United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

International Initiative on Water Quality

Microplastics in freshwater environments

Assessment by UNESCO-IHP International Initiative on Water Quality

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UNESCO

Division of Water Sciences - International Hydrological Programme

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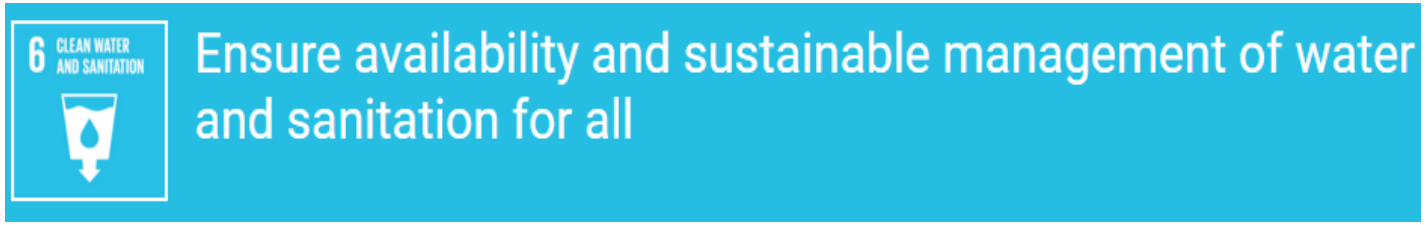
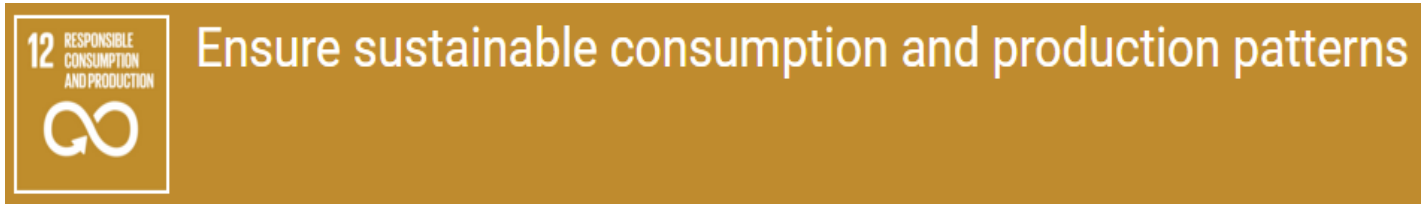
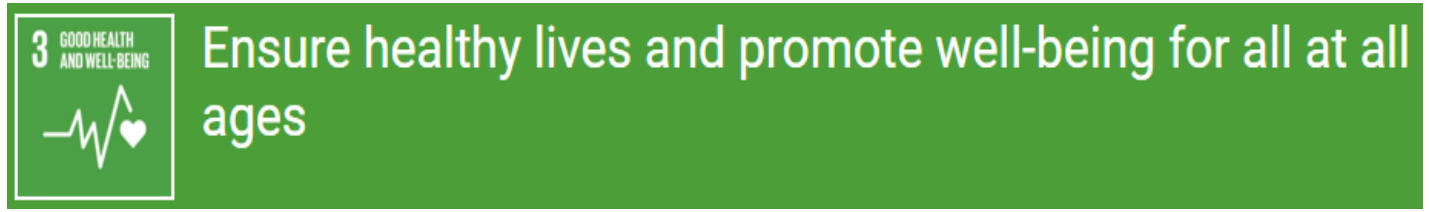
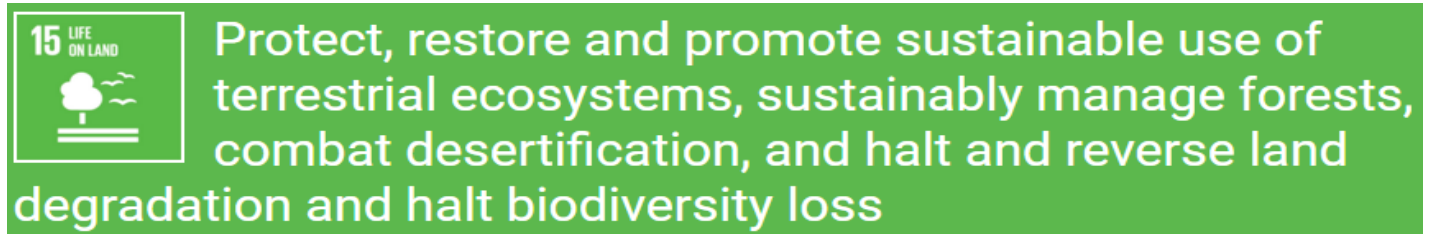
Improving water quality to achieve the SDGs









