WORLD WATER QUALITY ALLIANCE

ASSESSMENT – AGENDA SETTING -SERVICES

linking the global water quality agenda to the nexus and national local relevance

Hartwig Kremer, UN-Environment,

Inception Workshop WMO/Geneva 28/11/2018 & Follow Up, JRC ISPRA21-24/06/2019; World Bank 1-2/04/2019; OECD 06/06/2019

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Water quality in the Agenda 2030 & SDG context

- The 2030 Agenda adds an important new mandate and opportunity for UN Environment
- Within UN-Water, UN Environment is engaged in integrated monitoring and reporting for SDG 6: www.sdg6monitoring.org
- UN Environment has global custodianship of data collection for indicators in SDG targets **6.3, 6.5 and 6.6** – all connect to water quality
- UN Environment got the mandate to look into Water Quality globally in depth – including and going beyond SDG 6.3, into emerging issues, global trends, nexus focus, projection, governance and services - **WWQA**

UN WATER

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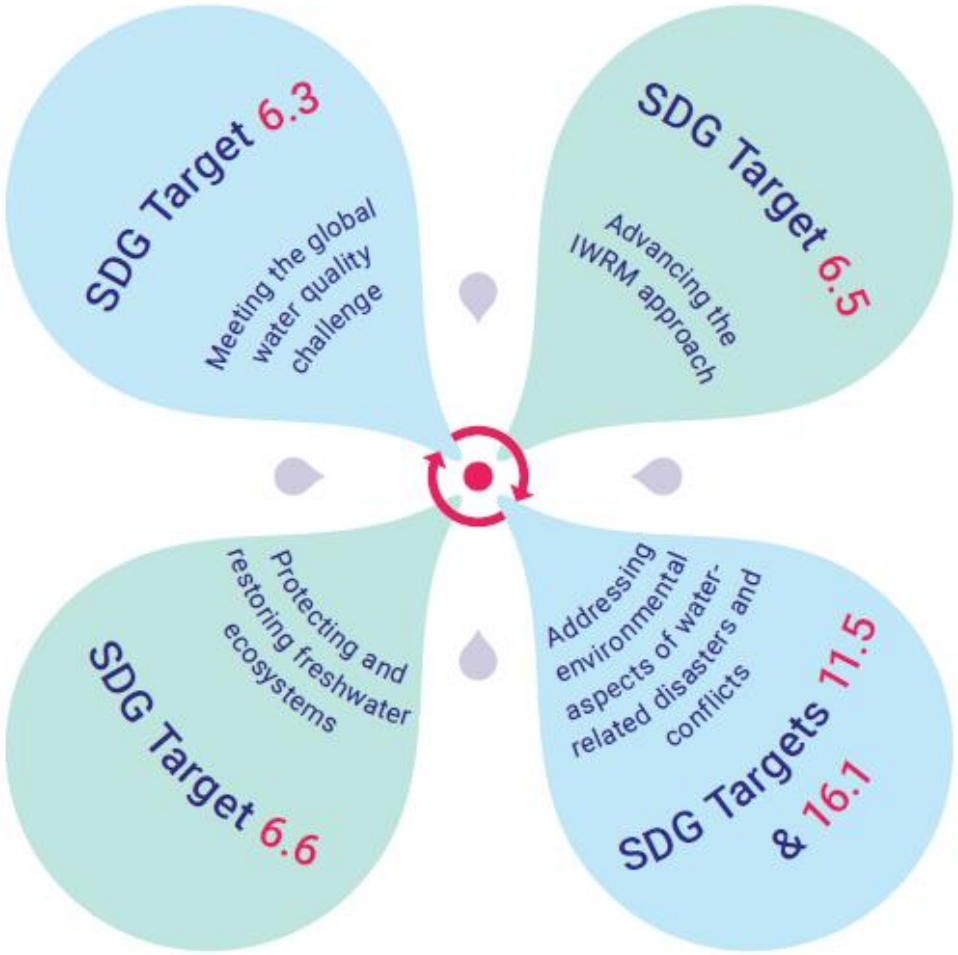
Partnering for Global Leadership



About the UN Environment Freshwater Strategy:

The Freshwater Strategy is firmly embedded and reflected in UN Environment's mandate to help countries achieve the 2030 Agenda for Sustainable Development, besides SDG 6 also 11.5 as well as 16.1.

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Global water pollution crisis

- Human activity and population growth put tremendous pressure on the world's freshwater resources.
- 80 percent of world's wastewater discharged untreated, threatening both human health and ecosystem services
- There has been a 30% decline in biodiversity health since 1970. More than 40% of freshwater fish species in the United States and Europe were in imminent danger of extinction (Millennium Ecosystem Assessment 2005).
- Pollution through **pathogens, organic matter, chemicals and salinity** are of particular concern – up to 1/3 of all rivers could be affected.

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Recent findings – the Snapshot of the World's Water Quality (UNEP 2016)

- Wastewater production at least doubling by 2050
  → Sewerage connections increasing
- But not wastewater treatment
  → More untreated wastewater to rivers and lakes

Nexus with human health:

Health risk of contaminated rivers & lakes → contact with surface waters → washing, cleaning, drinking

Nexus with food security:

95% inland fishery production from developing world;

200 million Africans consume fish regularly;

rapidly growing demand for irrigation from surface and groundwaters

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Key findings on water quality (UNEP 2016) The Snapshot Report

- **Water pollution has worsened** since the 1990s in almost all rivers in Latin America, Africa and Asia.
- **Severe pathogen pollution** already affects around one-third of all river stretches in Latin America, Africa and Asia.
- The number of **people at risk to health** by coming into contact with polluted surface waters may range into the tens of millions on these continents (842 000 deaths from diarrheal disease in 2012).
- **Severe organic pollution** already affects around one-seventh of all river stretches in Latin America, Africa and Asia.
- **Severe & moderate salinity pollution** → one tenth of all river kms
- The **food security from inland fisheries is threatened** in a number of countries in Africa and Asia
- **Emerging and persistent water quality problems** in industrialized countries – e.g. **pharmaceutical residues, eutrophication**
- **Majority of rivers** in developing countries **still in good condition** → Great opportunities for short-cutting further pollution and restoring the rivers that are polluted. → **Mix of management & technical options supported by good governance**

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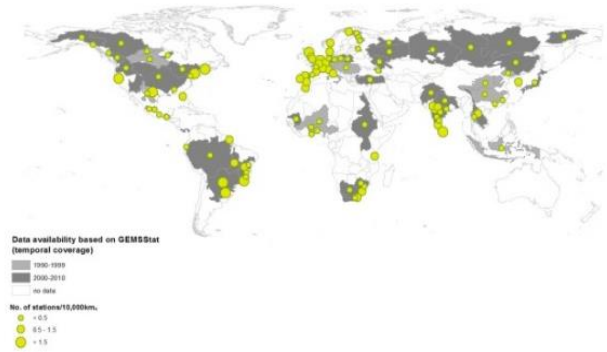
Key findings on information and data

World Water Quality Assessment



- There is a **substantial** data and information **gap**
- **Very low density of monitoring stations regionally** in the only global data bank (UN-Environment GEMStat)
  - typical minimum density of around 1.5 to 4 stations per 10,000 km^2 of river basin area in the USA and Europe.
  - The average density for the Latin American continent is 0.3 stations per 10,000 km^2, for Africa 0.02 stations per 10,000 km^2, and for Asia, 0.08 stations per 10,000 km^2
- **Significant inconsistencies** between global assessment and regional knowledge/information and service needs
- **Efforts and priorities** on data-deficient basins **needed** => for management
- **New Data Sources** (EO, Citizen Science, Machine Learning (e.g. WB study)) **advanced modelling/downscaling – from global comparison (Agenda 2030) to national/local relevance and services**

