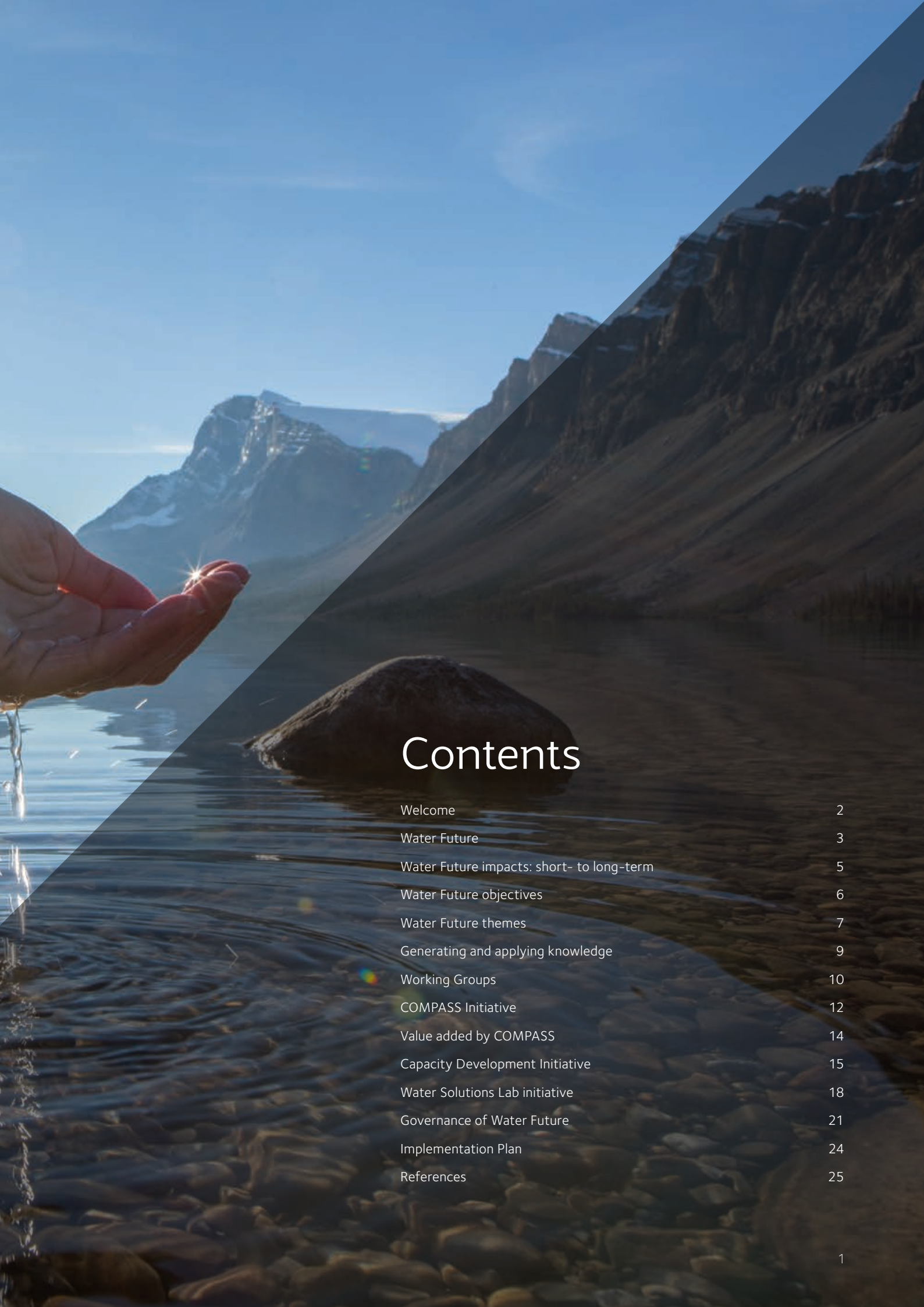
waterfuture

Sustainable Water Future Programme

Prospectus **2018**

The Sustainable Water Future Programme (Water Future) is a global platform facilitating international scientific collaboration through its partnerships with a large number of researchers and stakeholders. Its objective is to work together to harvest and synthesise authoritative, sound and a scientific knowledge base to achieve the Sustainable Development priorities associated with water.



Contents

Welcome

'Access to safe water and sanitation and sound management of freshwater ecosystems are essential to human health and to environmental sustainability and economic prosperity.'

Sustainable Development Goal (SDG) #6

Effective development of concrete actions and to tackle the world's water problems requires the uptake and application of knowledge through partnership and collaboration. The Sustainable Water Future Programme (Water Future), was established as a global science body under Future Earth Programme of the International Council for Science (ICSU) to facilitate international collaboration to inform and drive solutions and policy to address world's water problem and support the implementation of the goals set out by the United Nation's 2030 Agenda for Sustainable Development.

To 'ensure availability and sustainable management of water and sanitation for all' (SDG 6) require partnerships across Governments, Intergovernmental, Development organisations, Foundations, and the private sector. Water Future aims to support this through integrating research, stimulating innovation, and building capacity.

The value of evidence-based science is recognised as a key to underpinning the implementation and monitoring of goals for sustainable development and achieve the necessary international engagement and support for the successful implementation of Water Future.

We invite you to read through this document to become familiar with Water Future's objectives, initiatives, governing and operational structures and consider the benefits and strengths of becoming a partner in the Sustainable Water Future Programme.

Andras Szollosi-Nagy
Chair, Water Future

Anik Bhaduri
Director, Water Future

Water Future

The world's water problems are accelerating in scale and intensity, both locally and globally.

Water Systems are recognised as a critical component in securing food and energy security and supporting global health and development initiatives, such as the United Nations 2030 Agenda for Sustainable Development.

The Sustainable Water Future Programme (Water Future) seeks to support a balance between the needs of humankind and the needs of nature, recognising the interdependence of the two. Through its activities, Water Future takes a solutions-oriented approach, seeking to translate scientific research into actionable knowledge for the environmental planning, policy and management communities. It brings a unique, systems-level perspective to develop integrated approaches for both diagnosing water-related challenges and crafting innovative solutions.

The strength of the Water Future lies in its extensive, coordinated network of some of the world's leading water scientists, social scientists and practitioners, who will provide leadership and undertake the bulk of the initiatives of the programme. The integrative, inter- and trans-disciplinary Water Future programme addresses science, engineering, governance and management issues. This broad programme scope serves as an incubator, network hub and translator of scientific findings for science-policy dialogues. For example, Water Future will serve as a "testbed" for developing, testing and monitoring integrated methodologies, and will establish a future-oriented knowledge synthesis and assessment process on the state of global water resources.

Water Future offers an innovative combination of scientific knowledge and information technology that brings together advances to detect, evaluate and report on existing, imminent, and emerging water resource challenges around the world in a real-time framework at global and sub-global level (regional, nation, basin, and catchment). Tangible outputs will include the continuously updated Water State Index, Medium Term Water Trend, Business Intelligence Report, Six-Month Water Outlook, Annual State of Resource Report Cards, Sustainable Development Goal (SDG) Report Card, and other outputs across a range of thematic areas in the water domain. The content of these outputs will be co-developed by knowledge generators and knowledge implementers.

Over the next 12 months, Water Future will progressively develop its governance structures, regional and country nodes, funding and collaborative partnerships, as well as initiate a series of projects. At this juncture, Water Future is seeking international collaboration and funding support from National Governments, Intergovernmental and Development organisations, Foundations, and Private Sector, in order to successfully coordinate and implement its different initiatives.

Water Future is the central water activity under Future Earth, an international research platform driving global environmental change. As part of Future Earth, Water Future is supported by the International Council for Science, the International Social Science Council, the Belmont Forum of funding agencies, the United Nations Educational, Scientific and Cultural Organization, the United Nations Environment Protection Programme, the United Nations University, and the World Meteorological Organization.

