



ISTANBUL AYDIN
UNIVERSITY



TOSHKENT DAVLAT
TRANSPORT UNIVERSITETI
Tashkent state
transport university

CALL FOR PAPERS

2nd International Hybrid Conference

**ROLE OF CLIMATE CHANGE ON WATER
RESOURCES MANAGEMENT FOR A
SUSTAINABLE FUTURE
(ICCW2025)**

May 22-24, 2025



O'ZBEKISTON
RESPUBLIKASI
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ISTANBUL AYDIN UNIVERSITY
PUBLICATIONS

2nd International Conference

ROLE OF CLIMATE CHANGE ON WATER RESOURCES MANAGEMENT FOR A SUSTAINABLE FUTURE (ICCW2025)

E-ISBN: 978-625-96971-2-3

Publisher of ICCW 2025 Proceeding: Istanbul Aydın University Publication Center IAU Visual Design Unit, Istanbul Aydın University, Inonu Cad. No. 34295, Kucukcekmece, Istanbul-TURKİYE

Web: <https://www.aydin.edu.tr/tr-tr/Pages/default.aspx>

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PREFACE

Water scarcity has worsened globally due to climate change, population growth, over-exploitation of freshwater resources, and inadequate management. This crisis, affecting both water quantity and quality, has sparked widespread interest in understanding climate change impacts on water resources. For a sustainable future, adapting to climate change through resilient water resource management and urban planning is critical, emphasizing the need for responsible stewardship amid increasing water shortages and unpredictability. Key strategies include: investing in resilient infrastructure, such as flood defenses and advanced irrigation systems, to address changing climate conditions; leveraging advanced technologies for data collection, analysis, and modeling to anticipate water resource challenges; enforcing policies to ensure equitable water access and sustainable practices; promoting collaborative water management, including cross-regional and international resource sharing, to enhance resilience; and establishing precise regional and global action plans to tackle climate change impacts. The 1st International Conference on the Role of Climate Change on Water Resources Management for a Sustainable Future (ICCW2024) was held at Istanbul Aydın University from 29 March to 1 April 2024. The 2nd ICCW2025 Conference, hosted by Tashkent State Transport University, was inaugurated by Prof. Dr. Odil Abdurakhmanov, Rector, Tashkent State Transport University, and Prof. Dr. İbrahim Hakkı Aydın, Rector, Istanbul Aydın University, on 22 May 2025. This conference aims to unite scientists, planners, practitioners, and researchers to address current and emerging water resource challenges, fostering solutions for a sustainable future.

Organising Committee

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CONFERENCE TOPICS

- Integrated Climate Change Approach
- Interactions between Irrigated Agriculture and Climate Change
- Deep Learning Methods in Water Resources Management
- Impact of Drought on Water Resources and Mitigation Action Plans for Scarcity
- Resilience and Equity for Climate Change Adaptation
- Navigating the Waters of a Changing Climate
- Renewable Energy Applications in Rural Water Distribution • Adaptation and Mitigation Action Plans for Water Scarcity
- Water Harvesting, Soil Degradation and Securing Land related to Climate Change
- Tools and Computational Methods in Data Science for Climate, Water, and Health • Smart Irrigation Systems in Agriculture for Sustainability
- Proposals for Policy Making to Address Issues arising from Climate Change
- Education for Awareness on Climate Change and Water Resources Management
- European Green Deal and Implementations
- Artificial Intelligence Applications in Regional Climatologic Issues
- Wastewater Uses and Management Technologies in Agriculture
- Any other topic related to the theme of the conference are welcome

INVITED SPEAKERS



Dr. Rai Niaz Ahmad, is an Ex. Vice Chancellor, Arid Agriculture University, Rawalpindi, Pakistan. Presently, he is working as “Professor Emeritus” in the University of Agriculture Faisalabad. He carries a distinguished career in the Field of Agricultural and Bio-system Engineering. He completed his higher studies from the Iowa State University USA whereas post-doctorate studies from Kyoto and Tottori Universities, Japan. He is author of 90 plus research publications, and five books. He has received an Award from the International Commission on Irrigation and Drainage (ICID) as well as the Pakistan President Award of Technology. He completed a good number of Research Projects along with international researchers funded by the international organizations.



Dr. Ambreen Ashar, Professor of Chemistry, in Govt. Graduate college Samana bad Faisalabad.The field of research is engineering of nano materials for solar photo-catalysis, agricultural uses, antimicrobial activities and nano medicines. My specific field of interest is treatment of waste water for reuse, purification of portable water.



Naseer Gillani Former Senior Civil Servant Presently Adviser Public-Sector Large-Scale Enterprise. Presently working as Chair UNECOSOC accredited IHRO Think Tank DEVELOPMENT FINANCE AND INCLUSION, Pakistan.



Dr. Stefano Vignudelli-the Consiglio Nazionale delle Ricerche (National Research Council) in Pisa, Italy.



Akmalov Shamshodbek Baxtiyarovich-Associate Professor of the Department of “Hydrology and Hydro-geology” of the Moscow State Technical University of Mechanical Engineering, Doctor of Philosophy in Technical Sciences



Kakharov Bakhodir Bakhranovich, Associate Professor of the Department of Engineering Communications and Systems, Tashkent State Transport University, Doctor of Philosophy in Technical Sciences, Ph.D.



Maksumov Nadirjon Ergashevich, Deputy Head of the Construction and Housing and Communal Services Inspectorate under the Cabinet of Ministers of the Republic of Uzbekistan, Doctor of Philosophy in Economics, PhD



Prof .Dr. Rashmi Bhardwaj
University School of Basic & Applied Sciences Guru Gobind Singh
Indraprastha University New Delhi. India



Prof. Dr. Rovshan Abbasov

Environmental Research Centre Khazar University, Azerbaijan



Prof. Dr. Sevinç Aslıhan

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Assistant Professor of Meteorology, Department of Atmospheric Science, and Physics, Antonio,
University of the Incarnate Word, San TX 78209, USA

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**2nd INTERNATIONAL CONFERENCE
ROLE OF CLIMATE CHANGE ON WATER RESOURCES MANAGEMENT FOR A
SUSTAINABLE FUTURE**

22-23 May, 2025

Tashkent State Transport University

<u>May 22, 2025</u>	
INAUGURAL SESSION	10.00 – 11.00

WELCOME ADDRESS	PROF. DR. ODIL ABDURAKHMANOV KALANDAROVICH Rector of Tashkent State Transport University, Uzbekistan
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OVERALL	PROF. DR. ZAFER ASLAN and Dr. Sajid MAHMOOD Vice-rector of Istanbul Aydin University, Türkiye and TESPAC, Pakistan
	BREAK/PHOTOGRAPH/

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Session-1: Water resources issues, environmental protection and green economy

Chair(s): MELİKE BAŞBINAR & ZAFER ASLAN

11.30 – 13.00

<p>OPENING OF CONFERENCE SESSION</p>	<p>Prof. Dr. Zafer ASLAN & Dr. Sajid MAHMOOD</p> <p>Istanbul Aydin University, Türkiye & TESPAK, Pakistan</p>
<p>Speaker: MEHMET AKİF ARVAS, CEM OZDEMİR, <u>RAFET AKDENİZ</u>, <i>Türkiye</i></p> <p>mehmetakif.arvas@ibb.gov.tr rafetakdeniz@aydin.edu.tr</p>	<p>Machine learning Supported Chemical Dosing System for Sustainable Water Treatment Plants</p>
<p>Speaker: STEFANO VIGNUDELLI, ANGELICA TARPANELLI, FRANCESCO DE BIASIO, KARINA NIELSEN, PAOLO FILIPPUCCI, ROSA MARIA CAVALLI, <i>Italy</i></p> <p>vignudelli@pi.ibf.cnr.it</p>	<p>Satellite-Based Optical and Radar Observations Support Coastal Hydrology Studies</p>
<p>Speaker: SHAMSHODBEK AKMALOV, <i>Uzbekistan</i></p> <p>shamshodbekjon@mail.ru</p>	<p>Water resource management in Arid regions: problems and solutions</p>
<p>Speaker: MUSAJONOV MUKHAMMADRASUL ALISHER UGLI, IBADULLAYEV AHMADJON, CHORSHANBIYEV UMAR RAVSHAN UGLI, <i>Uzbekistan</i></p> <p>musajonov.mihammadrasul@ferpi.uz</p>	<p>Studying the Effectiveness of Polymer Compositions for Pipe Cleaning in Hydrotransport of Dispersing Systems</p>
<p>Online Speaker: AMBREEN ASHAR, IZZA MAHFOOZ, NAZIA SALEEM, TAHREEM KANWAL, AYESHA KANWAL, ZEESHAN AHMAD BHUTTA, <i>Pakistan</i></p> <p>ambreenashar2013@gmail.com</p>	<p>Advanced Strategies to Overcome Water Crisis in the Face of Climate Change</p>
<p>Online Speaker: RAI NIAZ AHMAD, NADIA NIAZ, <i>Pakistan</i></p> <p>niazrai@yahoo.com</p>	<p>Water Resources Issues and Solutions in Pakistan: A Model for Developing Countries under Changing Climate</p>
<p>Online Speaker: YADAV INDERJEET, RASHMI BHARDWAJ, <i>India</i></p> <p>yadavinder;eet386@gmail.com</p>	<p>Effects of Climate Change on Water Quality</p>
<p>13.00 – 14.00</p>	<p>LUNCH BREAK/REFRESHMENT</p>

