SOUTH EAST QUEENSLAND'S INSTITUTIONAL REFORMS FOR WATER RESILIENCE -LESSONS LEARNT

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ABSTRACT

To manage physical risks of droughts, floods, poor water quality and rising costs, both regulatory and institutional responses are essential. These responses are aimed at timely investments in infrastructure, in operational capability and in stakeholder relationships. The lessons learnt in South East Queensland (SEQ) are relevant as New Zealand implements significant reforms aimed at achieving resilience amidst climate change, environmental decline, economic pressure and emerging risks to services.

South East Queensland's Millennium Drought commenced around 2001 and lasted till 2009 coinciding with unprecedented population growth. Water and wastewater services in SEQ were being provided by seventeen council owned businesses, with widely varying levels of water security and operating models.

The unacceptable risk of water shortages led to significant investment in drought resilience and institutional reforms between 2003 and 2008. Government invested $6Bn in creating the interconnected SEQ Water Grid as well as additional supply sources including surface water dams, groundwater, desalination and recycled water. The government established **Queensland Water Commission** (QWC) and **Queensland Water Infrastructure Pty Ltd** to manage drought risk across the state and to develop required infrastructure.

Under the SEQ Water (Restructuring) Act 2007, four state Authorities were created and the bulk water assets were vested with them: supply headworks (catchment management, dams and water treatment plants) were vested with **Seqwater**, the Desalination and Recycled Water Plants with **WaterSecure**, the transmission network with **LinkWater** and the operation of the Water Grid with the **SEQ Water Grid Manager**.

Under the Water Supply (Safety and Reliability) Act 2008 and the SEQ Water (Distribution and Retail Restructuring) Act 2009, the Council businesses were amalgamated into three retail-distribution service providers owned by councils - **Queensland Urban Utilities**, **Unitywater** and **Allconnex** were formed to provide retail water supply services and end to end sewerage services.

The drought ended in 2009 followed by widespread flooding across Queensland in January 2011. A Flood Commission of Inquiry was charged to examine and report to the parliament on the causes and recommendations to address flood risk.

A change in government led to QWC being abolished and the amalgamation of Seqwater, LinkWater, SEQ Water Grid Manager and parts of QWC to create the Queensland Bulk Water Authority Seqwater which came into existence as a state-owned authority in January 2013.

Due to public concerns of rising water prices the government permitted councils to resume control. Allconnex demerged in July 2012 to split into council businesses - Gold Coast Water, Logan Water and Redland Water.

A major storm event in 2013 led to disruption to the main water treatment plant as well as the majority of the regional water treatment plants, and supply capacity was reduced. Later that year the recycled water scheme was placed into care and maintenance and the desalination plant was put into stand-by mode, to reduce costs.

This paper presents these reforms, the lessons learnt, conclusions and recommendations to consider when developing and implementing reforms aimed at sustained resilience of complex systems that include water services, environment, climate, economic, social and political dimensions.

KEYWORDS

utility models, water reforms, institutional reforms, drought resilience, sustainability

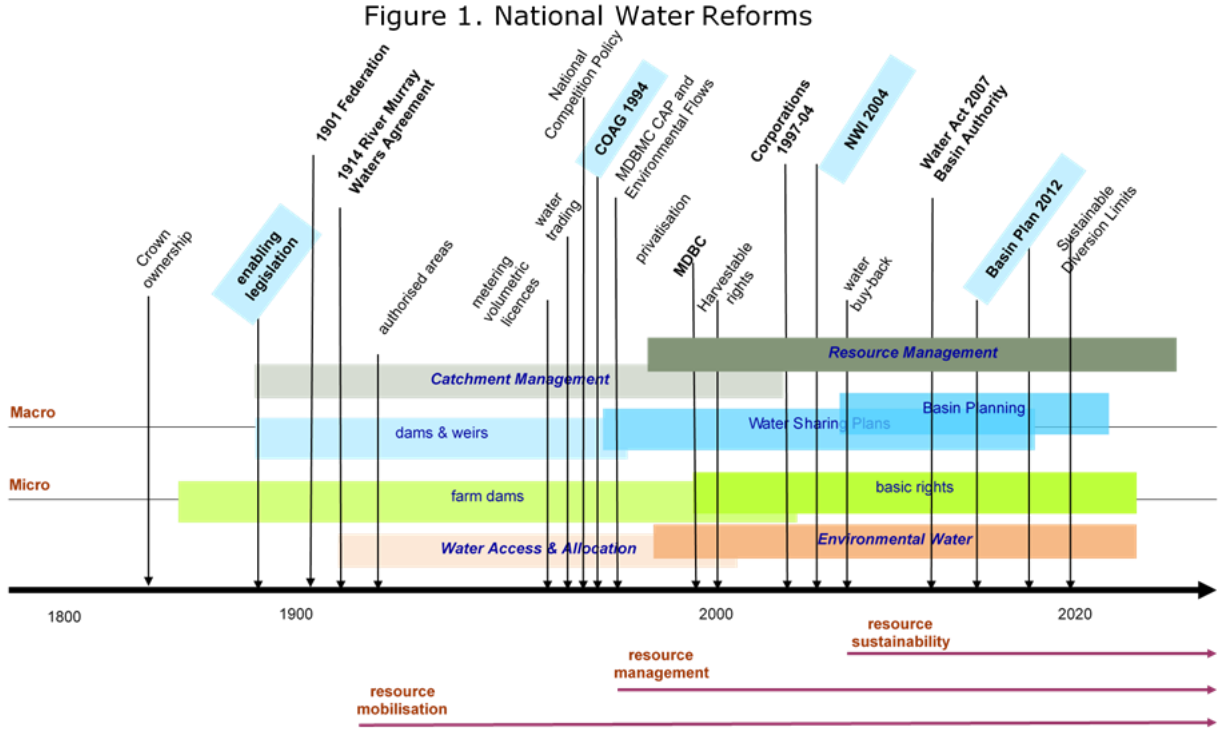
PRESENTER PROFILE

Abel Immaraj - This paper draws on Abel’s experience in governance, change management, and operations in water reforms covering local, state and national jurisdictions. These included formation of SEQ utilities, irrigation privatization, corporatization of State Water NSW, formation of the Murray Darling Basin Authority, amalgamation of SEQ water entities and asset transfers.

INTRODUCTION

Since federation, Australia's water reforms were primarily influenced by droughts and floods. At the time of the federation, water was vested with the Crown in State jurisdiction, with access to water principally assured by regulation and works of the Crown. Driven by droughts (ABS), floods (Australian Geographic), algal blooms (CSIRO) and increasing awareness, there has been a steady evolution of water management since then, with national and state reforms, funding programs and the Commonwealth taking a role in basin level planning and investment since 2007 (Commonwealth Government of Australia).

Figure 1. National Water Reforms



With population growth and economic development, meeting additional demands required water resource mobilization by way of dams and river regulation. The competition for water during periods of scarcity shifted the risk of over allocation of resources to the state governments. In the drought of the early 1980's competing demands for water pushed through reforms of water access, such as volumetric licensing, metering and water trading.

In 1994, the Council of Australian Governments (COAG) commenced comprehensive and systemic national water reforms, drawing on the approaches from New Zealand (Resource Management Act), the UK (water industry reform and privatization) and Canada (sustainable development outcomes). Simultaneously there were economic and environmental reforms including floating the Australian dollar, taxation, goods and services tax, competition policy, deregulation of financial sector, as well as the adoption of environmentally sustainable development (ESD) and precautionary principles.