SDG 6 – Water
Target 6.3
… improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials…

SDG 12 – Production & Consumption
Target 12.4
… significantly reduce release of chemicals to air, water and soil in order to minimize their adverse impacts on human health and environment

SDG 3 - Health
Target 3.3 *… combat water-borne diseases…*
Target 3.9 *… reduce deaths and illnesses from hazardous chemicals, air, water and soil pollution*

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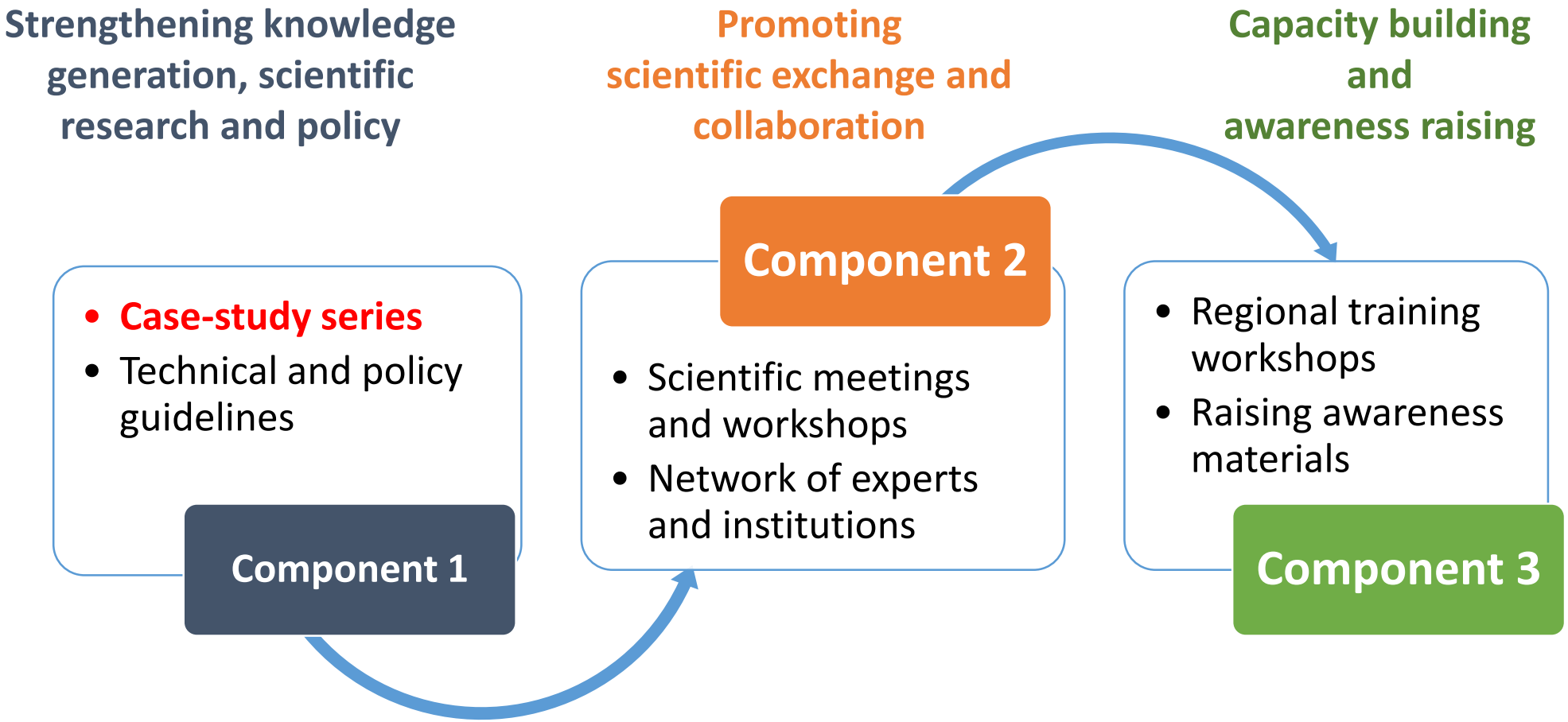
Water quality degradation