Session-2: Building a smart city and village – adaptation to climate change

Chair(s): MERYEM KARLIK & STEFANO VIGNUDELLI

14.00 – 15.30

OPENING OF TECHNICAL SESSION	Dr. Meryem KARLIK & Dr. Stefano VIGNUDELLI Chief Specialist of International Cooperation, Tashkent State Transport University, Uzbekistan & Consiglio Nazionale delle Ricerche (CNR), Italy
Speaker: <u>KAKHAROV BAHADIR BAKHRAMOVICH,</u> IBADULLAEV AKHMADZHAN, <i>Uzbekistan</i> kaxarovbb1963@mail.ru	Synthesis and Characterization of New Ionits for Decision of The Problems Peelings Sewage
Speaker: <u>HAYDAR ÖZPINAR,</u> HARSHADRAI M. RAWEL, SOREL TCHEWONPI SAGU, FLORIAN J. SCHWEIGERT, <i>Türkiye</i> haydarozpinar@aydin.edu.tr	Characterization and Comparison of The Toxic/Immunological Potential of Different Wheat Cultivars from Turkey
Speaker: MAKSUMOV NODIRJON ERGASHOVICH Uzbekistan n.maksumov@argos.uz	State Oversight in Adapting to and Mitigating the Consequences of Water Scarcity
Speaker: <u>DAVRONJON ALLAYOROV, AYBEK</u> <u>ARIFJANOV, UCHQUN UMAROV, AND</u> <u>DILBAR ALLAYOROVA</u> Uzbekistan allayorov_d@tstu.uz	Flooding: Hydro climatic Phenomena. Bibliometric Analysis for Future
Online Speaker: ZELHA ALTINKAYA YALOVA UNIVERSITY, FACULTY OF ACCOUNTING Türkiye zelha.altinkaya@yalova.edu.tr	Water Price Management Under Drought Conditions: A Case Study of İstanbul (1994–2024)
Online Speaker: <u>NASEER GILANI,</u> <i>Pakistan</i> naseeragillani@yahoo.com	Case Study Sialkot Bus Stand Shifting to Golu Phala, Naseer Gillani
Online Speaker: <u>ALIASGHAR IRAJPOOR,</u> <i>Iran</i> a.irajpour@yahoo.com	Human- Induced Impacts on River Hydrology and Watershed Management in The Maharloo Lake Basin: An Assessment of Land Use, Climate and Water Resource Changes
Online Speaker: <u>KAJAL CHAUDHARY,</u> RASHMI BHARDWAJ, <i>India</i> rashmib@ipu.ac.in	Efficient Irrigation System: Predicting Soil Moisture Using Machine Learning Algorithms
Online Speaker: <u>DIVISHA KANSAL,</u> RASHMI BHARDWAJ, <i>India</i> rashmib@ipu.ac.in	India’s Water Management Future: The Growing Significance of IOT, AI and Data Analytics

Session-3: Role of AI and App. Engineering Sciences in Technological Advancement

Chair(s): NAGIMA XUDAYBERGANOVA & SAJID MAHMOOD

15.30 – 17.00

OPENING OF TECHNICAL SESSION	Nagima XUDAYBERGANOVA (TSTU) & Prof. Dr. RAFET AKDENIZ (Istanbul Aydin University)
<p>Speaker: M.YU.RASULOVA, <i>Uzbekistan</i> rasulova@live.com</p>	Bethe Ansatz and Cryptography,
<p>Online Speaker: UGUR AKBULUT, ZAFER ASLAN, MAHMUD GÜNGÖR, <i>Türkiye</i> zaferaslan@aydin.edu.tr ugurakbulut@esenyurt.edu.tr</p>	Machine Learning Methods and Trend Analysis: Gelendost Example
<p>Speaker: UMAROVA DINARA, MUSAEV OLIMJON AND KHUDAYBERGANOVA NAGIMA Uzbekistan</p>	Automation of Water Supply and Sewerage Engineering System Design
<p>Online Speaker: SURBHI SHARMA, RASHMI BHARDWAJ India Email: surbhi11june@gmail.com Email :rashmib@ipu.ac.in</p>	Fractal Analysis of Global Fresh Water Use
<p>Online Speaker: ROVSHAN ABBASOV <i>Azerbaijan</i> rabasov@khazar.org</p>	Conceptual Framework OF Application of Pes Schemes IN Provision OF Environmental Flows in The Management OF Trans-boundary Rivers
<p>Online Speaker: ELENA ROJKOVA, LILIYA FILIMONOVA, TEVFIK DENIZHAN MUFTUOGLU <i>Uzbekistan, Türkiye</i> Rojkova-elena@mail.ru</p>	Mathematical Modeling of Ecological Processes in Water Bodies
<p>Online Speaker: VINITA SANGWAN, RASHMI BHARDWAJ, <i>India</i> vinita.8040890022@ipu.ac.in</p>	Water Quality Classification Prediction Using Machine Learning Models
<p>Online Speaker: ZEYNEB KILIÇ, <i>Türkiye</i> zkilic@adiyaman.edu.tr</p>	Bibliometric Analysis of Artificial Neural Networks on Open Channel Hydraulic

Session-4: Climate Changes, awareness, strategies and policies for green economy (Miscellaneous)

Chair(s): UCHQUN UMAROV & UMAR CHORSHANBIYEV

17.15 – 19.00

OPENING OF TECHNICAL SESSION	Uchqun UMAROV & Umar HORSHANBIYEV (TSTU)
<p>Speaker: ZAYNAB S. SAYFULLAYEVA, GOFURJON KH. KHAMRAKULOV, LOBAR B. ZIYODOVA, ELMIRA TESHABAEVA Uzbekistan zdaminkhonova@gmail.com</p>	Chemical Composition and Consumer Properties of Natural Honey: Identification Examination and Classification
<p>Speaker: ZAYNAB S. SAYFULLAYEVA, GOFURJON KH. KHAMRAKULOV, M.G. KHAMRAKULOV, AKHMADJAN LBADULLAEV Uzbekistan zdaminkhonova@gmail.com</p>	Study Of Physical and Chemical Properties of Natural Honey for Improvement of Conformity Assessment Procedure
<p>Speaker: UMAROV UCHQUN, RUZIBAYEVA MARXABO, BABAYEV ASKAR, IBADULLAEV AKHMADZHON, RIKHSIKHODJAEVA GULCHEKHRA Uzbekistan uchqunflying@gmail.com markhaboruzibaeva@gmail.com</p>	Research of Different Local Sands as Loading for Water Filters
<p>Online Speaker: VINAY KUMAR USA vkumar@uiwtx.edu</p>	Meteorology Meets Hydrology: Climate Change Impacts on Water "Security"
<p>Speaker: KAKHAROV BAHADIR BAKHRAMOVICH, IBADULLAEV AKHMADZHAN Uzbekistan ibadullaev1957@bk.ru</p>	Saving Water is one of The Ways to Conserve Energy Resources
<p>Online Speaker: FAISAL NADEEM SAHER, WAQAS ANWAR, ALI ANAN QAMAR Pakistan saher.gis@gmail.com</p>	Hydro-vision 360: Advancing Water Sector Project Appraisal Amid Climate Change with Web-Based Integration of Climate Catastrophe Services (CLICAT)
<p>Online Speaker: FATMA SUDE SÖKİN, SEVINÇ ASILHAN SİRDAŞ Türkiye sokin20@itu.edu.tr sirdas@itu.edu.tr</p>	Machine Learning Methods for Weather Research and Forecasting (WRF) Model Turbulence Forecasting at Istanbul Airport
<p>Online Speaker: DIVISHA KANSAL, RASHMI BHARDWAJ India rashmib@ipu.ac.in</p>	Analysis of Depression and Anxiety in Women Using Machine Learning Approaches
<p>Online Speaker: INDERJEET, RASHMI BHARDWAJ India rashmib@ipu.ac.in yadavinderjeet386@gmail.com</p>	Effects of Climate Change on Water Quality

