

WORLD WATER DATA INITIATIVE ROADMAP

February 2017

High Level Panel on Water

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1 Executive Summary

1. In adopting Sustainable Development Goal 6 (SDG6), member states of the United Nations have committed to “ensure availability and sustainable management of water and sanitation for all by 2030”. It is also broadly recognised that sustainable water management is key to achieving many of the other Sustainable Development Goals.
2. The High Level Panel on Water (HLPW) was convened in 2016 by the United Nations Secretary General and the World Bank Group President to promote implementation of SDG6 by accelerating the transformation of how governments, societies (communities) and the private sector use and manage water. The Panel includes eleven Heads of State and Government. The Panel aims to motivate effective action across governments, civil society and the private sector, and to advocate on financing and implementation by promoting efforts to mobilise and target financial resources.
3. In their [Action Plan](#) released on 21 September 2016, the HLPW identified access to water data as a key enabling requirement for delivering all other elements of the Action Plan. The Action Plan identified key challenges and a set of possible priority actions in regards to water data (see Annex 1).
4. The Panel’s ‘World Water Data Initiative’ aims to improve access to water data (defined as observations, processed data and model output) for governments, societies and the private sector by providing guidance on good policy settings, stimulating new technologies and harmonisation through common standards. This Initiative may also facilitate improvement of practices in the handling of broader water related information, such as social, economic, cultural and scientific information, that may be used by governments and the private sector in making decisions about water resources. However the focus of this Initiative is on improving access to water data as described above. Where broader application is intended, the expression ‘water information’ is used.
5. Improved access to water data will be pursued by accelerating current work and initiating new work. A key feature of the Initiative will be to promote practical solutions that are capable of adoption in any country and society.
6. It is therefore proposed that the Panel adopts the following high level project objective for the World Water Data Initiative:

To improve cost-effective access to and use of water and hydro-meteorological data by governments, societies and the private sector through policy, innovation and harmonisation.
7. In the life of the HLPW (April 2010 - March 2018), this objective will be pursued through practical measures under three pillars as outlined below and in figure 1. These will build on current and planned initiatives, and will provide the basis for the HLPW to promote broader adoption of sound water data policy and practices.
 - **‘Water Data Policy’ pillar:** To address the question *how can societies have better and more equitable access to water data and tools, and capacity to use this information, to manage water better?* Good practice guidance materials prepared under this pillar will highlight the benefits of equitable access to water data and demonstrate good practice principles and tools for the collection, storage, analysis and use of data, and the information derived from

it, that would be capable of universal adoption and application. Guidance materials will inform national and river basin scale policy settings that will provide governments with access to adequate information to make decisions about the sustainable use of water resources in the public interest, and enable broader society to access adequate information to serve its needs. [To deliver on Priority Actions 3 and 6].

- **‘Water Data Innovation’ pillar:** To address the question *how can governments, societies and the private sector access reliable data about water that is adequate to their needs at the lowest possible cost?* This pillar will be implemented in part through a grand challenge with quests focusing on tools, technology and systems. [To deliver on Priority Actions 4 and 6].
- **‘Water Data Harmony’ pillar:** To address the question *how to reduce costs and complexity at the river basin and national levels by accelerating progress on common standards for water data and for basic water data metrics?* Projects under this pillar would seek to accelerate adoption of common standards for water information and for basic water analyses. Development of a standards-based water accounting and assessment framework will assist in the preparation of national and basin water indicators, assessments, management plans and accounts, and the aggregation of water data at the regional and global level. [To deliver on Priority Actions 2 and 6.]