A global challenge for sustainable development

- Globally over **80% of all wastewater is discharged without treatment** into freshwater and marine water bodies
- **Emerging pollutants represent a new challenge,** with still unknown potential (long-term) impacts on human health and ecosystems
- The **freshwater pollution** is affecting negatively coastal waters and ecosystems. **8 million tons of plastic enter the ocean** from land-based sources every year.
- **Nutrient loads from unmanaged agricultural runoff** and inadequate wastewater treatment cause eutrophication of lakes and spread of dead zones in coastal waters.




UNESCO-IHP IIWQ Project on Emerging Pollutants



A flagship project under the International Initiative on Water Quality (IIWQ) of UNESCO-IHP
Funded by Sweden

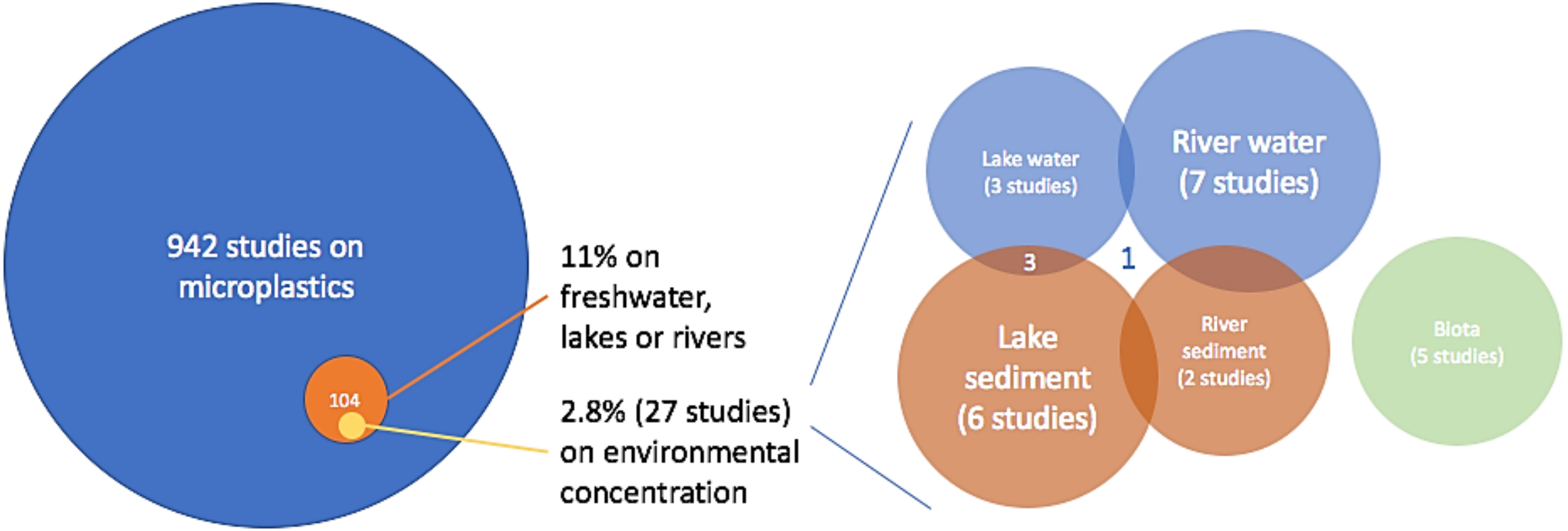
Microplastics in freshwater

What we know so far?

