

IAHR 2027 World Congress Topics

Pillar A: Climate Change Adaptation and Mitigation

Theme A-1: Climate Change Adaptation

Sub-themes (keywords)

- A-1.1 Climate Adaptation: Decision-Making Under Uncertainty** (*Deep Uncertainty, Robust Decision-Making (RDM), Adaptive Pathways*)
- A-1.2 Systemic Climate Risk: Multi-Hazards and Cascading Impacts** (*Cascading Climate Risks, Multi-Hazard Risk Assessment, Systemic Adaptation*)
- A-1.3 Decision Support under Climate Uncertainty** (*Deep Uncertainty, Robust Decision-Making, Decision-Support Tools*)
- A-1.4 Resilient Water Systems: Infrastructure and Irrigation Adaptation** (*Irrigation Resilience, Water Scarcity Management, Salinity Control*)
- A-1.5 Hydrological Extremes, Floods and Basin-Scale Adaptation** (*Hydrological Extremes, Basin-Scale Adaptation, Flood and Drought Risk*)

Special Sessions:

- SS-06 Integrated Flood Risk Management from Science to Practice** (*Flood Risk Assessment, Hazard Mapping, Risk Governance, Mitigation Strategies, Adaptive Management, Climate Change Adaptation*)
- SS-08 Digital Twin of Detailed River Basin Morphology and Hydraulic Structures for Advanced Basin Management** (*Digital Twin, Flood, Inundation, River Basin, Hydraulic Structures*)
- SS-12 Advances and Guidelines for Water Resources Management: Adaptation Under Evolving Climate** (*Climate-sensitive design, Adaptation, Guidelines, Decision making under change*)
- SS-27 Buoyancy-Driven Flows** (*Gravity currents, Internal waves, Atmospheric flows, Oceanic flows, Natural ventilation*)
- SS-32 Integrated Water Resilience in Arid Regions: Diversified Portfolios, Digital Systems, and Adaptive Governance** (*Integrated Water Resilience, Non-Conventional Water Portfolios, Water-Energy-Environment Trade-offs, Brine Resource Recovery, Adaptive Governance, Digital Water Systems*)

Theme A-2: Water and Nature

Sub-themes (keywords)

- A-2.1 Nature-Based Solutions for Flooding, Stormwater and Water Quality** (*Nature-Based Solutions (NbS), Hybrid Green-Gray Infrastructure, Stormwater Quality Management*)
- A-2.2 Ecohydraulics and Biophysical Interactions in Aquatic Systems** (*Ecohydraulics, Biophysical Interactions, Aquatic Ecosystems*)
- A-2.3 River, Catchment and Urban Nature-Based Solutions** (*Nature-Based Solutions, Catchment Restoration, Urban Water Resilience*)
- A-2.4 Coastal, Estuarine and Riparian Nature-Based Solutions** (*Coastal Nature-Based Solutions, Estuarine Resilience, Riparian Restoration*)
- A-2.5 Digital, AI-Based and Data-Driven Ecohydraulics** (*Digital Ecohydraulics, Artificial Intelligence, Data-Driven Modelling*)

Special Sessions:

- SS-01 Ecohydraulics: Biophysical Interactions in Natural and Engineered Aquatic Systems** (*Ecohydraulics, Flow-vegetation-sediment feedbacks, Restoration & climate resilience*)
- SS-03 AI and Data-Driven Ecohydraulics: Monitoring, Modelling, and Design** (*Ecohydraulics, Intelligent Environmental Sensing, Artificial Intelligence, Machine Learning*)
- SS-14 Nature-Based Solutions for Upstream Catchments and Small Streams** (*Nature-based Solutions, Ecohydraulics, Upstream catchments and small streams*)
- SS-15 Nature-Based Solutions for Urban Areas** (*Nature-based Solutions, Ecohydraulics, Urban areas*)
- SS-16 Nature-Based Solutions for Large Rivers** (*Nature-based Solutions, Ecohydraulics, Large rivers*)
- SS-17 Nature-Based Solutions for Coasts and Estuaries** (*Nature-based Solutions, Ecohydraulics, Estuaries and coasts*)

Theme A-3: Hydro-Environment Engineering and Society

Sub-themes (keywords)