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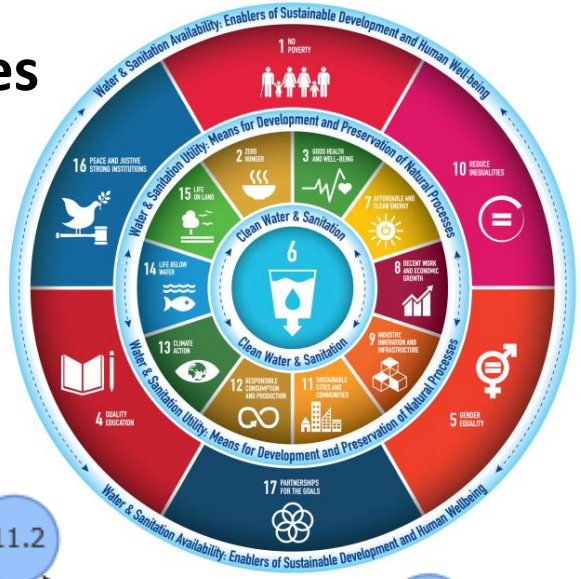
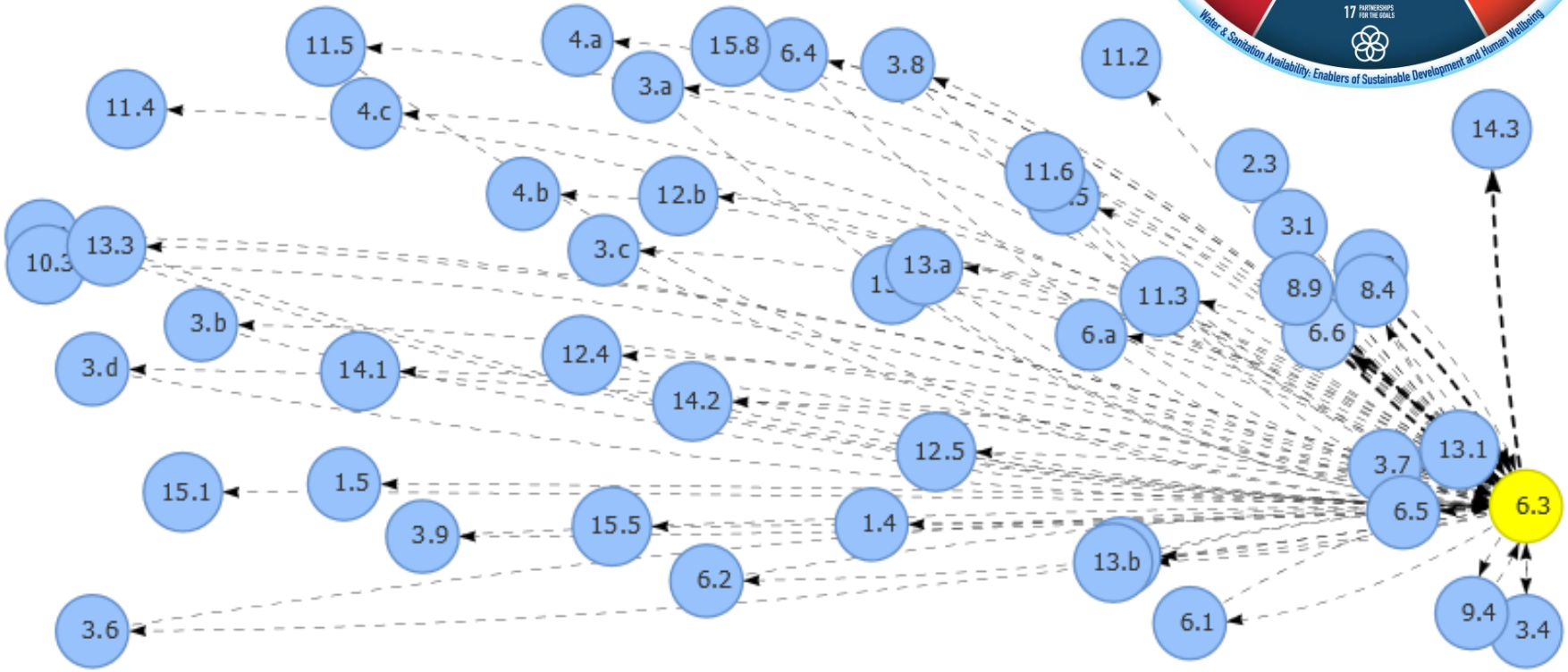
The challenge of the dynamic SDG Interlinkages (here South East Asia)

Institute for Global Environmental Strategies (IGES)
Strategic and Quantitative Analysis Centre





https://sdginterlinkages.iges.jp/visualisationtool.html (accessed 05-11-2017)

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UNEA-3 Water Quality Resolution (Res. 3/10) OP 16

"Assist countries to…" "in collaboration with national governments, local authorities and, as appropriate the private sector":

- Assist in WQ monitoring, capacity-building, and **data management**; information **WQ** testing for **contaminants (new and emerging)**
- Strengthening capacity to reach **wastewater targets** including wastewater **treatment options**
- Tools to address **water pollution and ecosystem health**, implement IWRM, address **water-related impacts of disasters**
- **Assessments, propose solutions, policies and technologies of invasive species, pharmaceutical contaminants, emerging pollutants; develop WWQA by UNEA-5;**

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UNEA-3 Water Quality Resolution (Res. 3/10) OP 16
"Assist countries to…" "in collaboration with national governments, local authorities and, as appropriate the private sector":

- Support countries **data collection, analysis** and sharing to implement w-r SDGs, **drawing on EO and global data**; provide necessary technical support monitoring/reporting SDG 6
- Develop programmes that invest in land and ecosystem management to prevent pollution
- Create enabling environment **including policies, laws and regulations, technologies and finance for water pollution including ww management**
- **Clean and recover** polluted water bodies

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Mandate

Example: Resolution on addressing water pollution to protect and restore water-related ecosystems (Res. 3/10)

FRESHWATER ECOSYSTEM MANAGEMENT

Framework for Ecosystem Management

Identifies main activities for countries to sustainably protect and restore freshwater ecosystems – needs implementation;

Integrated Water Resources Management (IWRM)

Develop tools to support countries, in addressing water pollution and ecosystem health; implement IWRM approaches; and address water-related impacts of disasters

Support for data collection, analysis and sharing

Data and technical analysis for integrated water resources management, with new partnerships on Earth Observations;

Monitoring and Reporting for SDG 6

UN Environment supports countries for indicators 6.3.2, 6.5.1 and 6.6.1 – additional support needed for capacity-building

WATER QUALITY MONITORING; APPRAISAL and SERVICES

- Strong mandate to support countries in WQ monitoring, monitoring network design, capacity development and data management
- Build upon the **GEMS/Water** Trust fund to ensure necessary resources
- Support countries in data collection, analysis and sharing, incl. SDGs indicator 6.3.2 reporting, potentially drawing upon Earth Observations and global data

WORLD WATER QUALITY ASSESSMENT (WWQA)

Develop, in cooperation with the science innovation community and other relevant organizations in and beyond UN-Water, a global water quality assessment for consideration at UNEA-5, taking into account, among others, emerging pollutants…..

SUSTAINABLE WASTE-WATER MANAGEMENT

Supporting the implementation of SDG indicator 6.3.1.

Supportive policies

Support countries to develop policies, guidelines and standards for sustainable wastewater management

Innovative financial mechanisms

Collaborate with private sector to invest and upscale business models for wastewater management tapping into innovative financing mechanisms

Addressing emerging pollutants

Pharmaceutical contaminants, personal care product including proposed solutions, policies, and technologies

Capacity-building through the Global Wastewater Initiative

- MOOC, webinars, Wastewater Atlas

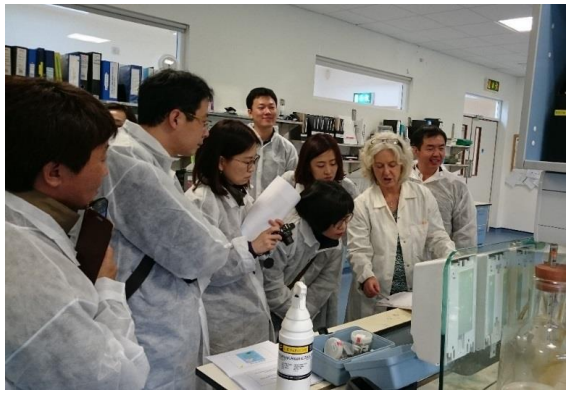
Global Environment Monitoring System for Freshwater (GEMS/Water)

1) Global Monitoring Network

2) GEMStat

3) Capacity Development

4) SDG indicator 6.3.2 on ambient freshwater quality



GEMS Water

Good ambient water quality?
We support you in the calculation of SDG indicator 6.3.2