A preliminary assessment by

UNESCO-IHP International Initiative on Water Quality

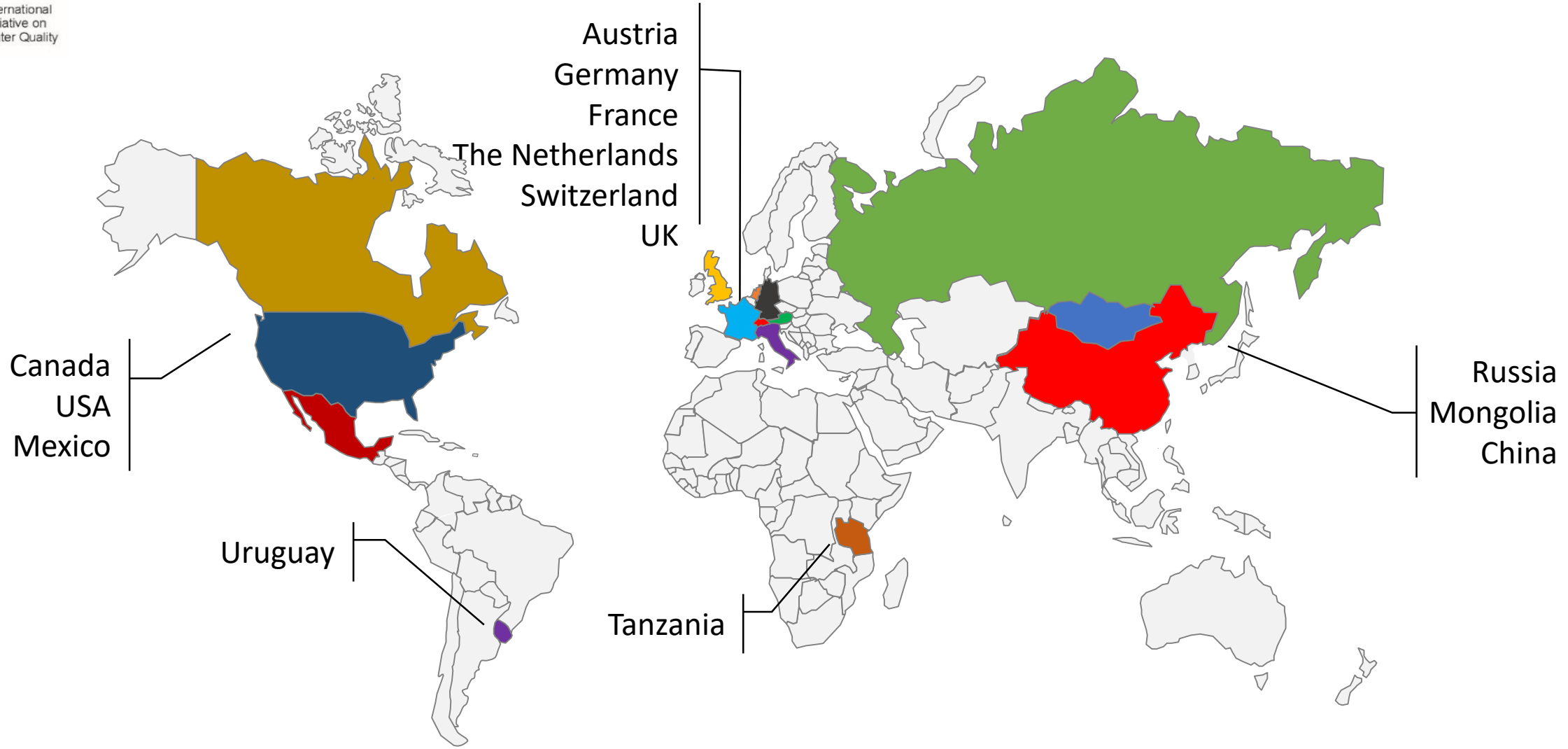
(lack of) Research data on microplastics in freshwater



Based on findings of UNESCO International Initiative on Water Quality (IIWQ) Case Study on Microplastics in Freshwater Environments

UNESCO-IHP International Initiative on Water Quality Case study

Microplastics in freshwater environments



Microplastics in freshwater are reported in 27 research studies in 15 countries in 5 continents

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Microplastics in lakes (water and sediment)

- **Great Lakes -** Canada/USA
  - Lake Huron (sediment) – industrial pellets comprised 94% of plastic derbis
  - Lake Ontario (water) – mainly industrial pellets; Humber River is one of main pathways
  - Laurentenian Great Lakes – mainly microbeads
- **European lakes**
  - Lakes and surface waters of Switzerland (Geneva, Constance, Neuchatel, Maggiore, Surich and Brienz)
  - Lake Garda in Italy
- **Lake Khuvsgul** – Mongolia
  - Mainly household plastics (lack of solid waste management)
- **Chinese lakes** - Lake Taihu & Lake Siling