<p>Online Speaker: EKTA YADAV, RASHMI BHARDWAJ India rashmib@ipu.ac.in</p>	<p>Utilising The Rough Set-SVM Model for Water Quality Assessment</p>
<p>Session-4: Climate Changes, awareness, strategies and policies for green economy (Miscellaneous) (Continued)</p>	
<p>Chair(s): UCHQUN UMAROV & UMAR CHORSHANBIYEV 17.15 – 19.00</p>	
<p>OPENING OF TECHNICAL SESSION</p>	<p>Uchqun UMAROV & Umar HORSHANBIYEV (TSTU)</p>
<p>Online Poster Speaker: SAJID RASHID AHMAD, MARIAM JAVED, SHAHID IQBAL sajidpu@yahoo.com, javed16@sbc.edu, shahidiqbal@mater.ie</p>	<p>Glacier Dynamics Assessment Related to Climate Change Impacts on Honz Sub-Basin Pakistan</p>
<p>Online Poster Speaker: MARIAM JAVED, SAJID RASHID AHMAD, BILAL AHMAD MUNIR sajidpu@yahoo.com, javed16@sbc.edu</p>	<p>Potential Pakistani Hill Torrents: A Systematic Approach to Flash Flood Water Assessment and Management of Monsoonal Water</p>
<p>Online Poster Speaker: UMAR CHORSHANBIEV, AKHMADJAN LBADULLAEV, ASKAR BABAEV, AKHROR OBIDJONOV umartvmikq25@gmail.com</p>	<p>Improvement of Methods for Increasing the Efficiency of Pumps for Transmitting Mining Waste Water</p>
<p>Online Poster Speaker: UZMA MAJEED SUMERA KHALID, AISHA KAZMI, MUHAMMAD ARSLAN ANWAR, MINAHIL KHAN, SAJID MAHMOOD, ZEYNEB KILIC, The City School, Rawalpindi, Pakistan. uzmalone@gmail.com</p>	<p>Role of Ngos In Promoting Climate-Friendly Practices and Awareness in Developing Countries: A Comparative Approach</p>
<p>Online Poster Speaker: SAJID MAHMOOD, ALLAUDDIN AHMED, HAFIZ ABDUR REHMAN, MUHAMMAD SAEED AHMED, ZEYNEB KILIC, FOUZIA KHURSHID, ALLAH DITTA MANSOOR, EMAN LSMAEIL EL-SARAG, ALIASGHAR LRAJPOOR tespakfsd@gmail.com</p>	<p>Film-Hole Irrigation: A Tool for Sustainable Water Management in Water Stressed Climate</p>
<p>Online Poster Speaker: ZEYNEB KILIÇ, Türkiye zkilic@adiyaman.edu.tr</p>	<p>A Review On Urban Flood</p>
<p>BREAK/PHOTOGRAPH</p>	
<p><u>May 22 , 2025</u></p>	
<p>CONCLUDING SESSION 19.00 -19.10</p>	
<p>CONCLUDING REMARKS</p>	<p>Organising Committee</p>
<p>ANNOUNCEMENT FOR 3rd ICCW2026 CONFERENCE</p>	<p>At Riphah University</p>

May 23, 2025, Technical and Cultural Tour to Samarkand.

MACHINE LEARNING SUPPORTED CHEMICAL DOSING SYSTEM FOR SUSTAINABLE WATER TREATMENT PLANTS

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Abstract:

In this study, machine learning methods are used to determine appropriate amounts of chemical substances used to clean water in drinking water treatment plants. The data coming from the turbidity sensor and the color sensor in the measurement system are integrated using linear regression and average and standard deviation models. A computer interface provides the user with the best indicator of live tracking and decision-making situations. In this way, the pollutant particles in the contaminated liquid are detected and the chemical dosing to be used in the process of removing the contaminants from the liquid is decided by analyzing the turbid and color values. The main aim of the research is to solve the problems related to the removal of liquid contaminants by machine learning models and to meet the needs of production process in the most practical way with a fast and low-cost technique. We also aim to provide new information on water quality assessment, risk warning and reduction of chemical dosing in the operation of water treatment plants.

Keywords: Water analysis, machine learning, drinking water.

SATELLITE-BASED OPTICAL AND RADAR OBSERVATIONS SUPPORT COASTAL HYDROLOGY STUDIES

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Abstract

Water pollution and sea level changes (surges and long-term rising) are important challenges affecting coastal communities. Coastal hydrology is an emerging domain of research due to the need of predicting river flooding and coastal associated impacts. Satellites provide a consistent set of observations that are now much improved compared to the past, with better coverage, revisiting, resolution for the monitoring of land-sea environments (Laignel et al., 2024). In this work, we present the case-study of Po River in Italy and show how optical imagery and radar altimeter can monitor extreme events and inland water and coastal area interactions. The Po River in the summer of 2022 experienced the worst drought in 70 years. The lack of rainfall and reduced snowfall, together with rising temperatures, led to a drastic reduction in water levels, with significant consequences not only for agriculture but also for the local population. The rationalization of drinking water for urban areas and the irrigation of crops in densely populated agricultural areas were just some of the consequences, along with dried up springs and trampled river beds. The situation was exacerbated by saltwater intrusion into the river, which destroyed crops and made irrigation almost impossible up to 40 km from the estuary. The analysis aimed to assess two aspects: 1) whether satellites were able to monitor the drop in water levels along the river and whether this was also reflected at sea; and 2) whether it was possible to monitor the salt wedge intrusion in the downstream sections of the Po River by satellite. The results of the analysis confirm that the satellite observed the significant increase and decrease in water levels in correspondence of the extreme events. In addition, the analysis of the data at the virtual stations in the downstream part of the Po River, together with the data along the tracks crossing the plume closer to the mouth of the river, supported by the optical imagery showed the interaction between the sea and the river.

Keywords: Remote sensing, drinking water

(1, 2, 3) Laignel B., **Vignudelli S.**, Almar R., Becker M., Bentamy A., Benveniste J., Birol F., Frappart F., Idier D., Salameh E., Passaro M., Menedez M., Simard M., Turki I., Verpoorter C. Observation of the Coastal area, Estuaries and Deltas from Space, in Special issue “Oceanology, Hydrology and Glaciology from Space (Editors: Anny Cazenave and Jerome Benveniste), Survey in Geophysics, doi:10.1007/s10712-022-09757-6, 2023.

Water Resource Management in Arid Regions: Problems and Solutions

Shamshodbek Akmalov

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Abstract

Water resource management in arid regions is a critical issue that directly impacts sustainable development, agriculture, and the well-being of communities. This presentation addresses the challenges and solutions related to water scarcity, monitoring, and management, with a specific focus on the arid regions of Uzbekistan, particularly the Karakalpakstan region. The research highlights the importance of integrating modern technological solutions such as Geographic Information Systems (GIS) and Remote Sensing (RS) to enhance data collection and analysis accuracy.

The study outlines the main problems faced in water resource management, including the lack of reliable data, inefficient monitoring systems, and the impacts of climate change. The agricultural sector, being the largest consumer of water, requires precise management strategies to ensure sustainable use. The presentation elaborates on methods for optimizing water usage through remote monitoring and data analysis, integrating satellite data with on-ground observations.

By deploying GIS and RS technologies, the research aims to establish a systematic approach to water management that accounts for water distribution, evapotranspiration rates, and groundwater levels. Furthermore, the presentation discusses the development of remote monitoring stations and their role in providing real-time data for effective water management. The research findings demonstrate a positive correlation between climatic variables and water availability, offering predictive insights for future water management practices.

In conclusion, the study emphasizes the need for modernizing water management systems in arid regions, advocating for the adoption of innovative technologies to mitigate water scarcity and support sustainable agricultural practices. This research contributes valuable insights for policymakers, researchers, and stakeholders involved in water resource management.

Keywords: Remote sensing, evaporation, water management

STUDYING THE EFFECTIVENESS OF POLYMER COMPOSITIONS FOR PIPE CLEANING IN HYDROTRANSPORT OF DISPERSING SYSTEMS

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Abstract

During hydraulic transport processes, the accumulation of sediments on pipe walls in dispersed systems negatively affects operational efficiency. This study explores methods for effectively cleaning pipes and enhancing their durability through the application of polymer compounds. Drawing on global research, it evaluates the influence of polymer coatings on hydraulic resistance and their environmental sustainability.

Keywords: Environmental sustainability, sedimentation, pipe walls

ADVANCED STRATEGIES TO OVERCOME WATER CRISIS in THE FACE of CLIMATE CHANGE

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Abstract

Water is a critical resource, yet the current situation is compounded by a growing water crisis in the world. Climate change will exacerbate the water crisis, which is already under pressure from rising temperatures globally, changing precipitation patterns, and extreme weather-related events. These changes, in addition to the water scarcity and pollution they create, threaten aquatic ecosystems, public health, and sustainable development. The underlying reasons for this multifaceted crisis arise from other causes, namely, over-extraction of freshwater, mismanagement of freshwater resources, and contamination of the sources from point and non-point sources, which includes toxic chemicals. The impacts of this crisis are multi-stakeholders, ultimately affecting the public health of humans and living organisms across environmental, social, and economic domains by compromising clean water access and use, the biodiversity in freshwater, and agricultural production. Advanced practices are being developed to mitigate the water crisis. New technologies, such as photocatalysis, offer new water treatment alternatives that support water re-use and conserve freshwater resources, as well as improved agricultural practices, including soil moisture management and drip irrigation, to sustain these practices in climate change stressed regions. Policy changes, infrastructure improvement, and straightforward integration of water-smart policies and practices are part of the management of freshwater and wastewater systems and infrastructure, as some level of climate change has occurred and/or will occur. Public awareness events and activities, community co-created initiatives, and international cooperation are also at the forefront of water-responsible use and practices for water stability for our future. Also, potential joint partnerships and funding, as well as investment, are significant forces to explore, develop, and fund water-resilient and human-healthy systems. Many of these issues will compound with climate change unless integrated and adaptive management strategies that involve technological innovations, sustainable agricultural practices, and global cooperation continue to be embraced. The key is to prioritize these approaches to address the water crisis to the best of our abilities as humans, through resilient systems, practices, and approaches that lead to a sustainable water future and opportunities for all living organisms into the future.