6 CLEAN WATER AND SANITATION

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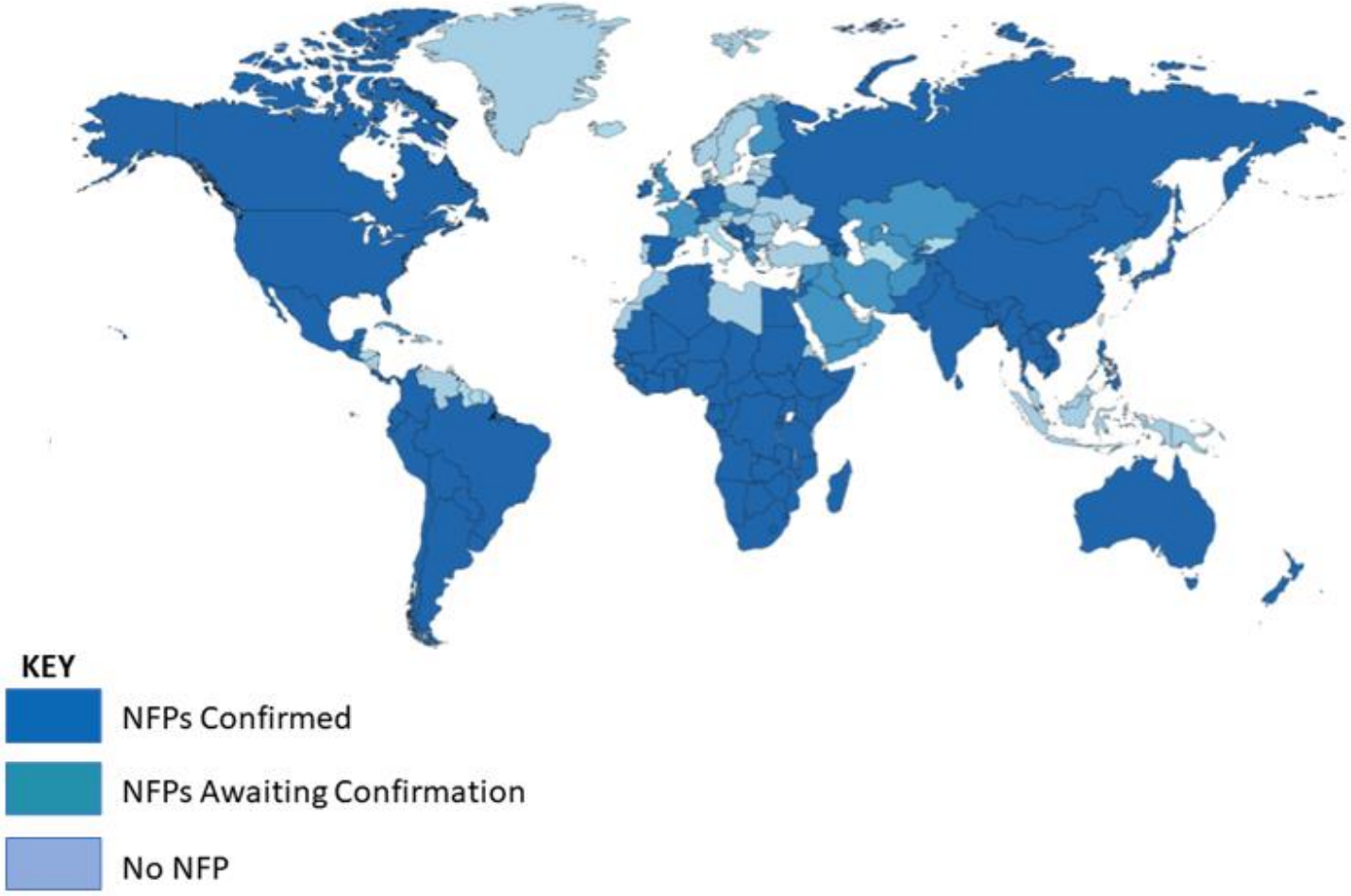
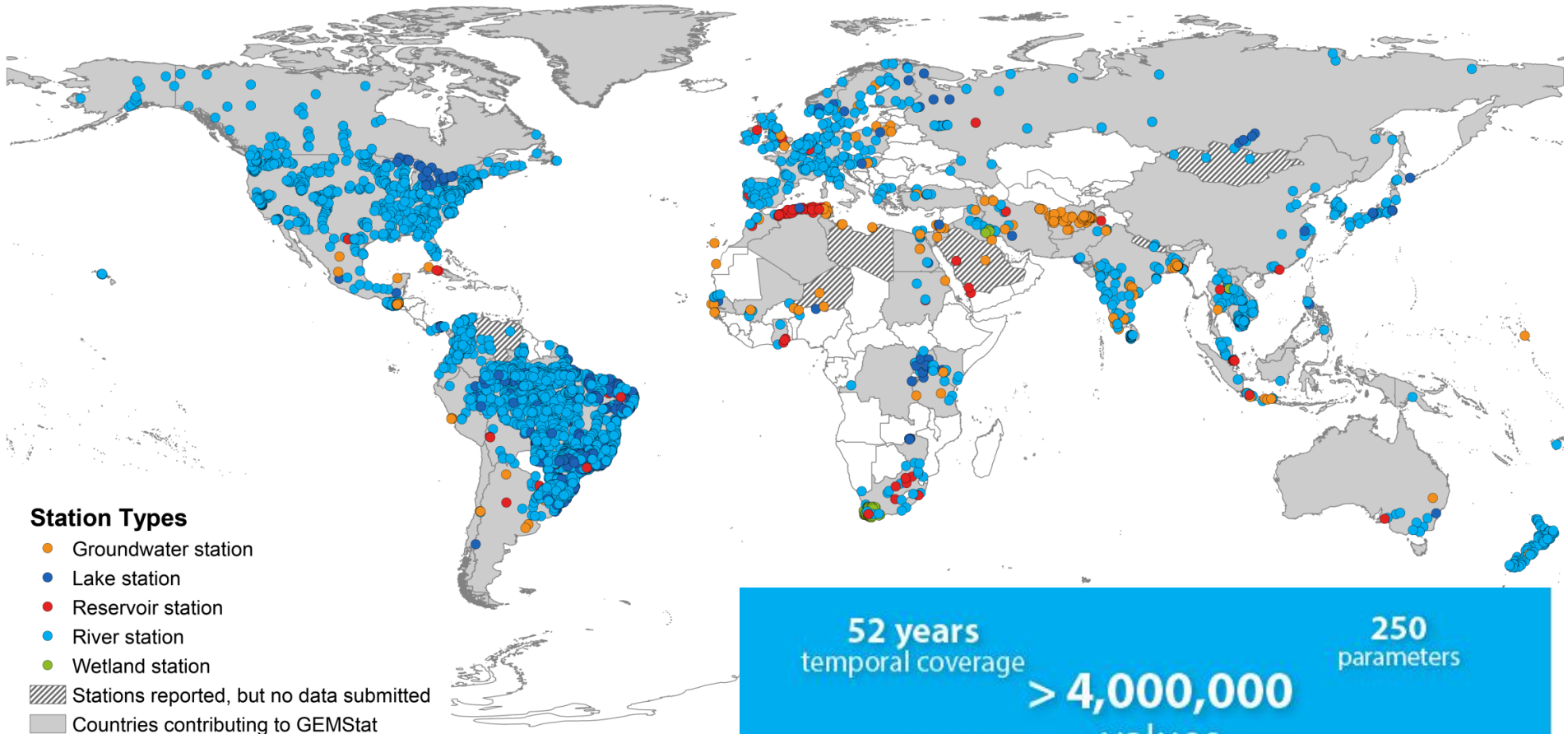
GEMS Water