Microplastics in rivers

- **European rivers**
  - Rhine, Jade, Mosel, Necker, Main – Germany (high inputs of industrial pellets)
  - Danube **–** Austria
  - Seine – France (mainly fibers; also high levels of fibers in wastewater)
  - Thames – UK (all types)
  - Po – Italy
  - Dalalven - Sweden
- **Rivers in US**
  - Chicago, Illinois, two rivers in Southern California (microbeads / multicoloured spheres – from cosmetic products)
- **Yangtse River** – China
  - High densities of microplastics (fibers, granules and films)
  - Accumulation of microplastics behind the Three Gorges Dam

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Microplastics in wastewater

- **The Netherlands**
  - Micro plastics found in effluents from a wastewater treatment plant (treated wastewater) with concentrations of 9 to 91 particles per litre
  - Mainly from consumer products (fibres, spheres and fragments)
- **Russia**
  - 1-day sampling in the influent and effluent of the wastewater treatment plant in Saint Petersburg
  - Microplastics are significantly removed (fibres captures in the sludge)
- **France**
  - Fibres found in wastewater

Microplastics in freshwater biota

- **Mollusks**
  - Microplastics found in the tissue of commercial bivalves from a Chinese fishery industry
  - Highest concentrations in the ark shell *Scapharca subcrenata*

