Sant'Anna
School of Advanced Studies – Pisa

ISTITUTO DI PRODUZIONI VEGETALI
Sant'Anna

Hybrid WORKSHOP

Nature-based Solutions and Managed Aquifer Recharge.

Application, case studies and market perspectives.

Palazzo Pilo Boyl

Via S. Cecilia 24, Pisa

Scuola Superiore Sant'Anna (Italy)

5th November 2025 (14.15-18.30 CET)

Participation (online or in presence) is free upon registration writing to giacomo.vescovo@santannapisa.it
Please specify: **name and surname**, **institution**, **country**, attending **online** or **in presence**.
Max 100 participants will be allowed online. Only 10 participants in presence still available.
Registration will be based on first come first served basis.
You will receive the link to the webinar on Tuesday the 4th November
Participants will be allowed to pose questions to the speakers at the end of each session.
Do not hesitate to write for further infos at rudy.rossetto@santannapisa.it

iah aih Italian Chapter

iah aih International Association of Hydrogeologists
Commission on Managing Aquifer Recharge

Val di Cornia
Osservatorio UNESCO per l'Ecoidrologia
GLOBAL ECOHYDROLOGY NETWORK
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Climate change is intensifying droughts, floods, and water scarcity. Adaptation therefore demands robust, low-energy, and ecologically sound strategies. Nature-based Solutions (NbS) provide such an approach, using natural processes to deliver societal benefits, restore ecosystems, and enhance resilience. Water-related NbS traditionally include artificial wetlands, river restoration and floodplain reconnection, and sustainable drainage systems that improve water quality and supply, biodiversity, and climate regulation.

Within this framework, Managed Aquifer Recharge (MAR) represents a key tool by intentionally replenishing aquifers. By storing water underground, MAR mitigates over-exploitation, prevents land subsidence and seawater intrusion, and supports groundwater-dependent ecosystems. Typical MAR schemes, i.e. infiltration basins and bank filtration, mimic natural recharge processes while offering control of quantity and quality.

Combining NbS and MAR creates powerful synergies: wetlands and vegetated areas can pre-treat recharge water, enhance infiltration, and generate co-benefits like habitat creation and landscape restoration. However, not all MAR systems automatically qualify as NbS. Their classification depends on biodiversity gains and ecosystem outcomes, not merely on recharge efficiency. Achieving measurable net biodiversity benefits remains a key research and design frontier.

This workshop explores how NbS and MAR can together strengthen water resilience and adaptation to climate change. Session 1 highlights complementary perspectives across contexts and scales. Daniela Benedicto Van Dalen (Acacia Water, Netherlands) presents the new-born **IAH NbS and MAR Community of Practice** (promoted under **the IAH MAR Commission**). Mara Meggiorin (Ramboll Italy) emphasizes the importance of infiltration basins as tools for safe groundwater replenishment. Anne Schultze (Technical University of Munich) quantifies groundwater-dependent ecosystem services linked to MAR, while Andrea Gigliuto (ERM Italy) reframes water from a scarce resource to a strategic asset. Finally, Elfithri Rahmah (UNESCO IHP) illustrates the role of ecohydrological NbS in the UN water agenda. Session 2 explores applied research and regional case studies. Niels Mulder (Deltares, Netherlands) outlines aquifer storage and recovery for sustainable banana farming in Colombia. Ivan Portoghese (IRSA-CNR, Italy) models hydrological regimes in Spain's Doñana wetlands, while Lea Augustin (TUM, Germany) presents a pilot linking stormwater management and water supply for hop gardens. Closing the session, Giacomo Vescovo (Scuola Superiore Sant'Anna) shares results from agricultural districts integrating MAR, NbS, and fertilizer-reduction strategies.

Together, these contributions demonstrate that NbS and MAR are not stand-alone technologies but parts of an integrated adaptation approach — one that merges hydrogeology, ecology, and governance to deliver resilient, low-energy, and biodiversity-positive water systems for a changing world.

Looking forward, NbS and MAR will increasingly underpin adaptation policies and sustainable finance initiatives. Markets such as water banking, payment for ecosystem services, and climate adaptation funds can mobilize investment if environmental and social benefits are transparently demonstrated.

Ultimately, integrating NbS and MAR means designing water systems that work with nature, not against it—providing resilient, circular, and regenerative solutions for future water security.

The workshop is organised within the **WAT-CHANGE Seasonal School** (https://www.santannapisa.it/it/seasonalschool/wat-change-water-ecosystem-climate-change)

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WORKSHOP PROGRAMME

Time	Speaker	Presentation title	Affiliation
14:00		***Participant Registration***	
14:15	Rudy Rossetto	***Welcome and workshop introduction.*** ***Managed Aquifer Recharge: a kind of water-related Nature-based Solution***	Scuola Superiore Sant'Anna IAH MAR Commission (Italy)
		Session 1	
14:35	Daniela Benedicto Van Dalen	***Presentation of the IAH NbS and MAR Community of Practice*** ***Integrating Nature-Based Solutions into the WASH Systems: few examples of improved water security in the African semi-arid***	Acacia Water - IAH MAR Commission (Netherland)
14:55	Mara Meggiorin	***MAR Solutions in Veneto - Ensuring Safe Groundwater Replenishment through Infiltration Basins and Long-Term Monitoring***	Ramboll Italy
15:15	Anne Schultze	***Quantifying Groundwater-dependent Ecosystem Services provided through Managed Aquifer Recharge***	Technische Universität München (Germany)
15:30	Andrea Gigliuto	***Water from Scarcity to Strategy. Unlocking the Strategic Value of Water in a Changing World***	ERM Italy
15:50	Elfithri Rahmah	***UNESCO Ecohydrological Nature based Solutions within the IHP-IX***	UNESCO Intergovernmental Hydrological Programme
16:10		**Networking Coffe Break**	
		Session 2	
16:40	Niels Mulder	***Aquifer Storage and Recovery for sustainable banana production in the Magdalena region, Colombia***	Deltares (Netherland)
16:55	Ivan Portoghese	***A simplified model to investigate the hydrological regimes of temporary wetlands: the case study of Doñana marshland (Spain)***	IRSA-CNR (Italy)
17:15	Lea Augustin	***Coupling stormwater protection and water supply for hop gardens: First results from a pilot plant***	Technische Universität München (Germany)
17:30	Giacomo Vescovo	***Restoring Nitrate-Contaminated Aquifers: Evaluating Managed Aquifer Recharge, Nature-based Solutions and Fertilizer Reduction Strategies in an Irrigated Agricultural District (Spain)***	Scuola Superiore Sant'Anna (Italy)
17:50		**Final discussion**	
18:15		***Workshop conclusions***	

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