Better Urban Drainage for Liveable Cities - creating blue green infrastructure through science translation, collaboration and multi-stakeholder governance.

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Abstract. The paper describes drainage management as a wicked problem, where one agency's solutions to their objectives created problems for another; with competing storm water design objectives and a splintered approach to the spending of government monies for flood prevention, water quality, and the liveability of the City. At the strategic level, the issue was addressed through integrated water policy. The paper identifies how science and policy translation were used to achieve a radically different and sustainable strategic direction for the City. The City has taken advantage of an opportunity to re-envision assets from grey to blue-green in the regeneration of the drainage system; achieved through multi-stakeholder engagement, collaboration, and policy development as part of its transition towards a water sensitive city.

1. Introduction
The City of Bayswater is a local government located on the Swan River in the inner east of Western Australia’s capital city of Perth. The City is 34.6 square meters and has a population of 65,050. The City of Bayswater has low tree canopy and has lost much of its natural, green spaces to development (1).

The Bayswater Brook Catchment is one of the largest urban catchments in the Perth Metropolitan area (27,000 hectares). Historically, the Bayswater local government area included wetlands and marshland that made the area prone to flooding. Extensive drainage channels were dug to lower groundwater levels and prevent flooding; and this narrowly focused view of drainage left a legacy of environmental problems, including flushing pollutants directly into the river and isolating large tracts of state land from the community with grey infrastructure (2).

In the early 1990s, the Bayswater Integrated Catchment Management group was the first to consider how these issues could be addressed through catchment management. This work was supported by the Water Authority of Western Australia, the Federal Government, and the Swan River Trust (3).

A significant project within this catchment management approach is the conversion of drainage lines and basins into living streams. A living stream is a retrofitted drainage system that mimics the ecosystem of a natural stream. These living streams also provide a reforestation opportunity for the City - which is important, as a sustainable city is a green city (4).

This paper discusses how this opportunity is being unlocked through policy development and collaboration.

2. Development of bureaucratic misalignment
In 1995, the state's Water Authority went through a structural reform where its traditional, vertical integration of water management for planning and service delivery was divided into two bodies:
• Water Corporation - the public water provider for services including supply drainage and sewerage.

• Water and River Commission - the agency responsible for water planning, policy and regulation (5).

As part of this change, the management of the drainage system by Water Corporation became regulated through a drainage licence. Management protocols focused specifically on protection against flooding, and were limited in its mandate to improve environmental outcomes in the catchment (5).

The agency management of the Water Corporation drainage licence became an obstacle to the reappropriation of the drainage systems into streams. The agency focus in practice, structure and behaviour was structured around the singular licence requirements of flood prevention. Long approval periods for works, the removal of critical living stream ecosystem design features, and the exclusion of the public from these lands was common place (5).

The management of water in the Bayswater Brook catchment was a wicked problem, where one agency’s solutions to their single lens objectives often created problems for a second agency. This resulted in competing objectives and outcomes that detracted from, if not outweighed, the benefits each agency was able to achieve in isolation.

This dilemma is well described by Nicholson-Crotty (2005), being that bureaucratic agencies will compete with one another over public policy if they hold different core beliefs; and rivals are unwilling to compromise with one another regarding key aspects of their policy (6).

3. First enabling activities developed at the local level
In responding to this dilemma, the City launched the Bayswater Brook Project. The project considered how local and state government agencies could work in collaboration to change entrenched methods for better and smarter outcomes for the community and the environment.

The approach taken was considered with the Kingdon Multiple Streams Framework - a tool used to analyse agenda setting processes and identify political windows for policy making (7).

![Diagram](null)

Drainage management at the local government level was considered using this framework. The overall problem had multiple definitions, as each agency had differing responsibilities and focal points. This
resulted in each organisation addressing their problems in different ways, despite the fact they were all managing the same resource. As such, the competition described by Nicholson-Crotty was evident.

To address this policy problem, the City developed the Bayswater Brook Working Group (BBWG). The group included representatives from all the water management agencies. The focus of the group was to realign the water managers to find a shared, holistic definition of the Bayswater Catchment and to collectively agree on the actions necessary to manage water flows, improve water quality, and provide long term services and benefits. This included ongoing flood management, improved community amenity and better ecological function.

4. Second enabling activities at the state government level
The second enabling activity was undertaken at the state government level by ministerial advisors and executives from the Water Corporation, and the Department of Water. During this process, these agencies identified that drainage problems could begin to be resolved by shifting the strategic goals from absolute policy approaches, to iterative policy approaches (8). They agreed that no one water model better supports or restrics water sensitive service delivery (5).

In documenting their previous attempts at water reform, the organisations identified that cultural and behaviour change could help achieve many of the strategic challenges. This resulted in the organisations developing two pieces of work, being a) a non regulatory agreement titled ‘Drainage Partnering Agreement’; and b) the Drainage for Liveability Program (5).

5. Results
The work undertaken at local and state levels to use policy thinking to resolve problems at different tiers of government, has opened a political window for the City. It has allowed the City to embark on a significant program to unlocked underutilised land and generate sustainable benefits - including amenity and public open space improvements, biodiversity conservation, and water quality and climate resilience benefits.

Examples of these projects include:

The Eric Singleton Bird Sanctuary Wetland Rehabilitation Project remediated a degraded, contaminated and drying wetland (with limited environmental and social value) into a productive, nutrient stripping and water harvesting wetland that is an outstanding community and environmental asset.
The reserve at Peters Place was scheduled to be developed into a drainage basin. Through the enabling factors, the City and Water Corporation were instead able to construct a micro wetland in the catchment. It was designed to prevent flooding, improve amenity, provide public open space, encourage and support biodiversity, and generate water quality and climate resilience benefits.

The site at Russell Street Park was a fenced off drainage reserve - a piece of inaccessible grey infrastructure in the heart of the Morley City Centre. Through the enabling factors, the City and Water Corporation were able to open the site to the public as a ninja park (fitness course) and convert existing drains into living streams.

6. Conclusion

This paper reviewed the causes of the wicked policy problems inherent to water management agencies at state and local government levels. On first consideration, it would seem the organisational restructuring locked in system drivers that deepened the intangibility of a wicked problem, similar to research discussed by Nicholson-Crotty. The review of how the enabling tools were achieved supports the notion that the water service modal itself does not act as an absolute barrier or driver for water service outcomes. Rather, interactive approaches to improving water outcomes, and supporting collaboration, behaviour and the culture of an organisation can go a long way to resolving these issues.

This paper discussed enabling projects that have unlocked system barriers, resulting in the creation of a more sustainable city through policy innovation, leadership, collaboration and finding common ground to deliver better water management outcomes at state and local government levels.

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