COAG endorsed a framework of water initiatives over six years, which included:

- Water rights: clarifying water property rights and the separation of water from land title, and facilitating water markets and trading

- Economic reforms: independent economic regulation, water pricing principles of consumption-based pricing and full cost recovery recognising environmental externalities, and progressively reducing subsidies or making them transparent
- Environmental reforms: water allocation for the environment, provision of environmental flow objectives and water quality objectives
- Institutional reforms: Separation of regulators from operators, corporatisation/privatisation of irrigation systems.

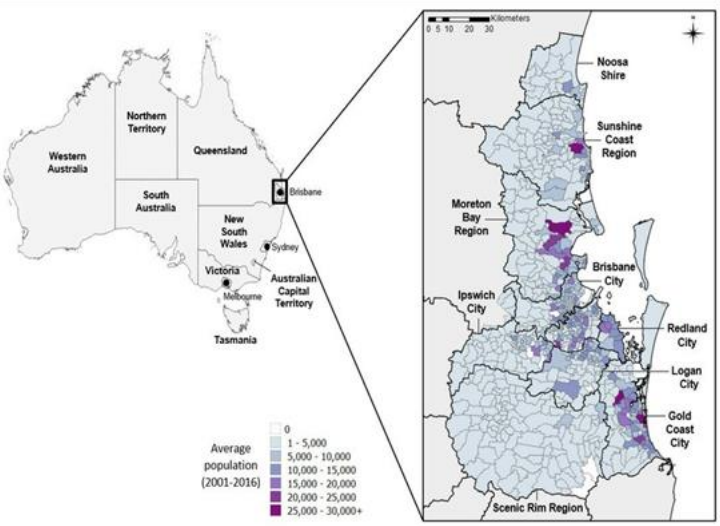
Urban water reforms became a priority with public focus on the pollution of Sydney's beaches between 1989 and 1995 (Beachwatch 1990, 2000) and the risks highlighted in the drinking water quality incidents in Walkerton Canada.

DISCUSSION

South East Queensland (SEQ) is a 22,420 km^2 bio-geographical, metropolitan, political, and administrative region, home to 3.8M of Queensland's 5.1M population (Department of Infrastructure & Planning 2009).

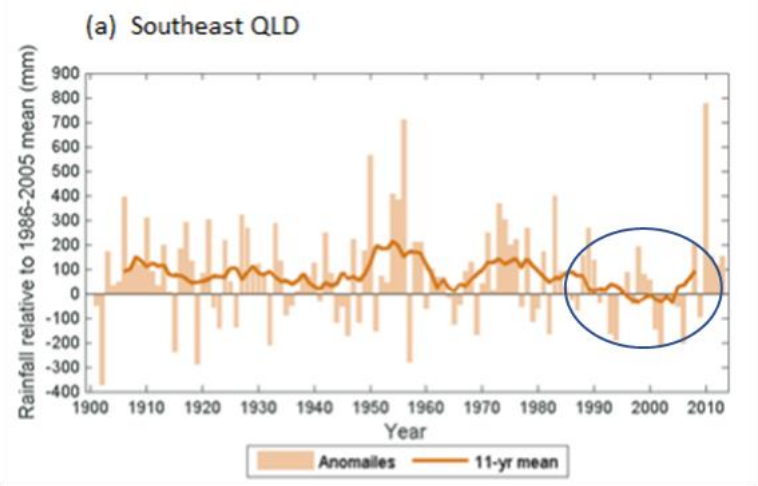
SEQ includes Queensland's three largest cities: Brisbane, the Gold Coast and the Sunshine Coast, and currently 11 local government areas from Noosa in the north extending 240km to the Gold Coast, and 140km west to Toowoomba (which is considered part of the SEQ for water resource management).

Figure 2. South East Queensland Region



The Millennium Drought commenced around 2000 and lasted till 2009 coinciding with a decade long unprecedented population growth. Water and wastewater services in SEQ were being provided by numerous council owned businesses, with widely varying levels of water security and operating models.

Figure 3. The Millennium Drought



By 2007 the combined surface water storages in SEQ had dropped to below 17% and Level Six Restrictions were set to commence at 15% (Queensland Water Commission 2010). The ensuing social discourse on restrictions, recycled water to reforms, created political expediency and legitimacy to act with urgency.

Figure 4. The Wivenhoe Dam Situation

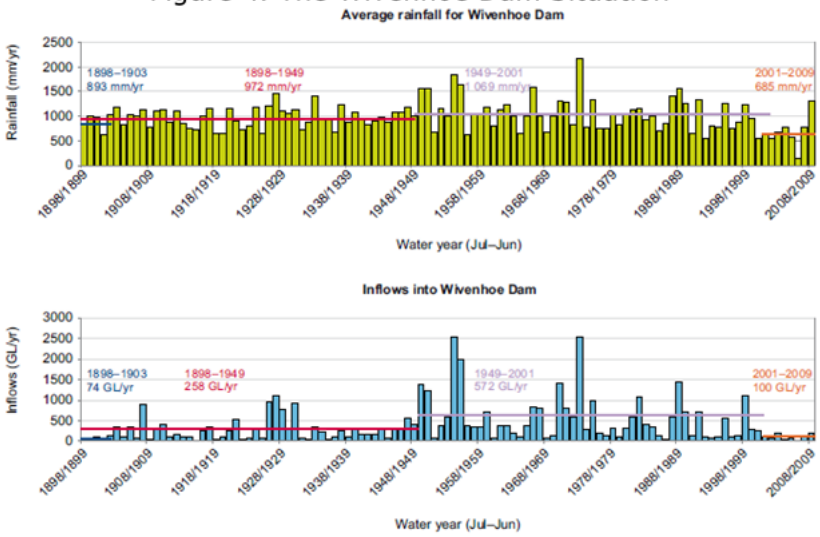
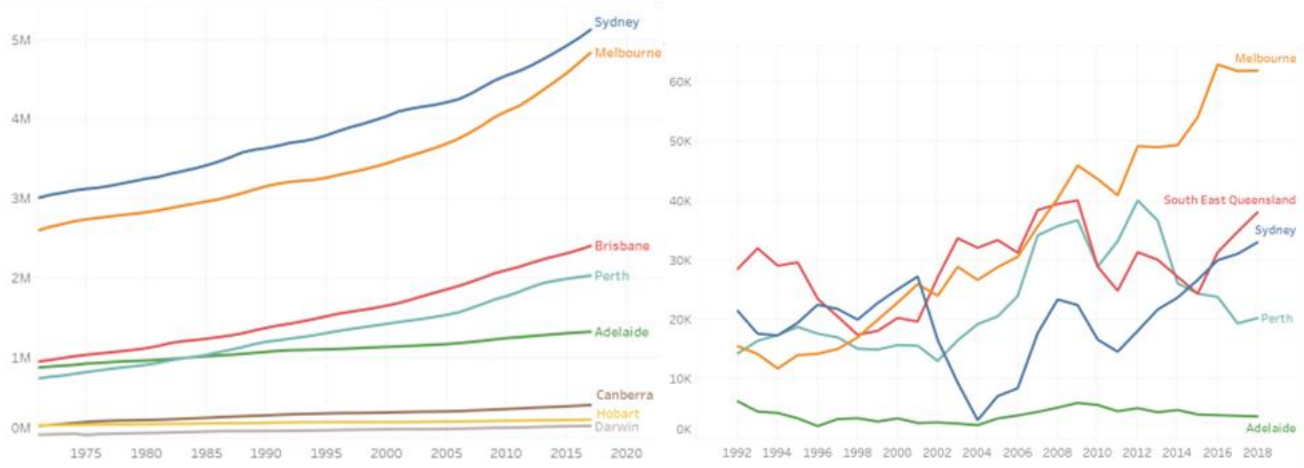


Figure 5. Growing cities (left) and sprawling suburbs (right)



Further, SEQ council amalgamations resulted in 22 councils reducing to 10 and back to 11 in 2014. The rapid growth in population, its distribution and change in demographics accelerated some of these changes. There was a rapid increase in growth of the suburbs from 2000 and peaked in 2008 (Chris Loader), which led to significant investment in infrastructure.

