Lucia Sánchez. "Ancient Hydro-Technologies as a Response to Climate and Food Emergencies: Use of Cultural Heritage to Rescue the Future." *Blue Papers* 4, no. 1 (2025): 44–53. <https://doi.org/10.58981/bluepapers.2025.1.04>.
- More, Ashwini, Claire L. Walsh, and Richard J. Dawson. "Re-Integration of Heritage Water Systems: Spatial Lessons for Present-Day Water Management." *Blue-Green Systems* 4, no. 2 (2022): 340–47. <https://doi.org/10.2166/bgs.2022.121>.
- Morris, James D K, and Jacinta Ruru. "Giving Voice to Rivers: Legal Personality as a Vehicle for Recognising Indigenous Peoples' Relationships to Water?" *Australian Indigenous Law Review* 14, no. 2 (2010): 49–62. <https://www.jstor.org/stable/26423181>.

Pincetl, Stephanie, Erik Porse, and Deborah Cheng. "Fragmented Flows: Water Supply in Los Angeles County." *Environmental Management* 58, no. 2 (2016): 208–22.

<https://doi.org/10.1007/s00267-016-0707-1>.

Selvaraj, Thirumalini, Prathiba Devadas, Jayashree Lakshmi Perumal, Anastasia Zabaniotou, and Mahesh Ganesapillai. "A Comprehensive Review of the Potential of Stepwells as Sustainable Water Management Structures." *Water* 14, no. 17 (2022): 2665.

<https://doi.org/10.3390/w14172665>.

Shakya, Shreeben, Bimala Ghale, Hanik Lakhe, et al. "Hiti System in Bhaktapur: An Evaluation of Its Current Status and Importance." *International Conference on Engineering & Technology* 5 (2023): 209.

Stone, Christopher D. *Should Trees Have Standing?: Law, Morality, and the Environment*. Oxford University Press, 2010.

Trizio, Francesca, Francisco Javier Torrijo, Camilla Mileto, and Fernando Vegas. "Flood Risk in a Heritage City: Alzira as a Case Study." *Water* 13, no. 9 (2021): 1138.

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Wang, Guangyu, Shari Mang, Haisheng Cai, et al. "Integrated Watershed Management: Evolution, Development and Emerging Trends." *Journal of Forestry Research* 27, no. 5 (2016): 967–94. <https://doi.org/10.1007/s11676-016-0293-3>.

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Willems, Willem J. H., and Henk van Schaik, eds. *Water and Heritage: Material, Conceptual and Spiritual Connections*. Sidestone Press, 2015.

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Williams, Jessica M. "Is Three a Crowd? River Basin Institutions and the Governance of the Mekong River." *International Journal of Water Resources Development* 37, no. 4 (2021): 720–40. <https://doi.org/10.1080/07900627.2019.1700779>.

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Zwarteveen, Margreet, Jeltsje S. Kemerink-Seyoum, Michelle Kooy, et al. "Engaging with the Politics of Water Governance." *WIREs Water* 4, no. 6 (2017): e1245.

<https://doi.org/10.1002/wat2.1245>.