Keywords: Water crisis, Sustainable water management, Photocatalysis, Water conservation, Environmental impact

WATER RESOURCES ISSUES AND SOLUTIONS in PAKISTAN: A MODEL for DEVELOPING COUNTRIES UNDER CHANGING CLIMATE

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Pakistan's agriculture is an important sector of its economy, which is contributing around 24% to its GDP and also engaging above 60% of its population directly with agriculture whereas, rest of the population is indirectly engaged in the agriculture related businesses and labour. Moreover, agriculture is an important main stay of the country's economy. Regarding agriculture land, about 47% of the country land is under agriculture, which is about 30.5 million hectares where the majority of this land (80%) is irrigated by flows of the mighty Indus River and its tributaries with a limited water storage, not enough to meet the irrigation demand more than 30 days under no or low flows. The Indus-basin groundwater storage is a little hope to the agricultural survival under dry weather if given enough considerations to its sustainable storage, quality and judicial use.

Regarding Pakistan population, it is growing at the rate of about 1.9% with the present number of about 225 million. It means, it will increase to 276 million by 2030 and 371 million by the 2050. The situation warns that Pakistan population growth may cause significant implications to its fragile irrigated-agriculture-based economy and food security under the changing climate conditions with centuries old conventional and traditional agricultural practices. It is a need of the hour, to set aside the past of low or no demands of lesser number of populations with the larger resources of both land and water. It is a time to exercise each and every effort/opportunity to improve land and water productivity to meet the ever-increasing demands of food and shelter for the increasing population.

This situation prevails all over the world especially with the developing countries, and more with the countries whom economies depend on the agriculture and related businesses. Many agriculture-based countries face concerns of low crop-water productivity or even irrigation water shortage which could raise food security issue under increasing population. The situation demands to value the irrigation water resources as matter of healthy and happy life for everyone.

Sources of water for agriculture are either direct rainfalls, in the rain fed areas, diversions of water flows from rivers for storage's (reservoirs, dams, ponds etc) and then its use for hydro-power or direct applications to crops under gravity flow or pump-age from low lying areas to uplands. Pakistan agriculture enjoys all types of water resources mainly from the rainfalls, glaciers melt, and reservoirs, and/ or direct diversion of river flows to irrigation system known as Indus Irrigation System. Pakistan is very much vulnerable to climate changes, which has affected its rainfall patterns, rivers flows (floods or droughts) and glaciers melting and finally its cropping patterns, sowing and harvesting etc. The situation has disturbed historic routine of agriculture and even has demanded to change the irrigation water supplies schedules in main canal systems and onwards. Need of the hour is to increase water reserves (reservoirs) , encourage on farm water storage's by rainfall harvesting, encourage groundwater recharge, and contribute for the control of climate change. Under present scenario, there is a dire need to address on farm water losses, and increase farm water productivity by adopting technologies of precision agriculture along with digital platforms. However, no doubt these modern technologies like drip, and sprinklers irrigation's improve water use efficiency but their applications on the farm in

developing countries are nothing more than failures. First of all, farmers cannot afford these technologies for the major crops and moreover they are not trained to make use of these technologies under prevailing facilities on the farm in Pakistan and as well in the developing nations. However, farmers of Pakistan have adopted watercourse lining and field leveling with the ridge and furrow irrigation's especially for corn and cotton. Efforts have been made to introduce raised bed technology, two feet beds with one-foot furrows, which saves irrigation water from 40 to 50 percent in wheat and rice with 20 to 25 % increase in grain yields in comparison with basin flood irrigation and also suit to almost all crops and vegetables. Concluding remarks include recommendations regarding increase of the on-farm storage, introduction of highly water efficient small farming of agriculture like Hydroponics to address water productivity and food shortages.

Keywords: Water resources, irrigation systems.

EFFECTS OF CLIMATE CHANGE ON WATER QUALITY

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Abstract:

The impacts of climate change on water quality of water bodies are associated with the climatic extreme events (heavy rainfall and flood, heat, drought, wildfires, cyclones, super storms) as the major drivers that require knowledge of understanding. The majority of studies discuss how climate change affects drinking water, water quality, and catchment-related water pollution, but less focus has been placed on particular critical water quality metrics, suitable techniques, ecological risks, and management strategies to reduce the effects. This study highlights how climate change affects surface water bodies based on recent research on how climate change affects water quality and encourages workable solutions for better handling these effects. We conclude that consideration of climate change preparedness plan in catchments is the best option to adopt for minimization of climate change impacts on water quality of water bodies.

Keywords: Climate change; water quality impairment, water quality models.

SYNTHESIS AND CHARACTERIZATION OF NEW IONITS FOR DECISION OF THE PROBLEMS PEELINGS SEWAGE

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Abstract

New phosphor containing ionits were synthesized from qua-ternary phosphonium salts and divinilbenzole, qua-ternary phosphonium salts and methyl metacrylate. The co-polymers having an inherent viscosity of 0,34-0,55 dL/g were obtained by the two-phase method using toluene as an organic solvent. The polymers were easily soluble in various organic solvents and had high glass transition temperatures in the range of 220- 260° C. An aromatic groups of a co-polymers having units was also prepared. However, its inherent viscosity was low because of the occurrence of a side reaction.

Keywords: Viscosity, organic solvent

**CHARACTERIZATION AND COMPARISON OF THE TOXIC/
IMMUNOLOGICAL POTENTIAL OF DIFFERENT WHEAT CULTIVARS
FROM TURKEY**

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Abstract

Although wheat is part of the daily diet of millions of people worldwide, α -amylase/trypsin inhibitors (ATIs) are known to be allergenic components for baker's asthma and are arguably responsible for non-celiac wheat sensitization (NCWS). Twenty-one bread wheat samples from selected regions of Turkey with different climates and from different years were collected after harvest. For wheat ATI analyses, different methods were used for characterization and quantification, including proteomics-based methods. ATIs were addressed in these studies. The challenge was to develop a more comprehensive workflow covering all wheat ATI samples analyzed in the UniProt database. Two extraction systems based on chloroform/methanol mixture (CM) and under buffered denaturing conditions were evaluated. Three aspects were optimized, using tryptic digestion, chromatographic separation and targeted tandem mass spectrometric analysis (HPLC-MS/MS) methods.

Keywords: Allergenic components, spectrometric analyses.

STATE OVERSIGHT in ADAPTING TO AND MITIGATING THE CONSEQUENCES of WATER SCARCITY

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Cabinet of Ministers of the Republic of Uzbekistan

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Abstract

Water scarcity has become one of the most pressing global issues of our time. In adapting to this situation and mitigating its negative consequences, state oversight plays a crucial role. Rational use, protection, and distribution of water resources, as well as the introduction of modern technologies and the digitalization of the sector, contribute significantly to increasing the efficiency of water resource management. In managing water, state institutions perform a central role. To fulfill this role effectively, it is essential to first establish a robust legal foundation — that is, to improve the legislative framework. One of the key responsibilities of state oversight is the treatment of water to meet drinking water standards essential for human life and health, ensuring its safe, high-quality, and sustainable delivery and distribution to consumers, along with the monitoring and control of its consumption.

At the same time, it is important to educate the population on water conservation and involve the entire community in this process. During emergencies, measures are taken to ensure fair distribution of water and protect ecological systems. Effective implementation of state oversight helps reduce the negative impacts of water scarcity and supports sustainable development. Moreover, cooperation between the state and the public is considered a decisive factor in the proper management of water resources.

Keywords: Water conservation, protection of ecological systems.

FLOODING: HYDROCLIMATIC PHENOMENA, BIBLIOMETRIC ANALYSIS for FUTURE

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Abstract

Global climate change is affecting the dynamics of snow melt and the amount and pattern of atmospheric precipitation, leading to a change in the frequency and duration of flash floods. The IPCC report notes that by the end of the 21st century, extreme precipitation events will increase by up to 20% globally. Today, the scientific study of flash floods is increasingly using not only hydrological and hydrodynamic models, but also artificial intelligence algorithms. The article aims to identify new trends and research tools in flash floods research using the bibliometric research tool (Biblioshiny). In the work, 264 publications published in 126 sources in the Web of Science database between 2014 and 2024 were selected. The average multi-year growth in research was 44.97 percent. The analysis showed that studies linking the process of flooding with “Climate Change” are being conducted intensively in China, America and Central Europe.

The thematic evolution of research works also showed that “Climate Change” has retained its relevance at all four stages, and in the near future, modeling based on artificial intelligence algorithms, linking flash floods to climate change, will become popular.

Keywords: Bibliometric research, climate change, flash floods, model, precipitation, risk analysis.

WATER PRICE MANAGEMENT UNDER DROUGHT CONDITIONS: A CASE STUDY OF İSTANBUL (1994–2024)

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Abstract

In the context of Adam Smith’s diamond–water paradox, water has traditionally been viewed as a “free good” in liberal economic thought—holding high use value but little or no exchange value. However, this perspective has evolved with the rise of neoliberalism, which increasingly frames water as a “scarce” economic good. This shift has significant implications for water governance, particularly under conditions of water security, which refers to a population’s ability to access sufficient quantities of clean water for essential needs

—such as drinking, sanitation, and food production—while also protecting water resources from overuse, pollution, and risks like floods, droughts, and conflicts. Climate change further exacerbates these challenges by increasing the variability and extremity of weather conditions, leading to supply–demand imbalances. Rising temperatures, rapid urbanization, and population growth add additional stress to water systems, especially in drought-prone areas. This article analyzes how neoliberal ideologies have shaped water pricing policies in İstanbul, Türkiye, from 1994 to 2024. It focuses on the role of price management during periods of drought and examines how water pricing has been used as a tool for addressing water scarcity and ensuring water security in a changing climate.