The decade 2003 to 2013 of the new millennium was an intense period of reform in SEQ. The backdrop of prior reforms at a national and local level, as well as the droughts gripping other major cities informed the reforms and investment measures.

To manage physical risks of droughts, floods, poor water quality and rising costs, both regulatory and institutional responses are essential. These responses are aimed at timely investment in infrastructure, operational capability and in stakeholder relationships. The lessons learnt in SEQ are relevant for New Zealand as it implements significant reforms aimed at achieving resilience amidst climate change, environmental decline, economic pressure and emerging risks to services.

The unacceptable risk of water shortages led to significant investment in drought resilience and institutional reforms between 2003 and 2008. Government invested

$6Bn in creating the interconnected SEQ Water Grid and additional supply sources including surface water dams, groundwater, desalination and recycled water. The Queensland Water Commission (QWC) and Queensland Water Infrastructure Pty Ltd were established to manage drought risk across the state and to develop some of the required infrastructure.

Fundamental changes were made to the regulatory frameworks for planning and managing water supplies, aligned with national approaches and industry best practice.

There were three areas of risk which converged during the period to create unacceptable risk to water security.

1. **Water source risk:** Rainfall was 32% below the previous wet period 1996 to 2001. The severity was exacerbated by high temperatures and evaporation. Reliability of the smaller storages was unacceptable and so was the consequential risk of supply failure and water quality risks. The wealthier councils proceeded to augment supplies, but the smaller councils were facing significant restrictions and the prospect of water rationing and water carting. Rainfall variability across Queensland was evident, with much of the state in drought conditions but at the same time Tropical Cyclone Larry caused extensive flood damage in northern Queensland in early 2006.
2. **Water demand risk:** There was continuing population growth in Sydney, Melbourne, Brisbane, Perth and Adelaide with consequential growth in water demand and requisite water security for the future. Nationally there was concern about the risk to large cities, with clear evidence that Perth's supply risk had to be addressed through significant investment and accompanying reforms. Demand management in SEQ was not consistent, with each council adopting local measures as was deemed suitable. Individual councils in SEQ adopted slightly different approach to water security and restrictions.
3. **Assets and operations risk:** The challenge of providing fit for purpose infrastructure for growing cities with the existing small dams, aging assets and long linear networks became a significant challenge, which led to a rethink on urban infill, intensification and multi-nodal cities. Due to the drought and drying of the clay soils in SEQ, there were more pipe breaks which resulted in water losses and leakage. This led to perceptions and concerns that the councils had failed to recognize climate change and maintain water networks.

Other driving forces were environmental awareness and the increase in wet weather sewer discharges to waterways, which resulted in significant capital outlay to upgrade sewer networks as well as treatment plants and overflow abatement.

Together, these factors posed a significant joint risk to achieving a cost-effective supply-demand balance for all the major cities. Recognising this, the State Governments then embarked on water supply augmentation, regulatory and institutional reforms.

Although principles of Integrated/Total Water Cycle Management and Water Sensitive Urban Design were already in play, stormwater was not specifically within the scope of the reforms, so it could be considered that SEQ and most of the Australian Cities adopted "two water" reform, supported by IWCM initiatives.

In SEQ, the water reform program had three parts:

- **Regulatory reforms**: SEQ Water Restructuring Act and amendments to the Water Act; Setting up Desired Level of Service (LOS) objectives consistent with the Water Supply Guarantee (QWC SEQ Water Strategy).

LEVEL OF SERVICE (LOS) STATEMENT OF OBJECTIVES (The 2010 SEQ Water Strategy)

The statement of the LOS was structured along the lines of a clear water demand target, process to achieve it and the expected residual risk.

1. **Target**: During normal operating mode, sufficient water will be available from the SEQ Water Grid to meet an average regional urban demand of 375 litres per person per day (including residential, non-residential and system losses).
2. **Process**: **Sufficient investment in the water supply system will occur so that:**
   - Medium Level Restrictions will not occur more than once every 25 years, on average
   - Medium Level Restrictions will only reduce consumption by 15% below the total consumption volume in normal operating mode
   - drought response infrastructure will be not be required to be built more than once every 100 years, on average
   - combined regional storage reserves do not decline to 10% of capacity more than once every 1000 years, on average
   - regional water storages do not reach 5% of combined storage capacity
   - Wivenhoe, Hinze and Baroon Pocket dams do not reach minimum operating levels.
3. **Residual risk**: It is expected that Medium Level Restrictions will last longer than six months, no more than once every 50 years on average.

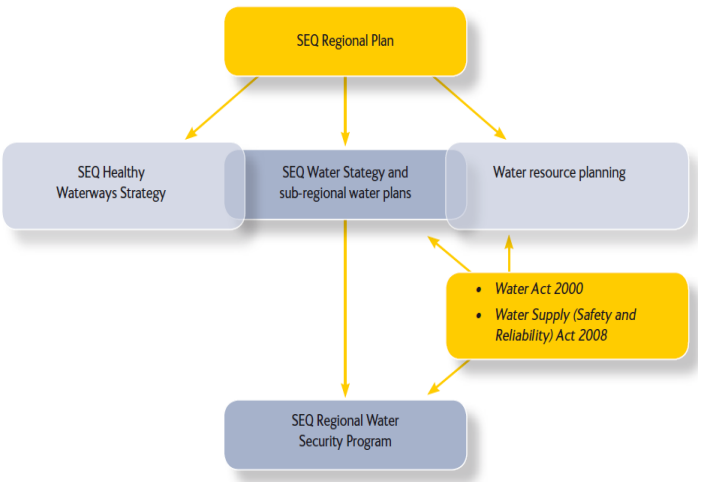
The Level of Service objectives, the integrated water grid and the institutional arrangements together formed the three pillars of the water strategy. Each of these pillars has a range of authorizing instruments and resourcing measures that interconnect them.

- **Planning reforms**: To incorporate reliability assessments (water 'budget' approach using historical data as well as supply-demand balance using stochastic data).

  Requirement of the SEQ Water Strategy, System Operating Plan, Water Security Program, SEQ Regional Strategy, Qld State Water Resource Planning (resource allocation), Demand and Drought Management Plans.

- **Institutional Reforms:** Under the SEQ Water (Restructuring) Act 2007, four state Authorities were created and the bulk water assets were vested with them: supply headworks (catchment management, dams and water treatment plants) were vested with Seqwater, the Desalination and Recycled Water Plants (AWTP) with WaterSecure, the transmission network with LinkWater and the operation of the Water Grid with the SEQ Water Grid Manager.

Figure 6. Integrated planning



Under the Water Supply (Safety and Reliability) Act 2008 and the SEQ Water Distribution and Retail Restructuring Act 2009, the Council businesses were amalgamated into three retail-distribution service providers owned by councils - Queensland Urban Utilities, Unitywater and Allconnex to provide retail water supply services and end to end sewerage services to residential and commercial retail customers.