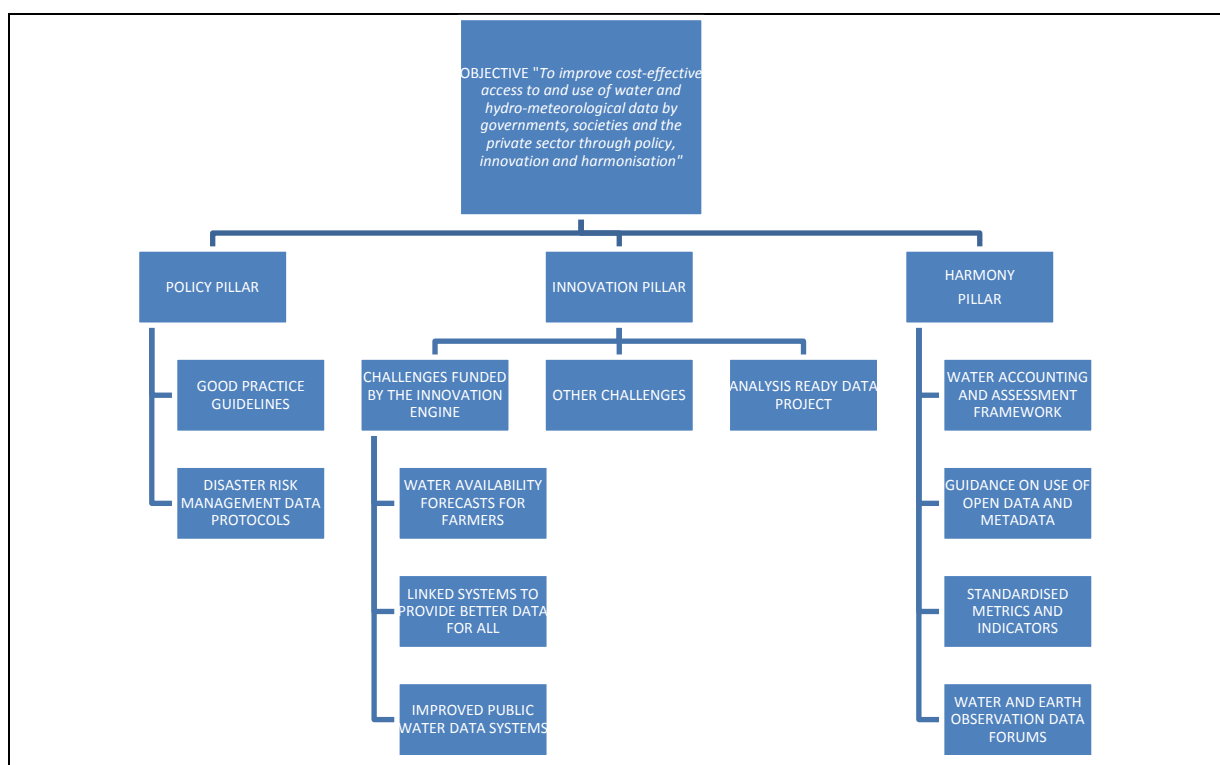


Figure 1 High level outputs of the World Water Data Initiative

- Members of the HLPW will work towards global adoption of the Initiative through the United Nations and other appropriate multilateral forums.
- This Roadmap sets out proposed objectives, strategies, projects, timelines and responsibilities for progressing the water data elements of the Panel’s Action Plan over the remaining period of the Panel’s mandate until March 2018. The Roadmap sets out what needs to be done, why, how, when and by whom.

2 Purpose of a World Water Data Initiative

10. The world is waking up to the enormity of our water-related challenges. Growing populations, more water-intensive patterns of growth, increasing rainfall variability, and pollution are combining in many places to make the availability of fit-for-purpose water one of the greatest risks to poverty eradication, peace and all three dimensions of sustainable development. Floods and droughts already impose huge social and economic costs around the world, and our climate is driving increases in the frequency and severity of water-related extreme events. If the world continues on its current path, projections suggest that the world may face a 40% shortfall in water availability by 2030, and economic growth in some regions may be cut by 6% due to water scarcity alone¹.
11. SDG6 outlines some of the key actions that the world needs to take on water, including providing universal access to services, improving water quality, increasing water-use efficiency, protecting and restoring water-related ecosystems, and more broadly, implementing integrated water resource management at all levels, including through transboundary cooperation. Such actions will also contribute to the achievement of many other SDGs, not least those related to economic growth and poverty reduction, public health, energy, food security, disaster risk reduction, sustainable cities and ecosystems. Likewise, a successful implementation of SDG 6 will closely depend on delivering on other SDGs, such as SDG 12 on responsible consumption and production and SDG 17 on partnerships and enhanced means of implementation.
12. However, each of these actions depends on decision makers having access to and being able to use information and data that in many places is insufficient, not being shared, of uncertain quality, or simply does not exist. In some key areas, the amount and quality of water data is declining just as water stress is rising. Accelerating global progress towards better availability and use of water data – collected and managed at the scale of each and every river basin / water catchment area - is therefore a key issue for the HLPW.
13. Improved access to adequate water data is also necessary for the implementation of all other HLPW initiatives. The OECD water governance principles call for evidence-based decision making in water. The HLPW has also recognised the importance of adequate information about water for good water governance, and the need for governments to have physical, socio-economic, financial and institutional information to guide their decisions.
14. The table in Annex 2 outlines the many and various types of information required to support government decision-making about water. Societies and the private sector also have interests in much of this information at the local and enterprise level. While this information serves many purposes, there are many common challenges in terms of collection, storage, exchange, analysis and application of core data and information derived from this. Capacity to adequately capture, consolidate, analyse, interpret, explain and share water data is essential to good water management and effective government decision making.

