

List of special sessions

[Keynote Sessions]

Keynote Session 1

Title: The ecohydrology of river vegetation

Organizer: Dr. Matthew O'Hare (CEH Edinburgh, Bush estate, Penicuik, EH26 0QB, UK)

Synopsis: This session will focus on the developing field of riverine plant ecohydrology. Riverine plants including both aquatic macrophytes and riparian vegetation respond to their physical environment but they also influence it, effecting both hydrological and fluvial geomorphological processes. The topic has significant blue skies research components but the fundamental nature of the plant-ecohydrological interactions means they can also determine system response to damming, channel modification and system restoration. Not surprisingly the topic has attracted researchers from a wide variety of disciplines, physics, engineering, ecology, fluvial geomorphology, modelling and environmental management. We expect strong contributions from the following main areas; the fundamental physics of plant –flow interactions; ecological interactions and applied management questions relating to channel conveyance, river restoration and eflows. Empirical lab based studies, field studies and modelling are all welcome. There has been an intensification in research activity in recent years and we encourage contributions from all areas of research. We envisage a session where ideas can be exchanged and discussion encouraged.

Keywords: macrophyte, ecohydrology, ecohydraulics, riparian, flume

Keynote Session 2

Title: Ecohydraulics in River Restoration

Organizers: Dr. Gregory Pasternack, (University of California at Davis, Davis, CA)

Dr. Martin Thoms (University of New England, Armidale, NSW)

Dr. Hamish Moir (Rivers and Lochs Institute, University of the Highlands and Islands; cbec eco-engineering UK Ltd)

Dr. Hironori Hayashi (Kyushu University, Fukuoka, Japan)

Synopsis: The worldwide practice of manipulating degraded rivers through active and passive efforts to improve ecological functionality is rapidly growing. Meanwhile, the topic of ecohydraulics has emerged as a dedicated, interdisciplinary endeavor to understand the links between physical and ecological dynamics. Often river restoration is designed on the basis of simple geomorphic metrics or traditional engineering practice, yet ecohydraulics is relevant to all stages of river restoration if the goal is to achieve ecological benefits. Some ecohydraulics methodologies may work best for monitoring river restoration projects, while others may work best for designing such projects. This session seeks new scientific findings from basic ecohydraulic studies that improve the theory and practice of restoration as well as practical applications in which ecohydraulics is used in river restoration.

Keywords: River restoration, ecohydraulics, channel design

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Ecohydraulic restoration concepts
- ✓ Ecohydraulic restoration methodologies and approaches
- ✓ Bio-physical linkages required for restoration design
- ✓ Case studies of restoration projects using ecohydraulics
- ✓ Challenges and opportunities in practical use of ecohydraulics

Keynote Session 3

Title: Using advanced genomics techniques to research and monitor freshwater biodiversity

Organizers: Michael Monaghan (IGB, Germany), Kozo Watanabe (Ehime University, Matsuyama, Japan)

Synopsis: Advanced genomics and bioinformatics techniques are increasingly used in biodiversity research and in environmental monitoring and assessment of freshwaters. Next-generation sequencing is now regularly used for the rapid identification of 100s-1000s of species in environmental samples, and more recent progress has been made in the use of sequence data to estimate relative abundance. Similar methods are also applied at the population level to examine adaptive genomic diversity in target species in large populations and over large spatial scales. This special session provides a forum for researchers and professionals working to apply methods in genomics and bioinformatics to the study of biodiversity in freshwaters (rivers, lakes, wetlands, etc.).

Keywords: genomics; biodiversity; DNA-metabarcoding; eDNA; next-generation sequencing; assessment; monitoring; genetic databases

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ DNA metabarcoding
- ✓ Population genomics
- ✓ Metagenomics/Metatranscriptomics
- ✓ Genome-wide SNP analysis
- ✓ Landscape genomics

Keynote Session 4

Title: Integrating Ecohydraulics and Ecohydrology in Environmental Flow Assessments

Organizers: Dr. F. Martinez-Capel (Chair of the Ecohydraulics Committee, Universitat Politècnica de València, Spain), M. McClain (Professor in Ecohydrology, UNESCO-IHE, The Netherlands), M. Stewardson (Vice-Chair of the Ecohydraulics Committee, The University of Melbourne), R. Tharme (Director of Riverfutures, England), J.T. Hickey (USACE, Hydrologic Engineering Center, CEIWR-HEC, California)

Synopsis: There is a wide array of tools for environmental flow assessment (or e-flows), including models, methods, frameworks and general schemes. The early methodological framework (IFIM) provided a general procedure for negotiation and decision-making in water allocation projects, integrating of river hydraulics, aquatic ecology, hydrology and water chemistry, legal and institutional analyses. Many of the early environmental flow studies focused on protection of minimum flows. In the 1990's the scientific community advocated new ecohydrologic approaches based on the natural flow regime, emphasizing the natural variability of the aquatic ecosystems. Some holistic methods were then created to integrate a great deal of the previous knowledge, such as the Building Block Methodology (BBM), the Downstream Response to Imposed Flow Transformation (DRIFT), or the Ecological Limits of Hydrologic Alteration (ELOHA). Some assessment tools also address social and economic aspects.

Despite this methodological development, major challenges remain in the application of environmental water assessment methods. In particular, there is a need to strengthen methods for scaling assessments from individual sites to a whole basin, and integrating multiple components within an environmental flow regime, considering the natural synchronicity of the ecohydrological processes and the life-history of aquatic species.

The integration of Ecohydraulic and Ecohydrological approaches is fundamental to resolving these challenges. In this session we would like to share experiences about the interaction between Ecohydraulics and Ecohydrology, from different perspectives. This can include scientific studies (at the microhabitat, mesohabitat or larger scale), integrative and holistic methods or procedures for e-flow assessments, challenges in studies of ecological responses to hydrological alteration, methods coupling habitat modelling and population dynamics, challenges in the assessment and implementation, and basin-scale assessment.

Keywords: Ecohydraulics, ecohydrology, environmental flow, habitat modelling, ecological responses, holistic methods, hydrological alteration, basin-scale assessment

Keynote Session 5

Title: Mitigating environmental impacts of dams: integrating ecohydraulics in the development of effective screening and fish passage

Organizer: Professor Paul Kemp, Dr Martin Wilkes, Professor Oscar Link, Professor Luiz Silva, Professor Paulo Pompeu, Professor Evelyn Habit

Synopsis: Screens designed to block fish from entering dangerous areas, such as hydropower turbine intakes, and the fishways and bypass routes to which they are directed are commonly installed at river infrastructure throughout the world. Designs continue to be based on those traditionally developed and used in Northern temperate regions, particularly North America and Europe, for a few economically important families, such as the salmonids. Today, expansive hydropower development and other river engineering is taking place in tropical, subtropical and neotropical regions, particularly in Asia and South America, and in Southern temperate zone. In these regions, the composition of communities differ considerably from the temperate North, and the target species of economic importance often exhibit very different life-history strategies, behaviours and locomotory guilds. It is perhaps unsurprising, therefore, that the validity of transferring screening and fish passage technologies from other parts of the world to these areas has been questioned. Even in the regions for which they were originally developed, the effectiveness of impact mitigation technology has been found to be lower than expected. There is an urgent need to review the principles of screen and fish pass design, and adopt an ecohydraulics approach to develop more appropriate criteria that can be better applied to accommodate regional variation in requirements. This special session will explore the justification, opportunities, and challenges associated with this topic.

Key words: fish passage, fishways, bypasses, hydropower, screens

Topics of interest:

- ✓ Fish passage
- ✓ Screening
- ✓ Fish swimming performance
- ✓ Fish behaviour

[Special Sessions]

Special Session 6

Title: Towards Activating the Role of Wetlands in Mitigating the Global Warming

Organizer: Dr. Ebrahim M. Eid (Botany Department, Faculty of Science, Kafr El-Sheikh University, Kafr El-Sheikh 33516, Egypt)

Overview: Combustion of fossil fuel and changes in land use, such as those resulting from deforestation, are considered the primary causes for the increasing concentration of atmospheric CO₂. Recently, CO₂ is increasing at 1.7 ppmv yr⁻¹ or 0.46 % yr⁻¹, which accelerating the global climate change. Global warming mitigation is becoming increasingly important as the effects of climate change are becoming apparent around the world. Wetlands are transitional systems occur intermediately between terrestrial ecosystems and aquatic ones and occur in areas where soils are artificially or naturally inundated or saturated by ground or surface water during part or all the year. Although wetlands occupy only 5-8 % of the earth's land surface, they contain about 68 % of the terrestrial soil carbon reserves and have an important role in carbon sequestration. Hence, wetlands represent one of the largest biological carbon stocks and play a decisive role in the global carbon cycle. Wetlands can be considered as a significant carbon sinks on earth and are key ecosystems to consider when managing and weighing earth's carbon stock. Their anoxic wet conditions are considered the fundamental factor slowing or resulting in incomplete decomposition of dead plant materials, resulting in accumulation of organic matter. The goal of this session is to provide a focused discussion between those working on problems related to wetlands and their role in mitigating the global warming.