Water Future builds on more than 10 years of work through the Global Water System Project (**GWSP**). **GWSP** began in 2004 as a joint project of the Earth System Science Partnership (ESSP) and sponsored by the International Council for Science (ICSU), and its four Global Environmental Change (GEC) programmes, the International Human Dimensions of Global Environmental Change Programme (IHDP), DIVERSITAS, the International Geosphere-Biosphere Programme (IGBP), and the World Climate Research Programme (WCRP).

The ratification of the United Nations 2030 Agenda for Sustainable Development and the SDGs, demands the introduction of a process to systematically harvest and test the value of the vast and continuously growing store of information within the water policy and management domains.

Knowledge synthesis and assessment process in partnership with the global water science community provides the opportunity for Water Future to integrate science and policy to co-design and co-produce solutions with a high level of legitimacy in both sectors.

Reliable information on interlinkages and the identification of patterns across multiple studies will be generated, providing a state-of-the-art scientific synthesis of freshwater-related knowledge that is targeted to the needs of stakeholders. This knowledge will cover a broad spectrum of challenges including *optimal governance for particular regions and locals*, and at the global scale; *watershed risk and protection; wastewater reuse; urban water management*; and, *achieving a balance between water allocations for humans and nature*. As well as documenting global-scale trajectories (e.g., aquatic habitat extent and biodiversity), and ranking of activities according to the urgency of the threat and/or its location (e.g., drought-related groundwater stress).

This will form the basis of comprehensive reporting on global water governance which can be used to diagnose water challenges, guide water policy reform, and assess and support good governance. Activities will be theme-based and result in a series of peer-reviewed products summarised succinctly for use by policymakers.

> *'Water is the life-blood of our planet: it is vital for human life and public health; grows our food that we eat; nurtures the environment that sustains our planet, and flows through and connects the economies we depend on.'*
>
> **Joint Statement of the High Level Panel on Water, September, 2016**

Water Future impacts: short- to long-term

The intended impacts of Water Future span multiple horizons—short-, medium- and long-term.

Following the "Theory of Change" Water Future incorporates the drivers of change, timescale and impediments to implementation, based on the premise that change happens with the influence of compelling and evidence-based research and advocacy. The ultimate success of any Theory of Change lies in its ability to demonstrate progress on the achievement of outcomes. Water Future will periodically review its activities, and achievements to ensure its broader societal impact.

Figure 1: Assessing the potential impacts of Water Future following the Theory of Change

Drivers			*Impacts*
Socio-Economic, political, technological factors	**Long term lasting changes (beyond 3 years)**	Enable governments, businesses, and individuals to act before emergency situations develop, underdeveloped and developing countries develop their own capacity to train the next generation of assessment practitioners, reduces the transaction cost that is normally incurred in the diffusion process of innovation	Changes in practices, policies, and attitude of users after incorporating result of the products
Continuous products over multiple time frames, transparency and traceability	**Medium term changes (more than 3 years)** Sphere of indirect influence on policy makers, knowledge network, practitioners	Track SDG progress and understand the effects of implementation on sustainability, foster new and adaptive planning and water system design principles through advanced capacity development in understanding, assessing water security risk, support the development and diffusion of local innovations by managing the flow of knowledge between projects at a global level	Changes in knowledge, skills induced by change agents
Co-generation of knowledge with imp. change agents in policy and business community	**Short term changes (1–2 years)** Sphere of direct influence to partners, donor countries	Identify impending water stress, identify risks for involuntary mass displacement, and hotspots from adverse economic impacs, understand some inherent linkages in the SDG target, generate awareness about water security in water scarce regions, train water assessment practitioners for formulating policies and tracking progress on the Agenda 2030 and SDG, production of Water Solution reports	Use of products by main actors
State of the art science network, resources and skills, co-design of products with policy and business community	**Ongoing programme strategy** Activities, stakeholder engagement, outputs	**Key outputs:** Water State Index, Business Intelligence Report, a conflict potential index, SDG Report Card, risk maps for water dependent sectors, water governance indicators, identify capacity development gaps, advance training + expanding network + active outreach	Engagement of stakeholders

Water Future objectives

To effectively take knowledge and develop concrete actions to tackle the world's water problems requires the production and application of knowledge.

To achieve this, Water Future will:

CONDUCT INNOVATIVE RESEARCH AND KNOWLEDGE SYNTHESIS

Water science has a strong tradition of local and regional assessment, but the global picture is lacking. Water Future seeks to "reposition the vantage point through which we can monitor and understand water" (Vörösmarty, Pahl-Wostl, Bunn, & Lawford, 2013) by conducting innovative and integrated research and knowledge synthesis to harvest our vast and growing store of water science, policy and management information.

STIMULATE INNOVATION IN WATER INSTITUTIONS WITH A BALANCE OF TECHNICAL-, ECOSYSTEM- AND GOVERNANCE-BASED SOLUTIONS

Find solutions through industry and government collaboration that promote interaction between students, researchers, entrepreneurs and community members through our Water Solutions Laboratory Network.

FUTURE-PROOF OUR WATER SYSTEM THROUGH A COMPREHENSIVE ASSESSMENT OF OUR GLOBAL WATER SYSTEM

Future-proof our water systems through a full scientific risk assessment of our global water system that focuses on the competing demands of the water, food and energy to meet the Sustainable Development Goals.

BUILD CAPACITY AND NURTURE THE NEXT GENERATION OF WATER SCIENTISTS AND PRACTITIONERS

Inform policymaking by facilitating a dialogue between scientists, policy-makers, water managers and community members, and building the capacity of students and young water professionals.

Water Future themes

Water Future is organised into three major thematic areas that resonate with a more solution- and action-oriented approach.

Water Future pursues its objectives and undertakes activities through the lens of three key water themes:

i. The global state of water

ii. Water as an agent of change

iii. Transformation to a sustainable water future[1]

i. THE GLOBAL STATE OF WATER

Despite more than a decade of substantial water-related research outcomes (e.g., through the Global Water System Project and several intergovernmental water programmes) and assessment (e.g., UN World Water Development Series), to date there is no formal compendium of integrated, distilled, global knowledge on the state of water that can allow countries to tackle macro-level water challenges.

Whilst climate scientists and allied researchers in the Intergovernmental Panel on Climate Change (IPCC) have been successful in bringing together comprehensive global summaries on the state of climate change through their series of Assessment Reports; no similar series is available for the global state of water. Nor has there been the same level of coordination of people and resources in global water assessments equivalent to the IPCC.

Water Future will develop conceptual and methodological innovations to improve practical analysis and diagnostic capabilities and assess the risk to humans and the global water system through appropriate risk-related metrics.

ii. WATER AS AN AGENT OF CHANGE

Climate change, population growth and changes in land use patterns influence the hydrological cycle, water-related services and risks, with wide-ranging implications for humans and the environment. Therefore, sustainable management of water resources in the context of the full hydrological cycle is a necessary part of achieving sustainable development (as defined by the targets in the United Nations SDGs).

Water is a major agent of global change; it can both enhance and detract from achieving sustainable development goals as crucial part of the SDG system.

The current state of water resources is therefore both a threat and an opportunity, and the trajectory of the resource is critical.

This theme addresses the interlinkages between water management, policy and governance for better understanding the linkages inherent in the targets contained in the SDGs, particularly for SDG6.

Under this theme, different water solutions will be evaluated to account for both the positive contributions to some targets and the potential adverse impacts on others spatially and demographically distinct; equity issues will be addressed as part of the project evaluation.

iii. TRANSFORMATION TO A SUSTAINABLE WATER FUTURE

The implementation of the ambitious SDGs poses considerable challenges to water governance. Many water-related problems arise from inadequate water governance, irrespectively of whether physical water scarcity is prevalent or not. Comprehensive information, improved technologies and legislation at different levels, even in developed countries, do not guarantee that problems like diffuse nutrient pollution can be solved. The persistence of such problems suggests that in many cases there are no simple technical, economic or regulatory solutions to these problems and that innovative approaches to the governance of such complex problems, influenced by many stakeholders and changing global environmental conditions, must be developed instead. Water Future, through its Water Governance Initiative, aims to create a framework that supports:

1. Development of water governance indicators to assess the effectiveness and degree of achievement towards integrated and adaptive water management in the context of SDG implementation.
2. Development of a comprehensive diagnostic toolbox that will analyse the influence of factors (governance system, context) supporting or hindering cooperation and coordination on the effectiveness of integrated and adaptive water management for SDG implementation at various scales.