- **Freshwater fish**

  - Microplastics (polymer fibres and pellets) found in the digestive tract of 12% of *Gudgeon* collected from 11 streams in France
  - Microplastics in 20% of *Nile Perch* and *Nile Tilapia* in Lake Victoria (Tanzania)
  - Microplastics in the digestive tract of 8 species of fish in outer Rio de Plata (Uruguay)

- **Marine biota – Gulf of Mexico**
  - Microplastics found in 8% of freshwater fishes (5% in non-urbanized streams and 29% in urbanized streams)
  - Microplastics found in 10% of marine fishes

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Microplastics in freshwater

What needs to be done?

More research and data on:

- Occurrence and concentrations in freshwater environments
- Pathways, transport and accumulation in the environment
- Potential ecological and health risks & effects on biota

Scientific cooperation

- Research in developing regions – Africa, Asia and Latin America
- Sharing of scientific knowledge and information
- Enhancing the capacity researchers and research institutions

Awareness raising

- Raising awareness of the public (responsible consumption)
- Engaging industries for stewardship and voluntary action (responsible production)
- Informing policy-makers

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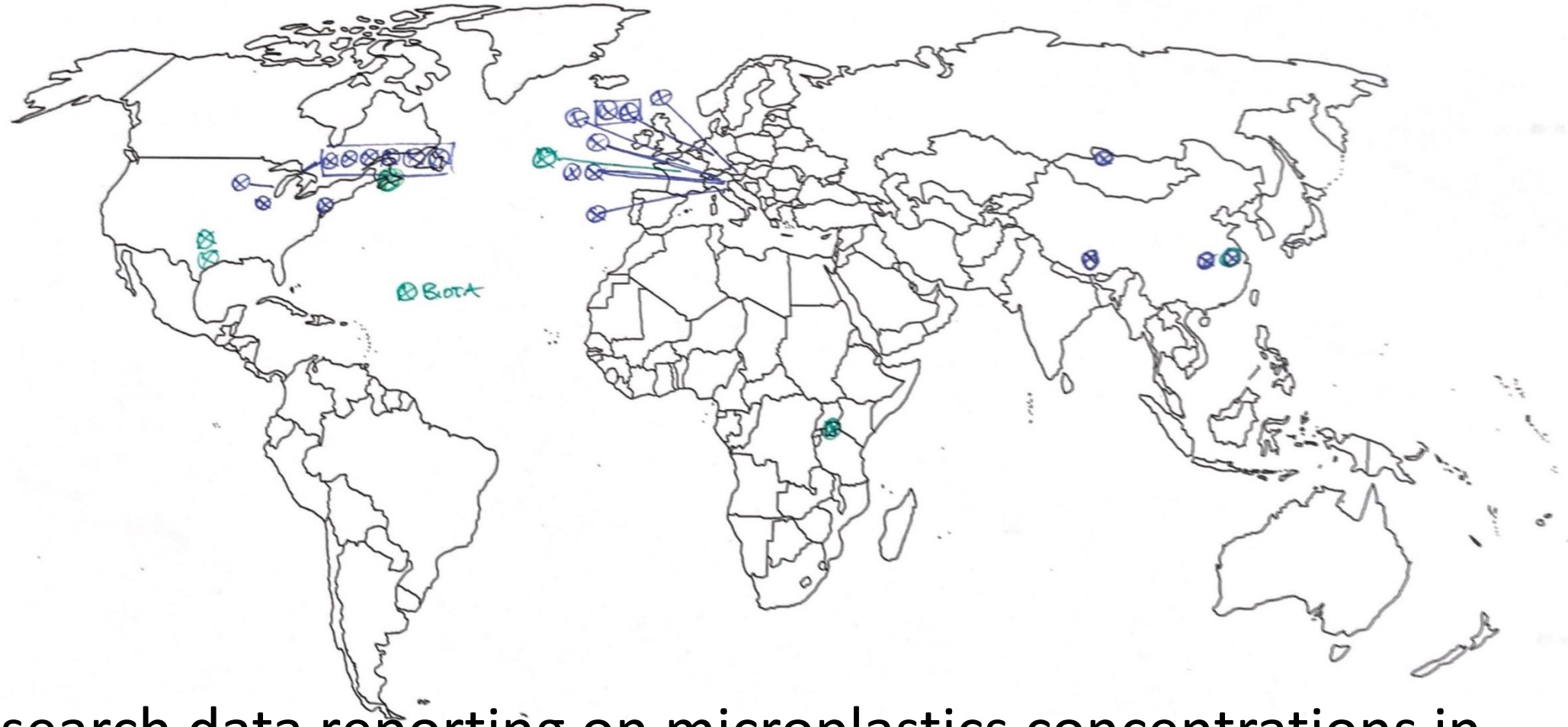
Microplastics in freshwater

