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UNESCO International Scientific Symposium

Scientific, Technological and Policy Innovations for Improved Water Quality Monitoring in the Post-2015 SDGs Framework

Hosted by Kyoto University

Kyoto – Otsu, Japan
15-18 July 2015

Concept Note – Call for Contributions

Background

Water quality degradation is becoming an increasingly acute problem in many parts of the world and is causing serious human health risk as well as environmental degradation. Water-borne diseases due to polluted water resources are an important cause of child and maternal morbidity in developing countries. According to the World Health Organization, more than 3.4 million people die every year as a result of water-related diseases, making it more than people dying from all forms of violence, including war. Environmental impacts of water quality deterioration go far beyond the widespread degradation of freshwater ecosystems, loss of biodiversity and reduced ecosystem goods and services. In most of the Lakes & Reservoirs eutrophication becomes one of the most widespread water quality issues leading lack of fish production and plants essential for feeding human populations. Water quality deterioration is causing also significant economic costs associated with the loss of fisheries, aquaculture or tourism. In some parts of the world, the increasing pollution of surface and ground water resources has become a key issue limiting the availability of water resources for different uses.

The continuing degradation of water quality across the world by the discharge of high loads of pollutants in wastewater with insufficient or without treatment, intensive use of fertilizers and pesticides, inappropriate solid waste management and land use changes calls for an urgent attention. Moreover, new and emerging pollutants are arising from the development and growing use of pharmaceuticals, personal care products and other dangerous chemicals, threatening water quality and requiring the development of new tools and technologies to effectively monitor them in water resources and assess the associated potential human health and environmental risks.

Water quality monitoring is a fundamental tool in management of freshwater resources as identifying a water quality problem in receiving waters is often the first step in the designing, planning and implementation of water management strategies and programmes. Effective water quality monitoring provides essential information characterizing physical, chemical and/or biological status of water resources, determining trends and changes over time, and identifying emerging water quality issues. Water quality monitoring and assessment also provides important information and the means to identify policies and measures to enhance water quality, reduce and control water pollution from specific sources, evaluate the efficacy of pollution control and regulation policies and their implementation, support decision-making and investment prioritization, and deal with water quality emergencies during floods and spills. Information that water quality monitoring brings help to build assessments improving pollution control management. Additionally, water quality monitoring accompanied with hydrological monitoring produces useful information not only for those objectives relating to water quality improvement, but also for an integrated water quality-quantity management. Therefore it is important that water quality issues should be understood in the framework of hydrological processes based on the water quality and hydrological monitoring.

However, water quality monitoring is poorly implemented in developing countries due to lack of appropriate instruments, financial resources, and technical capacities. Water quality monitoring programs in development countries are mainly based on ineffective traditional approaches, both in terms of methodology and institutional, and are jeopardized by lack of scientific knowledge and technical skills. As a result, water quality data are scarce, unreliable and unsystematic which are not useful for the use to support decision-making and investment prioritization. Water quality monitoring is also becoming a complex issue due to new water quality challenges. Although a large number of parameters can be measured, most of the time it is not possible to assess all of them due to technical and cost constraints. Assessing a wide range of contaminants in water and wastewater requires a sound scientific understanding of the interactions between the different parameters and an interdisciplinary knowledge. This issue is more challenging with new and emerging pollutants.

Consequently, water quality monitoring needs an urgent attention both in developed and developing countries. Sharing and dissemination of scientific knowledge and advanced technologies and building both human and scientific/technical capacities are needed to improve water quality monitoring to effectively deal with the complexity of monitoring a large number of water quality parameters, including new and emerging pollutants. The development of new scientific, technologic and policy tools will enhance water quality monitoring and provide a good basis for decision-making. Water quality monitoring needs to be better integrated, standardized and improved to provide reliable data and information. New and advanced water quality monitoring techniques using innovative technologies will produce reliable, accurate, continuous and systematic data on the quality of water resources, which are necessary for sound decision-making and the design, plan and implementation of effective pollution control measures. Improved mechanisms for sharing and reporting of water quality data are vital for sustainable management and use of water resources. In addition, water quality monitoring needs to incorporate efforts on raising awareness at all levels to better communicate water quality information and involve all relevant stakeholders, including the appropriate use of citizen monitoring. In this process, public awareness raising should not be neglected. Since every citizen can be part of the improvement of environmental conditions, water quality management and decisions need to be clearly relayed to them. Furthermore, there is a need to develop and strengthen a network of knowledge and experience sharing on water quality among relevant stakeholders at national, regional and global levels.

Improving water quality worldwide has been recognized as a key for enhanced water security in the post-2015 sustainable development, as demonstrated by a specific target dedicated to the improvement of water quality and wastewater management under the proposed Sustainable Development Goal (SDG) 6 on water. Improved water quality monitoring and data will be essential in monitoring and evaluation of progress achieved towards the achievement of this SDG target on water quality and wastewater.

Objectives

As an activity under the **UNESCO-IHP International Initiative on Water Quality (IIWQ)**, the meeting's overall aim is to promote the sharing and exchange of the state-of-the-art scientific knowledge and technologies on water quality monitoring for improved water quality monitoring. This meeting is organized in the framework of the implementation of **IHP-VIII Theme 3 "Addressing Water Scarcity and Quality"** of the Eighth Phase of International Hydrological Programme of UNESCO (IHP-VIII, 2014-2021), in particular Focal Area 3.4 "Addressing water quality and pollution issues within an IWRM framework: Improving legal, policy, institutional, and human capacity" and Focal Area 3.5 "Promoting innovative tools for safety of water supplies and controlling pollution". It is also a contribution to IHP-VIII Focal Area 2.4 "Promoting groundwater quality protection".