[1] **Note:** The themes approximate to 'phases' of the Water Future programme, but should not be considered prescriptive in their nature nor determine the sequencing of the work and operations of Working Groups.

Table 1: Major research areas that will guide the work of Water Future Working Groups

The global state of water

- Understand the connectivity across physical, chemical, biological, and human dimensions of the water cycle.
- Develop holistic understanding of ground- and surface-water interactions.
- Assess humans' impact on the global water system.
- Assess urban water systems subject to rapid urbanisation.
- Evaluate the impact of agro-ecosystems, which must support the additional 2 to 4 billion people on Earth.
- Setting planetary boundaries for water, analysing water-related thresholds of potential concern and social-ecological interactions in the Earth system.
- Risk assessment related to the achievement of the 'water Sustainable Development Goal' (SDG6).
- Define the interlinkages, synergies and impacts between strategies and policies in achieving the SDGs.
- Evaluate impact of the Sustainable Development Goals on the global and regionals water systems of the planet.

Water as an agent of change

- Assess water's fundamental role in sustaining functional socio-ecological systems.
- Analyse water transmitting impacts of global change across scales.
- Analyse the role of water for societal development.
- Reframe dealing with uncertainty towards robust, no-regrets strategies and design of resilient systems.
- Develop strategies for water driving sectoral integration: the water-energy-food nexus.
- Develop and support water innovation and green infrastructure potential.
- Analyse economic factors influencing the availability and quality of water across the energy-food-water nexus.

Transformation to a sustainable water future

- Identify regime shifts and tipping points in freshwater ecosystems.
- Investigate appropriate institutional structures for preparedness.
- Develop strategies to balance patterns of scarcity and excess of water.
- Support participation and equity in decision-making processes.
- Develop strategies to balance human water security and environmental health.
- Analyse effectiveness of science-policy link, particularly regarding pro-poor policies.
- Develop future water scenarios and assess trajectories towards a sustainable water future.
- Support design, implementation and evaluation of water governance settings at different levels.
- Analyse change in and role of values and beliefs on water governance.
- Analyse different conditions for effectiveness implementation of water market and other innovative financing mechanisms.

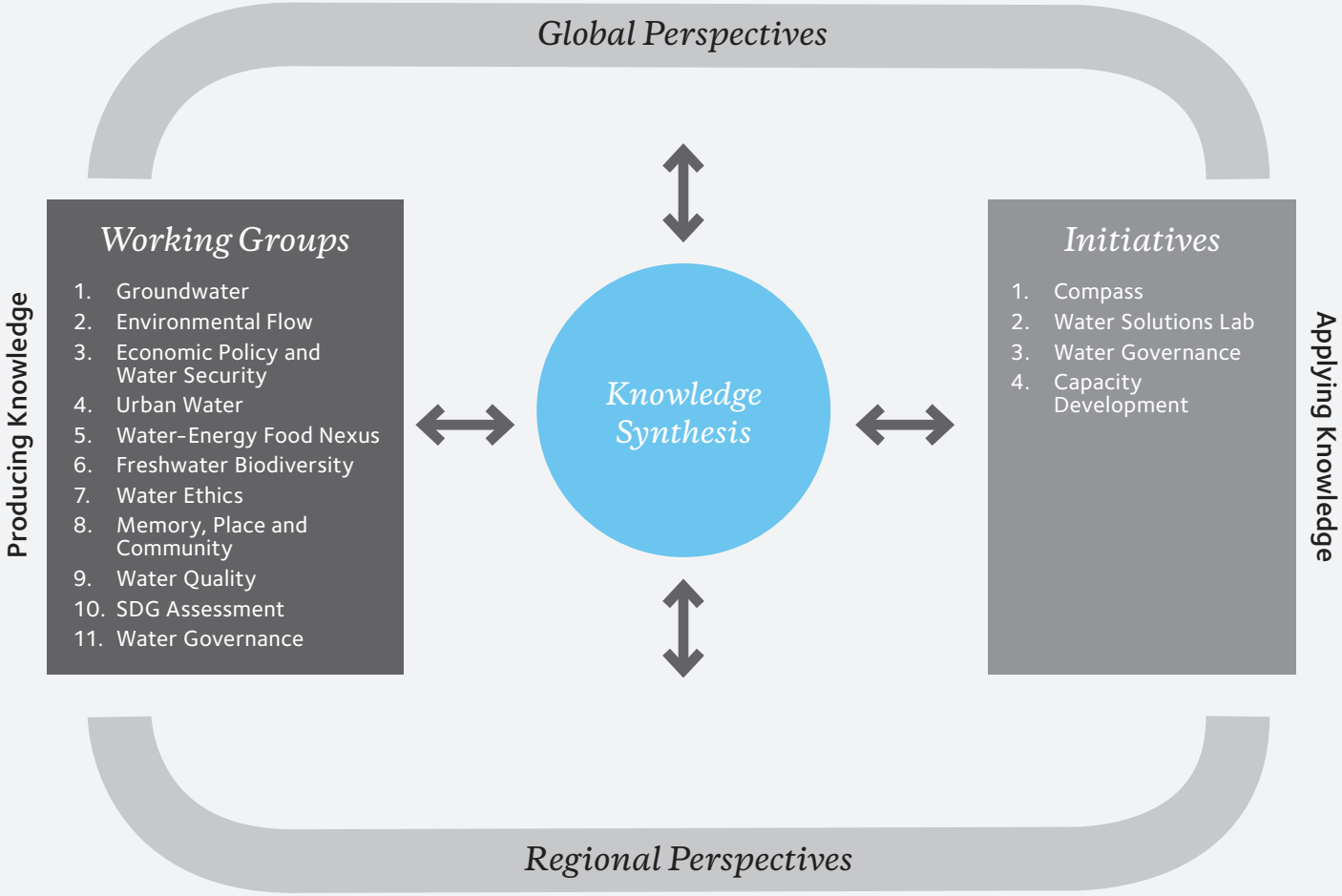
Generating and applying knowledge

The Water Future community contributes towards the programme objectives as knowledge generators and knowledge implementers.

Water Future connects activities that have clear scientific research goals (generators) and those that put the knowledge into practice, either in the field, governance or management or in science-policy dialogue (implementers). This is done through knowledge synthesis which supports creating cutting-edge water science, synthesising across disciplines in water research, and providing knowledge to leading global non-government organisations that have the expertise in programme and project delivery.

Figure 3 illustrates the process of synthesising results from different Working Groups and interpreting and applying their results within the global and regional context of different initiatives. In such a Knowledge Synthesis 'Collaboratory', the synthesis will take place at two levels. The first will involve each of thematic topic s(representing Working Groups) based on a series of policy objective questions (global as well as regional) while the second will be at a level which may require cross-thematic knowledge. The overall knowledge synthesis will be composite product combining both kinds of synthesis. The following sections describe the Working Groups and the key initiatives.

Figure 3: Knowledge Synthesis 'Collaboratory' of Water Future



Working Groups

Water Future has formed several working groups to tackle different thematic areas.

At the moment, these Working Groups comprise nearly 450 of the world's leading water researchers, natural scientists, social scientists, historians and ethicists.

These Working Groups provide the backbone to the programme and are responsible for pursuing key research questions in each thematic area. The Working Groups are responsible for the bulk of the outputs (such as research papers, journal articles, reports, etc.) of the Water Future programme. They also contribute to each key initiative of Water Future, for instance, the comprehensive water assessment (COMPASS) initiative and the Water Solutions Lab Network (see below for details).