Keywords: Water price management, drought, climate changes, İstanbul

CASE STUDY SIALKOT BUS STAND SHIFTING TO GOLU PHALA

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Abstract

The current terminal is located on Jail Road Sialkot. It has an area of 27 acres and 1,500+ foot frontage. International Consultants GHK Consultants (United Kingdom) were hired by The Government of Punjab regarding the General Bus Stand. The matter was settled by GHK Consultants, in their report Urban Planning in Sialkot, Punjab Cities Improvement Investment Program, and Sialkot Transport Sector Strategy and Action Plan. The report identifies that the current GBS at Jail Road has sufficient available space, with half of it utilized, and the problem lies not in the lack of land but in the mismanagement of existing resources. The government of Punjab with the assistance of ADB initiated and executed a well thought out program for Sialkot. This program specifically stated that the current GBS will be improved. This was based on ADB expertise. The proposed location is a violation of EPA Guideline and Land Use Plan Sialkot 20232043. EPA Guidelines – The Environmental guidelines issued by EPA KPK specifically for Construction or Expansion of Bus terminals. The guideline states The terminal should be located at least 500 meter from residential areas, schools and hospitals. It also violates another parameter of the Environmental guidelines i.e. Conflict of Existing Land Use, for example locating the bus terminal next to a hospital, school or very near a residential area. The Government of Punjab financed a comprehensive Land Use and Zoning Plan study and selected a high-ranking consultant MM Pakistan for The District Land Use & Zoning Plans District Sialkot 2023-2043. It declared Nasheman Housing Society, Green Villa Society and surrounding area of Goluphala as Residential Area. The Land Use plan also clearly identified relocation area of Bus Terminal in a special zone called the Relocation zone with focus on integrated development. That area is not Nasheman Housing / Goluphala Area. Therefore, neglecting designated area: Relocation to Residential Area is Against the Recommendations of International and National Experts; Conclusions Drawn in an International Hybrid Consultative Process on Shifting of General Bus Stand (GBS) Sialkot adjacent to Nasheman Housing (Goluphala) by International Human Rights Observer (IHRO Having consultative status with UNECOSOC Land Use Plans are Key to Mitigate Climate Change.

Keywords: Climate change, transport strategy.

HUMAN- INDUED IMPACTS ON RIVER HYDROLOGY AND WATERSHED MANAGEMENT IN THE MAHARLOO LAKE BASIN: AN ASSESSMENT OF LAND USE, CLIMATE AND WATER RESOURCE CHANGES

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Abstract

Rivers are dynamic systems that respond to a variety of environmental and anthropogenic factors, with human activities increasingly altering their equilibrium. This study assesses the impact of human-induced changes on river hydrology and watershed dynamics in the Maharloo Lake Basin in southern Iran. The region is characterized by significant land-use changes, including urbanization and agricultural expansion, compounded by dam construction and water diversion for irrigation. Using the SWAT model to simulate hydrological behavior, the study identifies a marked increase in surface runoff (10.61%) and changes in seasonal discharge patterns from 1992 to 2022. The findings reveal that urbanization and agricultural practices have exacerbated flood risks and increased lake salinity, which threatens the local ecosystem. These results underscore the need for an integrated water resource management strategy to mitigate the adverse impacts of human activities on the region's hydrology and ensure long-term environmental sustainability.

Key words: water level, temporal and spatial changes, human activities, Maharlo Lake

EFFICIENT IRRIGATION SYSTEM: PREDICTING SOIL MOISTURE USING MACHINE LEARNING ALGORITHMS

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Abstract

Food is one of the main components for our survival. Without food we cannot imagine our life as it is the main source of our energy. Irrigation is an agricultural process to grow different crops under varying conditions like the seasonal nature of rainfall. Machine learning (ML) based solution are transforming various fields of our lives like transportation, health, education, environment, and agriculture. The fresh water resources, which are already under pressure, are being used extravagantly in many countries. Machine Learning techniques can be used for the optimization of water usage in irrigation processes. This paper presents the application of ML algorithms to optimize the irrigation water usage by predicting the future soil moisture of a field. The data for different parameters like air, temperature, humidity, soil moisture, soil temperature, radiation and the weather forecast data are obtained from internet sources and available sensors. Various Machine Learning algorithms are applied for prediction of soil moisture in coming years. These proposed algorithms and research work could be really beneficial for an optimized and balanced use of water resources in agricultural fields.

Keywords: Rainfall rate, Machine Learning

INDIA'S WATER MANAGEMENT FUTURE: THE GROWING SIGNIFICANCE of IOT AI AND DATA ANALYTICS

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Abstract

Managing its water supplies is a huge task for India, a country with a diversified environment and a growing population. The situation worse by geographical differences, rising demand, and the effects of climate change. Nonetheless, promising solutions catered to India's unique requirements are being made possible by technical breakthroughs. With its powerful tools like satellite imagery and unmanned aerial vehicles (UAVs), remote sensing has become essential. In order to enable preemptive actions, authorities use these technology to monitor watersheds, evaluate the dangers of drought and flooding, and measure critical reservoir levels. These predictions are further enhanced by artificial intelligence (AI) systems, which enable well-informed decision-making to avert water catastrophes. Water systems may now be monitored and controlled in real time thanks to the combination of AI, data analytics, and sensor technology. India's infrastructure is covered by smart sensor networks that provide continuous water distribution and quality monitoring. By facilitating communication between different water management components, the Internet of Things (IoT) maximizes resource allocation and reduces losses. Innovations in membrane technology and energy-efficient procedures have made desalination technology-in particular, seawater conversion-economically feasible. This offers a possible remedy for the freshwater-deficient areas of India. Block chain technology is also encouraging efficiency and transparency in water governance. Pricing, scalability, and technical acceptance in developing countries like India are still issues, though. To overcome this, technology like desalination, smart sensors, remote sensing, and block chain applications must be customized for India's particular situation. Governments, IT companies, and local communities must work together to provide fair access to water resources and successfully complete this revolutionary process.

Keywords: Water management, Remote sensing, Artificial intelligence, IOT, Smart meters, Nanotechnology.

BETHE ANSATZ AND CRYPTOGRAPHY

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Abstract

The work is devoted to the application of the Lieb-Liniger Model of statistical mechanics to ensure complete information security in cryptography. For this purpose, using the Bethe Ansatz form, a complete set of explicit keys for information security is defined. In the author's previous works, a method for applying the method of using these keys to transfer complete security information between two objects using plane waves was developed. In this paper, this method is generalized for the transfer of the entire Bethe Ansatz.

Keywords: Information security, plane waves

MACHINE LEARNING METHODS AND TREND ANALYSIS: GELENDOST EXAMPLE

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Abstract

Water is one of the main sources of life for living things. Although about 75% of our world is covered with water, fresh water resources are very limited. Only 2.5% of the total amount of water on Earth is fresh water, most of which is stored in glaciers and groundwater. Usable freshwater resources include rivers, lakes and a small portion of groundwater. Rapidly growing populations, increasing water consumption, human activities and the impacts of climate change are increasing the pressure on water resources and posing the risk of water scarcity in the future. Therefore, sustainable management of freshwater resources is of great importance. In this study, the flow rate was estimated until 2050 using the data obtained from the flow observation stations in Isparta-Gelendost region. Within the scope of the study, monthly average current velocity, monthly total rainfall and monthly average air temperature data between October 1978 and October 2020 were analyzed. Machine learning models such as Linear Regression, Support Vector Machines, Decision Tree, Random Forest, Extra Trees, Artificial Neural Networks and Wavelet Artificial Neural Networks were applied to make forward-looking forecasts using historical data and the performances of the models were compared. As a result of the analyses, it was determined that Extra Trees, Random Forest and Wavelet-Artificial Neural Networks hybrid models were more successful in predicting the flow rate for 2050 compared to other methods. In addition, Mann-Kendall trend test and Sen's Slope method were applied to determine the temporal trends of flow, precipitation and temperature data. According to the results, while a significant upward trend was detected in air temperature, no significant trend was observed in precipitation. On the other hand, a statistically significant decreasing trend was determined in the flow rate. This situation indicates that water resources in the region may decrease in the future and water management strategies should be reconsidered.

Keywords: Mann-Kendall Test; Sen's Slope, Machine Learning.

AUTOMATION OF WATER SUPPLY AND SEWERAGE ENGINEERING SYSTEM DESIGN

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Abstract

Automation of water supply and sewerage network design has become a key factor in improving the efficiency of the construction industry, especially in developing countries such as Uzbekistan. This article explores the main approaches and software tools used in engineering practice, including AutoCAD, WaterCAD, Epanet, START-PROF, and KOMPAS. The advantages and limitations of using these programs in conditions of limited resources and skilled personnel are analyzed.