Keywords: Carbon capture and sequestration; Climate change; Global warming; Kyoto Protocol; Loss of wetlands; Mitigation and adaptation strategies; Mitigation measures; Simulation models; Soil organic carbon; Wetland management; Restoration of wetlands.

Special Session 7

Title: Basic Concept and Effectiveness of Eco-DRR

Organizer: Prof. Dr. Yukihiro Shimatani (Kyushu University, Japan)

Synopsis: In the disaster research field, disaster prevention using Ecosystem which is one of the green infrastructures, Eco-DRR (Ecosystem based disaster risk reduction) are attracting international attention.

Eco-DRR is generally cheaper in cost than countermeasures by artifacts.

Furthermore, ecosystems have multifaceted value and provide us with grace from ecosystem to human beings in normal times. For this reason, Eco-DRR was also taken up in the Sendai Framework of the 3rd World Conference on Disaster Reduction held in 2015, so that Eco-DRR is an international trend.

Eco-DRR cannot prevent all disasters, but can be more effective by combining with engineering techniques and software measures. Hybrid Eco-DRR combined with engineering technology is expected as an extremely effective method, but Eco-DRR is not familiar to engineers and its research is delayed worldwide. This session will exchange information on practical efforts of the world Eco-DRR.

Keywords: Eco-DRR, traditional knowledge, mangrove, riparian and coastal forest, resilience

Topics of interest:

- ✓ Is Eco-DRR more effective than conventional disaster prevention technique?
- ✓ Is the cost cheap?
- ✓ Is there a hint of Eco-DRR in traditional knowledge?

Special Session 8

Title: Assessing the eco-hydraulic implications of sediment transport: novel methods and tools

Organizers: Dr. Manousos Valyrakis (University of Glasgow), Dr. Oral Yagci (Istanbul Technical University), Dr. Mário J. Franca (IHE - Delft Institute for water education, The Netherlands), Professor Chunng Ji (Tianjin University), Dr. Dong Xu Dong Xu (Tianjin University)

Synopsis: Obtaining a better understanding of the dynamics of transport processes of earth material due to the action of geophysical flows, occurring in rivers, estuaries, lakes, coasts and other natural environments, remains one of the most fundamental challenges in eco-hydraulics. Geomorphic transport processes, spanning a wide range of scales, are intrinsically interlinked to the ecology of earth's surface water systems. Thus their study finds a range of important applications, from hydraulic engineering and infrastructure risk assessment to ecological restoration and river rehabilitation.

Keywords: turbulence, sediment transport, monitoring

Topics of interest:

In this session, contributions focusing on the measurement, monitoring and assessment of sediment transport processes are invited. We particularly welcome submissions that include, but are not limited to:

- ✓ Experimental studies of particle scale transport processes
- ✓ Fieldwork or case studies demonstrating novel sediment transport monitoring methods and/or applications of innovative measurement techniques
- ✓ Numerical investigations investigating fundamental and/or practical aspects of transport processes, across scales (from particle to reach scale).

Special Session 9

Title: Innovative measurement and modelling techniques in the lab and field

Organizers: Dr. Jeffrey A. Tuhtan (Tallinn University of Technology, Estonia), Dr. Markus Noack (Universität Stuttgart, Germany), Dr. Rafael Muñoz-Mas (Universitat Politècnica de València, Spain), Dr. Shinji Fukuda (Tokyo University of Agriculture and Technology, Japan)

Synopsis: New applications of existing image-based, optical and acoustic methods are emerging. This special session welcomes a wide range of researches considering novel physical methods for the measurement and classification of biotic and abiotic conditions as well as development and applications of machine learning to advance ecohydraulics.

Keywords: velocity, pressure, vorticity, turbulence, turbidity, temperature, vegetation, fish, flow sensing, classification, machine learning, sensor networks, underwater robotics

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Image processing (e.g. fish tracking, sediment motion, PIV)
- ✓ Optoelectronic methods (e.g. fiber optic strain gauges)
- ✓ Pressure-based sensing (e.g. pressure sensitive particles for sediment transport, lateral line probes)
- ✓ Hydroacoustics (e.g. hydrophones, geophones and acoustic Doppler methods)
- ✓ Inertial measurement units
- ✓ High-frequency measurements in the lab and field
- ✓ Sensor fusion and data-driven modelling using machine learning and other statistical approaches

Special Session 10

Title: Advances in ecohydraulic modeling: metrics and approaches towards genuinely integrated models

Organizers: Dr. Davide Vanzo (Laboratory of Hydraulics, Hydrology and Glaciology (VAW), Swiss Federal Institute of Technology (ETH). Zürich, Switzerland), Dr. Christoph Hauer (Inst. for Water Management, Hydrology and Hydraulic Engineering, Univ. of Natural Resources and Life Sciences (BOKU). Vienna, Austria), Dr.- Ing. Klaus Jorde (KJ Consult. Klagenfurt, Austria), Dr. Alexander McCluskey (Fakultät Bau Geo Umwelt, University Technische Universität München (TUM). Munich, Germany), Dr. Valerie Ouellet (The University of Birmingham, UK), Emilio Politti (Dept. of Civil Environmental and Mechanical Engineering (DICAM), University of Trento. Trento, Italy), Dr. Nicolas Lamouroux (Irstea Lyon, France), Dr. Davide Vettori (Dept. of Geography, Loughborough University. Loughborough, UK), Prof. Daniele Tonina (Dept. of Civil Engineering, Center for Ecohydraulics Research, University of Idaho. Boise, Idaho, USA), Dr. Paolo Vezza (Dept. of Environment, Land and Infrastructure Engineering, Polytechnic University of Torino. Torino, Italy)

Synopsis: Ecological and hydraulic models are common tools rooted into distinct paradigms (empirical/stochastic or deterministic) and evolved into diverse reference frameworks. At modeling level, their integration has traditionally been possible by adapting either hydraulic or ecological tools to face interdisciplinary problems. The challenge of the early and next generation of ecohydraulic modelers is to explore new approaches to genuinely couple ecological and hydro-morphological processes towards the development of integrated ecohydraulic models.

This session focuses on the physical and mathematical modeling of river ecosystem processes occurring at a broad range of spatial scales, hence from grain-water interface to river reach scale. Coherently with the variety of spatial scales, several temporal scales may also be considered, spanning from single-event (e.g. physical and biological responses to natural and artificial flow peaks) to long-term evolution (e.g. ecological response to hydro-morphological adjustment or climate change).

In this context we solicit contributions on consolidated approaches, novel tools as well as recent advances to model and predict interplays and feedbacks among different dynamic processes, such as (but not only): micro and meso-habitat changes, macrobiota (fish and macroinvertebrate) responses, sediment-water interface exchanges, water temperature and biochemical alterations, sediment transport and sorting, river morphodynamics, aquatic and riparian vegetation.

Keywords: modeling, physical habitat, vegetation, sediment, interface, surface and subsurface hydraulics

Topics of Interests:

The topics of this special session are, but not limited to, the following:

- ✓ micro and meso-habitat modeling
- ✓ macrobiota (fish and macroinvertebrate) responses
- ✓ sediment-water interface exchanges
- ✓ water temperature and biogeochemical alterations
- ✓ morphodynamics and sediment sorting
- ✓ aquatic and riparian vegetation

Special Session 11

Title: Innovative Monitoring Techniques for Ecohydraulic Research'

Organizers: Dr. Ellis Penning (Deltares, Delft, The Netherlands) and Dr. Daniele Tonina (Univ. of Idaho, Boise, USA)

Synopsis: This special session is dedicated to sharing the latest developments in monitoring techniques relevant for ecohydraulic research. This ranges from new measurement devices, such as fine-scale full spectrum cameras, green lidar applications and passive samplers, to new platforms such as Unmanned Aerial Systems (UAS) to host such devices, remotely operated boats or online sampling stations. We welcome contributions that show how these new techniques and instrumentation have furthered our understanding in ecohydraulics with a focus on cross-disciplinary research at larger spatial and temporal scales.