GEMS/Water Global Monitoring Network



Spatial Data Gaps in GEMStat



52 years temporal coverage

250 parameters

> 4,000,000 values

> 4,000 stations

75 participating countries

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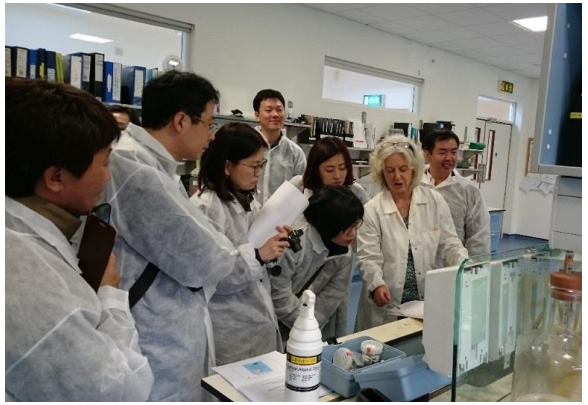
GEMS Water

Capacity Development in Water Quality Monitoring

- Training Courses (online and workshops) on all aspects of WQ monitoring, incl. data management)
- University accredited courses
- Technical assistance in WQ monitoring

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



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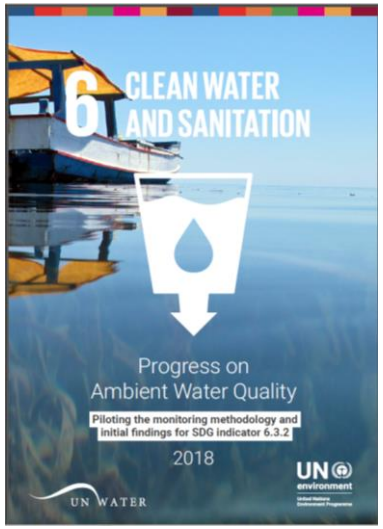
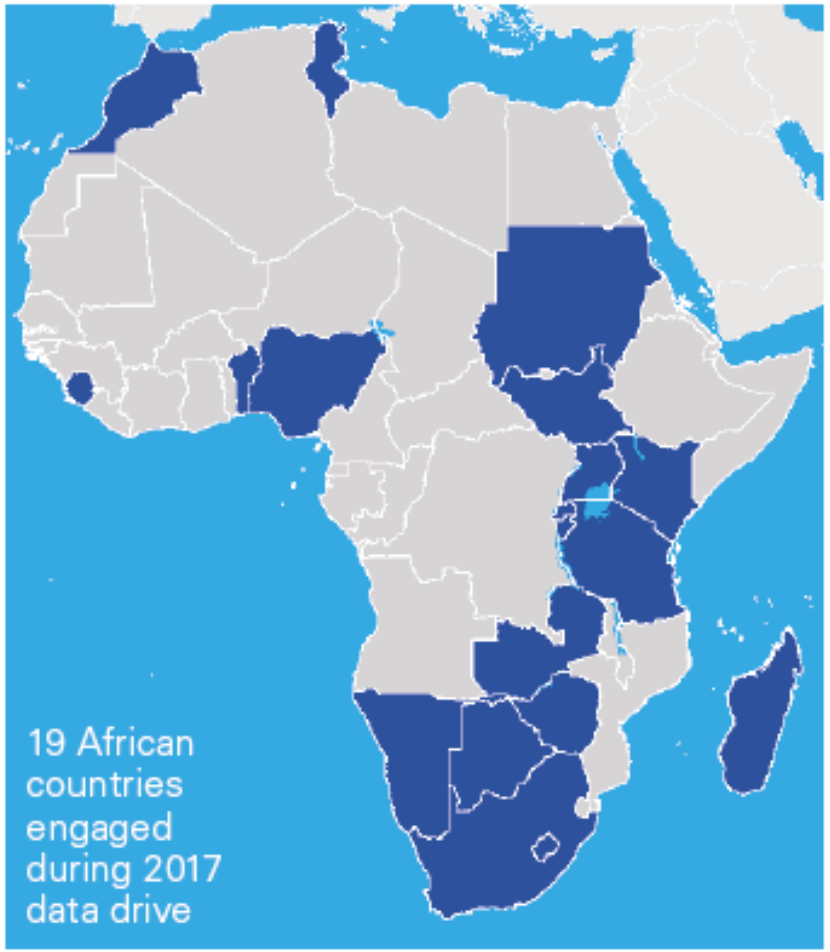
GEMS Water

SDG indicator 6.3.2: *Proportion of bodies of water with good ambient water quality"*

- Methodology development
- 2017 data drive: data from 50 countries
- Technical support: tutorials, webinars, helpdesk



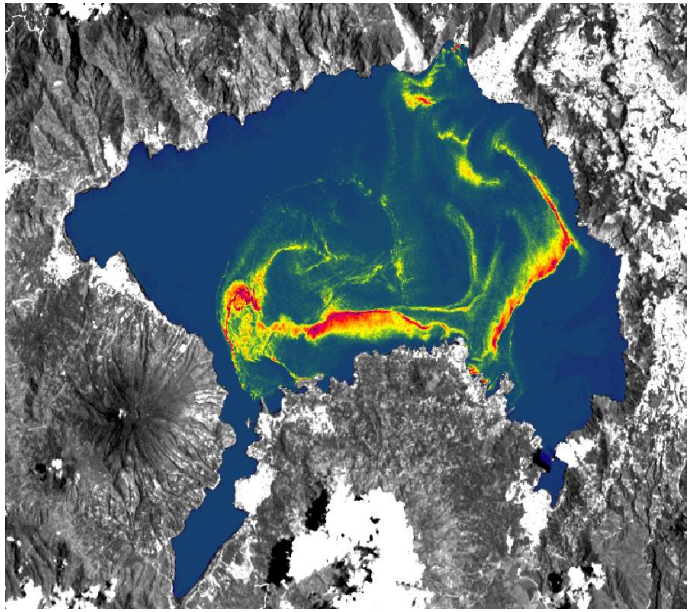


UN environment GEMS Water

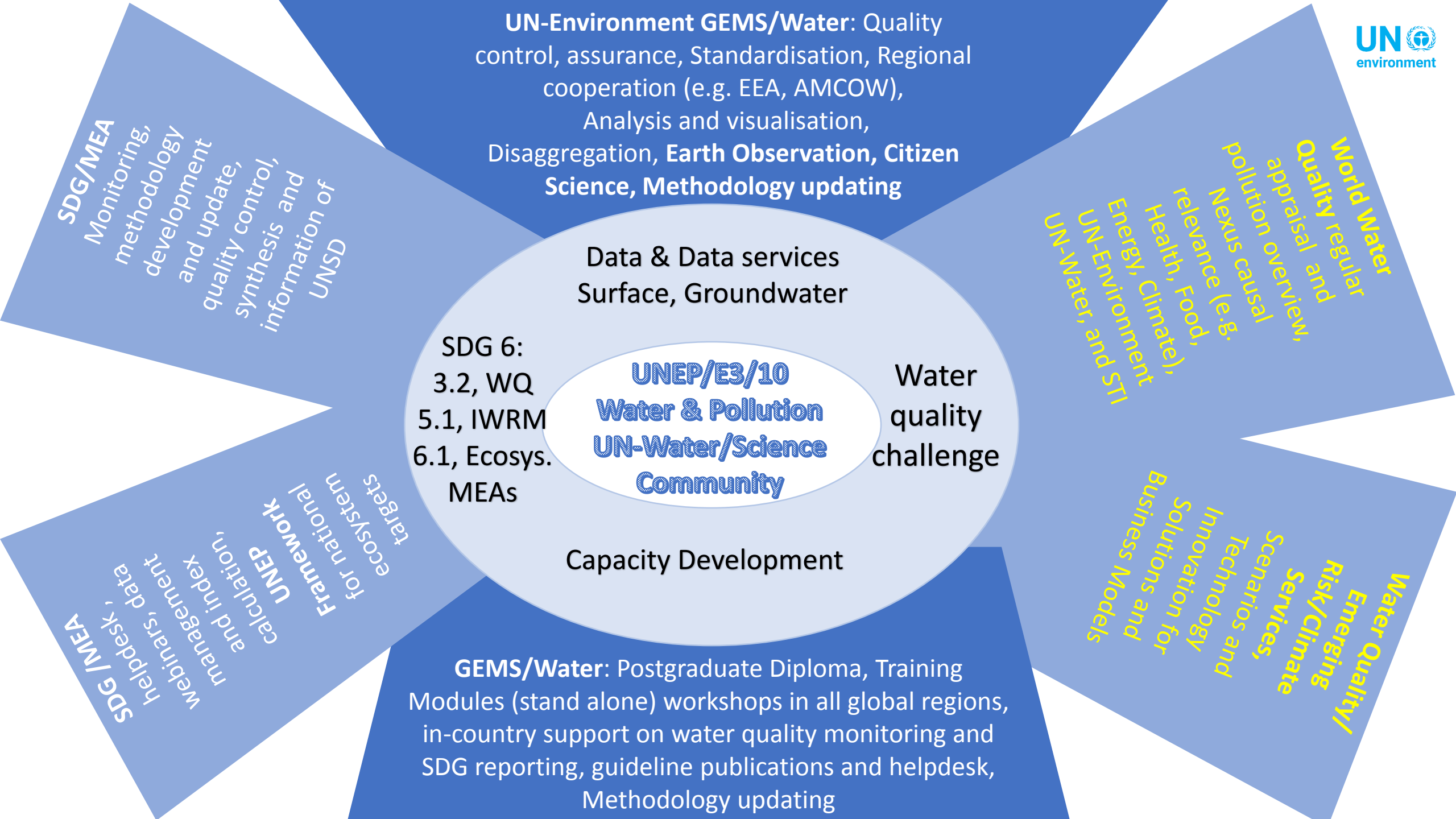
Exploring new sources of water quality data