¹ World Bank. 2016 'High and Dry: Climate Change, Water and the Economy' Available from: <http://www.worldbank.org/en/topic/water/publication/high-and-dry-climate-change-water-and-the-economy>

15. The Panel's particular role in championing the World Water Data Initiative will be consistent with its key operating principles:

- Motivate effective action by shining a light on examples of policies, institutions and programs that will enhance results-driven initiatives to strengthen water data for attaining all elements of the SDG6 goals;
- Promote efforts to mobilize and target financial resources, scale up investment and encourage innovation and partnerships; and
- Improve understanding by citizens of the importance of water and of good water policy and governance.

16. To assist with engagement with private sector and other non-governmental data providers, the Panel encourages them to form a group that could engage with the HLPW on the Initiative.

3 World Water Data Initiative Objectives

17. For the above challenges to be met, meaningful, multi-dimensional, accurate, timely and accessible water data needs to be available to governments (at all levels), businesses, communities, and water professionals.

18. At their meeting in association with the Budapest Water Summit on 29 November 2016, HLPW Sherpas identified in their 'Update on Initiatives' that 'Priority areas of focus' in regard to data should be making data more accessible and useable for decision-makers and fostering equal access to data, and that there could be a potential launch of a 'Challenge' early in 2017 in collaboration with business and other stakeholders.

19. The Initiative will be implemented consistent with the Fundamental Principles of Official Statistics, adopted in 2014 by UNGA (resolution A/68/L.36).

20. A key feature of the Initiative will be to promote practical solutions that are capable of adoption in any river basin, aquifer system, country and society. Solutions will therefore need to be of a range of costs and sophistication.

21. It is therefore proposed to set the following high level project objective for the World Water Data Initiative for the life of the current HLPW:

To improve cost-effective access to and use of water and hydro-meteorological data by governments, societies and the private sector through policy, innovation and harmonisation.

4 Proposed approach to the Water Data Policy Pillar

22. Data collection methods and technologies are often developed without supporting policy and institutional frameworks. The HLPW's Data Initiative will encourage policies and institutions that fit these realities and promote effective collection, management and processing of data.
23. Good practice guidelines will be prepared by experts with practical experience in the development of government policy in relation to evidence-based water resource management in a range of basin and country settings. These would address how to identify the existing challenges and gaps of data collection and management, achieve more equitable access to water data and to improve the analytical capacity of all countries. The Guidelines will draw on relevant policy principles adopted for each of the SDG6 indicators. Advantage will be taken of the range of development conditions and experience in the eleven HLPW member countries to test with their water agencies the practicality of the guidelines to their circumstances. The guidelines will advise potential roles of government agencies, private sector and civil society in collecting, accessing and analysing water data, as well as in ensuring that data collection connects to and continues on from existing and historical data sets. The guidelines will be adaptable to emerging new technologies and will outline a framework for accessing, managing, interpreting and using water data that will link with the proposed standardised/harmonised water accounting and assessment framework under the Data Harmony Pillar. The guidelines will be structured so as to have content relevant to countries in different stages of development.
24. The good practice policy guidelines for making data more accessible and useable for decision-makers will:
 - a. highlight the importance of evidence-based decision making in regard to water for the sustainable development of the economy and society at large, and therefore its relevance to political and economic leadership;
 - b. identify barriers (technical and institutional) to equal access to useful water data and the use of 'open data';
 - c. advise how to align data provision with policy objectives, using SDG6 indicators and Annex 2 as starting points, and including cost-benefit considerations;
 - d. advise how to ensure national water data is managed in accordance with the Fundamental Principles of Official Statistics, adopted in 2014 by UNGA (resolution A/68/L.36);
 - e. advise how to analyse data for policy making, evaluation and reporting;
 - f. address governance of data collection, quality checking, storage, exchange, analysis and use, including funding and cost recovery options, including the importance of clarity as to data ownership and the roles and responsibilities of relevant government agencies;
 - g. address appropriate governance arrangements (institutions and agreements) to allow for the adoption of harmonised standards;
 - h. advise options for promoting data provision by the private sector (such as groundwater data held by mining companies) and civil society entities;
 - i. advise how to authorise data collection methods that take full advantage of new technology opportunities (e.g. from remote sensing sources) while observing privacy requirements and maintaining capacity to access ground-sourced data;