Availabilitv of research and data



Research data reporting on microplastics concentrations in North America and Europe represent 82% of all studies

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UNESCO Emerging Pollutants in Water Series

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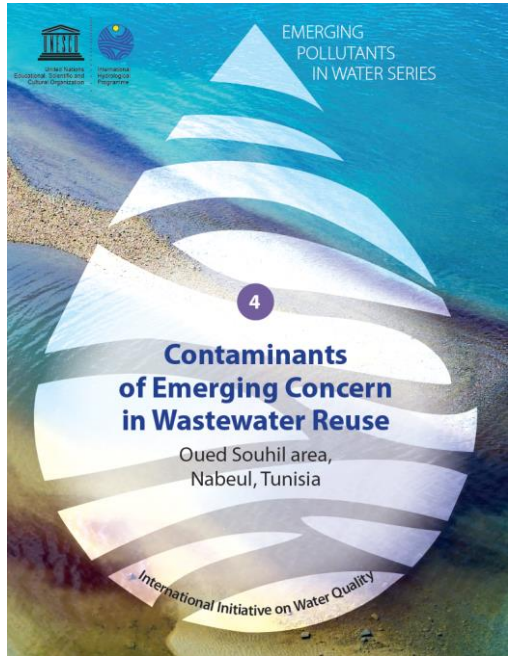
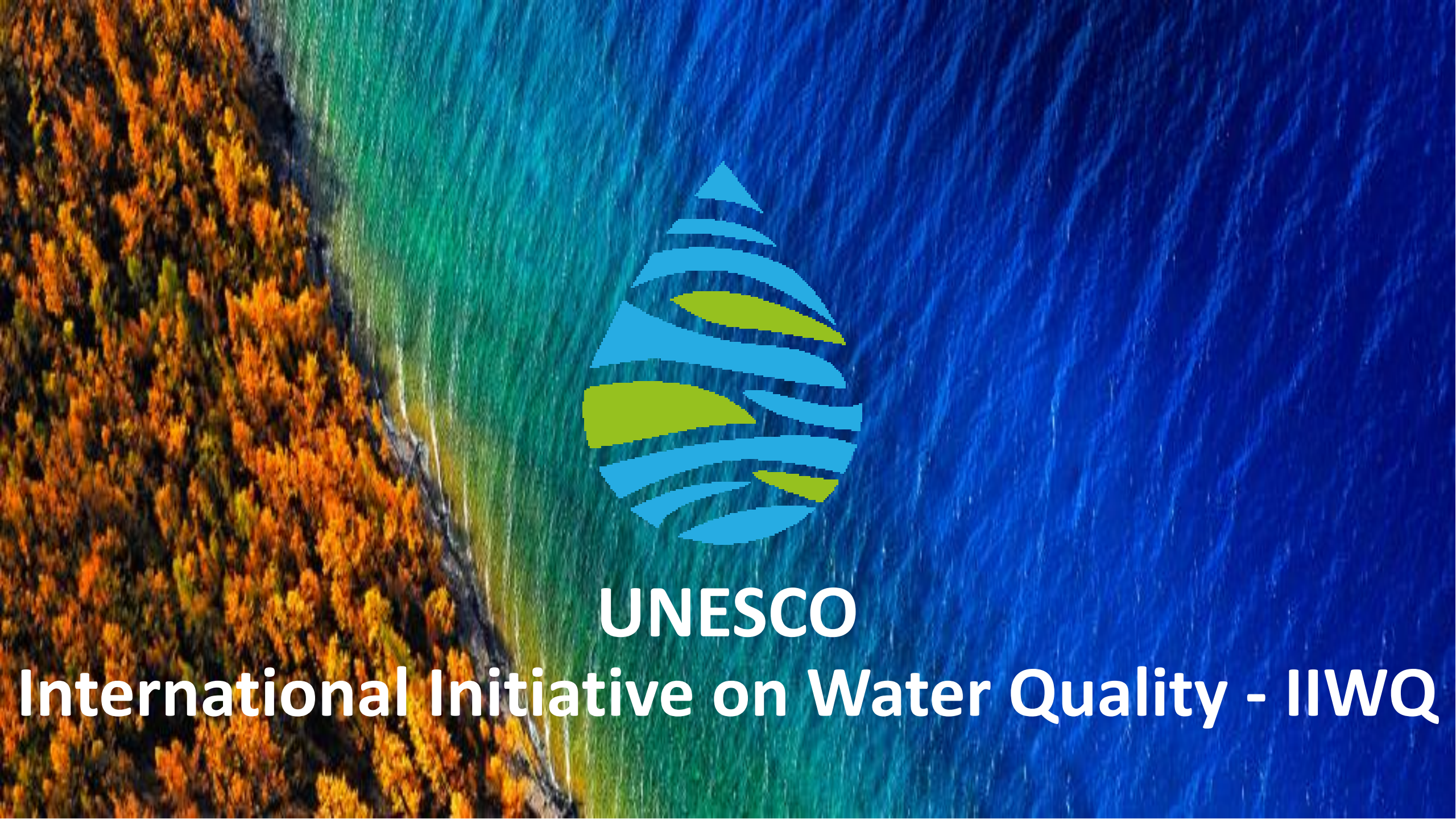


and others

http://en.unesco.org/emergingpollutants/strengthening-scientific-research-and-policy/case-studies



UNESCO
International Initiative on Water Quality - IIWQ

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Unique international initiative aims to address water quality issues in a holistic manner towards ensuring water security for sustainable development:

- Promoting research and scientific cooperation
- Facilitating knowledge generation and dissemination
- Promoting effective technological solutions, science-based policy-making, innovative approaches and best practices

IIWQ implements activities and projects of interdisciplinary and trans-sectoral scopes, focusing on specific water quality and wastewater issues

- in a participatory and cooperative manner, engaging researchers, water professionals, and policy-makers, as well as other stakeholders (NGOs, the private sector, the general public)
- in both developing and developed countries

IIWQ was established by the endorsement of the UNESCO IHP Intergovernmental Council in its 20th session in 2012.