SPONGE – Spaceborne Observations to Nourish GEMStat

Development of water quality monitoring products for selected water bodies in Guatemala, Ghana, Finland, Japan and



Landsat-8 RGB image and reference station locations (left) and C2RCC backscattering index (right) for the *Anabaena Sp.* bloom in Lake Atitlan, August 4 2016


UN-Environment GEMS/Water: Quality control, assurance, Standardisation, Regional cooperation (e.g. EEA, AMCOW), Analysis and visualisation, Disaggregation, Earth Observation, Citizen Science, Methodology updating
SDG/MEA Monitoring, methodology development and update, quality control, synthesis and information of UNSD
World Water Quality regular appraisal and overview, pollution overview Nexus causal relevance (e.g. Health, Food, Energy, Climate), UN-Environment UN-Water, and STI
Data & Data services Surface, Groundwater
SDG 6: 3.2, WQ 5.1, IWRM 6.1, Ecosys. MEAs
UNEP/E3/10 Water & Pollution UN-Water/Science Community
Water quality challenge
Capacity Development
SDG /MEA helpdesk, data webinars, management calculation, and index Framework UNEP ecosystem for national targets
Water Quality/ Risk/Climate Services, Scenarios and Technology Innovation Solutions for Business Models
GEMS/Water: Postgraduate Diploma, Training Modules (stand alone) workshops in all global regions, in-country support on water quality monitoring and SDG reporting, guideline publications and helpdesk, Methodology updating

Roadmap towards a Worldwide Water Quality Assessment

- Approach: DPSIR, pre-study, two spatial scales (regional, global)
- Trademarks of success (legitimacy, credibility) & Trade-offs

Review water quality state

1. Baseline assessment
State of water quality

2. Scenario analysis
Trends over next decades

Identify areas most under threat

SDGs as cross-cutting theme

3. Mitigat analysis
Technical measures & management approach

overnance analysis
Institutions to protect restore water quality

Identify options for effective measures

Increase capacity of developing countries

Enable efficient manage-ment

- Interfaces with operational services and policy advice

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Global Water Quality Appraisal and Services and Innovation

Demand:

Policy Agenda from global, regional, national to local

UN-Environment Assembly Agenda (UNEP/EA3/10_2017)

Policy field and inter-linkages (SDGs, Sendai, Paris, Addis, New Urban Agenda, MEAs)

Private Sector

Donors

Products: Peer reviewed science and Science Policy Business information global, regional and national fora Policy info and Assessments (UNEA, Regional (Africa, Asia, LAC, Europe), Regional Economic Commissions; Business models

Continued demand/supply dialogue

Supply and infrastructure:

Scientific and technological innovation; tools and assessments

Surface Waters

Groundwaters

Estuaries

Continued demand/supply dialogue

Products: Science and Technology Innovation and Knowledge Services; Relevant Causal Chains between Water Quality, Health, Food and, Agriculture Systems (land use and cover)

1. Reconcile sanitation/treatment and water quality, antibiotic resistances
2. Irrigation and water quality; Pesticide and Nutrient management
3. Micropollutants, Endocrine disruptors
4. Temperature, Dilution and Metabolic Capacities, Cyanophycean

Demand:

Operational services and policy advice

Water and Health

Water and Food

Water and Ecosystems

Water and Climate

Timeline

2018 Inception & SDG 6 | 2019 UNEA 4 Water Science Agenda | 2020/21 SDG6/UNEA 5; draft global report | 2022 SDG6 HLPF | 2023 UNEA 6 full global report | 2025 UNEA 7 SDGs review | 2027 UNEA 8 Rolling STI platform

Global Water Quality and Services Plattform Project

Policy Agenda from global, national to local

Scientific and technological innovations; tools, assessments

Operational services and policy advice

UNEA Agenda

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Water and Climate

- What kind of water bodies (river, lake, wetland, groundwater, estuary, …)
- Which scale (local, national, continental, global, …)
- What kind of substances (parameters on nutrients/eutrophication, salinization, hazardous substances, pathogen pollution, …)
- What kind of data source (singular measurements, continuous monitoring, modelling, remote sensing, …)
- What kind of case studies could be displayed on causal chains

- Relevance chains: Health, Food, Ecosystems
- Delivery chains: Data drive SDG 6

Timeline 2018 2021 2025 2027

highlighting/updating DPS-**IR**

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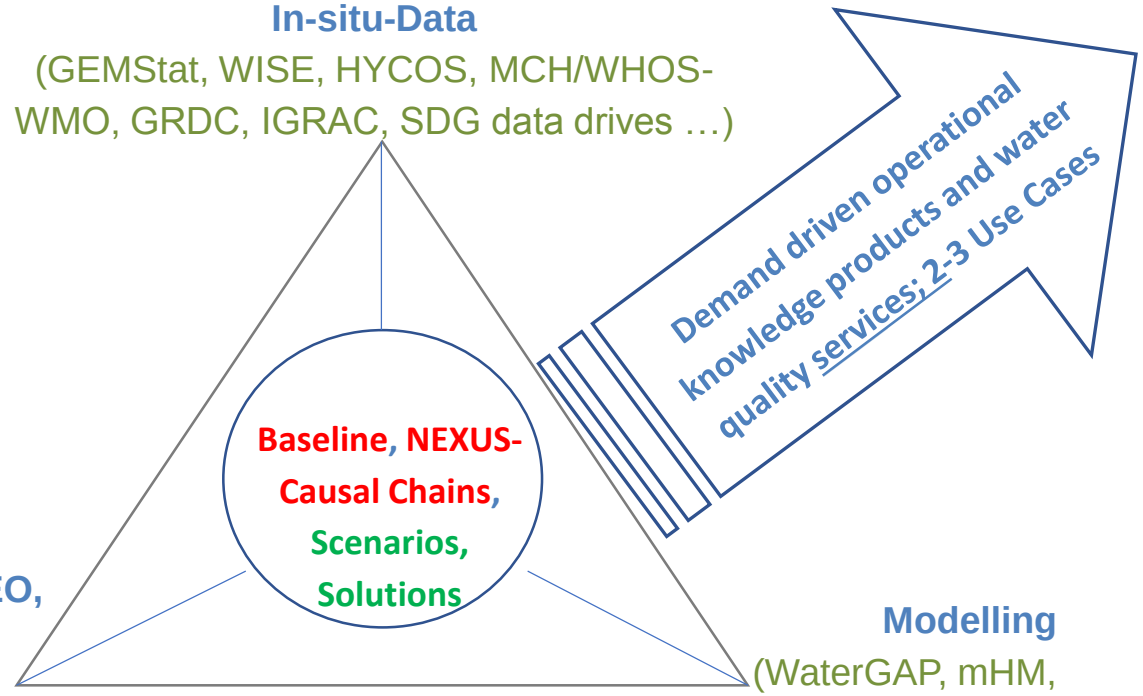
A consolidated **Baseline** linking Water Quality and Development triangular Data/Model Driven Approach – highlighting/updating **DPS-IR**

