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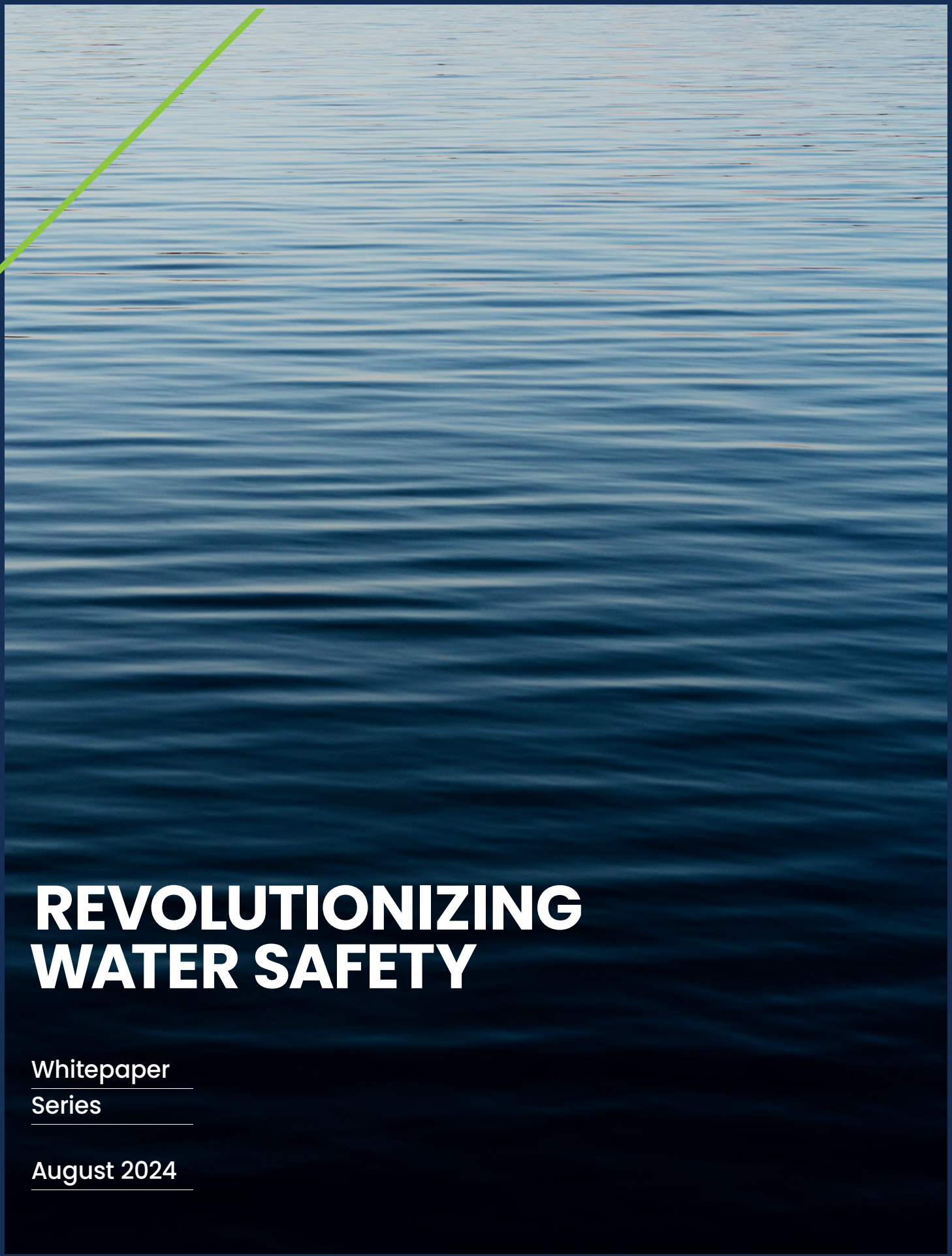

REVOLUTIONIZING WATER SAFETY

Whitepaper Series

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REVOLUTIONIZING WATER SAFETY

POOR WATER AND SANITATION CONDITIONS ARE A global challenge of the 21st century. Emerging economies face an insidious threat, as their healthcare systems are regularly overwhelmed with unforeseen outbreaks, of which 80% are waterborne, from one of the leading causes of water-related diseases. The bacterial species, Vibrio cholerae and enteropathogenic Escherichia coli (EPEC), are among the main pathogens causing diarrheal diseases, which are associated with high mortality rates.

Bangladesh is well known to be one of the countries most imperiled by the climate crisis. In 2000, WHO stated Bangladesh was part of the biggest mass poisoning in human history, due to arsenic contamination that infiltrated 49% of the country's groundwater from which 97% of the 200 million population still drink. In 2022, a cholera outbreak began in Bangladesh and the icddr,b hospital in Dhaka treated more than 1,300 patients. This could easily have been prevented with effective surveillance at source.