The Working Groups develop research strategies and activities in accordance with Water Future's agenda and address thematic aspects of the programme's agenda by running activities that result in integrated research and synthesis products.

Water Future engage relevant stakeholders in their activities (co-design and co-production) from policy development, government agencies, and non-governmental organisations including business groups and non-profits, and other representatives of civil society to facilitate the development and transfer of knowledge from Working groups to the implementation of the initiatives.

The following Working Groups have so far been established under Water Future.

> *'These Working Groups provide the backbone to the programme.'*

CORE GROUPS

Data Observation Core Group—provision of advisory services on the data, products and information needed for water research and assessment programme.

Sustainable Development Goals Assessment Core Group—assess the spatial and temporal synergies and trade-offs between water, energy and agricultural sectors in achievement of the UN 2030 Agenda for Sustainable Development Goals.

Water Governance Core Group—conduct research and synthesise insights on water governance theories and practice.

WORKING GROUPS

Economic Instruments of Water Security Working Group—assessment of socio-economic performance of strategies for enhancing water security using market-based policy instruments.

Environmental Flows Working Group—research and assessment into finding robust approaches to safeguard river health, biodiversity and human livelihoods.

Freshwater Biodiversity Working Group—examination of the relationship between flow alteration and species extinctions and vulnerability on a global scale.

Groundwater Management Working Group—assessment of the risks associated with overuse of groundwater, the contamination and collapse of ecosystems and socio-ecologies dependent on groundwater.

Memory, Place, Community in the Global Water System Working Group—creation of experimental and interactive experiences to transform knowledge, attitudes, practices, and values about water and related global environmental systems.

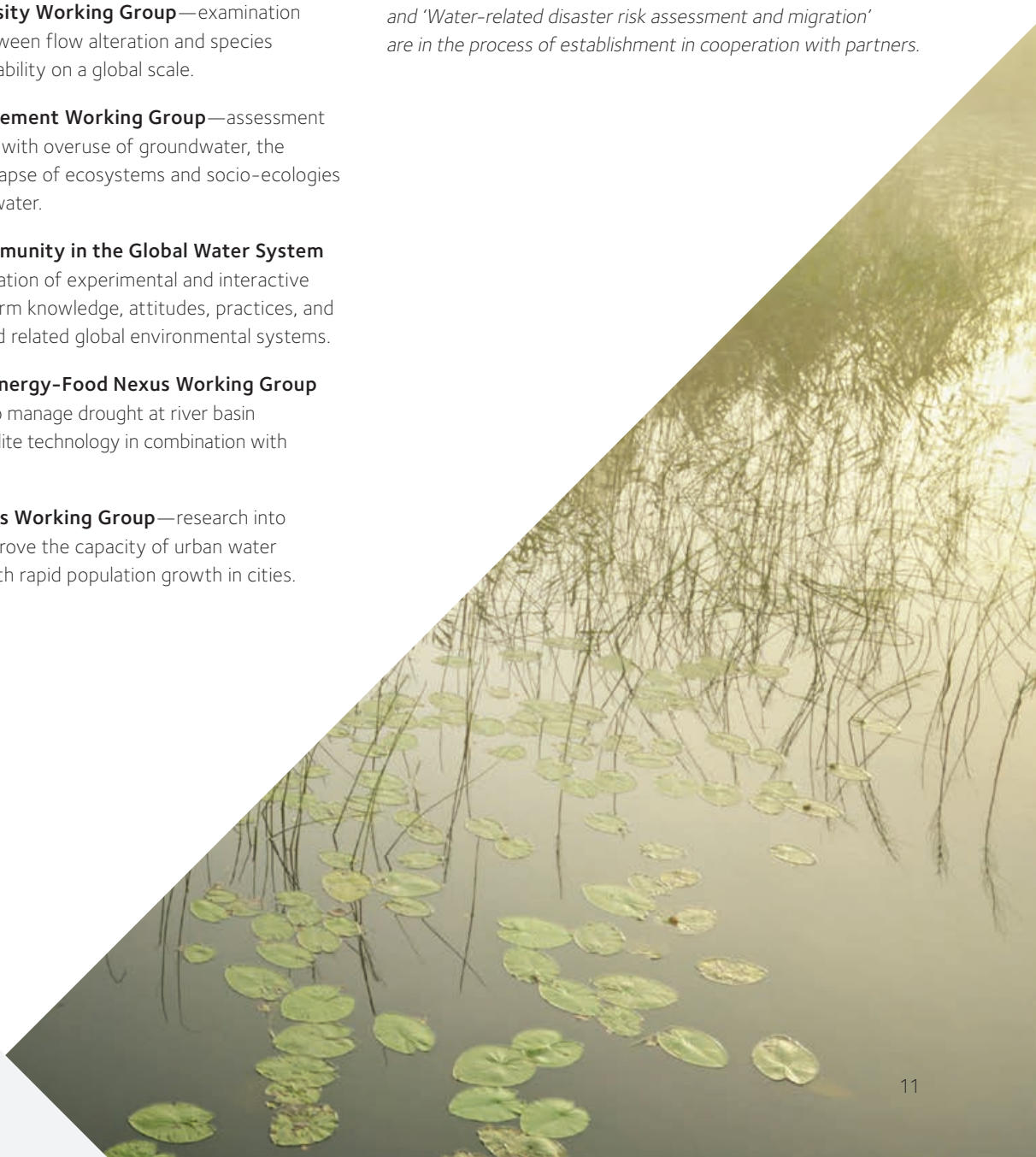
Sustainable Water-Energy-Food Nexus Working Group—devising pathways to manage drought at river basin scale better using satellite technology in combination with local knowledge.

Urban Water Systems Working Group—research into addressing how to improve the capacity of urban water systems to keep up with rapid population growth in cities.

Water Ethics Working Group—the exploration, definition, and establishment of the field of "water ethics" as a body of theory, a research agenda, and methods and strategies for implementation.

Water Quality Working Group—provision of a science-policy-practice platform to formulate and co-design research questions on the global state of water quality.

Note: *Additional Working Groups like 'Climate change and water', 'Water, sanitation and health', 'Transboundary Water' and 'Water-related disaster risk assessment and migration' are in the process of establishment in cooperation with partners.*



COMPASS Initiative

Water Future activities include a number of key initiatives, each of which aligns with, and seeks to contribute to, the programme objectives.

One of the key initiatives that Water Future, along with other partners including UNESCO's International Hydrological Programme and the World Water Assessment Programme, are currently designing is a comprehensive assessment (COMPASS) toolbox for near real time water resource assessments and SDG reporting.

COMPASS is an innovative combination of scientific knowledge and information technology that brings together advances in water science to detect, evaluate and report on existing, imminent, and emerging water resource challenges around the world in a real-time framework at global and sub-global level (regional, nation, basin, and catchment). It will forecast emerging water stress and identify risks for involuntary population displacement, and hotspots from adverse economic impacts in a real-time framework. A regular, consistent assessment function that provides rigorous, systematic, timely comprehensive assessments on a global basis would be a major contribution by the science community, supporting anticipatory planning at all levels of government, a basis for investment and policy decisions related to water. Such dynamic real-time assessment toolbox is an unprecedented step from the science and digital information community to assist decision and policy makers at different scales in real time, and helps to maximise the impact of their policies and decisions.

COMPASS Products (Figure 4) are being designed to produce indicators and indices merging the latest satellite data with model outputs, in-situ observations, and socio-economic information and citizen science data resources to produce continuously updated monthly assessments. (For details about the products see Brochure)

COMPASS can be used for infrastructure planning for domestic, industrial, and agricultural water use; for monitoring progress on UN Sustainable Development Goal implementation; and for identifying business opportunities and risks in water-related sectors.