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- j. advise how to benefit from current international efforts to establish water data exchange standards and include reference to policies associated with data sharing;
 - k. explain and demonstrate useful features of analytical models to inform decision making;
 - l. advise how to ensure equitable access to data, including for transboundary water systems;
 - m. advise how to ensure the availability of gender disaggregated water-related data;
 - n. provide guidance on data quality control based on best practices;
 - o. suggest investment models to cover the development and operating costs of field level monitoring and data collection infrastructure such as equipment for measuring river flows and transmission of data; and
 - p. suggest a methodology for keeping the adequacy of monitoring, data collection and reporting capacity under review to identify critical capacity gaps and strategies for addressing them.
25. Under this pillar, protocols will be developed or adapted in collaboration with relevant agencies such as the United Nations Office for Disaster Risk Reduction (UNISDR) for using water and hydro-meteorological data in disaster risk management, consistent with the Sendai Framework for Disaster Risk Management².

5 Proposed approach to the Water Data Innovation Pillar

26. The ultimate aim of work under this pillar is to reduce, as much as possible, the cost of achieving adequate capabilities in water data, such as by leapfrogging current technologies, or for accessing in 'real-time' data held outside of government control.
27. This Project will be based in part on 'challenges' that will test whether the outcomes of costly forms of current data collection may be achieved at much lower cost through new technologies, for example:
- remote sensing and new algorithms estimating water stocks and flows, surface and subsurface volumes, and water uses with sufficient accuracy to reduce the need for investment in much more costly on-ground measurement, possibly as a stepping stone to the development of more accurate systems;
 - lower cost on-ground hydro-metric measurement at all scales, ranging from on-farm soil moisture monitoring to bulk water flow measurement; crowd-sourced data using mobile phone technology to provide low cost reporting of water quality, aquatic environmental conditions and sanitation outcomes, potentially using a common data platform as occurs now with weather data;

²United Nations, 'Sendai Framework for Disaster Risk Management 2015-2030' available from: http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

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- ‘bottom up’ reporting on water access, water quality and service delivery issues by water service providers; and
 - leveraging WMO initiatives such as the MCH database management system for hydro-meteorological data archiving, which is available free of charge.
28. As well as stimulating new ideas, challenges under this pillar will also help scale up existing test products for application readiness.
29. One delivery mechanism for water challenges is the Water Innovation Engine being developed under the auspices of the HLPW as an enabling mechanism for the Water Innovation Initiative of the Action Plan. The Water Innovation Engine will bring together smart people, good ideas, and innovative financing, and funnel it towards areas of the water sector that are in greatest need of increased innovation and action: urban and rural water supply and sanitation, agricultural water use, and water data. The Engine will commence with initial pledges and will be able to be substantially scaled up.
30. In regard to water data, it is proposed that the Engine launch challenges that address the following water data needs:
- a. enabling all farmers, female and male, to benefit from water information that serves their needs at the lowest possible cost;
 - b. improved public water data systems that take advantage of remote sensing data and crowd-sourced data from citizens;
 - c. platforms that link different systems; and
 - d. technology to collect water resource data for use by farmers, local governments and businesses.
31. These topics will be further tested and refined by experts before a challenge is launched. Criteria for determining any further data-related challenges would be developed by the Engine Steering Committee. Challenge (a) above is recommended for early action through the Innovation Engine process, ideally with a view to this challenge (after further refinement) being ready to launch at the time of the formal launch of the Innovation Engine.
32. Water data innovation needs identified under this pillar that are not addressed in challenges funded by the Engine may instead be supported by any of the at least 25 other water challenge funds.
33. Additionally, the Committee for Earth Observation Satellites (CEOS) and Group on Earth Observations (GEO) will be asked to explore options for accelerating international access to analysis-ready data to enable country/regional capacity building programs on accessing satellite water data. Other organisations will also be actively encouraged to strive for innovation on water data, beyond the challenge methodology, acknowledging the progress by the World Meteorological Organization (WMO) on water data sharing standards (WaterML2.0).
34. Given the universality of the ambition of this Pillar, and the availability of deep expertise in many countries that are not members of the HLPW, the Panel will enlist broader support as early as possible.

