Senate Standing Committee on Environment and Communications Legislation Committee Answers to questions on notice Environment portfolio

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Hearing:	Additional Estimates
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Programme:	Bureau of Meteorology (BoM)
Topic:	Water information
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Senator Xenophon asked:

I note BOM's expenditure of \$430.5 million to 'improve water information' within the Murray-Darling Basin (Information from FOI 050514).

- 1. Can the BOM provide evidence of improved water information? Please provide details.
- 2. How does the BOM monitor value for money and outcomes from this program? Please provide details.

Answer:

Funding allocated through the *Improving Water Information* programme has allowed the Bureau of Meteorology to develop and deliver a range of comprehensive national water information products and services to policy-makers and the water industry that were not previously available.

In summary, the suite of water information products and services that has been developed or improved by the Bureau of Meteorology as a result of the *Improving Water Information* programme includes:

- Seasonal Streamflow Forecasting Service
- Short Term Streamflow Forecasting
- National Water Account
- Intensity-Frequency-Duration rainfall estimates
- Water Storage web product and iPhone application
- Water Data Online
- Groundwater Information Products
- Water Information Standards
- Water Restrictions website
- Hydrologic Reference Stations
- Australian Hydrological Geospatial Fabric (Geofabric)
- Australian Water Resources Assessment
- Water market information
- Australian Water Resources Assessment Modelling System
- Collecting and managing water information
- Providing water information to other agencies
- Research and Development

Further detail on these products and services is provided in <u>Attachment A</u>. The majority of these products are publicly assessable via <u>www.bom.gov.au/water/</u>.

These products provide water information users with greater access to better, more timely and nationally consistent data to assist with problem identification and decision making as well as longer term policy decisions. As a result, Australia now has a better understanding of our water resources. This is particularly useful in drier than average periods.

The Bureau gathers information on the uptake and impact of the *Improving Water Information* programme's suite of products and services through a range of channels. Web usage statistics are analysed on a regular basis, user case studies are collated and documented and feedback is elicited from stakeholders via consultative forums, workshops and presentations, and direct one-on-one discussions.

The Bureau of Meteorology will be undertaking a benefits assessment of the *Improving Water Information* programme, including by seeking the feedback from users to inform decisions on the future of the programme from 2017-18.

Summary of the Bureau of Meteorology's progress in the improvement of water information

The following is a summary of the range of water information products and services the Bureau has developed through the *Improving Water Information* programme.

Seasonal Streamflow Forecasting Service:

• The Bureau's Seasonal Streamflow Forecasting Service

(http://www.bom.gov.au/water/ssf/) issues monthly forecasts of the likelihood of a given volume of water flowing in a stream or catchment in the coming three months. The service commenced in December 2010, and now covers 101 locations in 52 river basins across Australia. Monthly updates of one month and three month forecasts at 44 locations in 27 river basins are also available to registered users. The streamflow forecasts are vital in helping water managers and users make informed decisions. Information on the accuracy of forecast for each month and location is provided to users by using probabilistic forecasts and historical assessments of forecast quality. The service relies on statistical and dynamic modelling approaches developed jointly by the Bureau, CSIRO and university sector.

Short Term Streamflow Forecasting:

A prototype Short Term (7 days ahead) Streamflow Forecasting (STF) service has
recently been made available to key external stakeholders, including state based water
agencies and the MDBA. The short term forecasts are now available, via a registered
user service, for 62 catchments and over 100 forecast locations, and is planned to be
released to the public by July 2015. This service is a major step forward in delivering
water information that will provide major economic benefits to the water industry and its
beneficiaries such as agriculture through improved water management, enhanced
environmental outcomes and improved flood warning services.

National Water Account:

• The National Water Account (<u>http://www.bom.gov.au/water/nwa/</u>), published annually, is the most comprehensive national water information report prepared for Australia, providing detailed insight into the management of Australia's significant water resources at the national and regional scale. The nine regions currently reporting on are home to about 80% of Australian population and represents 70-80% of Australia's total water consumption occurs. For each region, it discloses the total water resource, the volume of water available for use, the rights to take water and the actual use of water for economic, social, cultural and environmental benefit. The information presented in the Account is nationally consistent and comparable, and transparent about the source and quality of the data. Much of the information presented was previously difficult to access or unavailable to general users in a standardised form. It presents a multi-jurisdictional perspective on water administration and management.

Intensity-Frequency-Duration rainfall estimates:

• New Intensity-Frequency-Duration rainfall estimates, used by in the design of water infrastructure such as bridges and flood levees, were released in July 2013. Intensity-Frequency-Duration Design Rainfalls (<u>http://www.bom.gov.au/water/designRainfalls/</u>) are used in the design of infrastructure including gutters, roofs, culverts, stormwater drains, flood mitigation levees, retarding basins and dams. They are used to determine the flood capacity and water level needed to meet required levels of safety. They are also integral to large dam spillway adequacy assessments undertaken to determine the flood magnitude that existing dams can safely withstand. Other uses of Intensity-Frequency-Duration Design Rainfalls include the assigning of a probability to an observed rainfall event and the setting of thresholds for making decisions about warnings for severe weather and flash flooding.