COMPASS contributes directly to the disaster risk management and implementation of Sendai framework and plays an important role in SDG implementation, and monitoring. It also addresses Global Water Agenda of the High-Level Panel on Water (HLPW) convened by the United Nations Secretary-General and the World Bank Group President through contributing directly to following priority actions items of the HLPW Action. (For details about the objectives see the COMPASS Brochure).

> *'The next decade of research should be directed towards motivating a transition from knowledge-to-concrete action, and to find solutions through the co-production of knowledge.'*
>
> **Pahl-Wostl, Vörösmarty, Bhaduri, Bogardi, Rockström, & Alcamo, 2013**

Figure 4: Key compass products

Water State Index

Medium-term water trend

Business intelligence report

Annual state of resource report cards

Six months water outlook

SDG report cards

KEY BENEFITS TO DONORS COUNTRIES AND ORGANISATIONS

- Water analytics on emerging investment opportunities, risk maps for water-dependent sectors, and opportunities for innovative water technologies.
- Country-level synthesis of contemporary spatial patterns, trends, and extreme weather-related events with expert interpretations.
- A short-term forecast of emerging conditions to enable identification of impending water stress, which will be invaluable to emergency planners, business, and agricultural practitioners.
- National, regional, and continental-scale assessments on SDG progress using standardised metrics and data collection protocols.
- Continuous monitoring support to countries for priority-setting and effective policy decisions designed to accelerate achievement of the SDGs, particularly SDG 6 on water.

Value added by COMPASS

Improved fidelity of global resource inventories

Better manage water resources (quantity and quality) at global, regional, and national scales.

Early identification

Pinpoint emerging hotspots to enable governments, businesses, and individuals to act before emergency situations develop.

Water intelligence

Create a water intelligence data repository to identify emerging business opportunities.

Monitor progress

Support national governments and international bodies in tracking SDG progress and implementation.

State-of-the-art for timeliness

Use advanced science, observations, models, and technologies that form the basis of strategic, advisory, and consultative services.

Technology support

Improve the technical capacity of developing countries to manage their strategic water resources.

Identify new opportunities

Lead dialogue on emerging research, exposing the importance of water science to the highest levels of government to inform critical decision-making.

COMPASS contributes directly to the disaster risk management and implementation of Sendai framework and plays an important role in SDG implementation, and monitoring.

Capacity Development Initiative

Over the past decades, 'science' has advanced significantly in understanding the complexities of the water sector, and in developing management strategies and engineering solutions which can lead to significant improvements in water resources and management practices.

However, while decision making in policy and practice should be informed by scientific advances, implementation is often based on outdated knowledge with suboptimal practices. A reason for these suboptimal decisions and gaps is that science and practice are not sufficiently connected, and the information flow between these two domains is not (cost-) effective.

The Water Future Capacity Development Initiative aims at improving the knowledge flow from science to practice. As the success of sustainable development in the water sector is measured by real-world improvements, the transfer of scientific advances into practice requires significantly more attention. Bringing the scientific advances to application faster, and achieving 'smarter' decision making in policy and practice, however, also requires capacity development that puts much stronger emphasis on the needs of policymakers and practitioners. This is where the Water Future Capacity Development Initiative directly addresses this issue.

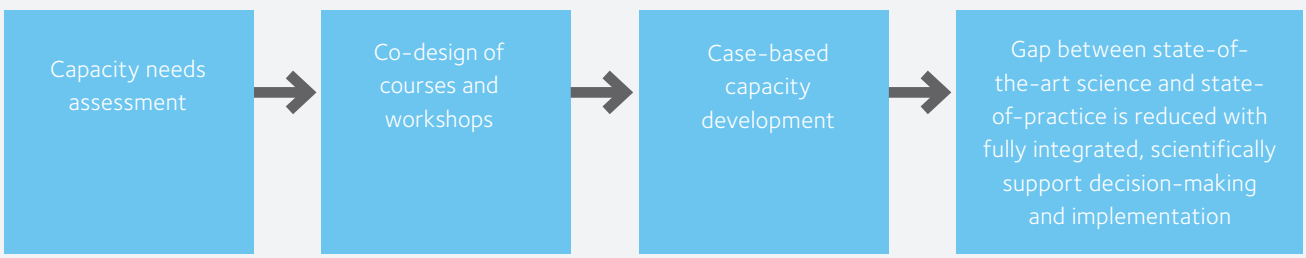
KEY ADVANTAGES OF A WATER FUTURE CAPACITY DEVELOPMENT INITIATIVE

- Teaching by world-class water experts from science and the policy domain.
- Practical, case-based courses, uniquely designed to understand issues, potential impacts, and identifying solutions.
- Opportunity for professional networking and to connect with state-of-the-art Water Future initiatives such as COMPASS.

WATER FUTURE'S CAPACITY DEVELOPMENT PROCESS

Water Future Capacity Development is framed according to an impact chain model. A key element is the need assessment that identifies capacity gaps of implementers. Bringing scientific advances into practice requires more than just the transfer of the scientific knowledge. The capacity development activities have a strong focus on case studies and implementation. The training courses and workshops are co-designed considering a two-way communication between scientists and practitioners in their development.

Figure 5: Water Future capacity development process



TARGET AUDIENCE

Water Future provides tailored capacity development for policy-makers, practitioners, institutions and science/academia.

The Water Future Capacity Development Initiative

The Water Future Capacity Development Initiative operates at two levels. At the individual level, the focus is on strengthening the disciplinary and transdisciplinary expertise of both practitioners and students. Developing their understanding of complex water systems will support them in effectively assessing potential developments and in generating science-based decision alternatives to the existing practice.

For those individuals active in 'real world' implementation of policies and solutions, the focus will be on a stronger science and evidence-based policy and practice. Therefore those in policy and practice will learn how to incorporate scientific knowledge into their decisions best, leading to more effective science-policy interactions.

A secondary focus is on the better connection of science with the world of practice leading to highly effective implementation to improve water resources. This mainly targets individuals from academia, from students to senior academics, in close exchange with practitioners, and aims at shifting the focus from pure academic outputs to real-life outcomes and impacts.

At the institutional/systemic level, the Initiative will particularly target institutional change agents and strengthen the capacities and skills of those who are interested, able and positioned to effect change through science-based policy development and the transfer and implementation of up-to-date scientific knowledge in practice. The main focus is to train a new generation of water scientists and practitioners, on key water resource challenges, making the most of the best state-of-the-art science, technology and water assessment tools. Further, institutions will learn to identify their own capacity gaps, to identify and involve key stakeholders who are involved in decision-making, and eventually, to carry out their own capacity development activities, to achieve a multiplier effect, particularly in developing countries and economies in transition.