Born out of a generational challenge, Hydroquo+ was founded in 2019 and has worked tirelessly to transform the water industry, with the goal of making water safer and sustainable for today and for future generations. Hydroquo+ has automated mission-critical testing and monitoring processes that were traditionally manual, slow and expensive. It has addressed these issues by developing an innovative solution that delivers a vertically integrated water quality and monitoring platform with intelligent hardware and software expertise. Real-time testing and monitoring addresses both water efficiency (leak detection and usage) and water quality (safety and composition), increasing overall water availability through the power of actionable and predictive water intelligence on a global scale.

A recent R&D effort with OEM partners based in Slovenia, Microbium has led to a breakthrough innovation in rapid testing of microbial presence. The Microbiological Alert Sensor (AMAS) is an automatic and remotely controlled microbiology sensor for field Coliform (C) and Escherichia Coli (E. coli) quantification at remote or difficult- to-access sites. Information about the microbiological water quality at any site equipped with an AMAS system is made available rapidly, enabling effective management of crisis situations, as well as routine management of drinking water, recreational aquatic or aquaculture sites, or general-purpose environmental monitoring. The AMAS makes it easier to keep watch on water quality and keep people safe from waterborne diseases.

THE AUTONOMOUS MICROBIOLOGICAL ALERT SENSOR: METHODOLOGY

The Autonomous Microbiological Alert Sensor (AMAS) can measure all by itself how much E.coli and coliform bacteria is in water. It does everything automatically - taking the water sample, preparing it, keeping it warm to allow bacteria to grow, using light to detect the bacteria, and sending the information to people. From start to finish, the entire process happens right →

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ABOUT THE AUTHOR

ZAHIN ROHAN RAZEEN is Founder & CEO of Hydroquo+, a Forbes 30u30, MIT Technology Review Innovator U35 Honouree, serving as Nobel Laureate Yunus Fellow and United Nations Secretary General's SDG Envoy. Hydroquo+ is a data company that helps the world's largest national agencies, public and private organizations in solving water, energy and infrastructure challenges. Hydroquo+ deploys advanced information and communications technologies built on a scientific foundation, combining sensor technologies, seamless software and innovative analytics to build and set up systems that make the world a safer, healthier, more sustainable and more resilient place.

→ at the water source location without any humans involved. Depending on how contaminated the water is, the AMAS can give results within 2 to 14 hours for fresh water sources. Because all the testing occurs at the site itself, there is no delay from transporting samples to a lab. Information about unsafe water levels can be had very quickly, so action can be taken right away.

FIELD OPERATION FOR DEVELOPING WATER QUALITY INDEX

Hydroquo+ took a PPP approach, involving the Water Resource Planning Organization, the Ministry of Water Resource and the Government of Bangladesh.

Rapid urbanization has been a consequence of industrial growth in Bangladesh, leading Dhaka, the capital and center of trade and business, to become one of the least livable places in the world. Dhaka, home to more than 20 million people and one of the world's most densely populated megacities, remains at the bottom in terms of livable cities. It has grown along the rivers Buriganga, Turag, Balu and Shitalakshya for the past 400 years. The unplanned development and much of its urbanization are linked to its industrial development, which over time has resulted in the decreased water quality of the rivers.