Figure 7. Implementation of SEQ Water Reforms (QWC Dec 2006)

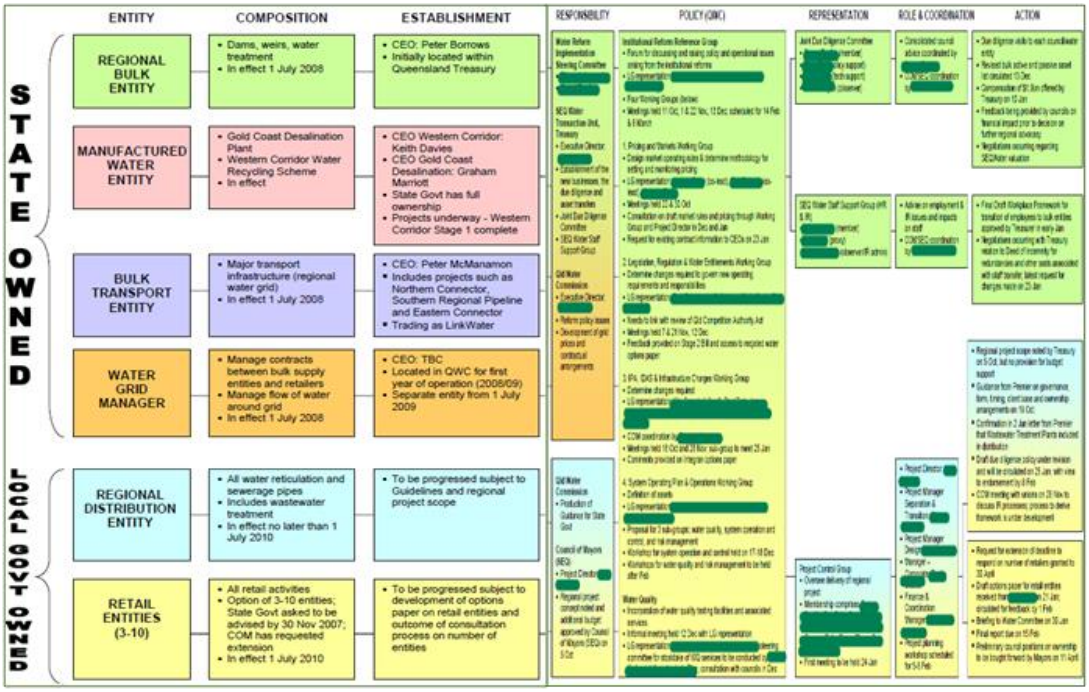
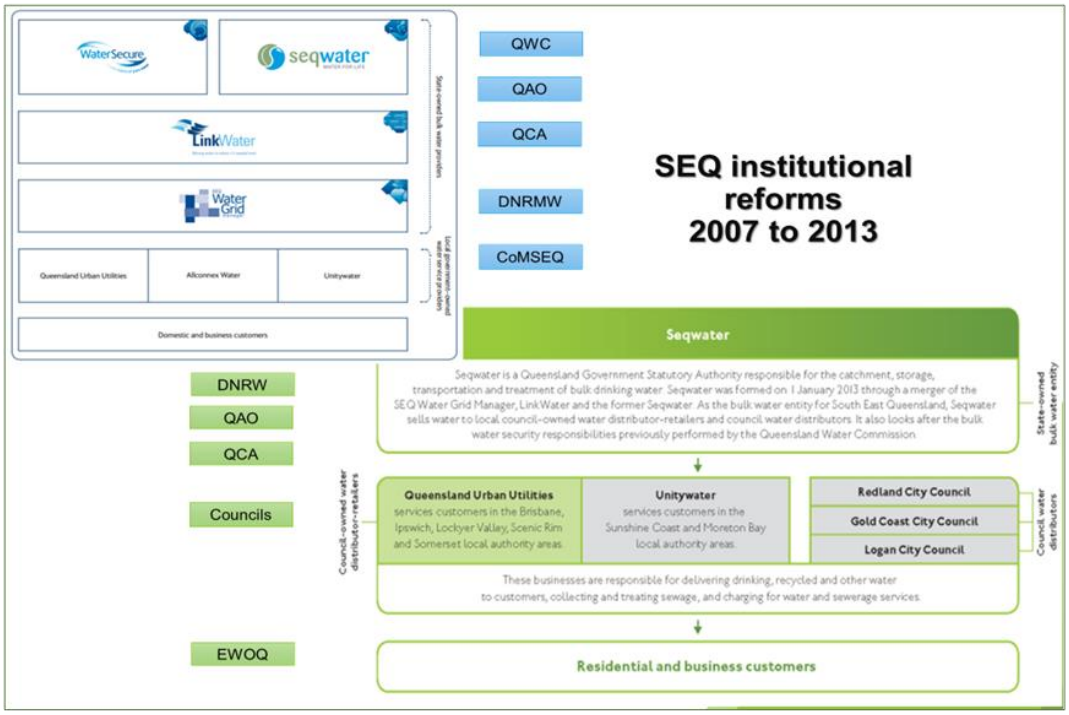
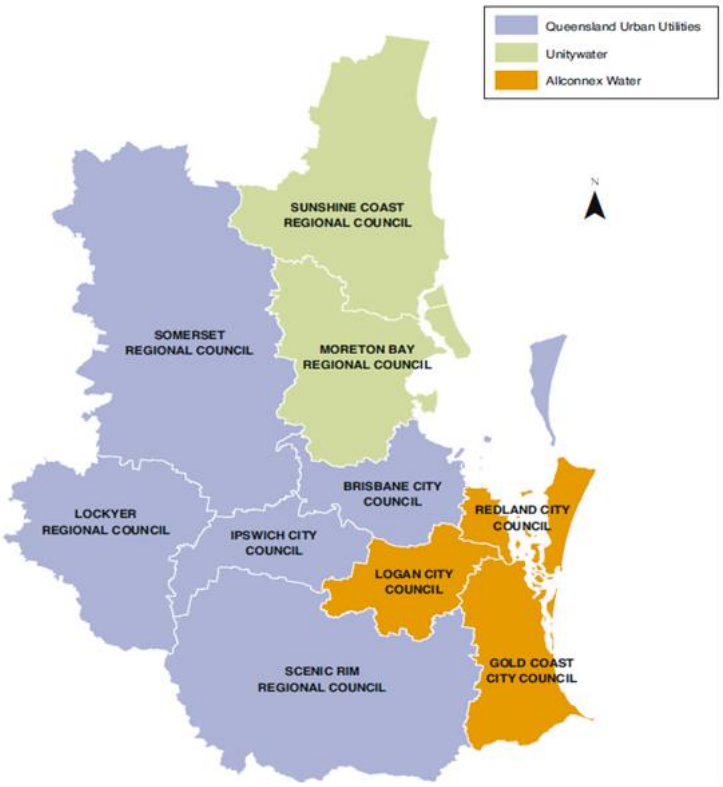


Figure 8. SEQ Institutional Reforms (QWC Dec 2006)



South-East Queensland Water (Distribution and Retail Restructuring) Act 2009 and the subordinate Participation Agreements enabled the configuration of the Distributor Retailers areas of operation, taking into account their assets and liabilities, operational effectiveness and efficiency and projected revenue streams to support business viability.

Figure 9. Retail Distributor Boundaries (QWC Dec 2006)



Financial modelling was undertaken to establish the preferred option, considering acceptable thresholds for affordability of water charges.

Till the millennium drought, South East Queensland was considered to have reliable rainfall with little variability and no signs of an extended trend. With increasing variability and growing water demand, the supply-demand imbalance posed an unacceptable risk of supply shortfalls and demand restrictions.