- A-3.1 Sustainable Hydropower and River Ecosystems** (*Environmental Flows, Hydropeaking Impacts, River Connectivity*)
- A-3.2 Innovation in Hydro-Environmental Education and Training** (*AI-Enhanced Learning, Digital Twin Training, Immersive Experiential Education*)
- A-3.3 Water and Hydro-Environment History and Heritage** (*Historical hydraulic infrastructure, Water heritage conservation, History of hydro-environment management*)
- A-3.4 Socio-Ecological Sustainability Transitions and Governance** (*Socio-Ecological Transitions, Systems Innovation, Data-Enabled Governance*)
- A-3.5 Climate Adaptation Governance and Finance** (*Adaptation Governance, Climate Finance, Implementation Pathways*)

Special Sessions:

- SS-33 Binding Without Erasure: River Monitoring, Plural Evidence and Environmental Obligation in Transboundary Governance** (*River Governance, Environmental Evidence, Adaptive Water Resources Management*)

Pillar B: Water Engineering and Energy, Ecological and Digital Transition

Theme B-1: Hydropower and water related renewable energy

Sub-themes (keywords)

- B-1.1 Reservoir Renewable Energy Systems** (*Floating Photovoltaics (FPV), Hydropower Flexibility, Structural Reliability*)
- B-1.2 Marine & Offshore Renewable Energy Systems** (*Offshore Renewable Energy, Hybrid Systems & Grid Integration, Resilience, Monitoring & Environmental Impacts*)
- B-1.3 Hydropower and Transient Flow Phenomena: Modelling, Monitoring and Mitigation** (*Water Hammer Mitigation, Hybrid Physics–AI Modelling, Digital Twin Monitoring*)
- B-1.4 Water–Energy Nexus and Integrated Water Infrastructure** (*Water–Energy Nexus, Hydropower–Desalination Integration, Integrated Water Infrastructure*)
- B-1.5 Digital Hydropower and Smart Asset Management** (*Hydropower Digital Twins, Asset Management, Smart Hydropower Operations*)

Theme B-2: Water engineering for inland water bodies

Sub-themes (keywords)

- B-2.1 Monitoring, Remote Sensing and Digital Observation of Inland Waters** (*Inland Water Monitoring, Remote Sensing, Digital Observation*)
- B-2.2 Hydrodynamics, Mixing and Environmental Fluid Processes in Inland Waters** (*Environmental Fluid Mechanics, Mixing and Transport, Inland Water Hydrodynamics*)
- B-2.3 River Morphodynamics, Sediment Transport and River Training** (*River Morphodynamics, Sediment Transport, River Training*)
- B-2.4 Extreme River Flows, Floods and Droughts in Inland Systems** (*Hydrological Extremes, Floods and Droughts, River Flow Monitoring*)
- B-2.5 Water Quality, Pollution and Ecosystem Health in Rivers and Lakes** (*Inland Water Quality, Aquatic Pollution, Ecosystem Health*)

Special Sessions:

- SS-05 Advances in Monitoring Extreme River Flows Across the Hydrologic Spectrum** (*Advanced streamflow monitoring methods, Drought, Flood*)
- SS-09 Ice Processes in Inland and Transitional Waters** (*River and lake ice, Ice dynamics, Climate variability*)

- SS-10 Sediment Transport and River Training in Alluvial Rivers: Current Understanding and Open Challenges** (*Alluvial River hydraulics, Turbulence monitoring and modelling, Scour protection and river training works*)
- SS-21 Plastic Transport in Rivers: Connecting Empiricism and Modelling** (*Microplastics and Litter, Multiphase flow, Numerical modeling*)
- SS-26 Advances in Environmental Fluid Mechanics** (*Fluid Mechanics, Modelling, Numerics*)
- SS-31 High-Fidelity 3D CFD and CFD–DEM Methods for Predictive Bed Morphodynamics** (*High-Fidelity 3D CFD, CFD–DEM and Multiphase Sediment Modelling, Morphodynamic Model Verification and Validation*)

Theme B-3: Water engineering and society

Sub-themes (keywords)