Keywords: innovative monitoring techniques, remotely operated vehicles, sensor development, online data acquisition, spatial scales

Special Session 12

Title: Ecosystem-based Disaster Risk Reduction (Eco-DRR) and combined defense against tsunami and storm surge by artificial and natural systems

Organizers: Prof. Norio Tanaka (Saitama University, Japan), Prof. Sundar, V. (Indian Institute of Technology Madras, India), Prof. Murali, K. (Indian Institute of Technology Madras, India), Dr. Nandasena, N.A.K. (University of Auckland, New Zealand), Dr. Samarakoon, M. (General Sir John Kotelawala Defence University, Sri Lanka), Dr. Iimura, K. (Utsunomiya University, Japan)

Synopsis: Coastal vegetation has been widely recognized as a natural method to reduce tsunami energy after the 2004 Indian Ocean tsunami and the 2011 Japanese tsunami. However, the effectiveness depends upon the local magnitude of tsunami and also on the characteristics of the structure of vegetation. With respect to the Ecosystem-based Disaster Risk Reduction (Eco-DRR) for high-energy events likely tsunamis and storm surges, optimal risk reduction should be discussed not only by natural systems like coastal vegetation, coastal lagoons and/or sand dunes, but also by artificial structures such as embankments, breakwaters, and seawalls and the combination of both as well. Disadvantages of the natural systems should also be discussed; for example, during a tsunami event, open gaps in a forest which can channel and amplify flow velocity, and floating debris from broken trees which also can increase in damage to the surroundings. Many studies have revealed that these demerits can be overcome with proper planning and management of coastal forests. This session discusses the proper planning and management of vegetation for promoting and strengthening the concept of Eco-DRR by analyzing the effectiveness of combination of artificial and natural structures and tangibility of the combined system as a holistic approach to disaster risk reduction.

Keywords: Bioshield, Eco-DRR, combined defense, energy reduction of tsunami

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Energy reduction by coastal forest
- ✓ Management of coastal forest
- ✓ Effective stand structure of forest
- ✓ Combined defense with artificial and natural systems

Special Session 13

Title: Restoring River-Floodplain Connectivity and Riparian Ecosystems

Organizers: Dr. Kumud Acharya (Research Professor, Desert Research Institute, NV, USA), Dr. Mark Stone (Associate Professor, University of New Mexico, NM, USA), Dr. Ryan Morrison (Assistant Professor, Colorado State University, CO, USA), Dr. Shaohua Marko Hsu (Professor, Feng Chia University, Feng Chia, Taiwan), Dr. Yiping Li (Professor, Hohai University, Nanjing, China),

Synopsis: The dynamic interaction between a river and its floodplain is important for a variety of hydrologic, ecological, and geomorphic processes. A notable example is the role of floodplain inundation in sustaining riparian ecosystems, which provide numerous water quality, habitat, and geomorphic benefits. Water management and river engineering activities have widely disrupted the natural flow regime, reducing floodplain connectivity and in many cases harming riparian ecosystems and other ecological processes. A growing appreciation of the human impacts on river-floodplain connectivity has led to many restoration efforts and studies over a range of scales, including both passive (e.g. environmental flows) and active (e.g. channel and bank modification) techniques.

This session plans to bring together researchers who are working on river-floodplain connectivity, riparian ecosystem, and other river restoration areas. Abstracts from a variety of studies are welcome, including hydrodynamic, ecological, and geomorphic perspectives of river and floodplain systems. The discussion will focus on how to better understand hydrogeomorphic and ecological responses to restored connectivity and methods for assessing connectivity. Examples may include hydrodynamic and ecohydraulic modeling techniques, riparian ecosystem responses to improved connectivity, ecosystem services, evaluation of large-scale floodplain loss, or hydrogeomorphic responses to reduced connectivity.

Keywords:

Topics of interest:

Special Session 14

Title: People and Politics in Ecohydraulics

Organizers: Marin Wilkes (Centre for Agroecology, Water & Resilience, Coventry University, UK), Tom Wakeford (Centre for Agroecology, Water & Resilience, Coventry University, UK), Luiz Silva (Universidade Federal de São João del-Rei, Brazil/Charles Sturt University, Australia)

Synopsis: Ecohydraulics plays a critical role in research applications that have the potential to cause public controversy. This was clearly evident at ISE 2016 when David Papps (Commonwealth Water Office, Australia) and Tom Chesson (National Irrigators' Council) went head-to-head over the Murray-Darling Basin Plan, continuing an argument that has received intense media attention. At the same time, developing closer research partnerships between academics, policy makers and public participants holds great potential to improve the coverage, quality and impact of ecohydraulics, as it has in other hydrological and ecological sciences.

Outcomes from a recent workshop held by the Early Careers on Ecohydraulics Network (www.ecoenet.link) showed that public and political engagement is a key priority for the next generation of ecohydraulics specialists (Wilkes et al., 2016, Journal of Ecohydraulics 1: 102-107). The incorporation of ideas from the social sciences was also seen as important for further developing ecohydraulics into a fully integrated discipline, particularly through increasing the coverage, quality and impact of ecohydraulics research.

We welcome submissions that explicitly focus on the relationships between ecohydraulics, other disciplines, policy makers and the public. Specific examples include: supporting policy decisions; informing public debates; critical physical geography; political ecology; citizen science; and participatory action research.

Keywords: Policy; public; citizen science; participatory research; critical physical geography; political ecology

Topics of interest:

Special Session 15

Title: Riparian Vegetation Processes – Knowledge, Modelling and Management

Organizers: Dr. Hyoseop Woo (Gwangju Institute of Science and Technology, South Korea), Dr. Takashi Asaeda (Saitama University, Japan), Dr. S.-U. Choi (Yonsei Univ., South Korea), Dr. Mahito Kamada (Tokushima University, Japan), Dr. Gregory Egger (Austria), Dr. Rohan Benjankar (Southern Illinois University, USA), Dr. Félix Francés (Universitat Politècnica de València, Spain), Dr. Onyx Wai (Hong Kong Polytechnic University), Dr. Diego García de Jalón Lastra (Universidad Politécnica de Madrid, Spain), Dr. Qiuwen Chen (Nanjing Hydraulic Research Institute, China), Prof. Yuji Toda (Nagoya University, Japan)

Synopsis: The riparian vegetation processes, recruitment, establishment, succession and retrogression, have been considered as a part of the natural phenomena, like flood and drought and changes in river course in fluvial system. Accelerated riparian vegetation processes due to anthropogenic changes and possibly climate change, however, have caused dramatic changes in the riparian ecosystem functions, and in some places, increased river-induced disaster risks. This phenomenon is called symbolically, in some regions, change from ‘white river’ to ‘green river’. This special session focuses mainly on 1) the scientific knowledge of riparian vegetation processes and interaction of each process with its non-biotic environment, 2) computer modelling of the processes based on the physical, chemical, and biological interactions and threshold conditions, and 3) management, based mostly on adaptation, of the detrimental effects of the accelerated riparian vegetation processes to human as well as conservation of the ecosystem. Relevant case studies in different geographic and climatic regions of each topic are also discussed.

Keywords: riparian vegetation, dynamic succession model, ‘white to green’ river, adaptive management

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Fundamentals of riparian vegetation processes (including field observation)
- ✓ Change in flow and sediment regimes and riparian vegetation
- ✓ Climate change and vegetation recruitment
- ✓ Invasion of exotic species in riparian vegetation
- ✓ Effects of non-point source pollutions to riparian vegetation
- ✓ Effects of riparian vegetation on flood management
- ✓ Riparian vegetation models: dynamic succession models
- ✓ Adaptive management of riparian vegetation (including stream restoration)

Special Session 16

Title: Development of the Kanto Region Ecological Network

Organizers: Masami Hasegawa (Ph.D, Professor, Toho University)

Synopsis: The Kanto Region used to have a wealth of biodiversity in its wetlands, but as the region was urbanized, rich ecosystems were rapidly lost. To reverse the situation, it is needed to conserve and restore wetlands and green spaces, to develop a blue and green network, and to protect habitats of wild fauna and flora.

The Kanto Region once was a major distribution area of Oriental white stork (*Ciconia boyciana*) and Japanese Crested ibis (*Nipponia nippon*), which can be good indicator species of wetlands and green spaces. For this reason, various stakeholders are collaborating with each other to conserve and restore waterside environments in riparian areas by using storks and ibises as indicator or symbolic species.

Those stakeholders are also making efforts to develop a nature-rich water and green ecological network and to promote robust economic development and economic revitalization.

Keywords: Wetland restoration, habitat recovery, economic development, and economic revitalization

Topics:

1. Efforts of river administrators: Wetland creation and restoration in river areas
2. Efforts of local municipalities: Spreading of eco-farming
3. Efforts of NPOs/NGOs: Conservation and management of wildlife habitats
4. Efforts of private companies: Nutrition education and environmental education
5. hands-on events, and facilitation of the urban-suburban economic benefit flow

Special Session 17

Title: Integration of Eco-hydrology with RS and GIS for monitoring water resources.