The implementation of the Water Strategy and Water Security Program saw the augmentation of surface water (a new Wyaralong Dam and augmentations at other existing dams) and groundwater supplies , manufactured water supplies (the 46GL/yr Tugun Desalination Plant, and the 84GL/yr Western Corridor Recycled Water Supply Scheme (including the Luggage Point Advanced Water Treatment Plant AWTP, Gibson Island AWTP and Bundamba AWTP), the interconnected Water Grid , a centralized Grid Operations Centre, an integrated system operating plan, model and market rules.By 2010 implementation of the initial strategy had been completed and the SEQ Water Strategy had recast the future water security as shown, based on revised supply-demand balance (QWC 2010). The physical risk of water supplies was primarily achieved by interconnecting disparate supply systems into the SEQ water grid.

The LOS system yield of the Grid is less than the sum of the allocations but it is larger than the sum of the LOS yields of the individual systems. Operating the SEQ Water Grid as a single system increased the system yield by about 14% compared to a disconnected system (Figure 10).

As at 2010 there was less than 1% probability of key SEQ Water Grid storages falling to 40% of combined capacity over the next five years, triggering Medium Level Restrictions. The potential future strategy for the portfolio is shown below:

Figure 10. LOS System Yield Scenarios (QWC 2010)

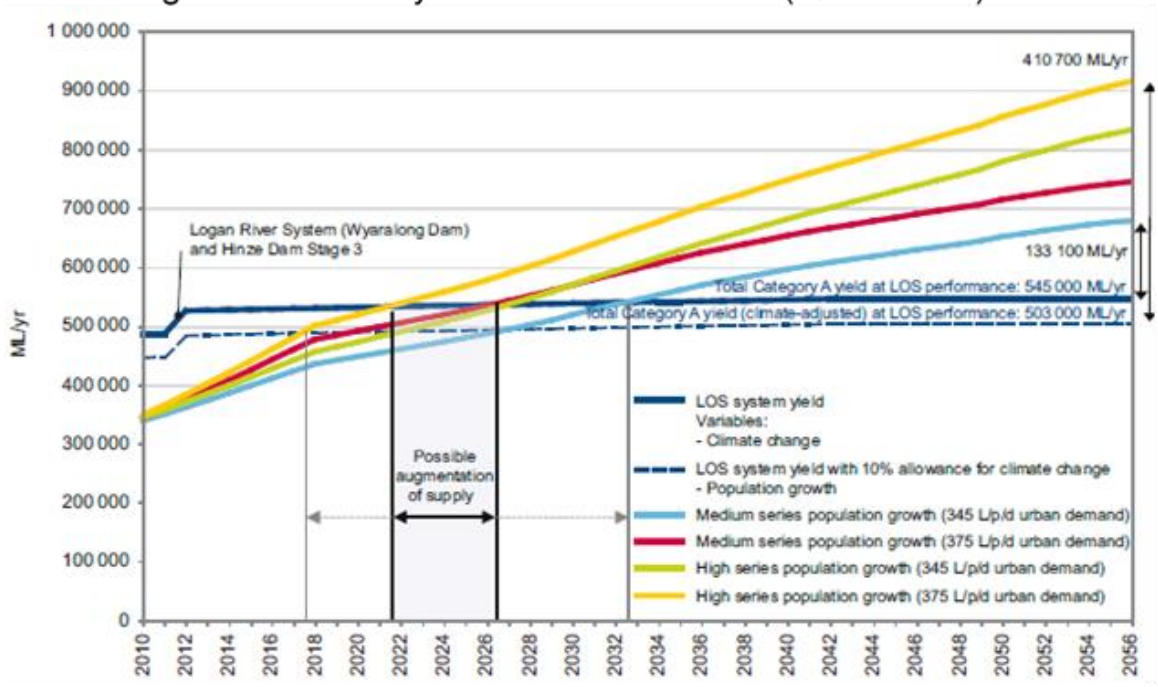
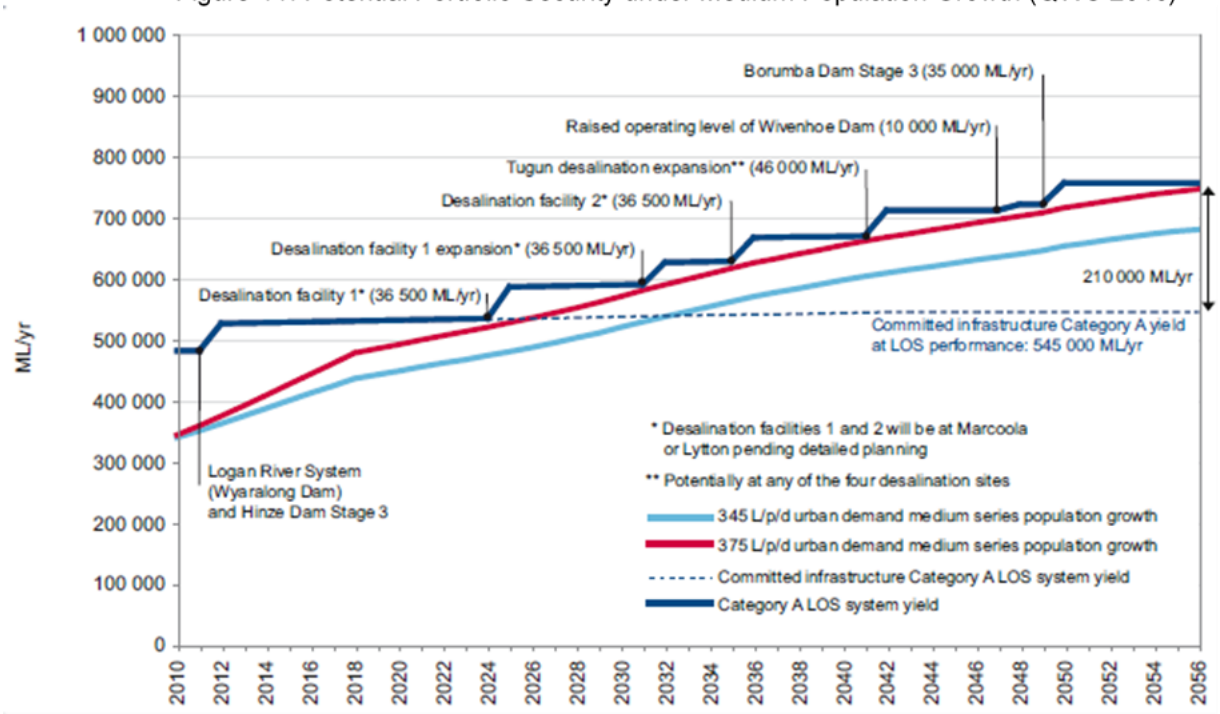


Figure 11. Potential Portfolio Security under Medium Population Growth (QWC 2010)



QUEENSLAND WATER COMMISSION

The role of Queensland Water Commission in the SEQ Water Reforms cannot be understated. The Commissioner's role in coordinating the reforms, drought policy, planning, implementing, advising the government on all matters of water supply security (and later, flood resilience) and brokering agreements; was somewhat like that of the role of the Chief Medical Officer in managing the current pandemic response.

Queensland Water Commission Role

To ensure a concerted focus on the Water Security Program for SEQ and steward the reforms safely through the complex environment, the Government formed the Queensland Water Commission, with authorisation to develop the Program, resources to implement it and accountability for the outcomes.

The Queensland Water Commission (QWC) was established under the Water Act 2000, commenced operations on 19/05/2006, operating under the Water Act and provisions of the South East Queensland Water (Distribution and Retail Restructuring) Act 2009.