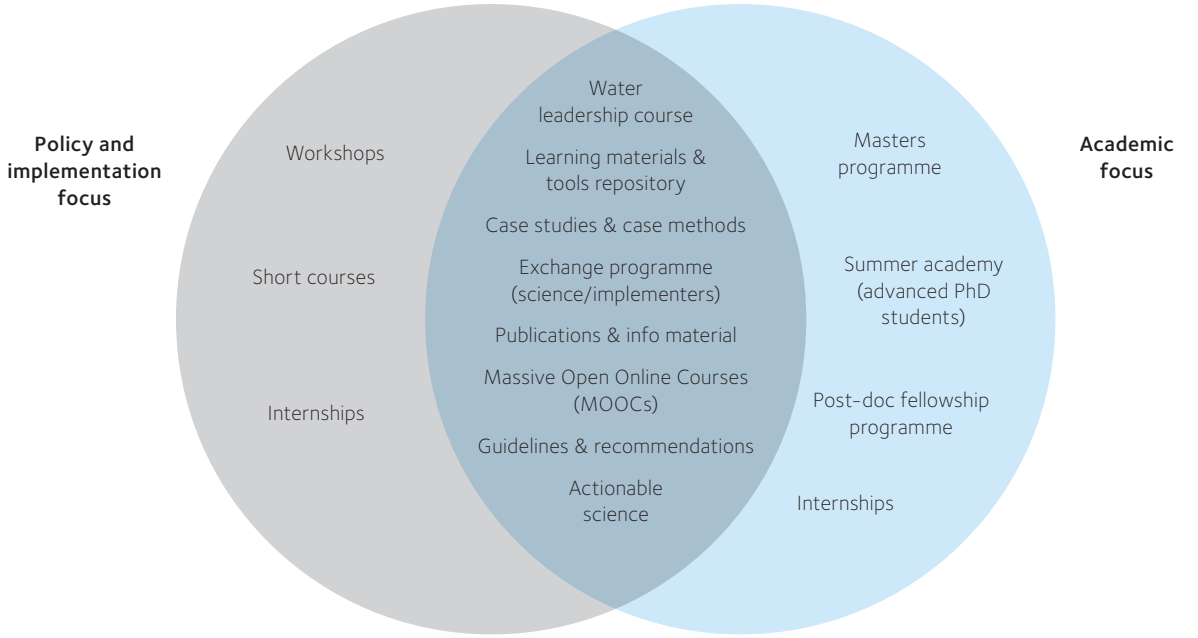
ACTIVITIES

Building on the Water Future Working Groups, and in cooperation with the Water Future Compass Initiative and the Water Solutions Lab, the Water Future Capacity Development Initiative will include:

- capacity needs assessment by identifying key capacity gaps between science and practice
- building, connecting and sharing transdisciplinary knowledge by facilitating exchange at conferences, through publications and online
- developing capacity through courses and workshops targeted to specific audiences, developed through co-design mechanisms.

The implementation of the capacity development activities will focus on the interface of academia and the world of practice to ensure better exchange between these two domains. Some activities of the Water Future Capacity Development Initiative are indicated in Figure 6.

Figure 6: Planned capacity development activities



United Nations University and Water Future and other partners are currently developing a knowledge-based, online capacity development course on Global Water Security.

The capacity development initiative on Global Water Security course is a response to the growing need to understand the complexities of water security. As water security becomes a mainstream concept, it will be increasingly important to educate water-related professionals and public servants with information and activities that they can use to achieve water security.

The course will provide a general and international approach to the ongoing issue of water security. The overarching goal of the course is to educate professionals on the processes and conditions needed for safe, secure, sustainable and sufficient water for community development.

KEY BENEFITS TO DONORS COUNTRIES AND ORGANISATIONS

- Secure technical and facilitation support for the participating donors with a high degree of prior professional readiness.
- A training and certification program for water assessment practitioners for formulating policies and tracking progress on the Agenda 2030 and Sustainable Development Goals.
- Foster new and adaptive planning and water system design principles through advanced capacity development in understanding, assessing water security risk.
- Expand capacity development activities, active outreach and awareness about water security in regions that suits the interest of the donor countries.

Water Solutions Lab initiative

Currently, many water initiatives exist and address water challenges from multiple perspectives.

Despite these various efforts, it is beyond any doubt that water-related sustainable development requires further accelerated technological, social and institutional innovation. The increasing demand for the drastic reduction of environmental burdens and the footprints of human consumption, for example, water pollution and groundwater overdraft, implies that adaptation within existing technologies is not sufficient. Instead, radical and systematic innovations - 'regime shifts'- are needed to meet such pressing challenges. Despite much progress in technologies over the past two decades, it is clear that the rate of technological development is not meeting the challenges of burgeoning human populations, demand for water, and increased rates of contamination.

Scientists are concerned with the understanding of water scarcity conditions, drivers and its impacts; businesses implement new strategies, technologies and products with many of these critically dependent on water; policymakers on all different levels attempt to mitigate and adapt to environmental impacts; and non-governmental organisations raise awareness and actively protect and support impacted humans and nature.

The limitation of the current approach involves an apparent disconnection between the knowledge generators and knowledge implementers, as the problems and solutions are often identified in silos. The innovation process and solutions developed by the solution identifiers often do not address the root causes of the problem that have been identified by problem identifiers.

We need a change in approach and a framework that strongly connects both problem identifiers with solutions identifiers, knowledge generators and knowledge implementers while focusing on integrated solutions. Such a solutions-oriented, integrated approach can act as an antidote to the otherwise sluggish flow of evidence-based knowledge from the water sciences, to policy formulation and ultimately to application and implementation. It may help to develop 'knowledge-to-concrete action' and find solutions through the co-production of knowledge, involving scientists and other stakeholders.

The three major barriers hindering the implementation of an innovative solution are apparent:

1. Lengthy diffusion time of innovation.
2. Lack of knowledge exchange between theory and practice.
3. Lack of implementation research to monitor and understand the effects of innovative solutions.

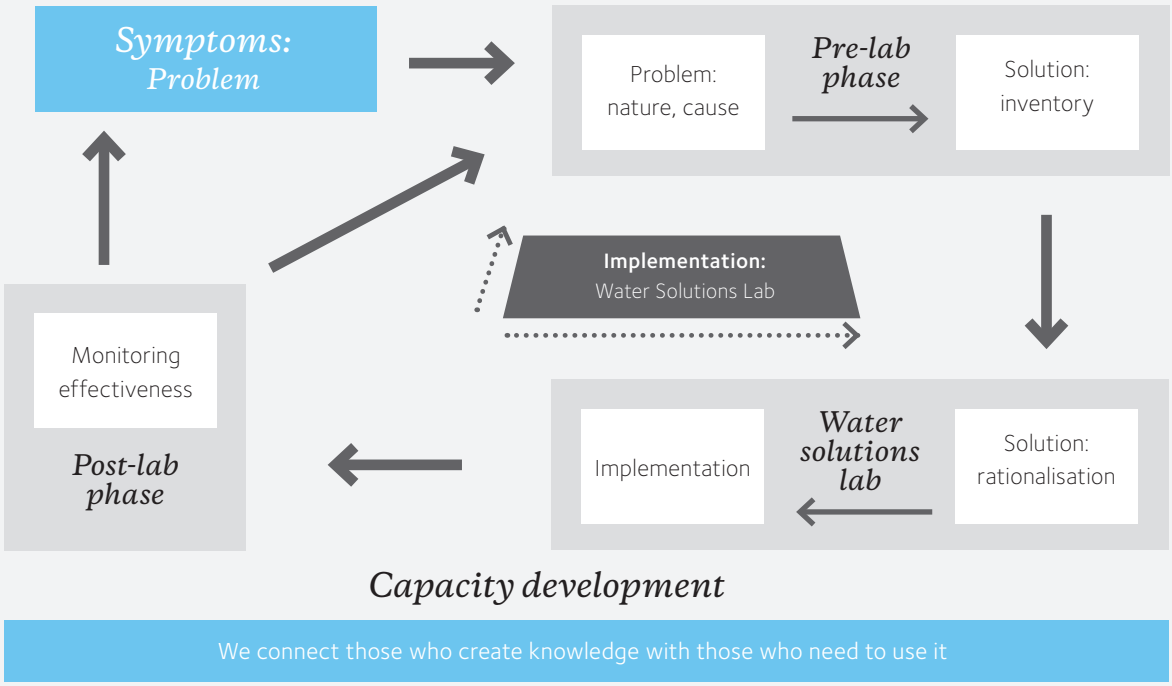
The central goal of the **Water Solutions Lab (WSL)** is to to overcome these barriers and **establish a framework to facilitate the process of innovation in water-related issues. WSL integrates problems with solutions towards identifying a feasible set of solutions that address the root causes of the problem at the local level.**

Figure 7 illustrates the process.