6 Proposed approach to the Water Data Harmony Pillar

35. The purpose of projects under this pillar is to reduce water data-related costs and complexity at the national level by accelerating progress on development and adoption of common standards for the highest priority water data, used to inform decisions about sustainable water resource use and disaster and risk reduction, and for basic water data analyses that underpin these.
36. Development of a standards-based water accounting and assessment framework will assist in the preparation of national and basin water indicators, assessments, management plans and accounts and the aggregation of water data at the regional and global level.
37. The HLPW will therefore encourage global progress towards implementing water accounting and assessment methods based on common standards to enable more consistent methods and language for compiling and communicating national water data to provide a simple, meaningful and comparable overview of a country's water resources and transboundary resources.
38. Such work will use and build on experiences of numerous countries with water accounting approaches, including Australia and South Africa from within the HLPW countries. It will also use and build on relevant harmonisation work already in train that will reduce costs for national data collection and management. Leaders of such work will be encouraged to undertake a joint review of these efforts to highlight gaps, synergies and opportunities to build on/link across existing initiatives and protocols.
39. Guidance material will be prepared on the foundation structure for using data (ground based, remotely sensed, modelled) and metadata to support national and basin water resource indicators, water resource assessments, water flow forecasting (including flood forecasting), and water accounts.
40. A longer term endeavour is to define a standardised set of core data-based water metrics and indicators that can be related to SDG6 indicators. This will involve all relevant international agencies, including UN bodies with water data related work already in train (such as FAO, WMO and UNESCO), OECD, GEMI and IFAs. The first objective will be to establish the governance and institutional machinery that would allow this long term project to be undertaken.
41. Agencies, academia and private sector bodies involved in the analysis and application of water data and earth observation will be encouraged to create forums for experience sharing and collaboration.
42. Outcomes under this pillar will need to be adapted to suit the circumstances of different countries and to lead to more concrete outcomes from the adoption of consistent standards and definitions for data and methods and enhanced capacity for inter-operability and comparability of data across borders, and consequently to more cost efficient and better protection and management of water resources. This forward agenda will aim to utilise as many existing or widely used data systems as possible to minimise costs and encourage take-up from those countries that currently do not have such standards in place.

7 Advocacy roles for members of the HLPW

43. While these Projects are underway, members of the HLPW will be in a position to advocate for the importance of the World Water Data Initiative by, for example:
- a. drawing attention to the critical importance of water data to inform their decisions on water policy and management by talking about their own experiences in using such data to inform key economic decisions;
 - b. promoting the economic, social and environmental benefit of evidence-based decision making;
 - c. advocating the achievement of other key global goals dependent on SDG6;
 - d. encouraging cooperation among global water actors to accelerate the continued development and implementation of standardised approaches to water accounting and assessment standards, including encouraging the commitment of resources to support the application of water accounting and assessment methods in priority countries;
 - e. encouraging national and regional investments in hydrological monitoring networks, including in data for disaster risk management and disaster response, such as occurring under the Sendai Framework;
 - f. drawing attention to domestic investments in water data, particularly for those indicators relevant to SDG monitoring;
 - g. cooperating with neighbouring countries – especially when sharing a river basin – to develop, operate and maintain compatible hydrological monitoring systems and share the data and benefits that flow from this; and
 - h. pressing for clearer and more coordinated collection of water data, including scaled up resourcing to collect, store and organize water-related data at both the global and country levels.