Particular attention is given to the challenges of implementing automated design systems in Uzbekistan, including the lack of localization, high license costs, and underdeveloped IT infrastructure. Based on the analysis, the article proposes directions for developing local software that complies with national standards, operates on various devices, and can automatically generate longitudinal profiles of utility networks in a short time. The paper emphasizes the need for a comprehensive approach to digital transformation in engineering design and outlines strategic steps for creating a competitive national software product.

Keywords: design automation, water supply and sewerage engineering systems, software (SW)

FRACTAL ANALYSIS OF GLOBAL FRESH WATER USE

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Abstract:

The overall amount of fresh water extracted in a given year, represented as a percentage of the total amount of renewable water available, is referred to as fresh water withdrawals. Where there is substantial water reuse or extraction from non-renewable aquifers or desalination plants, withdrawals may surpass 100% of the total renewable resource. Fractal statistics and exploratory data analysis were utilized to identify important details on the various nations' global freshwater extractions. According to fractal statistics analysis, the data distribution across areas is exponential, and the effects of water scarcity on nations are fractal. Degradation of the environment, freshwater depletion, and excessive subsurface water extraction are other important problems.

Keywords: withdrawals, fractal statistics analysis, depletion

CONCEPTUAL FRAMEWORK FOR APPLICATION OF PES SCHEMES IN PROVISION OF ENVIRONMENTAL FLOWS IN THE MANAGEMENT OF TRANSBOUNDARY RIVERS

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Abstract

In view of growing concerns of related to ecosystem degradation, it is very important to develop ways that would enable to manage ecosystems in a more sustained way. Environmental flows are very important threshold levels in the protection of river ecosystems. These minimal requirements, which characterize both quantity and quality of the flow have a great role in protecting rivers as an ecosystem, and in providing ecosystem services. Recent studies show that environmental flows can be useful not only in protecting river ecosystems, but also in provision of the multiple use and non-use values that stream flows may provide. In most cases, the environmental flow, which is set as the minimum water demand, often does not take into account the sociocultural values of the river ecosystem. The mentioned problems are more acutely manifested in the management of trans boundary rivers. Environmental flow norms, often applied in the upstream country, do not allow the withdrawal of water for economic purposes downstream, and do not fully take into account the sociocultural values that the river carries in the downstream country. For these reasons, it is very important to strengthen downstream- upstream relations in international rivers and find solutions that are compatible with the goals of both parties. It is believed that PES schemes, which have been successfully applied, can be successful in managing small international rivers flowing through the territory of the two countries.

Keywords: Ecosystem degradation, international rivers flowing.

MATHEMATICAL MODELING of ECOLOGICAL PROCESSES in WATER BODIES

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Abstract

The source of water transportation, water supply, climate regulation are rivers and canals. The ecological state of water resources is determined by the presence of pollutants in them that can spread in them.

To simulate the spread of pollutants, you need to know the concentration, spread rate, and rate of destruction of pollutants. Modeling of ecological water resources is based on mass transfer of matter, in particular diffusion. To ensure the ecological well-being of water bodies, it is necessary to control the quality of water by chemical and bacteriological indicators. The article examines the process of spreading a substance that has fallen into a narrow river or channel in order to determine the time and distance at which the concentration of the substance reaches the permissible value. Mathematical modeling of such a transfer of matter is based on the diffusion equation. There are many methods for solving this equation for one-dimensional problems: the method of separating variables, the method of sources, the operational method, the method of finite integral transformations.

Usually such an equation, in view of its complexity, is solved by numerical methods. This article provides an accurate solution to the complicated differential equation with constant coefficients, which describes the process of one-dimensional diffusion of matter by the recurrent operator method. The obtained solution makes it possible to predict the effect of the propagation speed on the distance of transfer of the substance from the release site, and determine the time at which the concentration of the harmful substance reaches the permissible level.

Keywords: Water pollution, numerical methods.

WATER QUALITY CLASSIFICATION PREDICTION USING MACHINE LEARNING MODELS

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Abstract

Water quality plays a crucial role for humans, animals, plants, industries, and the environment. Over the past decades, contamination and pollution have significantly affected water quality. This study focuses on predicting the Water Quality Classification (WQC). To enhance prediction accuracy, parameter optimization and tuning-techniques are applied to various machine learning models, leveraging these methods to effectively forecast WQC. Grid search is an essential technique for optimizing and fine tuning parameters in classification models. Extreme Gradient Boosting (Xgboost) model, Gradient Boosting (GB) model, and Adaptive Boosting (AdaBoost) model are used as classification models for predicting WQC. To examine the efficacy of the classification approaches, five assessment metrics were computed: accuracy, recall, precision, Matthews's Correlation Coefficient (MCC), and F1 score.

Keywords: Water Quality Classification (WQC), Machine Learning Models (ML Models), Extreme Gradient Boosting (Xgboost) model, Gradient Boosting (GB) model, and Adaptive Boosting (AdaBoost).

BIBLIOMETRIC ANALYSIS OF ARTIFICIAL NEURAL NETWORKS ON OPEN CHANNEL HYDRAULIC

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Abstract

An open channel is a flow system in which the top surface of the fluid is exposed to the atmosphere. The term open channel refers to liquid flow that is not completely enclosed by solid boundaries (such as in a river). In open channel flow, the flowing liquid has a free surface, and thus the liquid is not under gauge pressure at the surface. Open channel is takes place due to slope of bed of the channel only. Over the last decades, much research effort has been devoted to water flow control of open channel conveyance systems such as irrigation channels. A at number of regulatory procedures have been proposed.

Keywords: Open channels, water flow control

CHEMICAL COMPOSITION AND CONSUMER PROPERTIES OF NATURAL HONEY: IDENTIFICATION EXAMINATION AND CLASSIFICATION

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Abstract

For the export of manufactured products, it is necessary to take into account its classification according to the commodity nomenclature. The classification code of goods in accordance with the commodity nomenclature of foreign economic activity is one of the most common tools used by participants in foreign economic activity to minimize costs and expenses. This code, related to the information to be indicated in column 33 of the cargo customs declaration for goods, is of great importance, since it determines the amount of import (export) customs duty. In addition, in the lists of goods approved at the legislative level, in respect of which prohibitions and restrictions are established or tax benefits and exemptions are determined, the goods are determined exclusively by the CNFEA code, and the name of the goods is given only for ease of use. The use of some lists involves the use of both the product code and its name. CNFEA codes are also used when maintaining customs statistics.

Keywords: Economic analyses, minimizing costs.

STUDY OF PHYSICAL AND CHEMICAL PROPERTIES OF NATURAL HONEY FOR IMPROVEMENT OF CONFORMITY ASSESSMENT PROCEDURE

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Abstract

An analysis of the physical and chemical indicators of natural honey, determined by modern methods, and considers the indicators for improving the procedure of conformity assessment were presented in this article. Natural bee honey is known to be one of the main suppliers of biologically active substances. Recent discoveries in biology, chemistry, medicine, and commodity science suggest that the study of beekeeping products is far from completion. However, consumers today face several issues in the natural honey market. Therefore, a systematic and comprehensive approach is necessary to address the problems and improve the quality of this important product. The study focuses on the physical and chemical indicators of honey, which can determine its authenticity and naturalness. Honey is a valuable natural product that is susceptible to falsification, making the development of accurate regulatory documentation for its certification crucial. This work aims to investigate the physical and chemical indicators of natural honey to enhance the conformity assessment procedure. The aim of this work was to develop a complex testing programme for natural honey using HPLC and JR spectroscopy methods. The research results were analyzed and generalized to create the programme. The State Institution 'Uzbek Centre for Scientific Testing and Quality Control' and, (ts regional branches have implemented this programme for certification purposes.

Keywords: Testing program, natural honey

RESEARCH OF DIFFERENT LOCAL SANDS AS LOADING FOR WATER FILTERS

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Abstract

This article covers the research of primary experiments on finding ways to clean wastewater generated in modern industrial enterprises and a number of other production and service sectors with the help of cheap and effective local raw materials, efficient use of water resources, cleaning and preparing polluted water for reuse. Considering that the efficiency of settling tanks used in wastewater treatment is 40-70%, filters are used to more reliably clean the water coming out of it. Typically, the cleaning efficiency of sand filters is 95-99%. In the experiments, local desert red sands, which are widespread in the Kyzylkum regions, and black sands from the banks of rivers were selected for filtering wastewater. In order to bring the efficiency of the selected filter loads to the required level, the layer thickness of the filter loads and the losses in them were calculated, and the properties of the two types of sand were compared. Based on experiments, recommendations have been made on which sand to use and how to use it to clean polluted water.

Keywords: wastewater treatment, settling tanks, filter loads

METEOROLOGY MEETS HYDROLOGY: CLIMATE CHANGE IMPACTS ON WATER SECURITY

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Abstract:

The growing intersection of meteorology and hydrology is critical in understanding how climate change is reshaping global water security. This study explores the dynamic links between atmospheric changes and hydrological responses. It emphasizes the role of altered precipitation patterns, temperature extremes, and evapotranspiration in driving water stress. Using a combination of reanalysis datasets, and recent research, including regional case studies, this talk highlights key trends in drought frequency, flood risks, and shifting water availability. By integrating meteorological science with hydro-logical insights, we aim to identify sustainable water management strategies that enhance resilience in the face of a changing climate.