The meeting focuses on three main objectives:

1. Facilitating scientific discussion, knowledge exchange and collaboration among experts and stakeholders.
2. Establishing a state-of-the-art of scientific research, methodologies, tools, technologies, and policy approaches on water quality and wastewater monitoring.
3. Collecting practical cases of this stocktaking on water quality monitoring as a demonstration of the implementation of these tools and approaches.

The goal of this meeting is to enhance scientific capacities of countries to improve water quality monitoring at the national and global levels and to support the monitoring and evaluation of the SDG target on water quality and wastewater in the post-2015 sustainable development framework.

Topics

Water monitoring and assessment is guided by whether the water quality is at a required level for public health and the environment and suitable for the purpose of specific uses. This can be determined by the measurement and monitoring of wisely-selected parameters and indicators. Consequently, water quality and wastewater monitoring incorporates several key topics, on which discussions of the meeting will address:

1. **Ensuring safe drinking water: Monitoring different pollutants from source to tap**
   - Chemical and physical pollutants
   - Nutrients (nitrogen, phosphorus and potassium)
   - Bacteria and pathogens
   - Toxic organic compounds (harmful algal bloom and associated cyanotoxins)
   - **Emerging pollutants**
   - Other toxic pollutants of concern (radionuclides, explosives)

2. **Methodologies and tools for water quality monitoring**
   - Sampling design
   - Data credibility
   - Water quality modelling
   - **New and innovative technologies and tools** (smart monitoring technologies, etc.)
   - New approaches of searches and investigative monitoring
   - **Biological monitoring** (invertebrates and aquatic life)
   - **GIS-based water quality monitoring**

3. **Ecological assessment of water quality**
   - Ecological trends in watershed
   - Cyanobacteria in lakes and reservoirs
   - Habitat protection and restoration
   - Environmental and health issues
   - Climate change impacts

4. **Monitoring groundwater quality and quantity**
   - Evaluating the status of groundwater (chemical and physical components)
   - Monitoring pollution from land use practices and land-based activities (septic tanks, waste disposal sites, mines and tailings, agricultural land use, etc.)
   - Impact of pesticide and fertilizer applications on groundwater quality
   - Salt water intrusion
   - Groundwater and surface water interaction
   - Groundwater monitoring networks

5. **Monitoring wastewater**
   - Assessment of health and environmental risks
   - Toxicity evaluation
   - Safe wastewater reuse
   - Health and environmental protection measures

6. **Water quality indicators, data and reporting**
   - Water quality indicators
   - Water quality databases and information systems
   - Standardization and harmonization of data

- Reporting on water quality and wastewater monitoring
- Data-sharing mechanisms
- Interpretation of water quality data from the view point of hydrological processes

7. **Policy measures**
   - Water quality and pollution control regulations and guidelines
   - Implementation of water quality monitoring and assessment
   - Collaborative monitoring approaches
   - Water governance in understanding of surface water and groundwater continuum system
   - Development of regional and global policy frameworks

8. **Economic aspects of water quality monitoring**
   - Economic status and environmental water quality status
   - Wastewater treatment level
   - The economics of water quality

9. **Capacity building, awareness raising and cultural aspects**
   - Gender and water quality
   - Cultural aspects and values of water quality
   - Education and capacity building
   - Public involvement and awareness
   - Citizen's monitoring
   - Communicating water quality science and data to stakeholders

Participants and expected contributions

Water quality experts, researchers, water professionals and practitioners, public health and environmental specialists, and policy makers are invited to the meeting.

Expected contributions include the state-of-the-art scientific and technological advances on the above-listed topics relating to water quality and wastewater monitoring, as well as practical experiences of policy approaches to improve water quality monitoring. Practical case-studies and best practices aimed at strengthening of water quality monitoring and assessment knowledge are especially invited. All submissions need to include:

- an abstract of the contribution/case-study of no longer than 2-3 pages
- a recent short CV

Proposals for scientific contributions and case-studies have to be submitted no later than 05 June 2015 to waterquality@unesco.org .

The contributions will be reviewed and selected by an International Scientific Committee. For the contributions selected by the Scientific Committee, the submission of a full paper will be requested in advance of the meeting.

Venue and date

The meeting is organized by the International Hydrological Programme of UNESCO in collaboration with Kyoto University, Japan. This meeting will be hosted by Kyoto University in Japan and held from 15 to 18 July 2015.

Field trip

A field trip to Lake Biwa Observatory Vessel in Shiga Prefecture will be organized. Special sessions on Ecological Assessment of Watershed will be held in Otsu in conjunction with the field trip.

International Scientific Committee

An International Scientific Committee, composed of internationally-leading experts in fields related to water quality and wastewater monitoring, will be established to provide scientific advice on the meeting programme and contribute to the selection of contributions. The list of members of the International Scientific Committee is in Annex.

Travel grant

UNESCO will provide travel grants to invited experts and a limited number of participants from developing countries with accepted scientific and case-study contributions.

Contact information

UNESCO
Sarantuyaa Zandaryaa, PhD
Programme Specialist
Division of Water Sciences – International Hydrological Programme
UNESCO
Paris, France
E-mail: s.zandaryaa(at)unesco.org

Kyoto University
Prof Yosuke Yamashiki
Professor
Graduate School of Advanced Integrated Studies in Human Survivability (GSAIS)
Kyoto University
Japan
E-mail: yamashiki.yosuke.3u(at)kyoto-u.ac.jp