In accordance with Water Act 2000, the Commission's functions were to:

- plan, develop strategies for long-term water security and to advise the Government on regional water security programs for SEQ.
- ensure the implementation of approved water security programs, monitor implementation and report to the Minister.
- To establish Regional Water Restrictions where required and to encourage demand management.
- To develop the System Operating Plan which will govern the operation of regional water infrastructure to achieve water sharing within a water grid.
- To provide advice to government on other matters as directed by the Minister.
- In December 2010 QWC was assigned responsibility for managing the impacts on groundwater levels of water extraction by petroleum and gas tenure holders, including coal seam gas producers.
- In September 2011 QWC was assigned responsibility for

The Commission initially comprised a Chairperson and two Commissioners appointed by the Governor-in-Council, an Executive Management Team and other staff. A machinery-of-government change in 2009 led to a restructure of the Commission, reducing the number of Commissioners to one and enhancing its resources, systems and capability.

Under the "South East Queensland Water (Restructuring) and Other Legislation Amendment Act 2012", Chapter 2A of the "Water Act 2000" was amended to abolish the Queensland Water Commission with effect from 1 January 2013. The 2012 Act also merged South East Queensland's three bulk water businesses into a single bulk water supply authority, which assumed responsibility from the Commission for water security planning. The Commission's other surviving functions were integrated into the Department of Energy and Water Supply.

FROM EXTREME DROUGHT TO MAJOR FLOOD

The drought eased in 2010 and the dam levels rose to 40% which triggered the requirement to put purified recycled water into Wivenhoe Dam. The government reconsidered the decision and decided to defer the action. The new Wyaralong Dam which was expected to fill in seven years filled within two years, and Traveston Dam which was in final stage of Commonwealth Government approval was abandoned and the land acquired was sold off.

The extended drought was followed by an extensive tropical low with heavy rainfall and widespread flooding across Queensland in January 2011. In the SEQ the unique set of circumstances of an extreme drought followed by a major storm caused significant operational complexity for dam operations of multi-purpose dams that provide drought resilience as well as flood resilience.

A Flood Commission of Inquiry was charged to examine and report to the parliament on the causes and recommendations to address flood risk. A six-month long process considered all the evidence and over a hundred recommendations were made for consideration by the government.

A change in government in March 2012 led to QWC being abolished and the amalgamation of Seqwater, LinkWater, SEQ Water Grid Manager and parts of QWC to create the Queensland Bulk Water Authority Seqwater which came into existence as a state-owned authority in January 2013.

Due to public concerns of rising water prices the government permitted councils to resume control. Allconnex demerged in July 2012 to split into council businesses - Gold Coast Water, Logan Water and Redland Water.

A major storm event in 2013 led to disruption to the main water treatment plant as well as the majority of the regional water treatment plants, and supply capacity was reduced. By 2014 Western Corridor Recycled Water Scheme (WCRWS) had been put under care and maintenance and the desalination plant was put into stand-by mode, to reduce costs. One of the three Advanced Water Treatment Plants, the Gibson Island plant was mothballed, and the Brisbane groundwater bores and the Bromelton Off-stream Storage were decommissioned.

The Desalination Plant operates in hot stand-by mode and supplies water to the Grid from time to time, as needed. The Desalination Plant operated during peak demand periods, the 2013 storm event and also the 2020 refurbishment works at Mount Crosby WTP.

Although the WCRWS is factored into the water security computations, it has not had to operate to that effect. During 2018, prior to the 2020/21 drought, Seqwater commenced investigations to recommence operation of the WCRWS.

The lessons learnt from these reforms and conclusions should be considered when developing and implementing reforms aimed at sustained resilience of complex systems that include water services, environment, climate, economic, social and political dimensions.

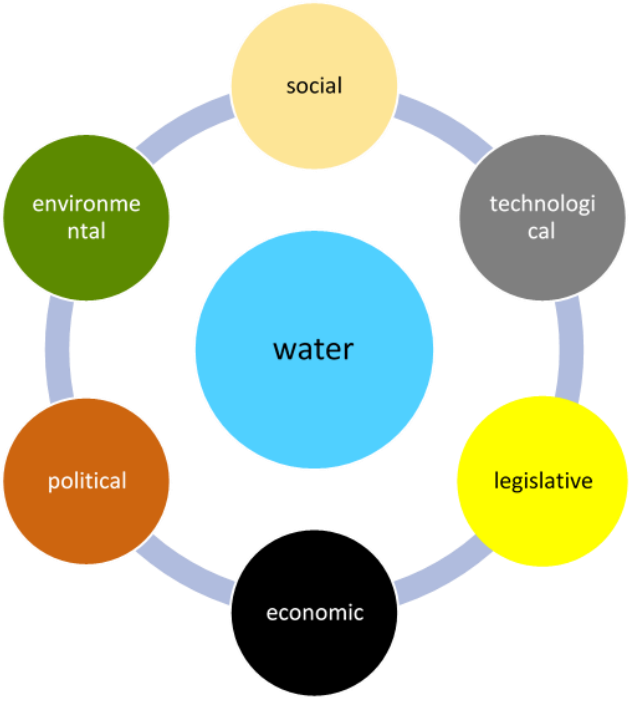
CONCLUSIONS

Beyond the physical operation of the SEQ Water Grid, the reformed institutional arrangements delivered significant benefits to the community by:

- improving and simplifying business structures to deliver water services in a coordinated manner
- creating economies of scale and scope due to the reduced number of entities
- improving service delivery by specialist entities, with the amalgamation of technical skill sets
- clarifying the respective roles of state and local governments
- improving the transparency and accountability for bulk transport and distribution networks with a strong asset management regime
- enhancing economic regulation and pricing.

The PESTLE-W framework helps capture the learnings of the reform process.

Figure 12. PESTLEW Framework for Lessons Learnt



This framework keeps the 'W' - water objectives central, and captures the 'PESTLE' Political, Environmental, Social, Technological, Economic and Legislative considerations

From the water reform perspective, there are strong inter-relationships amongst the PESTLE factors.

The correlation and perhaps causation between hydrology and sociology cannot be underestimated. Droughts trigger a social reaction that is only eased by rainfall, when the dams are full.

Political factors: The drought created a sense of citizenship *'we're all in this together',* and the floods created a spirit of citizenship *'We have to help our neighbours'.* These crises and the community sentiment were recognized by the government and the opposition and planning and response enabled citizen action, both for demand management as well as flood response and recovery.

Regional studies with extensive community engagement on acceptability of recycled water for potable use, drought restrictions and stormwater harvesting helped inform the SEQ Water Strategy and the Water Security Program.

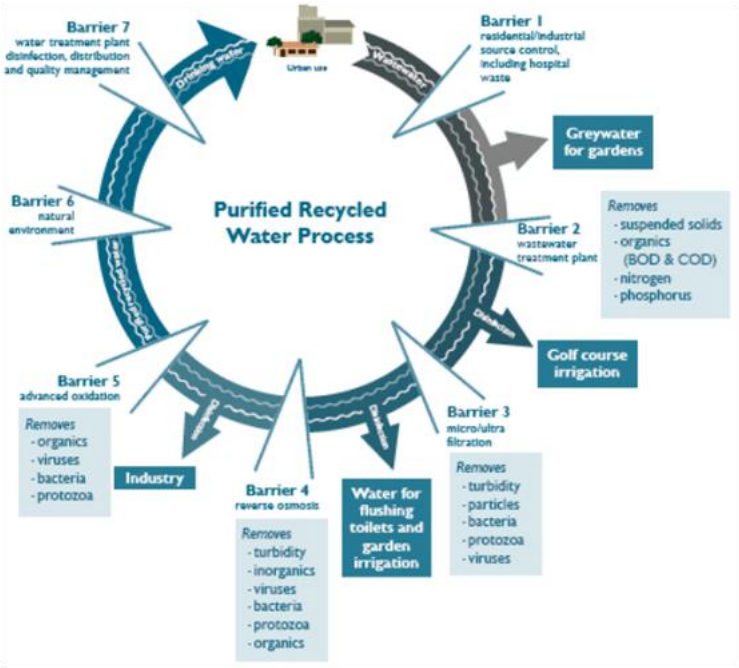
Given the urgency to act, it was generally accepted that unintended consequences of strategies, policies and plans can be addressed through mitigation measures, rather than delay action and compromise the integrity of the policies and plans.