Aimed to align cases – SDG 6/GEMI – WWQA – Snapshot



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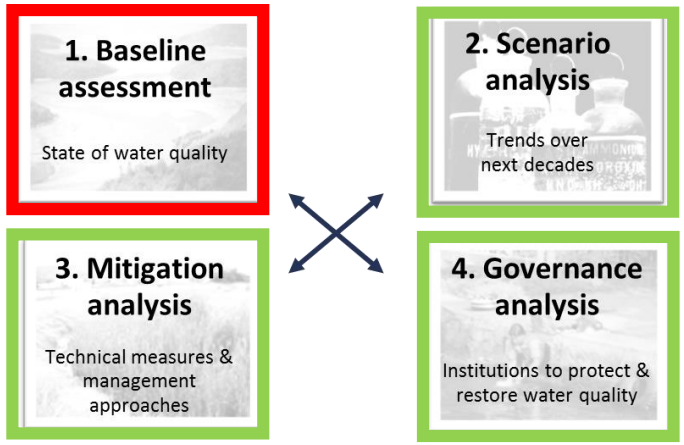

	Datenbanken (GemStat/WISE /WasserBlIcK)	Fern-erk.	Modell WaterGAP	Modell mHM	Valid. D/FE/Mod
lakes					
Como	X	X	X	X	?
Constance	X	X	X	X	?
Geneva	X	X	X	X	?
Victoria	X	X	X	-	?
Itaipu	X	X	X	-	?
Taihu	X	X	X	-	?
Poyang	-	X	X	-	?
rivers					
Elbe	X	X	X	X	?
Po	X	X	X	X	?
Mississippi	X	X	X	X	?
La Plata	X	X	X	-	?
Volta	X	X	X	-	?
Ganges	X	X	X	-	?
Selenge	X	X	X	-	?

A consolidated **Baseline** linking Water Quality and Development triangular Data/Model Driven Approach – highlighting/updating **DPS-IR**
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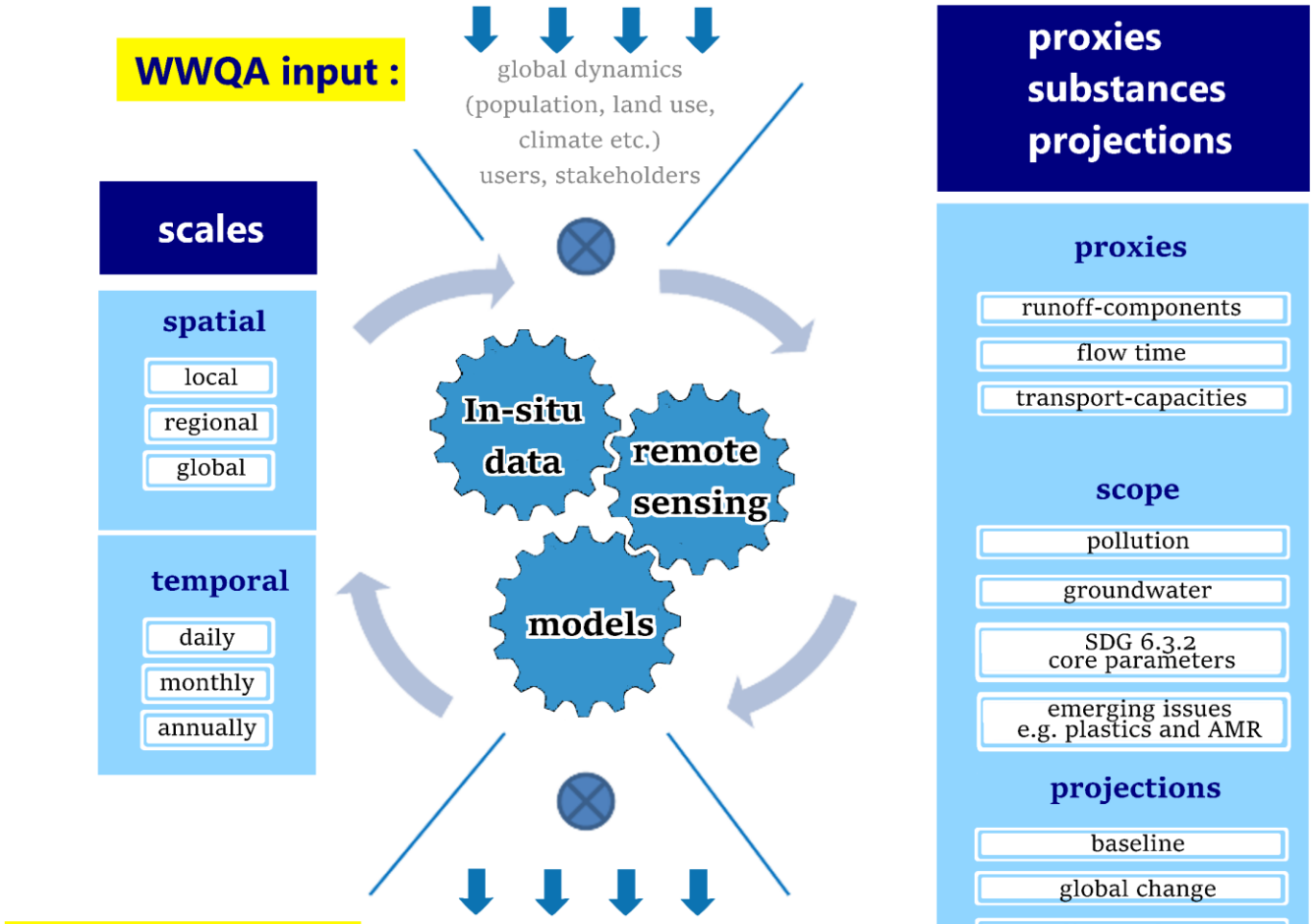


WWQA - Water Quality, Data, Assessment and Alliance Terms of Reference and Services

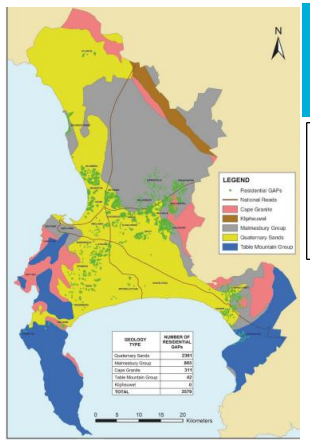
Co-designing Use Cases for Africa – a multi donor / partner pilot:

"Demand and data driven information services to national and transboundary water management“

UNEP, and key partners of the World Water Quality Alliance, follow up to UNEP/EA.3/Res.10 and **WWQA Inception**, **UNEP/WMO** Geneva 28-29 November 2018

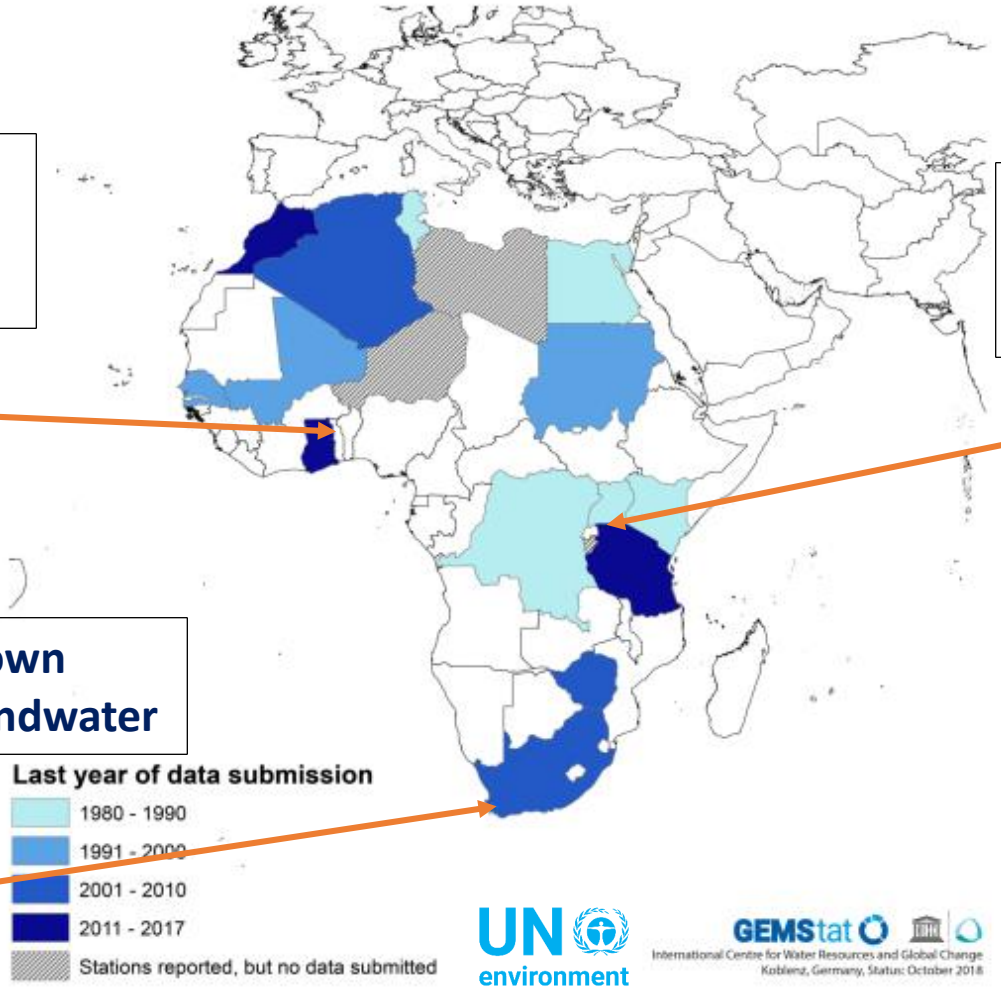
The Volta Basin (map by GLOWA)