Keywords: Climate changing, sustainable water management

SAVING WATER IS ONE OF THE WAYS TO CONSERVE ENERGY RESOURCES

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Abstract

This article covers the research of primary experiments on finding ways to clean wastewater generated in modern industrial

Services of the Republic of Uzbekistan dated August 22, 2024 No. 01/2-59 “On approval of urban planning norms and rules No. 2.04.01-22 “Internal water supply and sanitation of buildings” in the updated version, registered by the Ministry of Justice of the Republic of Uzbekistan on October 2, 2024 under No. 299, the basic rules were revised. The main directions for improving the energy efficiency of water supply systems are listed. Various options for reducing drinking water consumption are described, including the most common technical measures. Useful tips on saving water at home are given.

Keywords: Energy efficiency, water consumption

HYDROVISION 360: ADVANCING WATER SECTOR PROJECT APPRAISAL AMID CLIMATE CHANGE WITH WEB-BASED INTEGRATION OF CLIMATE CATASTROPHE SERVICES

(CLICAT)

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Abstract

Effective planning and monitoring of water sector projects have become increasingly challenging due to the uncertainties posed by climate change. To address these challenges, Hydro Vision 360, a GIS-based the web application, developed under the supervision of the Member (Infrastructure) by the Sector Specialist (Water), supports water resources projects and sectoral initiatives in Pakistan. It integrates advanced geospatial visualization, real-time project monitoring, and climate vulnerability assessment, empowering policymakers and stakeholders with data-driven insights.

Additionally, the Climate Catastrophe (CliCat) Web GIS application enhances this framework by incorporating regional climate change model predictions, enabling proactive risk assessment for infrastructure projects. HydroVision 360 provides a comprehensive approach to project appraisal by integrating satellite imagery, GIS layers, and project design overlays to facilitate site assessment and feasibility analysis. Decision-makers can compare proposed infrastructure plans with existing on-ground conditions to ensure project viability before execution. The system also assists in risk identification by evaluating environmental, hydrological, and structural vulnerabilities through GIS-based analysis. By leveraging interactive infographics and key performance indicators (KPIs), stakeholders can assess project outcomes, costs, and potential risks, ensuring a robust appraisal mechanism. In addition to appraisal, Hydro Vision 360 plays a crucial role in project monitoring, enabling real-time tracking of construction progress by overlaying satellite imagery and GIS data with original project designs. This capability allows for change detection analysis, helping identify deviations from approved plans, reducing cost overruns, and mitigating delays. The performance evaluation module provides insights into key metrics through infographic dashboards, supporting informed decision-making. Moreover, Hydro Vision 360 fosters transparency and accountability by making project data accessible to relevant stakeholders, ensuring efficient resource allocation. The integration of Cli Cat significantly enhances Hydro Vision 360's analytical capabilities. Cli Cat is a web-based GIS platform specifically designed to analyze project areas under climate change vulnerability by utilizing regional climate model (RCM) predictions. This tool assesses potential climate-induced hazards such as flooding, drought, temperature extremes, and shifting precipitation

patterns, enabling decision-makers to integrate climate resilience strategies into project planning. By combining historical climate data with future climate projections, Cli Cat provides a comprehensive risk assessment framework, ensuring that infrastructure investments remain resilient in the face of climate uncertainties. Together, Hydro Vision 360 and Cli Cat form a holistic decision-support ecosystem for the water sector and broader infrastructure projects. This integration empowers stakeholders, policymakers, and engineers to adopt a proactive, data-driven approach to project management. By embedding GIS-based visualization, climate risk modeling, and real-time progress tracking, these platforms ensure that project are scientifically appraised, efficiently monitored, and climate-resilient. In conclusion, HydroVision 360, augmented by CliCat, represents a paradigm shift in water sector project planning and monitoring. By leveraging geospatial intelligence, climate risk analytics, and data visualization, these tools enable better-informed decision-making, optimized resource utilization, and enhanced project success rates. This integrated approach is crucial for sustainable water resource management, ensuring that infrastructure projects can withstand future climate challenges while promoting long term economic and environmental sustainability.

Key Words: GIS-based Decision Support, Water Sector Appraisal, Climate Change Vulnerability, Project Monitoring, HydroVision 360, CliCat Web GIS, Geospatial Analysis, Risk Assessment, Climate Resilience, Real-Time Data Visualization

MACHINE LEARNING METHODS FOR WEATHER RESEARCH AND FORECASTING (WRF) MODEL TURBULENCE FORECASTING AT ISTANBUL AIRPORT

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Abstract

This study aims to analyze atmospheric turbulence characteristics around Istanbul Airport using high resolution numerical modeling and machine learning-assisted methods. The WRF-ARW (Weather Research and Forecasting – Advanced Research WRF) model was configured with two nested domains at 900 m and 300 m horizontal resolutions. Turbulence parameters, including Turbulent Kinetic Energy (TKE), Brunt–Väisälä Frequency (N^2), Panofsky Index (PI), and Richardson Number (Ri), were calculated to assess the temporal and vertical variability of atmospheric turbulence. The model simulations were initialized and forced with Global Forecast System (GFS) analysis data. Physical parameterizations included the New Thompson micro-physics scheme, the RRTMG radiation schemes, the MYJ planetary boundary layer scheme, and the Noah land surface model. To improve the model output accuracy, machine learning models such as Random Forest (RF) and LightGBM (LGBM) were applied. Key input features for these models included 10-meter wind speed (WS10), 2-meter temperature (T2), potential temperature (θ), water vapor mixing ratio (QVAPOR), and surface pressure (PSFC). Model performance was evaluated using Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and the coefficient of determination (R^2). The results demonstrated that machine learning approaches significantly enhanced the predictive accuracy for wind speed and temperature compared to the raw WRF outputs. Overall, this study highlights that integrating high resolution numerical weather prediction with machine learning-based statistical corrections offers a promising approach for operational airport forecasting and turbulence risk assessment.

Keywords: Atmospheric Turbulence, WRF, Machine Learning, XGBoost, Numerical Weather Prediction

ANALYSIS OF DEPRESSION AND ANXIETY IN WOMEN USING MACHINE LEARNING APPROACHES

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Abstract

In developing nations, major disabilities are largely attributed to anxiety and depression. According to a study by the World Health Organization (WHO) on anxiety disorders in the South East Region, India ranked highest, with women undergoing twice the level of distress compared to men. To tackle these issues effectively, we have developed a model that employs machine learning algorithms alongside standard psychological evaluations to identify different stages of these mental disorders, as early intervention is more cost-effective and successful than delayed treatment. Our proposed model has identified three distinct AI techniques that show promise when applied to datasets for both anxiety and depression: our CNN-based model outperforms the others when evaluating various metrics such as accuracy, recall, and precision. Specifically, it exceeds the performance of current algorithms, achieving 96% accuracy for anxiety and 96.8% accuracy for depression. Furthermore, our study indicates that 7.4% of urban women aged 18 to 35 suffer from severe anxiety, while 15.6% endure chronic depression.

Keywords: Machine learning, CNN, depression, anxiety, linear regression

EFFECTS OF CLIMATE CHANGE ON WATER QUALITY

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Abstract

The impacts of climate change on water quality of water bodies are associated with the climatic extreme events (heavy rainfall and flood, heat, drought, wildfires, cyclones, super storms) as the major drivers that require knowledge of understanding. The majority of studies discuss how climate change affects drinking water, water quality, and catchment-related water pollution, but less focus has been placed on particular critical water quality metrics, suitable techniques, ecological risks, and management strategies to reduce the effects. This study highlights how climate change affects surface water bodies based on recent research on how climate change affects water quality and encourages workable solutions for better handling these effects. We conclude that consideration of climate change preparedness plan in catchments is the best option to adopt for minimization of climate change impacts on water quality of water bodies.

Key words: Climate change; water quality impairment, water quality models

UTILISING THE ROUGH SET-SVM MODEL FOR WATER QUALITY ASSESSMENT

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Abstract

Excessive factors in assessing water quality will affect the evaluation's outcome. First, using rough set theory, the study reduces influence factors and extracts important factors. The safe class that the water quality evaluation falls into is then determined by regression analysis based on support vector machines, which is a small sample method. Ultimately, a demonstration analysis result that aligns with practice is obtained. The study also examines the efficacy of the combined model and fuzzy comprehensive evaluation, concluding that the rough set-SVM model is an exploratory approach to water quality assessment with a greater identification accuracy and consistency with practice.

Keywords: Rough Set theory; SVM, water quality; evaluation

GLACIER DYNAMICS ASSESSMENT RELATED TO CLIMATE CHANGE IMPACTS ON HONZ SUB-BASIN PAKISTAN

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Abstract

The present research involves using GIS techniques and remote sensing to obtain baseline information on the Hunza Basin's glaciers because conducting field surveys is challenging in this region due to the range of terrain associated with these glaciers plus the absence of in-situ data. Finding the mass balance of these glaciers, examining their connection to climate variability, and evaluating glacier velocity variation utilizing sophisticated geo-spatial techniques such as the co- registration and correlation (COSI-CORR) of optically sensed satellite images had been the specific goals of the study.