Water Storage web product and iPhone application:

 The Water Storage product (<u>http://water.bom.gov.au/waterstorage/</u>) and iPhone application, released in June 2010, provides the only nationally consistent assessment of Australia's public surface water storages (capacity equal or over 1 GL). The product provides a snapshot of current storage volumes as well as a historical comparison of surface water storage availability across the country and highlights trends over time. The product can be accessed through the web application or through the iPhone application to find how much water is available at a National, state, drainage division, capital city or individual storage scale.

Water Data Online:

 Water Data Online (<u>www.bom.gov.au/waterdata/</u>), released on 20 October 2014, provides access to streamflow and water level data (Water Regulations Category 1) from lead water agencies. Additional water information categories and monitoring sites will be added over time. Users can view static data and pre-computed reports, use data exploring tools, download data and receive data though web services – machine to machine data access.

Groundwater Information Products:

• The Australian Groundwater Explorer (<u>www.bom.gov.au/water/groundwater/explorer/</u>) is the first web mapping portal for visualising, analysing and downloading standardised groundwater data across Australia. It provides access to a comprehensive national data set for groundwater bores including bore purpose, bore construction details and bore log data. The Explorer also provides time series data for groundwater levels and some additional three-dimensional spatial data sets for aquifers in some locations. The Explorer provides access to a spatially-enabled groundwater data set that allows users on the web to extract data within a specified area and with specified characteristics (for example: all Irrigation bores within 50 km of a given point can be identified and data downloaded). For Geospatial Information Systems (GIS) users, it provides an interface for previewing the data before downloading it for advanced analysis with GIS software. It was released in October 2014 and by late 2015 it will also have time series of groundwater salinity.

- The Groundwater Dependent Ecosystems Atlas
- (http://www.bom.gov.au/water/groundwater/gde/) is a web mapping portal for visualising, analysing and downloading data for the location and characteristics of groundwater dependent ecosystems in Australia. It is the first comprehensive national inventory of groundwater dependent ecosystems and incorporates available scientific evidence including fieldwork, literature and mapping from previous studies and satellite remote sensing data. Its purpose is to improve Australia's understanding of groundwater dependent ecosystems and facilitate their inclusion in environmental/water management – in particular for new developments affecting groundwater conditions. It was released in September 2012.
- The National Groundwater Information System (<u>www.bom.gov.au/water/groundwater/ngis/</u>) is a spatial database for GIS specialists, that contains a range of groundwater information including more than 800,000 bore locations with associated lithology logs, bore construction logs and hydrostratigraphy logs and a selection of 2D and 3D aquifer geometries.
- The National Aquifer Framework (<u>www.bom.gov.au/water/groundwater/naf/index.shtml</u>), which provides nationally consistent terminology for describing and grouping sediment and rock layers with similar hydraulic characteristics, was first released in September 2013.

Water Information Standards:

- Ten national industry guidelines for hydrometric monitoring were released in May 2013. The purpose of the National Industry Guidelines
 (http://www.bom.gov.au/water/standards/niGuidelinesHyd.shtml) is to increase
 consistency of practices in hydrometric monitoring, and improve consistency of the
 resulting information generated by collecting agencies. Over 200 organisations around
 the nation gather and supply water data to the Bureau as required under the Water
 Regulations 2008. Within those organisations, data are generated for many different
 purposes to satisfy a spectrum of business needs. Consequently there have been a
 considerable range of standards, practices and procedures applied across the country at
 each stage along the data value chain.
- Australian Water Accounting Standards and a Water Accounting Conceptual Framework have been developed, supported by the Bureau's Water Accounting Standards Board and in collaboration with the Australian Auditing and Assurance Standards Board. The Australian Water Accounting Standards (<u>www.bom.gov.au/water/nwa/water-accountingstandards.shtml</u>) are a framework for water resource accounting aimed at ensuring adequate measurement, monitoring and reporting systems are in place to account for how water is distributed and used. The standards provide a standardised reporting format to guide the preparation, presentation and assurance for general purpose water accounting reports.
- The Water Data Transfer Format (<u>http://www.bom.gov.au/water/standards/wdtf/</u>) is an Australian standard of water data exchange. It provides the first nationally comprehensive definition of water domain information concepts. It also provides a common view on data which enables the sharing of data between organisations, where the sender and receiver understand the meaning and structure of the data file without consultation. This style of data exchange is suitable for machine to machine exchange and systems automation. The first version (V0.1) was released in August 2008, with the most recent version (V1.2) released in December 2013.

Water Restrictions website:

The Bureau's Water Restrictions website (<u>http://www.bom.gov.au/water/restrictions/</u>)
provides a single national web portal for urban water restrictions for 56 urban water
authorities, was released June 2013. It provides the Australian community with a single
point of reference for water restriction information and serves to raise awareness of water
use responsibilities.