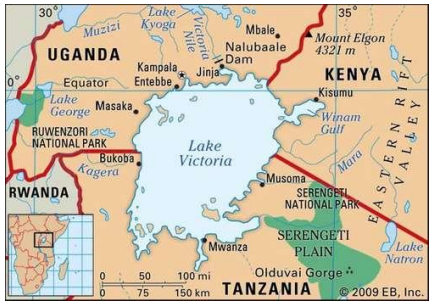
The Volta - Pathogens (Ghana)



Cape Town, Ground Water Abstraction Points – Wright & Jacobs 2016

Cape Town Urban Groundwater





Lake Victoria (Encyclopaedia Britannica)

Lake Victoria - Ecosystems (Kenya)

Work with Countries, AMCOW, Partners, Donors to:

- demonstrate the Water Quality - Alliance capacity in supporting the Agenda 2030
- identify / address the needs of national operational services and related products
- demonstrate the role of quality assured data on water quality, and the hydrological cycle
- establish a data, model and observation driven state of water quality, and
- causal chains in the water, food, health, ecosystems nexus and future scenarios

Emergence of the World Water Quality Assessment, Alliance and Service Platform - History, Status, Projectin

UNEP/EA3/Res 10

Dec 2017 – WWQA Mandate

2018 WWQA request for Expression of Interest – UN Water and external (80 approached; 50+ positive responses)

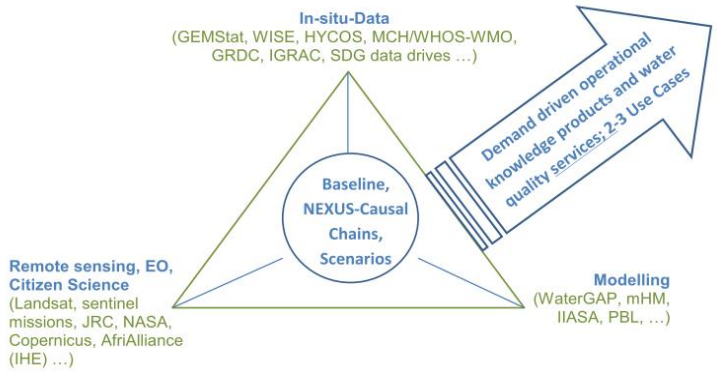
Inception WMO/UNEP, Geneva Nov 2018 – Mapping of expertise/ activities – World Water Quality Alliance is formed

9/2019 WWQA 2nd global Meeting – Joint Research Centre of the EU Com., Ispra, Italy

3 African Use Cases
WWQA ToR & Servicesheets
Co-design test 2019-20
(Volta, Victoria, Cape Town)

WWQ Alliance WGs 2019ff e.g.:
Urban Water Quality, Climate, Groundwater, Citizen Science…
Affiliation of further projects;
Continued GEMS & GEMI (SDG 6) data drives

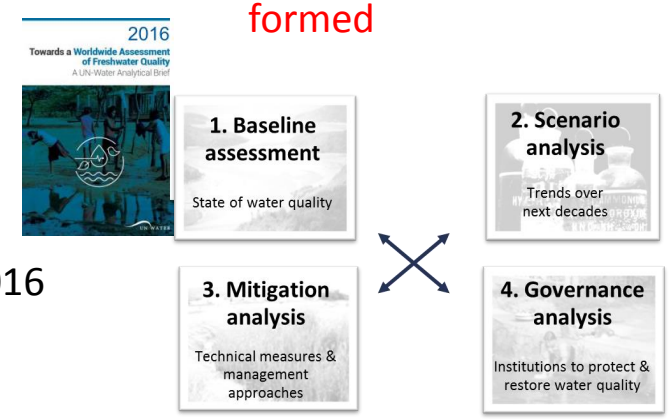
Globe WQ – DPSIR – approach (2019-22)…



Snapshot Report

& Analytical Brief

UNEP/UN Water 2016



Data Fusion Innovation approach:
Data/Remote Sensing (EO)/Modelling driven – **Water Quality Baseline – UNEA 5** & long term operationalisation in GEMS/Water; **10 + Pilot Cases – aligning Snapshot/WWQA/GEMI (SDG6)**
Platform and pilot tests in cases
Full WWQA report, scenarios, platform – UNEA 6 (2023)

UN environment

Objectives and findings of the Inception and Alliance

- Mapping current WQ activities of UN-Water Members and external experts and how these could fit in WWQA
- Overview of data sources, models, approaches and identify gaps which need to be filled in order to deliver a global assessment and future services in a long term programme approach
- Support the narrative around Water Quality and Sustainable Development in the 2030 Agenda
- Build a World Water Quality Alliance – as interacting Community of Practice - profiling ambient freshwater quality and interlinkages with other 2030 Agenda goals globally and providing innovation expertise and services

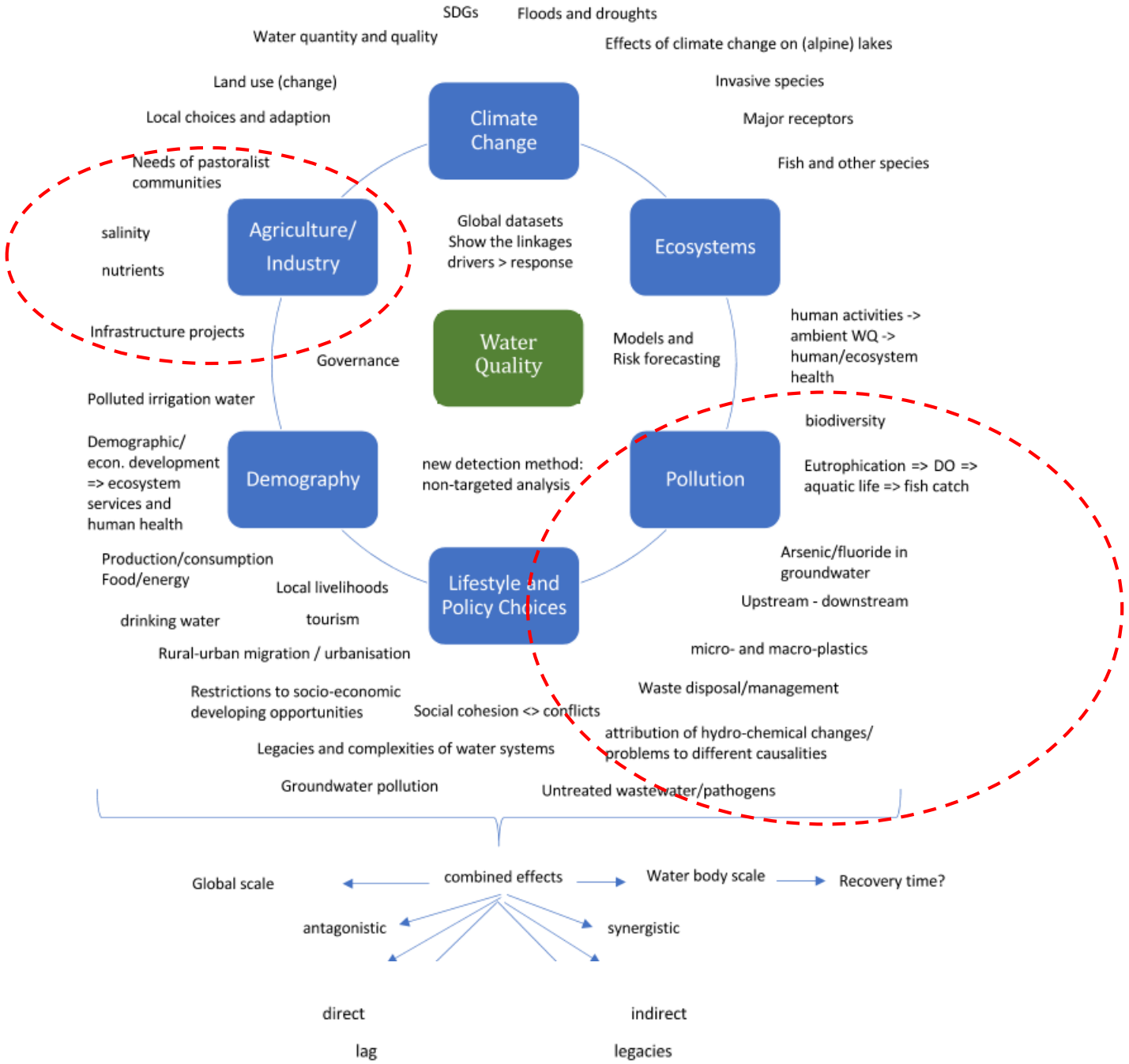
Three Working Group Nexus Themes: **WQ – health and cities; WQ and ecosystems; WQ and food**