8 World Water Data Initiative Indicative Work Plan to 2018

44. January-February 2017: Finalise the proposed content of the World Water Data Initiative. Key steps are:

- Australia and the World Bank to host an initial series of scoping discussions, working to finalise this Roadmap (Washington DC 5 January 2017).
- Other HLPW members and expert bodies to be consulted.
 - *Deliverable: 'World Water Data Initiative Roadmap' submitted to Sherpas for endorsement as being consistent with the HLPW Action Plan and 'launch ready'.*

45. February/March 2017: This period will focus on the launch of the Initiative, work plan development for the projects under the Water Data Policy and Data Harmony pillars, and preparing for pitching the Innovation Challenges. Key steps are proposed to be:

- Launch the World Water Data Initiative by Australia and other HLPW members wishing to participate.
 - *Deliverable: Relevant leaders make a statement of support for the World Water Data Initiative.*
- Meeting of relevant stakeholders (facilitated by World Bank) to prepare a workplan for the Data Harmony Pillar, including with any private sector data providers group that is established:
 - *Deliverables: i) Water Data Harmony workplan finalised. ii) Stocktake commenced of the status of current and planned data harmonisation projects.*
- Australia to prepare a work plan and initial draft of good practice principles under the Data Policy pillar, in consultation with any HLPW members wishing to be engaged.
 - *Deliverable: Initial draft of good practice principles.*
- The Water Innovation Engine Steering Committee specifies the data-related challenges to be funded under the Engine.
- Proponents of any other data challenge projects seek funding support for these.
 - *Deliverable: 'Water Data Innovation Challenge Invitation' issued by the Engine.*

46. March/April 2017: This period will see commencement of work on the policy projects, settling governance arrangements for the Harmony projects and pitching the Innovation Challenge. Key steps are proposed to be:

Harmony Pillar

- Institutional leads settle governance and funding arrangements for the project and convene a meeting of lead harmonising agencies to encourage them to undertake a review of the their work programmes.

- *Deliverables: i) governance and funding arrangements resolved; ii) review initiated by harmonisation leaders of their work in train.*
- Preparation of guidance material for the foundational structure for using water data and metadata to support national water resource indicators, water assessments, water flow forecasting, water accounts and water management plans.
 - *Deliverable: Draft guidance material presented for discussion within HLPW countries*
- Consultants will be engaged to undertake a cost benefit analysis of using one or more common platforms under the Harmony Project.
 - *Deliverable: consultant's report to the HLPW.*
- UN-Water to be asked to build on the work already conducted for the measurement of SDG6 and the World Water Assessment Programme, to produce a brief summary of the current state of multilateral water databases, the sustainability of their storage, and gaps in the data and platform architecture to help inform further work on this part of the Water Data Harmony Project.
 - *Deliverable: a report to HLPW on the current state of multilateral water databases.*

Policy Pillar

- Experts workshop (hosted by Australia) to consider the initial draft good practice principles and to further develop these.
 - *Deliverable: Good practice principles ready to be tested with broader range of interested organisations, including OECD and water data specialist bodies.*

Innovation Pillar

- Australia and the World Bank pitch the Innovation Challenge Invitation to the private sector.
 - *Deliverable: Corporate funding pledged to the Water Data Innovation Challenge.*

47. May-November 2017: Over this period the core project work will be done:

- Harmony projects undertaken by project leads;
- Policy projects undertaken through a series of workshops involving all key stakeholder bodies;
- Innovation Challenges that are funded are being run;
- Tiered guidance developed for countries at different levels of development to acquire, manage, and apply different water data and metadata to meet national water resources information needs.

48. September 2017 UNGA: The HLPW presents the World Water Data Initiative progress report to the UNSG and President World Bank seeking to go forward with a UN-sanctioned approach for continuation of the Initiative under UN auspices following the closure of the HLPW.

49. December 2017: The Joint Secretariat consolidates all work under the World Water Data Initiative into a final report for HLPW that they would be launched at their concluding session.

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50. March 2018: At the HLPW concluding session (World Water Forum Brazil), the World Water Data Initiative is formally launched, framed as a global programme of work endorsed by the UN to be implemented under UN auspices. A small number of trials will commence to test the application of the foundational structure and guidance to support national water resource data needs.