Environmental factors: The extended drought and climatic variability was recognized early in the drought, given the similar conditions that other cities were experiencing. The decline in catchment conditions and the 'green drought' were also recognized by the community at large and measures such as greywater reuse and rainwater tank incentives were initiated.

The building of new dams (particularly Traveston Dam in the Mary River Valley) elicited considerable debate and eventually opposition. The energy intensive manufactured water plants were controversial to say the least.

Social Factors: Water management is more about psychology than hydrology. Droughts and floods are catalysts for conversation and action. Sustained water security is a balancing act of supply, demand and operations. This balance can only be achieved and maintained by a combination of supply and demand measures and social licence to operate the system for maximum benefit. The 'explainability' of policies and plans is critical if enduring community support is to be maintained.

Figure 13. Seven Stage Barrier Process for Indirect Reuse



The assurance of safety of manufactured water required considerable concerted effort by the industry and scientists working together to develop the seven-stage barrier process for indirect potable reuse (Huijun Zhao et al 2009).

Notwithstanding this, in a plebiscite in July 2006 about 60% of Toowoomba residents voted against potable use of recycled water.

Manufactured Water Readiness Plan was initially incorporated into the Water Security Program to ensure the option remains on the table for the future. It is currently structured as a Restart Plan driven by the Water Security Plan.

Technological factors: An 'all options on the table' approach is important, to ensure a suite of measures that diversify the water security risk through a range of supply side and demand side measures that can be implemented through integrated operations.

The Program incorporated a range of solutions which drew on technologies ranging from data analytics and modelling (predictive and prescriptive), GIS, SCADA, smart meters, smart water networks, water and wastewater treatment processes, operations optimisation.

Centres of excellence such as the Australian Centre of Excellence for Water Recycling, Advanced Water Management Centre, Cooperative Research Centre for Water Sensitive Cities; Industry bodies such as Australian Water Association, Water Services Association of Australia and Water Directorates contributed extensively to scoping the issues, developing options and selecting solution pathways.

Legislative factors: The implementation program included access to additional water under Water Resource Plans, enabling powers to plan and deliver infrastructure, authorisations for regulatory powers, compliance and enforcement.

In addition, any liability arising from implementing the Water Strategy, to the State and the water service providers is limited to ensure essential/critical services can be provided to the benefit of the whole community.

The Water Strategy is empowered by the legislation and implemented through the Water Security Program, by the purpose-built institutions. The Water Security Program, the institutional arrangements work together to manage the physical as well as transitional risks in an integrated manner. This was best enunciated in the statement of Level of Service Objectives "sufficient investment must be made… to achieve the desired objectives".

Economic factors: Risk evaluation of the Millennium drought as well as the implications of the reforms were undertaken. Based on the probabilities of the continuing drought, likelihood and consequences of drought, impacts of restrictions, the investment in the SEQ Water Grid was justified from a whole of societal risk. In the end, SEQ adopted a hybrid economic regulatory model, with Queensland Competition Authority regulating bulk water prices but not retail services for water and wastewater. Retail prices are set by the utilities in consultation with their council shareholders.

Figure 14. Costs of demand management measures (QWC 2010)

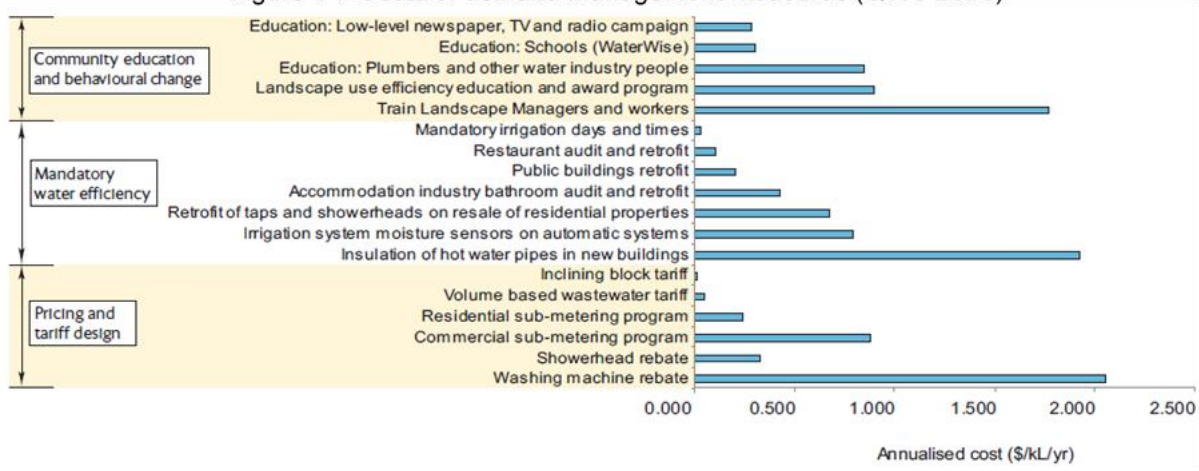
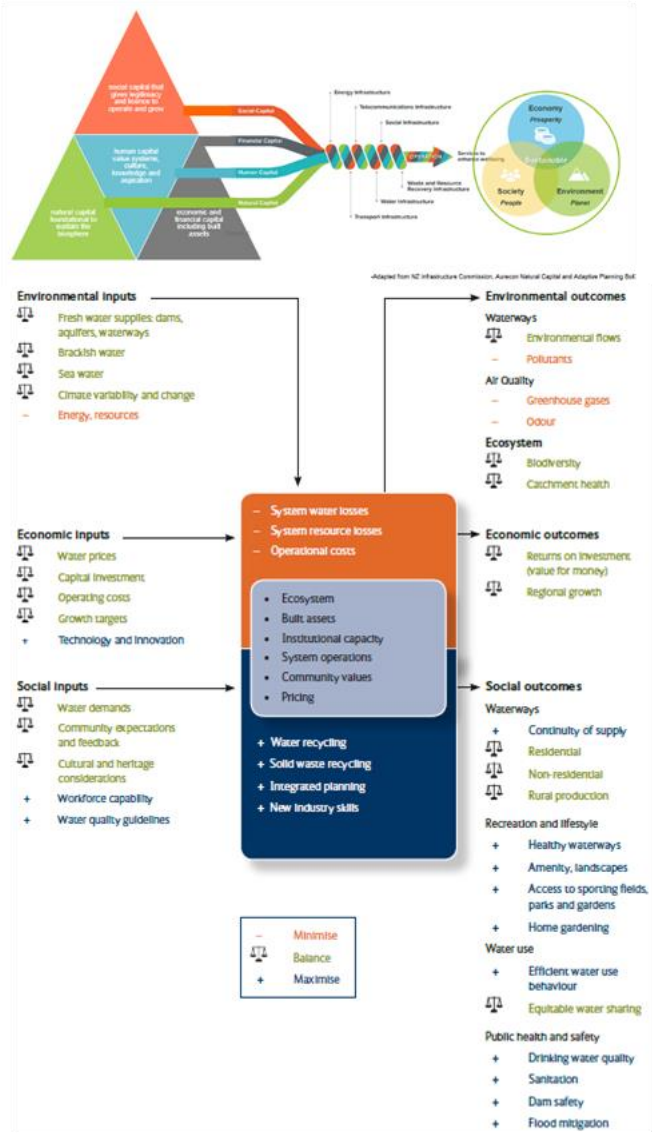


Figure 14 illustrates the annualised cost of some of the potential demand management measures, based on the initial planning assumptions. More detailed economic analysis was undertaken for significant investments, including levelised cost assessments and portfolio analysis.