The goal will be achieved by stimulating innovation through:

1. Identifying the root cause of problems at local levels using a systems approach, and understanding interactions between hydrology, biogeochemical processes, infrastructure, and human dimensions of water-related problems. As several problems are interconnected, identifying root-causes of the problems through systems-based approaches will help to reduce the costs of solving water-related problems at local levels. It will allow systemic problems to be addressed.
2. Providing a solution knowledge platform that showcases different solutions available at global, regional, national and local levels and is relevant to the problems identified through systems analysis.
3. Identifying feasible solutions from the solution platform that address root causes of the problems using a multi-stakeholder and multi-criteria analysis framework.
4. Monitoring and assessing implementation of solutions using impact analysis.

Figure 7: Water Solutions Lab process



LAB SHARES ITS KNOWLEDGE

The activities are supported by knowledge hubs, which shares knowledge and solutions, and builds the capacity and skills of our international water management community. The knowledge hub:

- showcases different research organisations' expertise in water research, management, policy, and their support for the Lab
- facilitates domestic and international collaboration through developing a network and referral service of water solution providers, experts and institutions or countries with problems
- assists in global capacity building, training and skills development and know-how in water management
- establishes a means for easily presenting and sharing water management knowledge and information
- provides a portal for participants worldwide to discuss, review and share information to create and apply new knowledge and improve practices.

Currently, a co-design process is undergoing to establish such a Water Solutions Lab knowledge hub based at Indian Institute of Science (IISc), Bangalore. It is a collaborative forum (involving many partners including Federation of Indian Chambers of Commerce and Industry (FICCI)) for addressing water-sector challenges in India, with emphasis on challenges facing the city of Bangalore. The Solutions Lab will seek to increase access to effective solution providers in the water sector. Such a process of establishing Water Solutions Lab is also currently underway in other countries.

KEY BENEFITS TO DONORS COUNTRIES AND ORGANISATIONS

1. The WSL framework reduces the transaction cost that is normally incurred in the diffusion process of innovation.
2. The lab will support the development and diffusion of local innovations by managing the flow of knowledge between projects at a global level. Common issues, problems and best practices of local innovation projects can be identified and compared with each other on a global scale in order to accumulate knowledge and strengthen current and future innovative projects.
3. The Lab will benefit private small and medium industries in exploring the demand side for innovative products and services by facilitating dialogue between the private sector and local actors/communities. This will help to stimulate the diffusion process by identifying demand pulls instead of creating a supply push.
4. The Lab will result in business solutions and therefore contribute to economic growth and creation of jobs, and help to enhance the competitiveness.
5. The Labs will also take place in emerging, developing and underdeveloped countries, and in the form of north-south and south-south collaboration. It will be an instrument for cross-learning and help to develop further innovations and business solutions.
6. WSL addresses multi-objectives simultaneously as the result of its multi-stakeholder and multi-criteria perspectives.

Governance of Water Future

Effective and inclusive management of key activities is a central role of Water Future.

A seventeen-member Planning Committee for Water Future is currently guiding the formulation of a strategic research agenda for the programme and making recommendations to the Scientific Committee on research initiatives and operations. The Committee currently includes former members of GWSP executive committee, as well as representatives of different partner organisations.

The Planning Committee currently reviews and provides advice on the implementation and means by which to achieve key priorities of the programme. The planning committee has played a key role in the formation of Working Groups, scientific steering Committee as well as in designing key initiative like COMPASS.

Once the programme evolves out of the development phase, the Planning Committee will be divided into a Governing Board and an Executive Committee.

The GOVERNING BOARD: It is expected to have a diverse stakeholder perspective to understand the strategic demand for knowledge among knowledge-implementing communities. The Governing Board (GB) will include representatives from supporting donor countries, financial institutions, the industry, intergovernmental and development organisations.

The Governing Board will have, therefore, a strategic overview of the programme's implementation in general and have the opportunity to:

- guide the formulation of strategic agenda through investment in different initiatives
- review and provide advice on the implementation and means to the priority of the programme
- periodically review of the performance of the programme
- guide International Secretariat and Country Nodes and Regional Hubs in major managerial, administrative, and/or financial decisions.

The strategical Governing Board will works closely with the operational Executive Committee in guiding Water Futures. It will meet once in every year, and such meeting may take place on the side of a major International Water Event such as the Stockholm Water Week.

An EXECUTIVE COMMITTEE (EC) will be formed to design and operationally implement different initiatives, COMPASS, Water Solution Lab, Capacity development and Global Water Governance. The Executive Committee works closely with the Governing Board and reports regularly on the progress made. The EC comprising of the chair of each of the initiatives, will provide guidance on all aspects of the operational functioning of the initiatives. Other specific responsibilities of the Executive committee include:

- evaluate proposals for Working Groups
- identify and propose appropriate research activities and guide the implementation of Working Groups.

The SCIENTIFIC STEERING COMMITTEE has already been established to provide scientific guidance to the Water Future programme and also is the responsible body for publishing any scientific results/studies. The Scientific Committee (SC) provides scientific guidance, fine-tune the broader research themes defined by the Executive Committee and translates them into cutting-edge research questions and projects. The coordination between the two bodies will be synchronised by the International Secretariat, which also guarantees a smooth implementation process for the overall programme and the effective communication with all stakeholders, including the broader public. Each SC member is required to lead a working group. The SC members are self-selected through applying to periodic proposal calls for Working Groups. The proposals are assessed (approved/rejected) by the planning committee, and in future, the role will be taken by the Executive Committee.

The requirement for geographic, gender balance of SSC group as well as the balance of research priority topics will be taken into consideration during the proposal selection phase.

The term for these appointments will normally be three years, renewable once subject to the formulation of a new (or continued) working group. The term of SC Chair may be extended to maximum 5 years (excluding years served as an ex-officio member).

The primary functions of the members of Scientific Committee are:

- develop a Science Plan and Implementation Strategy for the working group
- execute plans on behalf of the designated working group
- encourage collaboration between the working group and any other relevant work, both within and outside of the programme
- work closely with the Executive Director and other Programme Officers in implementing the objective of the programme
- report the development and implementation of the working group annually.

INTERNATIONAL SECRETARIAT consisting of the Executive Director together with scientific and administrative staff, facilitates the expeditious and orderly development, implementation and evaluation of the programme. Its main functions are to implement the strategic priorities of the programme and facilitate communication processes.

As a result of the Sustainable Water Future Programme network character, the Secretariat functions will function as a node and information hub, collecting information, ensuring communication flow and organising events relevant to the entire programme.

The Secretariat is further responsible for the dissemination of outcomes and results of the Programme's activities. Staff members represent the programme at important scientific and programmatic meetings, lobbying and initiating new activities and partnerships and fostering research activities. Equally importantly, the Secretariat serves the Governance Board, Executive Committee and Scientific Committee in coordinating and implementing their decisions.

In collaboration with the Working Groups and its broader network of scientists, the Secretariat is responsible for attracting third-party funds and preparing research proposals. Communication and outreach activities for the programme are concentrated within the Secretariat, which also supports selected activities of the projects in this realm. The Secretariat`s main responsibility is to provide services of cross-cutting interest for the entire programme.

Country NODES and Regional Hubs

The country nodes and regional hubs of the programme play an important role within knowledge production and implementation domain in contributing to the global water system assessment process, and in implementing the Water Solutions Lab.

The country nodes and regional hubs promote and coordinate international research and implementation activities in domains of specific importance.

The country nodes and regional hubs advance the scientific understanding of the global water system by providing regional and thematic knowledge for comparative studies of catchments, bringing forward best practices and expanding the viewpoint of river basin research and management to include a global perspective.

The goals for the hubs and centres include the exchange of knowledge and scientists, water managers and other stakeholders concerning the impact and importance of global factors on watershed management. Through this co-production of knowledge, involving researchers and practitioners in different catchments, the country nodes or regional hubs develop novel approaches to adapt to global changes.