9 Proposed organisation and events

51. Lead and co-leads: Australia and World Bank
52. HLPW partners: Hungary, Netherlands, South Africa, Special Adviser Dr Han.
53. Project team lead agencies:
- a. Policy pillar projects: Australia (Bureau of Meteorology (BOM)) + UN World Water Assessment Programme (WWAP)
 - b. Innovation Challenges: Australia (DFAT, with Results4Development - who will assist to operationalize the Innovation Engine)
 - c. Harmony pillar projects: Australia (BOM) + UN (WWAP)
54. Calls, meetings and events that may be used to guide process:
- a. Sherpa meeting Mexico City March 2017
 - b. CEOS meeting April 2017
 - c. G20 Summit Hamburg July 2017
 - d. 37th IAHR World Congress Kuala Lumpur, August 2017
 - e. UNGA 17 New York, September 2017
 - f. WWF 18 Brazil, March 2018

Annex 1. HLPW Action Plan Extract

WATER DATA

"POSSIBLE PRIORITY ACTIONS

1. Initiate a strong political message on the critical importance of water data to effectively address water problems.
2. Encourage UN Water and other stakeholders to work towards defining a more integrated and standardised set of core water accounts and indicators – covering the core physical, economic, environmental and social issues, including gender and disability – that would enable governments, private sector and civil society to diagnose their challenges, set priorities, and guide their implementation efforts.
3. Encourage institutions and platforms to create a level playing field for the analysis and application of earth observation data.
4. Initiate a grand challenge process to unlock Water Data Innovation to improve the aggregation, integration, communication and application of water-related data.
5. Encourage interested stakeholders to develop better communication approaches in order to increase public and political understanding of water issues, such as through a global water atlas and a global water education campaign.
6. Encourage the international community to collect consistent and continuous gender disaggregated data on water-related disasters that will assist the development of indicators, and enable governments to set priorities, engage citizens in an inclusive way, and measure progress.”

Note:

The Water Data Policy Pillar focusses on #3 and #6

The Water Data Innovation Pillar focusses on# 4 and #6

The Water Data Harmony Pillar focusses on #2 and #6

Annex 2. What do governments need to know about water?

About?	What?	Informing analysis of decisions about:
Water supply	<ul style="list-style-type: none"> • Stocks • Flows • Variability • Risks to water security • Risks of flooding 	<ul style="list-style-type: none"> • How much water to allow to be used • Management of current assets • Infrastructure investment • Long term economic development planning • Cross-boundary water sharing
Water use	<ul style="list-style-type: none"> • Domestic consumption • Manufacturing • Food and fibre • Energy • Environment 	<ul style="list-style-type: none"> • Allocations of water for different purposes • Management of current assets • Infrastructure investment • Long term development planning
Water quality	<ul style="list-style-type: none"> • Fitness for purpose: (e.g. potability of drinking water, salinity of agricultural water) 	<ul style="list-style-type: none"> • Investment in water quality treatments • Public health policies • Regulatory measures to safeguard water supplies from pollution
Water values	<ul style="list-style-type: none"> • Social and economic (e.g. health, employment, recreation) • Environment 	<ul style="list-style-type: none"> • Allocations of water for different purposes • Management of current assets • Infrastructure investment • Long term economic development planning
Water risks	<ul style="list-style-type: none"> • Storage • Supply • Stormwater • Floods • Wastewater 	<ul style="list-style-type: none"> • Investment in safeguards • Public information, such as warnings and status • Regulatory frameworks
Water services infrastructure	<ul style="list-style-type: none"> • Storage • Supply • Stormwater • Wastewater 	<ul style="list-style-type: none"> • Institutional arrangements for service provision • Level of investment in asset renewal and maintenance • Water pricing • Regulation of service providers
Water service providers	<ul style="list-style-type: none"> • Infrastructure • Service delivery 	<ul style="list-style-type: none"> • Regulation of service providers • Public information
Water policies	<ul style="list-style-type: none"> • Frameworks • Planning • Access 	<ul style="list-style-type: none"> • Effectiveness of current policy • Cumulative and inter-related impacts of water development decisions • Continuous improvement strategies