- B-3.1 Water Justice, Equity and Affordability in Water Infrastructure** (*Water Justice, Equity in Water Services, Affordability & Tariff Design*)
- B-3.2 Participatory Water Governance and Citizen Engagement** (*Participatory Governance, Co-production, Citizen Science*)
- B-3.3 Climate-Resilient Water Services and Social Vulnerability** (*Climate-Resilient Water Services, Social Vulnerability Assessment, Adaptation Strategies*)
- B-3.4 Responsible Digital Water: Ethics, Governance and Security** (*Responsible AI, Data Privacy & Cybersecurity, AI Governance*)
- B-3.5 Blue Economy, Financing and Economics for Sustainable Water Systems** (*Sustainable Water Finance, Cost-Benefit Analysis, Life-Cycle Costing*)

Special Sessions:

- SS-25 Water Security in Latin America: From Local Experiences to the Construction of a Regional Metric** (*Water Security Index, Regional / Transboundary Water Assessment, Cooperative Governance & Coordinated Decision-Making*)

Theme B-4: Irrigation, drainage and pollution control

Sub-themes (keywords)

- B-4.1 Smart Irrigation and Precision Agriculture Water Management** (*AI-Driven Irrigation Scheduling, IoT Soil–Plant Sensing, Precision Fertilization*)
- B-4.2 Agricultural Drainage and Edge-of-Field Water Quality Protection** (*Controlled Drainage, Water Table Management, Drainage Water Recycling*)
- B-4.3 Water Reuse for Irrigation: Safety and Water Quality** (*Reclaimed Water Irrigation, Micropollutants & AMR, Quantitative Microbial Risk Assessment (QMRA)*)
- B-4.4 Digital Groundwater Monitoring and Remediation** (*Groundwater Digital Twins, AI-Enabled Monitoring, Data-Driven Remediation*)
- B-4.5 Emerging Contaminants in Agro-Water Systems** (*PFAS in Agro-Water Systems, Microplastics Fate and Transport, Novel Remediation Technologies*)

Special Sessions:

- SS-11 Advances in Marine and Freshwater Outfall Systems: Innovations in Modelling, Design, and Environmental Protection** (*Outfall systems, Climate change adaptation, Digital transformation*)

Theme B-5: Water engineering for water infrastructures

Sub-themes (keywords)

- B-5.1 Smart Water Infrastructure and Digital Transformation** (*Smart Water Digital Twins, AI-Enabled Infrastructure Monitoring, Predictive Asset Management*)
- B-5.2 Reservoir and Dam Management under Climate Change** (*Forecast-Informed Reservoir Operations (FIRO), Dam Digital Twins, Sediment–Ecosystem*)
- B-5.3 Ageing Infrastructure, Rehabilitation and Risk-Based Asset Management** (*Ageing Infrastructure, Infrastructure Rehabilitation, Risk-Based Asset Management*)

B-5.4 Hydraulic Structures: Design, Performance and Safety (*Hydraulic Structures, Performance Assessment, Infrastructure Safety*)

B-5.5 Water Allocation, System Operations and Infrastructure Reliability (*Water Allocation, System Operations, Infrastructure Reliability*)

Special Sessions:

SS-04 Transient Flows in Hydraulic Systems (*Hydraulic transients, Dam break, Tidal bores, Tsunamis*)

SS-13 Scour around Hydraulic and Coastal Structures (*Hydrodynamic-structure interaction, Foundation design, Scour protection*)

SS-19 Hydraulic Challenges of Ageing Infrastructure (*Ageing Infrastructure, Climate change adaptation, Structural health monitoring*)

SS-20 Fundamental Flow Hydraulics at Hydraulic Structures (*Hydraulic Design, Numerical Modelling, Laboratory Experiments*)

SS-28 Digital Empowerment of Whole-Process Water Allocation (*Water Allocation, Digital Twin, Artificial Intelligence*)

Pillar C: Improving Resilience Against Water Hazards and Disasters

Theme C-1: Climate Change Mitigation and hydraulic-infrastructure resilience

Sub-themes (keywords)

C-1.1 Digital Innovation for Sustainable Water Systems (*Low-Carbon Digital Twins, AI-Driven Operations, Operational Decision Support*)

C-1.2 Net-Zero Strategies for Water Utilities (*Net-Zero Accounting, Decarbonization Roadmaps, Best-Practice Frameworks*)