Organizers: Dr. Le Quoc Hung (Vietnam National Remote Sensing Department, Vietnam), Assoc. Prof. Dr. Tran Ngoc Anh (VNU University of Science -Vietnam National University, Hanoi, Vietnam), Dang Truong Giang (Vietnam National Remote Sensing Department; , Vietnam), Dr. Tran Tuan Ngoc (National Remote Sensing Department, Vietnam), Dr. Chu Hai Tung (Vietnam National Remote Sensing Department, Vietnam), Assoc. Prof. Pham Van Cu (Hanoi University of Natural Resources and Environment, Vietnam)

Synopsis: Under climate change and human activities, water management must face a lot of challenges in 21st century. There are increased pressures on water resources with many high competitions of the water users at local, regional and international scales, between upstream and downstream. Thus, monitoring water resources must provide the explicit description of water quantity and quality, water redistribution and water use from reservoir, river and groundwater systems, achieving greater spatial detail. RS and GIS is the strong tool to collect the data of the earth in large scale. Integration of Eco-hydrology with RS and GIS can estimate water surface volume, some chemical and physical features of water to improve accuracy and spatial detail in hydrological and ecological model estimation. Besides, it can detect abnormal index of hydrology, ecology, topography characteristics under changing of water flow whereby people can prevent and reduce water disaster water disaster to ecosystem.

Keywords: Eco-hydrology, RS, GIS, water management, water disaster, climate change.

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Developing integration of Eco-hydrology with RS and GIS method.
- ✓ Integration of Eco-hydrology with RS and GIS for monitoring water quantity and water quality.
- ✓ Integration of Eco-hydrology with RS and GIS to prevent and reduce polluted water disaster; flood and drought; impact of water exploitation.
- ✓ Developing and applications of Integration of Eco-hydrology with RS and GIS to improve accuracy of hydrological and ecological model.

Special Session 18

Title: A Thousand And One Ways to Explore Hydrosystems Using Remote Sensing

Organizers: Ana Adeva Bustos (NTNU, Norway), Christian Haas (I AM HYDRO, Germany), Knut Alfredsen (NTNU, Norway), Richard Hedger (NINA, Norway), Håkon Sundt (NTNU, Norway)

Synopsis: Remote sensing (RS) of hydrosystems experienced a vast development over the last years. With increasing computing capacity, development and improvement of sensors, the field offers a wide range of new possibilities. However, remote sensing, particularly on riverine systems has still a big potential for developing new methods and applications. This session will focus on RS applications for monitoring and managing freshwater ecosystems in terms of physical, chemical and biological parameters varying from micro and meso scales up to the full extent of catchments. It offers an effective approach in terms of cost, output and effort as subject to the project scale.

This session will offer the opportunity to present latest state of the art in remote sensing on riverine systems as well as current research and development, including methods, sensors, data processing as well as implementation of data and technology.

Keywords: Remote sensing applications, sustainable management, remote sensing methods, remote sensing challenges

Topics of interest:

- Methods and retrieval of RS data
- Cost-effectiveness of the sensor and method used
- Challenges during data processing
- Early stage methods (testing phase)
- Comparisons of RS methods
- Multi-observation (sensors, resolutions, monitoring) analysis of RS data
- Applications of image retrieval in remote sensing:
 - ✓ Climate change and flood control/lake imaging
 - ✓ Thermal applications
 - ✓ RS as inputs to biological models
 - ✓ RS and vegetation
 - ✓ RS and ice

Special Session 19

Title: Hydrology and ecology of brackish water zones

Organizers: Masumi Yamamuro (The University of Tokyo, Chiba, Japan), Takashi Asaeda (Saitama University, Saitama, Japan)

Synopsis: Brackish water zones provide with various kinds of important aquatic resources, such as fish and finfish, clam, etc.. These organisms are highly affected by the conditions related to salinity of water in the zone. Higher density of saline water compared to freshwater produces the stable stratification in the brackish zone and the anoxic condition in the bottom layer. The anoxic condition affects several chemical properties of the sediment, such as the production of hydrogen sulfide, etc., and prohibits the colonization of benthic invertebrates. Salinity also determines the animal species, and temporal and spatial compositions of vegetation. The source of the salinity in brackish water zones is the intrusion of sea water, and is affected by the geomorphology of the connection to the sea, meteorological conditions, sea level, freshwater and sediment inflows, wave action, etc.. These intricately connected features of the brackish water zones are discussed in this session.

Keywords: brackish water; salinity stratification; anoxic zone; benthic invertebrates; Corbicula clam

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Lagoons
- ✓ Estuaries
- ✓ Tidal zone of the river

Special Session 20

Title: GIS and remote sensing application on rivers and watersheds management

Organizers: Dr. H.L.K. Sanjaya (Department of Limnology and Water Technology, Faculty of Fisheries and Marine Sciences and Technology, University of Ruhuna Matara, 81000, Sri Lanka)

Synopsis: GIS and remote sensing technology has received a considerable interest in river and watershed management in the recent years. This technology is now widely applied on collecting and processing data, as it has proved to be a practical approach to study complex geographic terrain types and diverse inaccessible ecosystems. It provides a wide range of sensor systems including aerial photographs, airborne multi-spectral scanners, satellite imagery, low and high spatial and spectral resolution and ground based spectrometer measurements. Remote sensing technology has many attributes that would be beneficial to detecting, mapping and monitoring the dynamics of the rivers and their watersheds. The multi date nature of satellite imagery permits monitoring dynamic features of landscape and thus provides a means to detect changes and quantify the rates of change in relation to the rivers. Integrated GIS and remote sensing have already successfully been applied in various other aspects including hydrological and environmental modeling. On the other hand, an increasing number of publications dealing with the application of remote sensing and GIS can be seen in recent years. Therefore, having such a strong topic in the ISE2018 conference will be an added value to the conference to attract a wide range of audience.

Keywords: GIS and remote sensing, satellite imagery, river dynamics, watersheds, river dynamics

Topics of interest:

- ✓ Sediment processes in rivers
- ✓ influences of watershed processes on rivers
- ✓ spatial and temporal dynamics of river landscape

Special Session 21

Title: Clarification of biotic production mechanism and application for river ecosystem management — Collaborative research through integration of ecology and river engineering —

Organizers: Masatoshi Denda (Public Works Research institute, Water environmental group, River restoration team, Japan)

Synopsis: Present studies and restoration on river ecosystem mainly focus on habitat restoration. However, river ecosystems are established on not only habitat but also material and organic dynamism, that is consist of primary production and secondary production such as aquatic insects and fishes. To effectively conserve the river ecosystem, it is important that we focus on primary production and secondary production.

River ecosystem academic research group of the Chikuma River corroborating ecologist and river engineer have conducted field research and numerical model research, trying to clarify mechanisms of the productions. We deal the production as continues systems consisting of river morphology, 3D flow on pool and riffle structure, primary production and secondary production. And we evaluated on influence of structure change of this system on fisheries resource, try to develop river channel management criteria to maintain the production.

In this session, we will report the latest research results on the corroborating research, and will discuss total management method adding the view point on productivity to the habitat conservation

Keywords: Morphology and hydraulics; Pool and riffle structure; Primary and secondary production; Management criteria of productivity

Topics of interest:

- ✓ Primary production and secondary production relating pool and riffle structure
- ✓ Organic matter dynamism relating 3D hydraulics
- ✓ Corroborations between filed observation on biotic and numerical hydraulic simulation
- ✓ Management criteria on primary production and secondary production

Special Session 22

Title: Ecohydraulic approaches to analyse multiple stressors in aquatic ecosystems

Organizers: Thomas Hein (University of Natural Resources and Life Sciences, Vienna & WasserCluster Lunz, Dept. Water – Atmosphere – Environment, Gregor-Mendel-Straße 33, 1180 Vienna), Takashi Asaeda (Saitama University, Department of Environmental Science, 255 Shimo-okubo, Sakura, Saitama, 338-8570 Japan), Elisabeth Bondar-Kunze (University of Natural Resources and Life Sciences, Vienna & WasserCluster Lunz, Dept. Water – Atmosphere – Environment, Gregor-Mendel-Straße 33, 1180 Vienna)

Synopsis: Aquatic ecosystems are exposed to multiple stressors ranging from alterations in geomorphology, hydrology, pollution and various other pressures related to changes in temperature and species composition. These stressors are not only affecting aquatic systems individually, moreover they also show interlinked effects based on complex stressor interactions. Conceptually, these interactions can be additive, antagonistic and synergistic compared to single stressor effects. In lotic environments flow alterations are a key issue and are related to water abstraction, damming, residual flow and hydro-peaking effects. These alterations in flow are combined with various other stressors in many aquatic ecosystems and thus, the understanding of these interactions is a critical issue for aquatic ecology and ecosystem management.

Various examples for different ecosystem components and for different regions and aquatic ecosystems will be discussed and allow a comprehensive overview on the current status and potential future development as well as the identification of relevant multiple pressure interactions and their effects on ecosystem health and provide a basis for future implementation in aquatic ecosystem management.