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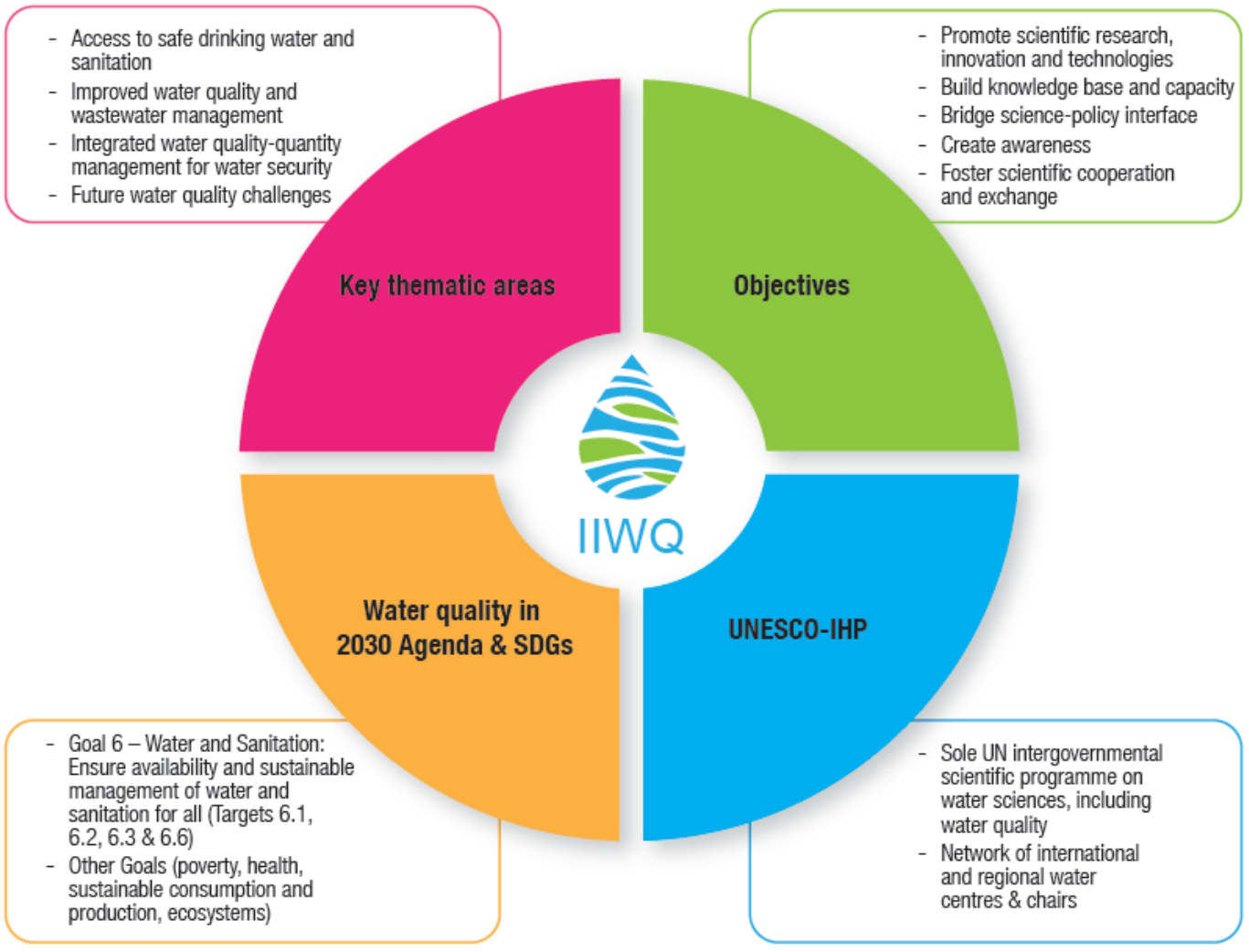
UNESCO-IHP International Initiative on Water Quality (IIWQ)



Key thematic areas:

- Safe drinking water and sanitation
- Water quality management
- Wastewater management and reuse

Objectives:

- Promoting scientific research, innovation and technologies
- Building the knowledge base and capacity
- Bridging the science-policy interface
- Creating awareness
- Fostering scientific cooperation and exchange

IIWQ Expert Advisory Group

A network of experts and specialists on water quality and in other areas related water quality, representing governmental and non-governmental organizations, research institutions and the academia from different regions.

The IIWQ Expert Advisory Group aims to:

- Provide state-of-the-art technical and expert advice on water quality challenges, priorities, and emerging issues, as well as on future directions of IIWQ
- Facilitate scientific exchange and promote collaboration to support IIWQ activities

International Initiative on Water Quality
Partners

- **A large network of experts** in fields related to water quality, wastewater and other specialized areas with strong links to water quality
- **An expanding network of collaborative research institutions and governmental organizations** in both developing and developed countries
- **Strategic collaboration with UN, intergovernmental and international organizations**
  - **OECD, UNEP, HELCOM etc.**
- **Active in all regions**: Africa, Asia, Arab States, Europe, Latin America and the Caribbean, North America.

For more information:

http://en.unesco.org/waterquality-IIWQ

http://en.unesco.org/emergingpollutants

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Thank you !

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