TRACKING CHANGES IN WATER QUALITY OVER TIME IN DIFFERENT AREAS

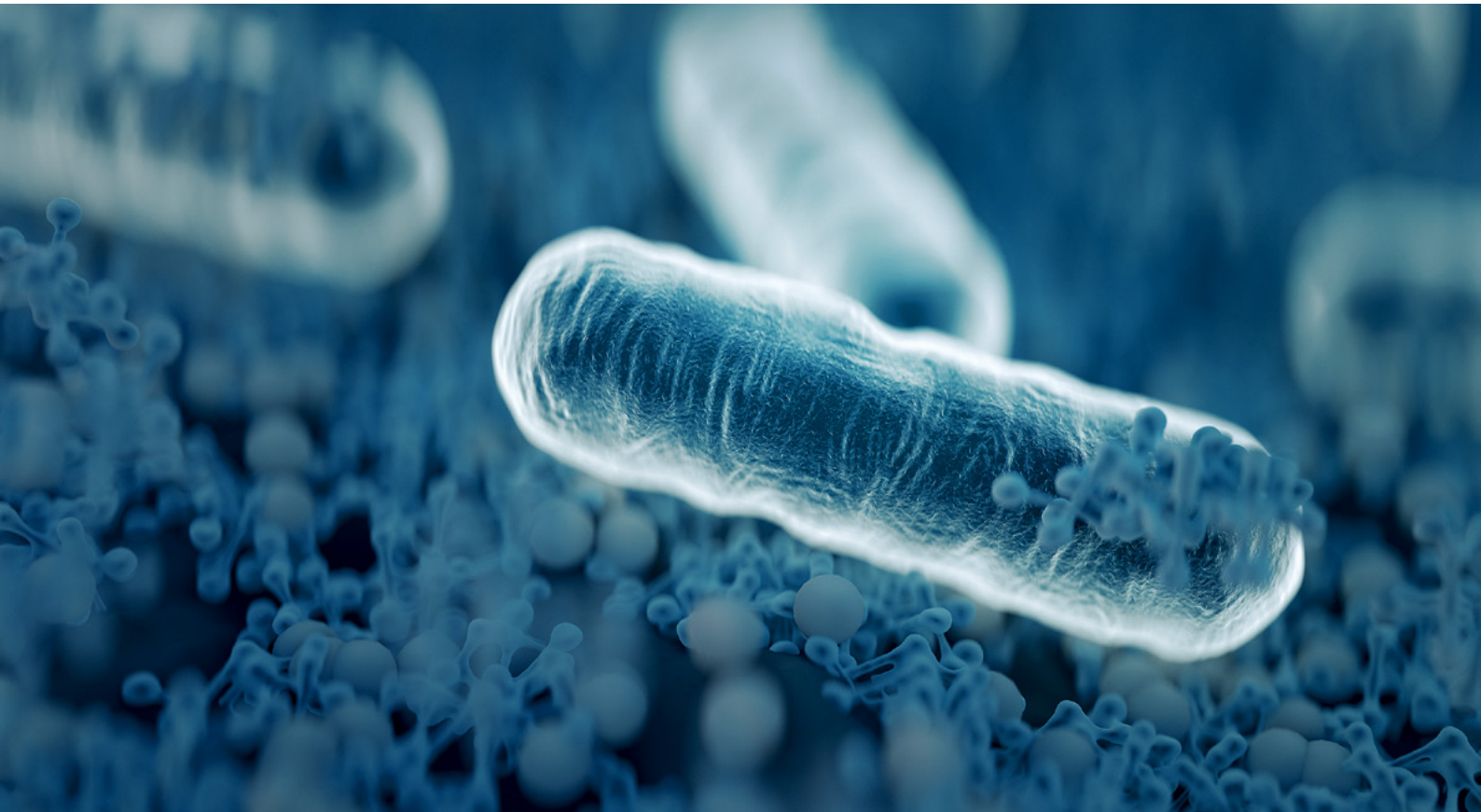
The Water Quality Index (WQI) is a score that combines the effects of many different factors impacting water quality. There are several methods to calculate the WQI, such as the National Sanitation Foundation WQI, Oregon WQI, Weighted Arithmetic WQI and Canadian Council of Ministers WQI. Hydroquo+ planned to calculate the WQI using the most critical parameters identified through analysis. Based on their research, they proposed a modified way of expressing the WQI calculation specifically for the rivers in Bangladesh. This modified WQI method would make the calculations quicker, consistent and more objective. It would also allow tracking changes in water quality over time in different areas. The goal was to develop a WQI tailored for Bangladeshi rivers that provides a standardized, reproducible way to evaluate water quality status.

WORLD INNOVATION IN MICROBIOLOGY SYSTEMS

The Autonomous Microbiological Alert Sensor System deployed in this project acts as a world innovation in microbiology systems and allows for field-quantification of bacterial contamination, enabling a faster response than what is currently possible using standard laboratory techniques (with the possible exception of some PCR-based analyses). Major contaminations can be detected in a couple of hours.

AMAS systems can be used for either routine monitoring of sites or to perform contamination monitoring during singular events such as outbreaks in distribution networks, storms and accidents resulting in sewage pollution. These characteristics make the system uniquely versatile and user-friendly, acting as an immediate tool for combating waterborne outbreaks.

Hydroquo+ has been financially supported by the Ministry of Water Resources, the Water Resource Planning Organization, the Government of Bangladesh, and the Bangladesh University of Engineering and Technology.



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ABOUT FII INSTITUTE

FUTURE INVESTMENT INITIATIVE (FII) INSTITUTE IS a global non-profit foundation with an investment arm and one agenda: Impact on Humanity. Global, inclusive, and driven by data, we foster great minds from around the world and turn ideas into tangible solutions and actions in four critical areas: Artificial Intelligence (AI) and Robotics, Education, Healthcare and Sustainability. We are in the right place at the right time, when decision-makers, investors and an engaged generation of youth come together in aspiration, energized and ready for change.

We harness that energy into three pillars: THINK, XCHANGE, ACT. Our THINK pillar empowers the world's brightest minds to identify technological solutions to the most pressing issues facing humanity. Our XCHANGE pillar builds inclusive platforms for international dialogue, knowledge-sharing and partnership. Our ACT pillar curates and invests directly in the technologies of the future to secure sustainable real-world solutions. Join us to own, cocreate and actualize a brighter, more sustainable future for humanity.

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