Keywords: drivers, pressures, multiple pressure effects, synergistic effects, antagonistic effects

Topics of interest:

- ✓ Types of multiple pressure interactions
- ✓ Experimental evidence of multiple pressure interactions
- ✓ Case studies demonstrating multiple pressure effects
- ✓ Further implication for ecosystem management

Special Session 23

Title: Towards better management of discontinuity of rivers: impacts, and potential and challenges in water level controls of reservoirs, artificial flow releases from dams, and gravel augmentation

Organizers: Junjiro Negishi (Hokkaido University, Japan), Kazuhiro Azami (OYO Corporation, Japan), Chihiro Yoshimura (Tokyo Institute of Technology, Japan)

Synopsis: Degradations of river and riparian ecosystems due to change in flow and sediment regime associated with artificial cross-channel structures (e.g. flood control and irrigation dams) are widespread. Biological consequences include the colonization and proliferation of invasive alien species as well as drastic shifts in community structure of aquatic and riparian organisms in the reservoirs and/or downstream areas. Some of anadromous species are also negatively affected by migration barriers associated with such structures and even smaller erosion control dams. This session aims to showcase recent findings on impact assessments and measures to minimize negative impacts of cross-channel structures for the conservation of native aquatic and riparian ecosystems in surrounding areas.

Keywords: biodiversity; channel network; ecosystem restoration; flow; food-web; invasive species; sediment

Topics of interest:

- ✓ Flow and sediment regime restoration
- ✓ Invasive species management
- ✓ Dam impact assessment
- ✓ River network discontinuity/continuity

Special Session 24

Title: Dam reservoir and surrounding ecosystems in monsoon Asia

Organizers: Kazuhiro Azami (Oyo Co), Hidetaka Ichiyanagi (Watershed Environmental Center) and Kazumi Tanida (Osaka Museum of Natural History)

Synopsis: Most dams in Japan and other islands are relatively smaller than continental dam reservoirs. This session involves smaller reservoirs in monsoon Asia. The limnology of dam reservoirs, ecology and civil engineering of surrounding ecosystems: ecotones, relating forests and streams, and outflow streams will be treated.

Keywords: reservoir, ecotone, regulated streams, inflow streams

Topics of interest:

- ✓ Limnology,
- ✓ Hydraulics,
- ✓ Ecology,
- ✓ Biodiversity,
- ✓ Outflow streams,
- ✓ Reservoir- forest interactions,
- ✓ Control tactics of reservoirs

Special Session 25

Title: Physical-chemical processes and ecosystems in riparian zones

Organizers: Dr. Taku Fujiwara (Professor, Kochi University, Japan), Dr. Hao Zhang (Associate Professor, Kochi University, Japan)

Synopsis: Riparian zone is the transitional area between land and water, bringing aesthetical and recreational benefits for human beings as well as providing important habitats for aquatic and terrestrial species. Riparian zones involve a lot of complex and interactive phenomena and processes such as the water flow, groundwater, mass transport, morphological changes, vegetation and forest, biota movement, human activities and so on. An understanding on the riparian zones necessitates a comprehensive perspective, great knowledge and integrated approaches. This special session is intended to provide a platform for inter-disciplinary communications and to promote possible collaborative research among hydraulicians, morphologists, chemists, biologists and sociologists who are interested in the riparian zones of our planet. It is expected that approaches and case studies from different research fields will be presented and discussed in the framework of riparian zones which may lead to the formation of integrated methods and new ideas.

Keywords: Hydraulics, vegetation, forest, pollutant, nutrient, biology

Topics of interest:

- ✓ Physical processes in riparian zones: hydraulics, sediment, morphodynamics, vegetation, etc.
- ✓ Chemical processes and/or chemical analyses related to water/mass in riparian zones: water quality, pollutants, nutrients transport, etc.
- ✓ Biology related to riparian species: biota movements, biodiversity, ecology, etc.
- ✓ Other aspects in riparian zones: waterfront utilization, aesthetics and recreation, landscape, culture and social aspects, etc.

Special Session 26

Title: Transdisciplinary Management of Wadi Flash Floods in the Arid and Semiarid Environments

Organizers: Prof. Tetsuya Sumi (Kyoto University, Japan), Assoc. Prof. Sameh Kantoush (Kyoto University, Japan), Prof. Reinhard Hinkelmann (TU Berlin, Germany), Prof. Ekkehard Holzbecher (German University of Technology, Oman), Prof. Uwe Tröger (TU Berlin Campus El Gouna, Germany), Prof. Marco Borga (Department of Land, Environment, Agriculture and Forestry, University of Padova), Dr. Mohamed Saber (Kyoto University, Japan), Prof. Karima Attia (NWRC, MWRI, Egypt), Dr. Saif Al Hinai (Water Management Systems, Oman), Prof. Dalila Loudy (University Hassan II – Casablanca, Faculty of Sciences and Techniques, Morocco), Prof. Gamal Abdo (Water Research Center, University of Khartoum, Sudan)

Synopsis: Wadi flash floods (WFF) in arid and semi-arid environments have recently become more frequent and devastating resulting in great property damages and extensive loss of life as well as environment degradation. Wadi is a dry riverbed that can discharge large water and sediment volumes after extreme rainfall either to the coastal or the desert plateau. Wadi channel perform same ecosystem services for the overall basin to transport water, sediments and nutrients. The Wadi system is characterized by lack of hydrological data, missing of integrated management, social and ecological studies. Therefore, understanding of WFF phenomena in terms of frequency and intensity are desperately needed to develop proper approaches for forecasting, mitigation, wadi basin geomorphology, sedimentation, ecological biodiversity and ecohydrology. The objective of this special session is to stress on these existing challenges of WFF integrated management and ecosystem. This session discusses the following topics:

1. Hydrological Modelling and Climate Change Impacts
2. Disaster Risk Assessment and Management
3. Ecosystem and Environment
4. Innovative technologies for Sediment and Water Management
5. Development of Wadi Society

Keywords: Wadi ecosystem, Flash flood management, Hydrological modelling, Climate change, Arid-Semi arid region, Ecological biodiversity

Topics of interest:

1. Hydrological Modelling and Climate Change Impacts
2. Disaster Risk Assessment and Management
3. Ecosystem and Environment
4. Innovative technologies for Sediment and Water Management
5. Development of Wadi Society

Special Session 27

Title: Integrated Sediment and Flow Management for River Ecosystem Restoration under the Impact of Dam Construction

Organizers:

Associate Prof. Yasuhiro Takemon (Kyoto University, Japan), Prof. G. Mathias Kondolf (University of California Berkeley, USA), Senior Researcher Giyoung Ock (National Institute of Ecology, Korea), Assistant Prof. Sohei Kobayashi (Kyoto University, Japan)

Synopsis: Effective counter measure against dam sedimentation is a worldwide issue. At a same time, restoration of degraded river ecosystems under the impact of high dams constructed upper stream is also required. In order to satisfy both requirements, we have to develop the evaluation method for suitable sediment flow as well as water discharge below dams. In recent years, the environmental flow concept has been widely spread and its applications to works are increasing in number including flushing discharge combined with sediment augmentation below dams via dredging, sluicing, sediment bypass tunnel, etc. However, we have never had enough knowledge yet to determine a target value of sediment flow under the given discharge in the river ecosystems. In this session, we focus on methods for quantifying the sediment grain size and flow volume from an aspect of “Habitatology”, science of habitat structure and its maintenance mechanisms, to determine the target value of sediment flow for restoration of sustainable ecosystem services. Papers on empirical field studies, laboratory experiment and model simulation studies on this topic are expected to contribute to the session. Discussions will be made on classification of the optimal target values changing with geographical and climate settings of the rivers.

Keywords: river ecosystem, habitatology, dam impact, sediment augmentation, environmental flow, channel geomorphology

Topics of interest:

1. Integrated sediment management in basin scale with dam operation
2. Ecological evaluation of riverbed geomorphology in changing flow regimes
3. Prediction of reach-scale channel configuration under flow and sediment control
4. Longitudinal changes in dam impacts on river ecosystems
5. Climate change impacts on flow regimes and sediment supply in basin scale

Special Session 28

Title: Current situation and problems of water environment in Myanmar

Organizers: Takeshi Fujino (Assoc. Prof. of Saitama University, Japan), Noriko Tominaga (Former Prof. of Ochanomizu University, Japan), Kazumi Fujikawa (Kochi Makino Botanical Garden, Japan), Aung Nanda (Myanmar Sustainable Development Engineering Services Co., Ltd., Myanmar), Frauke Kraas (Geographer University of Cologne Geographisches Institut, Germany), Hnin Wityi (International division, CTI Engineering Co., Ltd., Japan)

Synopsis: Although Myanmar is located in the center of Indo-Burma Biodiversity Hotspot, it is very vulnerable in terms of conservation for water environment and living organism except for certain areas. Supplying high quality water is becoming difficult, restoration of the natural environment is required, but the economic activities in urban areas are given priority. The country has diverse life culture that should be respected, environmental protection measures with development are necessary. In this session, we collect case examples on the impact of society on the environment and examples of environmental restoration activities through cooperation from other countries, and discuss the current situation and future issues on water environment.