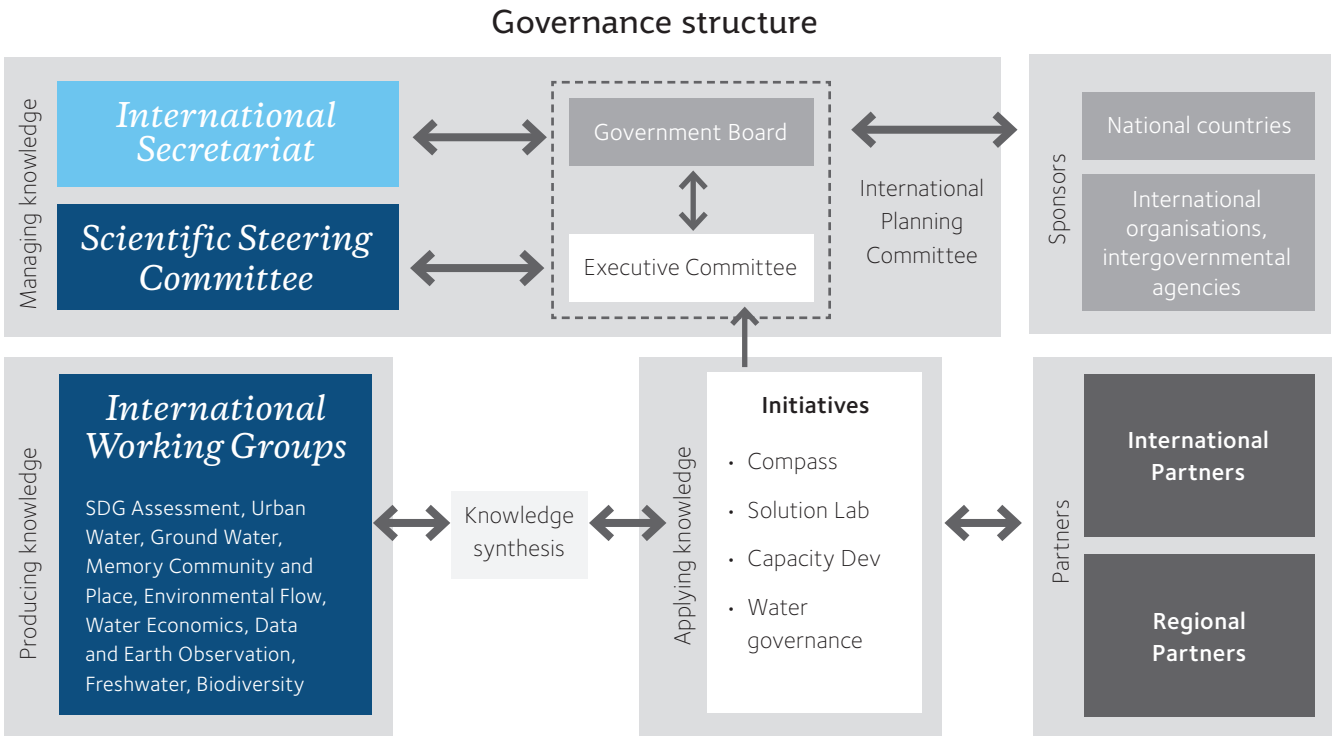
The Hubs and centres manage and govern themselves, yet develop research strategies and regional activities in accordance with the Programme's objectives. The centres are meant to bring together stakeholders to address regional water issues with global implications, allowing for analysing interdependencies and linkages between site-specific phenomena, regional observations and global processes. Understanding the relationship between the regional and global processes helps to find solutions that fit local conditions while "getting the big picture", banking on the experiences and expertise of the global network of Water Future and the expertise of the country node or a Regional Hub.

In collaboration with the Secretariat of the programme, the specific activities of regional and thematic centres include the following:

- Implementation of COMPASS: Contribute in near real-time water assessment situation in the country with relevant stakeholders.
- Implementation of Water Solutions Lab: bring forward best practices in the country and contribute to the water solution knowledge platform that showcases different solutions available at global, regional, national and local levels.
- Development and Implementation of Capacity development activities, for instance in understanding, and assessing Water Security Risk and also sharing knowledge in technological, institutional and social innovation in mitigating water security risk.

Currently, two country nodes have been established—Water Future – Canada, and Water Future – Australia.

Figure 8: Governance Structure of Water Future



Implementation Plan

Water Future evolved from Global Water System Project and started its operation in January 2016 with the move of International Secretariat from Bonn to Brisbane.

Water Future International Secretariat is strategically located in Australia also to address the severe water security challenges in the densely populated areas in the Asia Pacific regarding the quality and quantity of water, which are compounded by accelerated urbanisation and increased vulnerability to disaster risks in the context of climate change.

ACHIEVEMENTS AND ACTIONS IN 2016-2017 – "SET UP"

- Establishment of International Secretariat at Australian Rivers Institute, Griffith University, Brisbane and transfer of data and administrative functions from GWSP (Bonn).
- Establishment of Planning Committee to oversee development of key governing and executive bodies.
- Establishment of Scientific Steering Committee.
- Establishment of Country Nodes in Australia and Canada.
- Formed 12 core and Working Groups with over 400 researchers spanning almost every country across the globe.
- Partnerships with IMWI, IIASA, UNU, UNESCO-WWAP.
- Design of Key initiatives like COMPASS, Water Solutions Lab, Capacity Development.

Water Future has coordinated preparatory dialogues with many relevant stakeholders and leaders from the science, policy, and applications communities around the world, with the aim of creating a design framework and the implementation structure for different initiatives. Many of the initiatives, in particular, COMPASS are now in the advanced design phase and are in a position to deliver prototype analyses based on a first track evaluation of technical capabilities, state-of-the-art knowledge, and present technologies and data availability.

WATER FUTURE PLANS IN 2018

Initiatives

- Develop fully operational products of COMPASS and capacity development, coordinate the scientific assessment, review and synthesis with all relevant stakeholders and leaders from the science, policy, and applications communities.
- Develop and design Water Solutions Lab in developing and emerging countries and implement labs where it is in the design phase.
- Implement capacity development activities, particularly a knowledge-based, online capacity development on Global Water Security in collaboration with the United Nation University.

Organisational

Establishment of Governing Board to replace the Planning Committee. Water Future is seeking funding and international cooperation from countries, intergovernmental agencies, private organisations and Foundations to develop and implement the Initiatives. The donor countries and organisations will be represented on the governing board of the programme where they will have the opportunity to formulate the strategic agenda of the programme through investment in different initiatives.

Partnerships

Water Future plans to develop further strategic partnerships for the establishment of Water Solutions Labs, Country and Regional Hubs in different supporting countries.

Current partners include UNESCO's International Hydrological Programme and the World Water Assessment Programme, The United Nations University,The International Institute for Applied Systems Analysis (IIASA), The International Water Management Institute (IWMI), Global Water Futures (GWF) program.

Many of the initiatives, in particular, COMPASS are now in the advanced design phaseand are in a position to deliver prototype analyses based on a first track evaluation of technical capabilities, state-of-the-art knowledge, and present technologies and data availability.

References

1. High-Level Panel on Water. (2016). Joint Statement of the High Level Panel on Water, September 2016 http://bit.ly/2CmaeX3 *Mobilizing Action Towards a Water Secure World for All.*
2. Pahl-Wostl, C., Vörösmarty, C., Bhaduri, A., Bogardi, J., Rockström, J., & Alcamo, J. (2013). Towards a sustainable water future: shaping the next decade of global water research. *Current Opinion in Environmental Sustainability*, 708-714.
3. Sustainable Water Future Programme. (2015). *Initial Design Report No 1. Sustainable Water Future Programme*, Bonn.
4. Vörösmarty, C. J., Pahl-Wostl, C., Bunn, S., & Lawford, R. (2013). Global water, the Anthropocene and the transformation of science. *Current Opinion in Environmental Sustainability*, 5:539-550.

Water Future
Sustainable Water Future Programme
Australian Rivers Institute
Griffith University
Nathan, QLD 4111

P I +61 7 3735 9271
water-future.org

Designed by Griffith University

CRICOS No. 00233E J001811