The Water Security Program specifically linked strategy to action, enunciated in the Water Strategy. The inputs, process and outputs were identified and categorized so as to build stakeholder confidence and 'explainability' to the community.

The underlying model for the Water Strategy has further evolved – it is seen as the mobilization of the four capitals to create the integrated infrastructures that deliver valued services to society (Infrastructure NZ, Aurecon).

Figure 15. Connecting strategy inputs to program outcomes



Observations on foundational capability for change management

Water security is a shared responsibility of governments, water agencies and the community. The desired Level of Service reflects this shared agreement and provides the legitimacy to act in accordance with the Water Strategy and invest in line with the Water Security Program. This applies equally to flood resilience.

In 2013 the Queensland Audit Office undertook reviews and evaluations of the Water Security Program and the investment business cases for drought infrastructure, to collate key learnings and make recommendations to the government for building foundational capability for managing complex change.

The importance of retaining community trust, corporate memory and proprietary knowledge of systems, operations and stakeholder relationships. Maintaining the existing capability and resourcing of councils and utilities, as well as additional capacity is fundamental to the transition. The QWC, government task forces, industry bodies (AWA, WSAA and Water Directorates) assisted the councils and utilities with shared expertise and knowledge, throughout the change period.

Recognising that change and reforms are the new normal, the government initiated public service reforms through the Qld Public Service Commission. Senior public servants were assessed for core competencies, proven strengths and practiced capability. A learning mindset was engendered by creating a level playing field for learning and training in managing change .

Customized programs in strategy, program delivery, contestability, commissioning of services, strategic procurement of outcomes, asset recycling/repurposing, and decision-making in complexity (delivered by Australia New Zealand School of Governance ANZSoG and Qld University of Technology Business School), helped develop public service functional competencies and purpose driven capabilities.

Maintaining acceptance of recycled water for potable use is labour-intensive, requiring a high-level of continual effort. Keeping the plant prepared as a ready source is costly. Managing sewer catchments for source water quality protection and addressing emerging contaminants is critical for water recycling.

A 'Line in the sand' approach helped address legacy risks, and trade-offs. Political nous and business acumen generated bipartisan support for investing in long-term strategies and long-lived assets or operational measures.

Water literacy in SEQ during the peak of the drought was at its highest (Healthy Waterways 2010) but as the history of the drought passes and population demographics change, there is attrition of water literacy and loss of knowledge of demand management and drought restrictions. To redress this, an ongoing program of awareness, education and engagement is required. Continual communication is crucial to maintain community support and keep the implementation program on track.

Contingency planning helps prepare for volatility, uncertainty, ambiguity and complexity. The decisions to defer adding recycled water to Wivenhoe Dam, and mothballing assets significantly impaired the grid value.

The reforms did not cover Three Waters, but there are projects incorporating stormwater as a supply source and being pursued in green field developments.

Business continuity planning, contingency planning and keeping future options open through investment, research and education. Dealing with complexity before simplification proved to be an advantage in implementing the program.

We didn't get it right the first time with the SEQ Reforms, neither the strategy nor its implementation was flawless. However, the foundational capabilities of know-how, learning and capability helped the utilities to maintain drought preparedness and to continue to make progressive improvements.

Figure 16. Institutional Structure Before Water Reforms

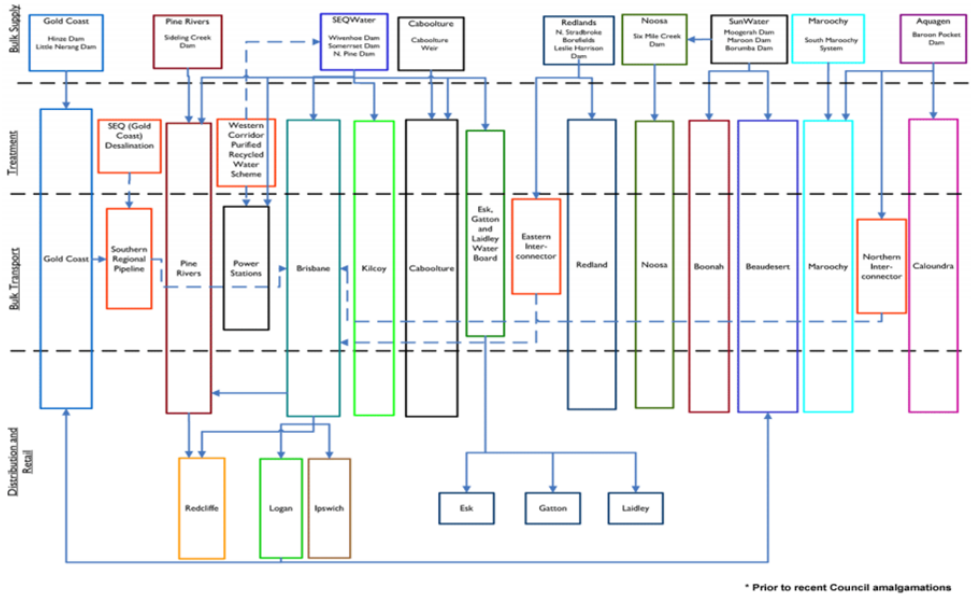
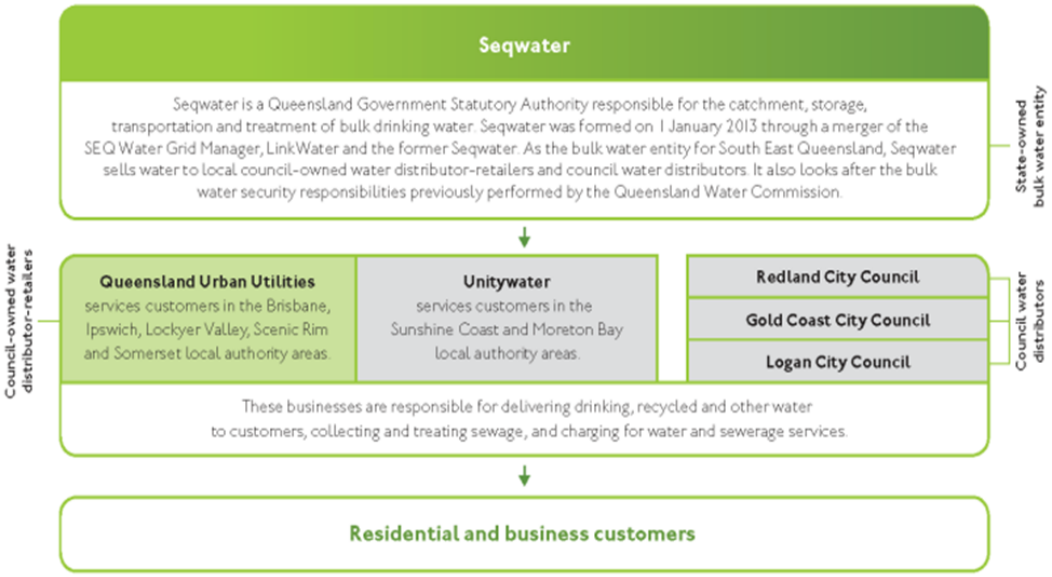


Figure 17. Current institutional structure after further reforms



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