Keywords: Environmental & Social Managements, Indo-Burma hot spot, Inle lake, International cooperation, Irrawaddy River Basin

Topics of interest:

- ✓ Hydrological Process
- ✓ Stream & lake environment
- ✓ Environmental Carrying Capacity
- ✓ Environmental Education
- ✓ Flora and fauna in watershed
- ✓ Forest management
- ✓ Eco-tourism
- ✓ Socio Economic Development

Special Session 29

Title: Emergent macrophytes at coastal and riparian zones

Organizers: Wenxin Huai (State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, China), Tao Sun (State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China), Dongdong Shao (State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China)

Synopsis: Coastal and riparian zones, as important buffer zones, mediate land-water interactions and provide crucial ecosystem services including flood defense, water purification and habitat provision. The delivery of these important ecosystem services hinges on the omnipresent emergent macrophytes at the buffer zones. In-depth understanding of the relevant mechanisms underlying the interactions between the plants and the surrounding physical environment that comprises current, wave, sediment and nutrient, etc, can improve our knowledge on the relevant ecological processes, e.g., seed dispersal and plant colonization, and hence become a hot topic in recent ecohydraulics research. This special session aims to provide an interdisciplinary platform for researchers with varying backgrounds to meet and discuss on the scientific problems involved, as well as the implications on relevant practical activities such as eco-shoreline construction, riparian and coastal wetland restoration.

Keywords: emergent macrophyte, coastal and riparian zones, flow-vegetation interaction, ecological engineering

Topics of interest:

The topics of this special session include, but are not limited to, the following:

- ✓ Physiological responses of salt-marsh plants to wave
- ✓ Seed and propagule dispersal in vegetated-channels with and without tide
- ✓ Effects of hydrological connectivity on salt-marsh plant colonization
- ✓ Combined action between vegetation, current and sediment
- ✓ Particle-stem interaction
- ✓ The role of emergent macrophyte in nutrient cycling in wetland
- ✓ Exotic macrophyte invasion mechanism under altered hydrological regime
- ✓ Effects of coastal development on plant community

Special Session 30

Title: Innovative Methods for Monitoring and Analyzing Riparian and Aquatic Environment

Organizers: Prof. Hitoshi Miyamoto (Shibaura Institute of Technology, Japan), Prof. Yuji Toda (Nagoya University, Japan), Prof. Yoshihisa Akamatsu (Yamaguchi University, Japan)

Synopsis: The field measurement and monitoring are most fundamental way for understanding the riparian and aquatic environment. The recent developments of the monitoring technologies, such as UAV, ALB, MMS, and Environmental DNA, could have a high potential enabling us to spread the horizon of our knowledge of the aquatic environments.

On the other hands, the rapid development of computer technology has dramatically increased the ability of the aquatic ecosystem simulation, and the computer based approach has become another important tool for understanding the ecosystem to interpolate the coarse resolutions of measurement and monitoring in space and time.

This special session mainly discusses 1) the forefront of measurement and monitoring technology of riparian and aquatic environment, 2) the latest development of computer modelling of the aquatic ecosystem, and 3) the future direction based on integrating the latest monitoring and analyzing technologies. The session also seeks to promote interactions between ecohydraulic sub-disciplines, ecologists - engineers, and empiricists - modelers.

Keywords: Monitoring technology, computer modelling, riparian and aquatic environment, integration of monitoring and modelling outcomes

Topics of interest:

- ✓ Application of latest monitoring technologies such as UAV, ALB, MMS and Environmental DNA.
- ✓ Integrating modelling and simulation of riparian and aquatic ecosystem
- ✓ Feasibility of the advanced technologies for ecosystem conservation

Special Session 31

Title: Ecohydraulic modelling and habitat assessment in small streams and channel networks

Organizers: Shinji Fukuda (Tokyo University of Agriculture and Technology, Japan), Paul Franklin (National Institute of Water & Atmospheric Research, New Zealand), Takuya Moriyama (Utsunomiya University, Japan), Mitsuru Ohira (TUAT, Japan), Masaomi Kimura (The University of Tokyo, Japan) , Shigeya Maeda (Ibaraki University, Japan)

Synopsis: Agricultural channels and urban streams, in general, are regulated and under anthropogenic impacts for development purposes. Despite the vicinity to human activities, these flows are known as a key biodiversity hotspot for aquatic species. It is therefore important to better understand the biophysical conditions in a target system. For this to achieve, detailed flow information should be monitored, based on which an accurate hydraulic model can be developed. Together with data-driven or knowledge-based habitat models, ecohydraulic habitat conditions for a target species can be assessed. This special session provides a forum for researchers and professionals working on monitoring, modelling and assessment of small streams and channel networks such as those found in a paddy environment.

Keywords: Agricultural channels; small streams; connectivity; network structure; hydrodynamics; habitat assessment; paddy and water environment

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Significance of connectivity and network structure of small rivers and streams
- ✓ Hydraulic modelling of channel networks and small streams
- ✓ Habitat assessment and restoration in agricultural channels and agriculture-dominated landscapes
- ✓ Biodiversity conservation considering channel networks and small streams

Special Session 32

Title: River Restoration Methodology contributing to the Formation of Ecological Network

Organizers: Kenji Kanao (Chairperson of Asian River Restoration Network (ARRN), President of Japan Riverfront Research Center, Japan), Junjiro Negishi (International Exchange Committee, Ecology and Civil Engineering Society; Hokkaido University, Sapporo, Japan), Nobuyuki Tsuchiya (Japan River Restoration Network, Japan RiverFront research Center, Tokyo, Japan)

Synopsis: In conservation and restoration of natural environment, in view of organisms' growing and breeding habitat development in terms of areal spread, we are required to consider ecological network in a wide area such as basin-wide or nationwide. Rivers are continuous space of up and down streams connecting forests, suburbs, cities and the mouth and therefore they are regarded as an important axis of ecological network. Besides watershed is living space for people. So there are also effects from it being artificially developed and through interactions among rivers and people, people to people, subsistence and cultural activities have been formed.

On the other hand, it is required to collaborate widely or cooperation with other fields, in order to advance countermeasures and plans smoothly, it is effective to know pioneering cases that include various knowledge and method on consensus building and to establish information network for sharing.

In this session, we are to discuss important points and course of actions for countermeasures and cooperation among participating nations by sharing cases of representative research in Japan and river restoration cases by nations and regions, some of whom are Asia River Restoration Network participants in ecological network perspective.

Keywords: River restoration, ecological network, organisms' growing and breeding habitats, flood plain, regional collaboration, consensus building

Topics of interest:

- ✓ Research on ecological network (up and down river, rivers and surrounding land area, interbasin, etc.)
- ✓ River restoration method based on ecological network
- ✓ Cases where local citizens and the government collaborate

Special Session 33

Title: Sustainable river basin management looking from institutional and cultural perspectives

Organizers: Guangwei Huang (Professor, Graduate School of Global Environmental Studies, Sophia University, Japan)

Synopsis: This special session is aimed at discussing new ways of thinking and practices to balance the conflicting objectives of economic efficiency, social equity, and environmental sustainability within a given river basin. The emphasis is placed on institutional and cultural challenges for sustainable river basin management. It is also intended to highlight the need for new agendas towards better integration of technical and socio-economic knowledge.

Keywords: Sustainability, water allocation, public participation, water culture, environmental justice

Topics of interest:

All subjects related to institutional development and cultural aspects for better river basin management

Special Session 34

Title: Wastewater treatment techniques by utilizing site-specific and low-cost materials in developing countries

Organizers: Prof. Ken Kawamoto (Saitama University, Japan), Dr. Tran Thi Viet Nga (National University of Civil Engineering), Dr. Nguyen Hoang Giang (National University of Civil Engineering, Vietnam)

Synopsis: Due to rapid industrialization and increase in population, most of urban areas in developing countries have been experiencing various kinds of environmental problems such as water pollution by industrial refuse/waste and domestic wastewater, air and noise pollution, marine pollution, and soil degradation. In particular, unsanitary solid waste landfills cause serious environmental degradation including surface and groundwater pollution, and soil contamination. In most of developing countries, however, advanced wastewater treatment systems and facilities are not applicable in all cases because of the technical limitations. Therefore, development and applications of low-cost and effective techniques for wastewater treatment are highly demanded. This special session entitled “Wastewater treatment techniques by utilizing site-specific and low-cost materials in developing countries” aims to discuss the wise-use of site-specific and low-cost materials such as bio-resources, geomaterials, solid waste, and construction and demolition waste for the treatment of polluted water. Case studies in Vietnam and Sri Lanka on the removal of heavy metals from contaminated water, the treatment of domestic wastewater and sewage, and the development of permeable reactive barrier for groundwater treatment will be introduced.