C-1.3 Circular Economy and Resource Recovery in Wastewater Systems (*Water Resource Recovery, Circular Economy, WRRF Transformation*)

C-1.4 Climate-Resilient Management of Surface Water and River Basins (*Climate-Resilient Operations, Storage & Allocation, Integrated Basin Management*)

C-1.5 Early Warning, Flash Floods and Hydraulic Infrastructure Safety (*Early Warning Systems, Flash Flood Risk, Hydraulic Infrastructure Safety*)

Special Sessions:

SS-18 Digital Ecohydraulics for River Resilience: Integrating Remote Sensing, Machine Learning, and Advanced Modelling (*Digital Ecohydraulics, Remote Sensing, Machine Learning, Hydromorphological Modelling*)

SS-22 Resilience against climate change in the Asia-Pacific Region (*Climate trends, Nature-based solutions and engineered strategies, Community-led resilience initiatives*)

SS-23 Intelligent Early Warning Systems: Machine Learning Integration for Hydrometeorological and Tsunami Hazard Management (*Physics-Informed Neural Networks (PINNs), Intelligent Early Warning Systems (EWS), Responsible AI (bias & data deserts)*)

SS-29 Digital-Intelligent Empowerment of Flash Flood Disaster Prevention (*Flash Flood Early Warning, Digital Twin, AI-based Hydrological Simulation*)

SS-30 Debris and Driftwood Accumulation at Hydraulic Structures (*Driftwood and floating debris, Hydraulic structures, Flood resilience and debris management*)

Theme C-2: Urban water cycle, industrial water and water treatment

Sub-themes (keywords)

C-2.1 Urban Water Resilience and Sustainable Drainage (*Blue-Green Infrastructure (BGI), Sponge City Design, Hybrid Urban Drainage*)

C-2.2 Emerging Contaminants and Risk Mitigation in Water Treatment (*Microplastics Removal, Plastisphere Microbiome, Antimicrobial Resistance (AMR)*)

C-2.3 Water Quality Dynamics, Modelling and Control in Urban Water Networks (*Water Quality Modelling, Urban Water Networks, Digital Twins and AI-enabled Control*)

C-2.4 Next-Generation Asset Management for Urban Water Networks (*Predictive Asset Management, Smart Water Networks, Condition Monitoring*)

C-2.5 Water Loss Management in Distribution Networks (*Non-Revenue Water (NRW), Leak Detection & Localization, Pressure Management*)

Special Sessions:

SS-07 Theory and Applications of Smart Water Networks (*Smart Water Networks, Autonomous & adaptive control, AI-Hydraulics Verification & Safety*)

SS-24 From Scarcity to Smart Management: Solutions for Intermittent Water Supply Systems (*Intermittent Water Supply (IWS), Digital Transformation (Sensors & IoT), Intermittence Modelling & Management*)

SS-34 Cities Don't Fail in Silos: Governing Water-Energy-Cooling Dependencies for Metropolitan Resilience (*Urban water resilience, Cascading infrastructure risk, Water-energy nexus*)

Theme C-3: Deltas, coastal and maritime engineering

Sub-themes (*keywords*)

C-3.1 Advanced Coastal Modelling, Digital Twins and Hazard Forecasting (*Coastal Modelling, Digital Twins, Hazard Forecasting*)

C-3.2 Advanced Marine Biodiversity Monitoring and Assessment (*Environmental DNA (eDNA), Autonomous Sampling Platforms, AI Ecological Assessment*)

C-3.3 Coastal Protection, Design and Management (*Coastal Defense Performance, Design Standards, Scaling & Validation*)

C-3.4 Sustainable and Resilient Ports and Maritime Systems (*Shore Power (Cold Ironing), Green Shipping Corridors, Port Energy Hubs*)

C-3.5 Delta and Estuarine Resilience: Compound Flood Risk, Sediment Dynamics and River-Coast Connectivity (*Compound Flood Risk, Sediment Dynamics, River-Coast Connectivity*)

Special Sessions:

SS-02 Ecohydraulics in Coastal and Riparian Zones as Critical Interfaces under Change (*Coastal zone, Riparian zone, Transitional ecosystem, Ecohydraulics process*)