Hydrologic Reference Stations:

The Hydrologic Reference Stations product (<u>http://www.bom.gov.au/water/hrs/</u>) features a network of 221 stations for which streamflow data can be displayed as an annual, seasonal, monthly or daily time series. Long-term trends in streamflow can be explored and specific station streamflow data can be viewed or downloaded. It was released in December 2012. The purpose of the Hydrologic Reference Stations product is to create a national asset that can be used to assess the effects of long-term climate variability and change on water availability across all hydro-climatic regions in Australia at annual, seasonal, monthly and daily time scales. The product will be upgraded in 2015 with more recent streamflow data.

Australian Hydrological Geospatial Fabric (Geofabric):

 Geofabric products and services (<u>http://www.bom.gov.au/water/geofabric/</u>) provide a single, consistent, national geospatial framework for discovering, querying, reporting and modelling water information. The Geofabric includes a suite of well maintained, evolving, authoritative data products containing a consistent representation of Australian water system features and their connectivity. By detailing the spatial dimensions and relationships of important features, such as: streams, catchments, aquifers, storages, wetlands, monitoring points and other structures, we can visualise and model how water is captured, transported and used through the landscape.

Australian Water Resources Assessment:

Australian Water Resources Assessments (<u>http://www.bom.gov.au/water/awra/</u>) provide a national view of Australia's water resources status. It uses the best available water data, continental scale water balance models and analysis to describe the state of the water resources at regional to national scales, highlighting trends in urban and rural water availability and use, the hydrological condition of rivers, wetlands, storages and aquifers, and water levels of major surface water storages and aquifers. It also highlights any nationally-significant rainfall and flooding events that occurred during the report period. The Assessments provide water information at the national scale, as well as for drainage divisions, irrigation areas, urban centre, iconic wetlands and reference points (river stations or aquifer bores) scales. It assists the development of broad-scale water resource policies and plans, enabling the identification of current and future water management challenges.

Water market information:

 Using data collected under the Water Regulations 2008, the Bureau provides information through a National Water Market System web portal (operated by the Department of the Environment) on the number and volume of entitlements that have been issued, and volumes and price of entitlement and allocation that have been traded. Bureau- collected market information is regularly profiled at the Bureau's monthly National Climate and Water Briefings, used in the National Water Account and underpinned the National Water Commission's annual Australian Water Markets report. See www.bom.gov.au/water/market/index.shtml.

Australian Water Resources Assessment Modelling System:

 The Australian Water Resource Assessment Modelling System is an operational, continental and regional scale, coupled landscape, groundwater and regulated river system analysis tool. It was developed to provide inputs to the National Water Account and the Australian Water Resource Assessment report. The Modelling System provides seamless water balance information and data across Australia for the past and present using both observational data, where available, and model outputs. The Modelling System is a new integrated hydrological simulation system designed and prototyped by CSIRO and the Bureau through the Water Information Research and Development Alliance initiative.

Collecting and managing water information:

- The Australian Water Resources Information System (AWRIS), ingests, standardises, stores, and provides access to Water Regulations 2008 data and provides the ICT infrastructure for the delivery of a wide range of water information data, reporting and forecasting products.
- The Modernisation and Extension of Hydrologic Monitoring Systems Program, which ran from 2007 to 2012, with annual funding cycles, provided \$78.1 million to named persons in the Water Regulations 2008 to conduct 463 projects, assisting these organisations to update monitoring systems and improve data quality delivered to the Bureau.

Providing water information to other agencies:

- Since August 2011, the Bureau has been running monthly National Climate and Water briefings, with around 50 people attending each briefing from more than 40 government departments and stakeholder organisations. Each briefing presents a summary of recent climate and water conditions and investigates the outlook for the coming months.
- Though the expansion of the Bureau's water information capability, the organisation has been able to respond effectively to information requests received from Commonwealth agencies such as the Department of the Environment and the National Water Commission amongst others. For example, the Bureau delivered the Mapping Hydrological Indicators component of the National Water Commission's National Inventory of Water Stressed Catchments and Aquifers Project.
- Routine and ad hoc water data provision to external organisations including, the Department of the Environment, National Water Commission, Murray-Darling Basin Authority, CSIRO, World Meteorological Organisation, universities and industry. For example, since December 2010 water market trade data, collected from 15 organisations, is delivered on a weekly basis, to the Department of the Environment for publication in the Water Markets Report on the National Water Markets website. This information is also delivered on an annual basis to the National Water Commission for use in their Australian Water Market Report.

Research and Development:

- The Bureau entered into a research partnership with CSIRO in 2008, the Water Information Research and Development Alliance, as the primary mechanism for investment in research and development, to ensure that its water information role is supported by the best available science and technology.
- A number of research projects are also undertaken in partnership with Australian universities.