Keywords: Wastewater treatment, Pollution control techniques, Site-specific materials, Solid waste landfills, Cost effectiveness, development countries

Topics of interest:

- ✓ Improvement of wastewater management and sanitation practices in developing countries
- ✓ Low-cost treatment systems for polluted surface and groundwater
- ✓ Pollution control techniques for solid waste landfills and treatment of landfill leachate
- ✓ Utilization of site-specific and low cost materials such as bio-resources, geomaterials, solid waste, and construction and demolition waste for the removal of heavy metals and for the treatment of oil polluted water

Special Session 35

Title: Physical, chemical, and biological processes of sediment and suspended particles in rivers, lakes, and oceans

Organizers: Ryuichiro Shinohara (National Institute for Environmental Studies, Japan), Tetsunori Inoue (Port and Airport Research Institute (PARI), Japan), Eiichi Furusato (Graduate School of Science and Engineering, Saitama University, Japan)

Synopsis: Sediment and suspended particles transport nutrients and are important contributors for eutrophication in rivers, lakes, and oceans. The processes related to sediment and suspended particles are complex including physical, chemical, and biological processes. In the case of phosphorus (P) release from sediment to overlying water, for example, P adsorbed onto the sediment particles is desorbed to the pore water and the desorbed P in the pore water is further released to the overlying water by diffusion. Specifically, inorganic P included in sediment particles can be desorbed due to the chemical process of redox conditions, thereby being affected by physical processes (diffusion). On the other hand, organic P, which is P associated with organic matters, is degraded by the biological process (enzymatic activities). In the current session, we shed light on the physical, chemical, and biological processes of sediment and suspended particles that affect the cycling and management of phosphorus and the other nutrients. We also aim to explore not only P but also carbon and nitrogen in the current session. Various approaches, such as field observations, laboratory experiments, and numerical calculations, are all welcome.

Keywords: sediment, suspended particles, field observation, laboratory experiment, numerical simulation

Topics of interest:

- ✓ The processes of solid (suspended particles and sediment) and solution phases (pore water, water).
- ✓ Physical (diffusion, transport), chemical (chemical equilibrium, chemical compound), and biological (enzymatic hydrolysis) processes of phosphorus and the other nutrients.
- ✓ Various kinds of approaches, such as field observation, laboratory experiment, and computer modeling.

Special Session 36

Title: Towards better understanding the role of inland water on complex carbon cycle

Organizers: Dr. Tadanobu Nakayama (National Institute for Environmental Studies, Tsukuba, Japan)

Synopsis: There is a growing understanding that inland water including rivers, lakes, and groundwater may play some role in carbon cycle, though its contribution has remained uncertain and more biased due to limited amount of reliable data available. Inland water actually plays a role in transport, mineralization, and sequestration of carbon in terrestrial-aquatic linkages, interplay between inorganic and organic carbon and its relationship to nutrients, chemical weathering, food chains in aquatic ecosystems, greenhouse gas emissions, and carbon transport to the ocean, etc. These carbon cycles are also complicated by hydrologic interaction between surface water and groundwater, hillslopes and river networks, and other intermediate regions. This session will focus on the recent improvement in understanding of carbon cycle in inland water by using new tools and innovative approaches of observation, satellite data, modeling, and analytical methods. The discussion will also focus on the mechanisms of human-nature-coupled carbon cycle such as hydraulic constructions of reservoir and dam, fertilizer application to agricultural fields, and pollutant loading from urban areas. Presentations are also invited to discuss with integrated interdisciplinary approaches to examine linkages between them from local, regional, to global scales.

Keywords: carbon cycle, ecohydrology, inland water, terrestrial-aquatic continuum, anthropogenic activity

Special Session 37

Title: Management strategies of cyanobacterial blooms and secondary metabolites in lakes and reservoirs

Organizers: Dr. H. Damitha Lakmali Abeynayaka (Saitama University, Japan)

Synopsis: The occurrence of cyanobacterial blooms and unnecessary metabolites (odor, taste and toxic compounds) depends on lake and reservoir hydrology, morphology, water chemistry, and biological parameters. Making predictions and controlling of cyanobacteria blooms and metabolites out breaks are challenging. Hence obtaining a better understanding about the dynamics of cyanobacteria metabolites formation under distinct lake and reservoir hydrological parameters is essential. This special session is dedicated to sharing the innovative research ideas in understanding, predicting, monitoring and controlling techniques relevant for cyanobacterial blooms and secondary metabolites formation in lakes and reservoirs.

Keywords: Cyanobacteria, Odor formation, Toxin, lake management, environmental parameters, controlling, prediction

Topics of interest:

- ✓ Experimental studies of cyanobacterial secondary metabolites formation during different environmental conditions
- ✓ Studies of metabolites formation modeling and predictions
- ✓ Fieldwork or case studies demonstrating temporal and spatial variations of cyanobacteria and secondary metabolites
- ✓ Novel monitoring methods and/or applications of innovative controlling techniques
- ✓ Challenges for cyanobacterial bloom and secondary metabolites management in lakes and reservoirs

Special Session 38

Title: Fish migration through rivers

Organizers: Christos Katopodis, P.Eng, FCSCE (President, Katopodis Ecohydraulics Ltd., Canada), Dr. Paulo Branco (Universidade de Lisboa, Portugal), Keiko Muraoka, (Public Works Research Institute, Japan), Dr. Youichi Yasuda, (Nihon Univ., Japan), Dr. Mattashi Izumi, (Hirosaki University, Japan), Dr. Muneyuki Aoki, (Toyo University, Japan), Dr. Xiaotao Shi (China Three Gorges University, China)

Synopsis: Substantial long-term efforts had been focused on improving the upstream migration of anadromous species with significant success. The more recent recognition for successful passage strategies for all migratory species including small, weak or bottom swimming species, has inspired renewed efforts to devise suitable solutions. To cope with the challenges involved, engineers and biologists work together systematically to design passage structures based on the ability and willingness of fish to seek and accept suitable hydraulic conditions. On this session, hydraulic and biological knowledge on river basin fish migrations and passage solutions will be discussed widely.

Keywords: Ecohydraulics, fish passage, swimming performance, multiple fish species

Topics of interest:

The topics of this special session include, but not limited to, the following:

- ✓ Fish passage hydraulics
- ✓ Effects of hydraulic structures on fish
- ✓ Migration of weak swimmers
- ✓ Evaluations for fish migration and fish passage
- ✓ Management of fish passage
- ✓ Dam removal
- ✓ Natural and anthropogenic disturbances
- ✓ Biotelemetry and biologging

Special Session 39

Title: Fish biology and habitat utility

Organizers: Christos Katopodis, P.Eng, FCSCCE (President, Katopodis Ecohydraulics Ltd., Canada), Dr. Francisco Martinez Capel, (Universitat Politècnica de València, Spain), Dr. José Maria Santos (Universidade de Lisboa, Portugal), Dr. Noriyuki Koizumi, (Institute for Rural Engineering, NARO, Japan)

Synopsis: The river environment for fish has been changed by human activities, and this has influenced the distribution of native species. Sometimes modified rivers allow invasions by alien species. To conserve fish diversity in a river, it is important to know the habitat utility characteristics for each species based on their life cycle. To maintain healthy habitats, we must know the utility of each habitat type, under modified river conditions. Linking biology and habitat utility will result in productive discussions, particularly on essential fish habitats.

Keywords: Conservation, River basin, life stage, fish diversity,

Topics of interest:

The topics of this special session include, but are not limited to, the following

- ✓ Ecosystem services and fish
- ✓ Habitat conservation
- ✓ Artificial management of habitat
- ✓ Alien species
- ✓ Fish diversity and habitat
- ✓ Spawning and nursery habitat
- ✓ Variety and continuity of habitat
- ✓ Evolution of habitat
- ✓ Management and planning
- ✓ Variety and continuity of habitat
- ✓ Fisheries and aquaculture
- ✓ Biodiversity and game fishing

Special Session 40

Title: Innovative technologies for hydropower and fish

Organizers: Christos Katopodis, P.Eng, FCSCCE (President, Katopodis Ecohydraulics Ltd., Canada), Prof. Peter Rutschmann (Technical University of Munich, Germany), Dr. Francisco Martinez Capel, (Universitat Politècnica de València, Spain), Prof. António Pinheiro (IST, Universidade de Lisboa, Portugal), Dr. Carl Robert Kriewitz, ETH Zurich (BKW Group, Bern, Switzerland), Dr. Xiaotao Shi (China Three Gorges University, China)

Synopsis: There are several environmental impacts of hydropower on individual fish species and on fish populations which need to be addressed at existing or new projects. Considerable efforts are focusing on developing innovative technical solutions to ecological challenges of such projects, especially fish. Collaborative interdisciplinary efforts through ecohydraulic studies, novel data syntheses, evaluations of mitigation measures, and re-thinking hydropower project designs, are leading to advances which can meet such challenges. This session intends to highlight technical innovations in hydropower to meet challenges for fish species, lessons learned, and future directions.