Q1: What is your expertise/activity and what data do you have beyond GEMS to describe/contribute to the WQ baseline?	**Q2: What is following your expertise/mandate the most serious data/waterbody gap to describe the WQ baseline?**
Q3: Which kind of scenarios do you use? (specify: temporal/spatial projection and boundary conditions / drivers)	Q4: What are the most important linkages / feedbacks between pressure and impact to be assessed?
Q5: What examples you work on in terms of responses (cost-) efficient mitigation / adaptation measures?	Q6: Which operational services shall we engage with to align demand and products we can provide (policy, management and technology, can be UN)?

- The Alliance shared their expertise and possible commitment:
- Some 18 institutions engage in the health / city nexus incl. ground water aspects
- Some 16 institutions in water and food
- Some over 20 in the ecosystem health and services context

Open focal recommendations – not yet covered/funded: WQ and Cities/Groundwater WQ – Nexus/New Data/CD

Objectives and findings of the Inception and Alliance



Current WWQA Funding – Future topical focus (evolving)

- UNEP GEMS/Water — GEMStat (BMU – till 2024 (2030))
  GEMS Capacity Development (Africa/Global) – till 2020 (small scale – Ireland)

- (Integrated Monitoring Initiative (UN-Water) 2nd phase ca 200-230 K/a expected/indicator (here 6.3.2, 6.5.1, 6.6.1)

- WWQA — some 2.5 Mio have been raised in kind by various donors and also voluntary commitment to bring in funded work into the Assessment, Cases and technical work by Alliance Members

  Approved and affiliation / leveraging:
  PRIMA (EU) up to 4 Mediterranean coastal groundwater cases to be affiliated (approved)
  TRACER (Helmholtz Assoc.) – PhD college – 2times 4 years (1-2 FTEs to WWQA tasks)

Gaps: Alliance-Coordination and Working-Groups (UNEP Headquarter FTE, WWQA-WG: Groundwater, Finances and Water Investment, Data, advanced socio economic modelling, Urban WQ; ; GEMS-SDG 6 and WWQA Capacity development on monitoring and services and in WWQA incl. to define national operational service demand

WWQ-Alliance – Structure – Operations – Deliverables (currently 50+ members)

World Water Quality Alliance – Organisation and Deliverables

Global Community of Practice and Expert STI communication and agenda setting Platform on Water Quality and development

(coordination by UNEP)

TAC

(15 rotating)

SAC

(15 rotating)

World Water Quality Assessment

What: Data, Observation Model Fusion; RD – core activity;

Who: Impl. PIs + complementary contributions from Alliance members

What: Case studies (Causal Chain / Nexus);

What: Regional/National Use Cases (in country participatory process and product piloting)

Who: Impl. PIs + complementary contributions from *Alliance* members, and contractors

Agenda Setting - WQ emerging topics investigating & products

What: Expert Dialogue and Horizon Scanning of Water Quality status and persistent and emerging issues in a nexus context incl. Finance (Investment), others

Targeted Working Groups (temporary) to investigate, synthesise, communicate, advise

Who: the expert parties to the Alliance, Countries and Donors

How: Moderated UN-Water Expert Group in Water Quality and Waste Water

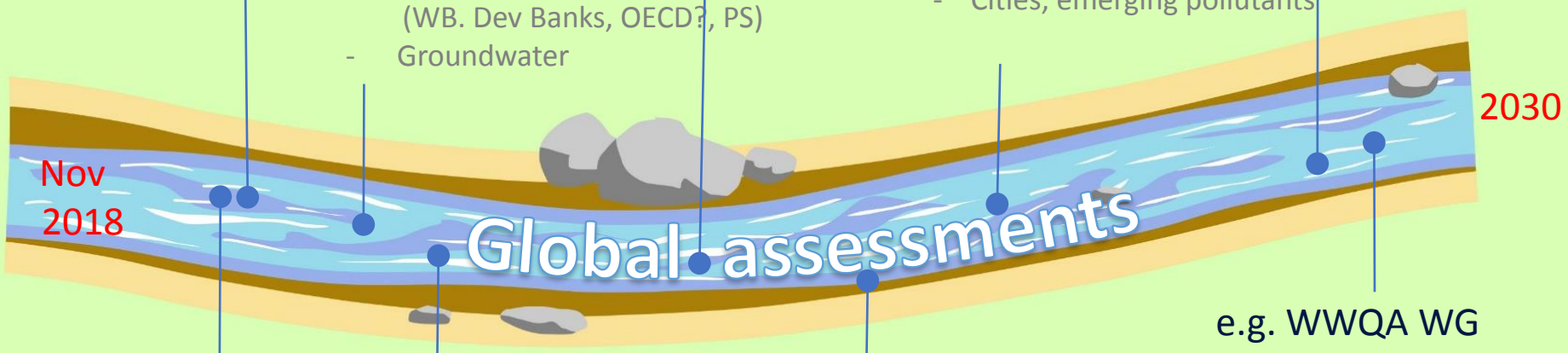
Annual meetings and Working Groups

Product: e.g. position papers, discussion platform and peer exchange – regular information flow into science policy interface processes

Piloting meaningful active involvement with Civil Society, major groups

WWQ-Alliance Annual Meeting (hosted by members (rotating)
Regular and ad hoc sessions of the **UN-Water Expert Group on Water Quality and Waste Water**

WWQ-Alliance – Summary an Timelines



WWQA commissioned study
- Microplastics in freshwater: monitoring and mitigation concepts (Sep 2019)

DEMO:
Initial Use Cases until 2021
- Volta, Victoria, Cape Town
- Added value of WWQA concept

Future WWQA WGs
- Use needs;
- Product oriented, SMART

WWQA Expert Groups e.g.
- WQ hotspots & finance (WB. Dev Banks, OECD?, PS)
- Groundwater

WWQA Expert Group e.g.
- Cities, emerging pollutants

Nov 2018

2030

WWQA meeting
- JRC Ispra Sep. 2019

Modelling (DPSIR)
- Baseline + some cases
- First Final Draft UNEA 5 March 2021

Global DPSIR Assessment
- +10 Pilots
- Full Final Report and Synthesis for UNEA 6 – March 2023

e.g. WWQA WG
- Transboundary systems and water quality

Thank YOU

Looking forward to fruitful collaboration with National Water Quality Monitoring Council

UN environment