The glaciers were mapped using multispectral data from MODIS, Landsat-8, and Sentinel-2 from 2013 to 2020. The research findings indicate that while a glacier's speed diminishes at its terminus, it increases with altitude. Furthermore, the tributary glaciers make a substantial contribution to the mainstream glacier velocity, which rises toward the terminus, according to spatial patterns of glacier surface ice velocity. The different ice velocities were then analyzed by glacier's orientation, altitude, size and debris cover. To address the effects of global warming and climate change, this study aids understanding on how glaciers behave in response to changing climates and the water resources. It also suggests consistent tracking of the dynamics of the glaciers.

Key Words: Climate Change, GIS/RS, Hydro-logical Assessment.

POTENTIAL PALDSTANI HILL TORRENTS: A SYSTEMATIC APPROACH TO FLASH FLOOD WATER ASSESSMENT AND MANAGEMENT OF MONSOONAL WATER

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Abstract

Rainfall patterns in the mountain catchments of the DG Khan hill torrents are examined in this research. Two climatic zones (CZ) are monitored for their unforeseeable, monsoon-oriented rainfall patterns: CZ-1 (1960-1990) and CZ-2 (1991-2020). The Mann-Kendall statistical method used to detect the patterns of fluctuation in precipitation. Also, using the PCSWMM for evaluation of flash flood response from 2015 to 2020, while integrating GIS/RS to predict torrent catchment parameters. The relation-based dam suitability analysis (RDSA) technique for rainwater harvesting is suggested as a mean of managing flash floods by determining the best dam/storage locations. According to the results, 55-60% of the yearly rainfall hits during the monsoon months from June to August. Although 39% of the data appear random, the CZ-2 indicates a general rise in the monsoon, and the Mann-Kendall test reveals a 95% confidence level for a rising June rainfall trend. Rainfall runoff investigation demonstrates that flash flood peak assessment is highly accurate. Ten appropriate rainwater harvesting sites are identified using the RDSA approach. Results suggest that Punjab's cropping patterns could be unproved by proper management of the flash flood water.

Key Words: Hill Torrents, Rainfall Patterns, Water Management.

IMPROVEMENT OF METHODS FOR INCREASING THE EFFICIENCY OF PUMPS FOR TRANSMITTING MINING WASTE WATER

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Abstract

The article presents research on improving the efficiency of pumping units that transport wastewater generated during ore processing and beautification in the mining industry. During the study, the chemical composition of the wastewater was analyzed using fundamental parameter methods (Scatter FP) on a NEXCG analyzer from Rigaku Technologies (USA), revealing that it consists of 25 elements. The impact of wastewater on pumping equipment was determined, and a composite modifier composition was developed to reduce the viscosity of wastewater, thereby increasing the pump's effective power. The organic substances used are local and secondary raw materials, namely gossypol resin, carboxymethyl cellulose (CMC), and secondary adsorbents (Alkanolamines) produced from natural gas processing. The modifier was prepared by combining these substances in proportions of 5%, 2%, and 93%, respectively. The optimal amount of this modifier was determined through experimental studies and found to be 80 g/t. As a result of using the modifier, both the efficiency and useful power of the pump increased. Consequently, it was determined that the energy consumption of the pumping station could potentially be reduced by 31.86% across four pumping units.

Keywords: Energy consumption, modifier

ROLE OF NGOs IN PROMOTING CLIMATE-FRIENDLY PRACTICES AND AWARENESS IN DEVELOPING COUNTRIES: A COMPARATIVE APPROACH

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Abstract

Non-Governmental Organizations (NGOs) have become instrumental in addressing climate change challenges, especially in developing countries that often lack adequate resources and institutional capacity. This review explores the multifaceted roles NGOs play in promoting climate-friendly practices and environmental awareness in developing nations, with a focus on Pakistan, other Asian developing countries such as Bangladesh and Nepal, and selected European developing countries like Albania and Moldova. Drawing from recent scholarly literature and field-based evaluations, the paper highlights key challenges faced by NGOs, including financial constraints, political resistance, limited public engagement, and the growing pressure of climate change on water resource management. Strategies devised to overcome these barriers-such as grassroots mobilization, policy advocacy, education campaigns, and partnerships with local governments-are critically examined. The review concludes by discussing the importance of institutional support, sustainable funding, and community-led implementation to ensure the long-term success of NGO-led climate initiatives for a sustainable future.

Keywords: Climate change, sustainability

FILM-HOLE IRRIGATION: A TOOL FOR SUSTAINABLE WATER MANAGEMENT IN WATER STRESSED CLIMATE

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Abstract

Proactive approaches are crucial to increasing the resilience to drought for people, ecosystems and societies. In developing countries, food security should be at the core of national drought policies and a strong driving force for drought preparedness at all levels. In the coming decades, drought is projected to increase in severity, frequency, duration and spatial extent, at the same time as the world's land areas are expected to become drier overall due to lesser availability of water. This will have severe consequences for people in poor countries and particularly in rural areas with arid and semi-arid lands for survival on this globe. To meet such circumstances in least water available areas, many modern approaches are applied for sustainable application of water for crop produce. Among others, one of them is Film-hole Irrigation. Film-hole Irrigation is relatively new irrigation method that refers to the bordered field completely covered with plastic film having holes of equal sizes. The main benefit associated with Film-hole irrigation is the reduction in water losses due to minimum evaporation from the field. Its advantages over other surface irrigation methods are faster water advance, water saving and increased crop yield. Present study was an attempt to experience Film-hole irrigation (FHI) on bordered field completely covered with plastic sheet having holes of equal sizes through which crop seedlings come out. Field experiments were conducted at Postgraduate Agriculture Research Station (PARS), Faisalabad, Pakistan to check its effectiveness in terms of water saving for wheat crop yield on various sized borders having Fine Sandy Loam soil. Irrigation water was applied with an average discharge of 19 lps and field data was collected from each plot during 1st, 2nd and 3rd irrigation's for the growing season. Results of this study revealed that advance time taken in Film-hole irrigation method in completing the advance phase was comparatively less as compared with the conventional irrigation. Averaged water saving from 9 to 23% was observed with Film-hole irrigation method and the yield of wheat crop was 23 to 30% higher as compared to conventional irrigation method. A reduction in soil salinity level was noted in Film-hole irrigated plots that add up to its benefits in another dimension for sustainability in irrigated environment.

Keywords: Climate change, sustainability, irrigation

A REVIEW ON URBAN FLOOD

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Abstract

As a result of climate change, urban areas in particular are becoming increasingly vulnerable to floods, which can cause devastating effects in terms of both life and property loss. Therefore, it is essential to correctly assess urban flood processes in threatened areas and develop pre- disaster recovery strategies. With global climate change; adverse effects such as excessive precipitation, environmental pollution, coastal floods and heat waves are experienced more frequently. It is estimated that imbalances in global climate change, together with urbanization and land use change, will cause even more severe floods and damage in urban areas in the near future. Rapid and unconscious urbanization increases urban flood risks. Urban floods also cause epidemics, contamination of drinking water and damage to the ecosystem. Different methods and urban flood risk warning methods should be used to reduce flood risk in urban areas.

In this study, we have reviewed some research articles on urban flood risk It is neither practical nor economically possible to completely save urban areas from floods, and it is important to take serious measures to reduce their damage. In addition, institutions working on the subject should always be aware of the need to develop “integrated” flood management plans and strategies to minimize flood hazards and increase flood resilience. This study is expected to assist in related research and raise awareness on the subject.

Keywords: Urban flood, climate change, environment.

FINAL DECLARATION

2nd.International Hybrid Conference ‘‘Role of Climate Change on Water Resources Management for a Sustainable Future (ICCW2025) ‘’ was organized by Tashkent state Logistic University and Istanbul Aydın University in Tashkent on 22-23 May, 2025. Water scarcity has incrementally exacerbated in many parts of the world due to climate changes compounded by population growth, over exploitation of freshwater resources, and a lack of proper management. This upsurge has sparked worldwide interest in understanding the potential impacts of climate change on water resources. Climate change is often entwined with alterations in both water quantity and quality, aggravating the fast growing water crisis. In envisioning a sustainable future, the capability of adapting to climate change and ensuring the sustainable management of water resources and urban planning, reflecting the urgent need for resilience and responsible stewardship in a world where water scarcity and unpredictability are increasingly prevalent are among the important aspects to consider. Investments in resilient infrastructure, such as flood defenses and improved irrigation systems, are essential to cope with changing climate conditions. Utilizing advanced technology for data collection, analysis, and modeling can help anticipate and respond to challenges related to water resources. Governments and regulatory bodies need to develop and enforce policies that ensure equitable access to water resources and sustainable management practices. Collaborative approaches to water management, including the sharing of water resources across regions and countries, can enhance resilience in the face of changing climate patterns. Furthermore, precise definitions of regional and global action plan for climate change need to be considered. The ICCW2025 conference aims to be a step towards bringing together scientists, planners, practitioners, and researchers to discuss recent issues and those expected to emerge in the future before the problems become too perplexing to solve for a sustainable future on this globe. The next conference will be held in Riphah International University in Islamabad (Pakistan) in 2026. Following table shows some numbers on papers and authors.

Table- Details on Conference Papers

COUNTRY	No of Authors
Azerbaijan	1
Germany	4
India	9
Iran	1
Italy	6
Pakistan	29
Türkiye	11
Russia	1
USA	1
Uzbekistan	26



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