Keywords: fish friendly hydropower, technical innovations in hydropower, ecological hydropower mitigation, habitat connectivity

Topics of interest:

The topics of this special session are, but not limited to, the following:

- ✓ Innovative technologies focusing fish and hydropower (devices for up- and downstream fish migration, turbine technologies, techniques to mitigate effects of hydropeaking, etc.)
- ✓ Hydropower ecological impacts and solutions (ecological flows and sediment management strategies, evaluation and understanding of environmental impacts);
- ✓ Improvement and restoration of habitat quality and connectivity;
- ✓ Cost effectiveness of mitigation measures and mitigation strategies.

Special Session 41

Title: Coastal wetland restoration and ecosystem services enhancement

Organizers: Baoshan Cui (State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China), Junhong Bai (State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China), Haitao Wu (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun, China), Jiangbao Xia (Binzhou University, Shandong Provincial Key Laboratory of Eco-Environmental Science for Yellow River Delta, Binzhou, China)

Synopsis: Coastal wetlands provide important ecological services such as habitat, coastal defense, water purification, carbon sequestration and recreation. However, coastal wetlands worldwide suffer from serious degradation and quick loss due to natural and anthropogenic impacts. This session will address the ecological response and consequences of coastal wetlands to the various anthropogenic threats, such as altered trophic structure and biogeochemical cycle, degradation or loss of habitats and erosions of the eco-services. On the other hand, the session will also focus on the rehabilitation methodologies and techniques for the coastal wetlands at multiple scales, from site-specific soil remediation and revegetation to the reconstruction of tidal hydrological regime, habitat structure and connectivity at local scale, and to building an ecological and climate-adaptive coastal zone by integration of conservation and restoration priorities at regional scale. In addition, how to develop rehabilitation-based socioeconomic motivation and benefits and to link the practice of coastal wetland restoration with ecological friendly socioeconomic industries will be targeted in our session.

Keywords: coastal wetland, ecosystem services, rehabilitation and restoration, eco-economy

Topics of interest:

The topics of this special session include, but are not limited to, the following:

- ✓ Benthic community ecological status assessment
- ✓ Zonal vegetation distribution
- ✓ Construction of muddy coast protective forest
- ✓ Effects of Water and Salinity Regulation Measures on Soil Organic Carbon Sequestration
- ✓ Seed retention and germination mechanism
- ✓ Facilitation of microtopographic structure in plant recolonization
- ✓ Effects of invasive plants on ecosystem multifunctionality

Special Session 42

Title: Ecohydraulics in turbulence boundary layer and roughness layer of gravel bed and aquatic vegetation

Organizers: Dr. Tanaka, N. (Saitama University, Japan), Dr. Uchida, T. (Hiroshima University, Japan), Dr. Sanjou, M. (Kyoto University, Japan), Dr. Harada, M. (Gifu University, Japan)

Synopsis: Dynamics in turbulence boundary layer and roughness layer of gravel bed and aquatic vegetation have attracted not only hydraulic researchers to evaluate momentum exchange with flow turbulence and sediment transport, but also ecological researchers to assess the benthic habitat and periphyton distribution in rivers. Recent advancements in numerical simulation and measurement techniques make it possible to evaluate micro-scale hydraulics induced in these layers, which is expected to contribute to the ecologic research fields. For example, bottom velocity distribution induced by vortex around boulders and clusters entrain sediment and vegetation transported from upstream, producing evacuation spot for benthic insects. Turbulent motion such as sweep and ejection produced on these layers has an important role on the transportation of dissolved oxygen from water surface to the benthic habitat near the bed. This special session invites papers with findings in turbulence boundary layer and roughness layer of gravel bed and aquatic ecosystem both from hydraulic and ecological points of view to develop ecohydraulics near the bed in rivers.

Keywords: Boundary layer, roughness layer, turbulence, benthic habitat, invertebrate, periphyton, demersal fish, vegetation, gravel bed river, sediment transport

Topics of interest:

- ✓ How can we bridge between fluid motion, vegetation dynamic and benthic habitat?
- ✓ What can the ecologic and hydraulics in boundary layer do for ecohydraulics?

Special Session 43

Title: Catchment Drainage vs. Watershed Storage – Shifting Paradigms

Organizers: Sergio Vallesi (HR Wallingford and Durham University, Oxford, United Kingdom)

Synopsis: To address several of today's global challenges we need to better appreciate, restore and protect ecological systems, and look at watershed in a completely new way. This session will showcase examples of natural measures and infrastructures from around the world about sustainable management of watersheds, from ancient techniques to the present, and will include the importance of preserving and nourishing a water culture intelligence. The real challenge humanity is facing is not resource, climate and financial crisis, but a shortage of values around water, and of skills to effectively read land and waterscapes and recognise how to restore and preserve watershed ecological functions. The ability to fairly share water including human, animal, plant and mineral, down to microbial level, has been common practice for many cultures over much of history. Combining these ancient learnings with modern uses and requirements leads to new perspectives on water management and integration of uses. A holistic approach to sustainable water management, which involves community-based participatory processes and recognising water as a living element, would enhance climate and resource resilience. This approach would naturally foster a watershed circular economy, which mimics the hydrological cycle to circulate economic flows within a watershed, and enhance financial resilience.

Keywords: Natural infrastructures, watershed storage, resource climate and financial resilience

Topics of interest:

- ✓ Sustainable watershed management
- ✓ Sustainable hydropower
- ✓ High rangelands land and water management

Special Session 44

Title: Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh: Investigate measures using Japanese science and technology to prevent or mitigate flood and storm surge damage

Organizers: Dr. Hajime Nakagawa, Dr. Kenji Kawaike, Dr. Yasuyuki Baba, Dr. Hiroshi Takebayashi, Dr. Nozomu Yoneyama, Dr. Masakazu Hashimoto, Dr. Tetsuya Hiraishi, Dr. Hideaki Mizutani, Dr. Yuji Hasegawa, Shampa, Dr. Kumiko Fujita Dr. Gulsan Ara Parvin, Sibly Sadik, Rocky Talchabhadel (Disaster Prevention Research Institute, Kyoto University, Japan), Dr. Rajib Shaw (Keio University, Japan) Dr. Tomonori Deguchi (Nittetsu Mining Consultants Co., Ltd, Japan), Dr. Zhang Hao (Kochi University, Japan), Dr. Akiko Matsuyama (Nagoya University, Japan), Dr. Maiko Sakamoto (Tokyo University, Japan), Dr. Md. Munsur Rahman, Dr. Mashfiqus Salehin, Dr. Anisul Haque, Dr. Mohammed Abed, Hossain, Dr. Md. Rezaur Rhaman (Institute of Water and Flood Management, Bangladesh University of Engineering and Technology, Bangladesh)

Synopsis: Bangladesh suffers significant damage due to flooding and storm surges, and this exacerbates poverty, further reducing the ability to counter such damage and generating a downward spiral. Preventing and mitigating damage is an urgent task. This special session provides attempting to produce flood and storm surge hazard maps, to propose measures to reduce damage from riverbank erosion and levee collapse, to develop warning and evacuation systems, and to work on predicting and taking action against flood-driven dispersal of harmful substances. The aim is to construct resilient local communities. This session will offer the opportunity to present technology intervention of flood and storm surge risk reduction not only in Bangladesh but in lowland and deltaic countries.

Keywords: flood, storm surge, hazard map, early warning, evacuation, stakeholders' participation

Topics of interest:

1. Flood Disaster Risk Assessment and Mitigation
2. Development of Improved Storm Surge Warning and Evacuation Systems for Coast
3. River Bank Erosion and Embankment Failure Related Disasters and their Mitigation
4. Study on Flood Assisted Spreading of Deposited Toxic Substances and Possible Mitigation Measures
5. Disaster Management Strategy for Resilient Society

Special Session 45

Title: Water and Sediment Continuity and Environmental Response in River Basin

Organizers: Hideaki Sekine (CTI Engineering Co., Ltd., Japan)

Synopsis: This special session focuses on the following topics.

- ✓ Environmental hydraulics in Sabo area
- ✓ Environmental hydraulics in Dam area
- ✓ Environmental hydraulics in river channel area
- ✓ Environmental hydraulics in estuaries area

Keywords: Lateral & longitudinal connectivity

Special Session 46

Title: Application of ecohydraulics to make river management compatible with ecosystem

Organizers: Dr. Kunihiko Amano (National Institute for Land and Infrastructure Management, Japan), Dr. Tetsuya Oishi (Public Works Research Institute, Japan)

Keywords: river management, channel design, vegetation management, sediment, ecosystem function