
Achieving sustainable stormwater management in Melbourne, Australia, as part of the journey to a water sensitive city

Atteindre une gestion durable des eaux pluviales pour faire de Melbourne (Australie) une ville respectueuse de l'eau

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RÉSUMÉ

Cet article porte sur les problèmes traités par la Société des Eaux de Melbourne (Melbourne Water Corporation) pour tenter d'aboutir à gestion plus durable des eaux pluviales. La question la plus importante étant celle de la place de la gestion des eaux pluviales dans le processus qui conduit vers "une ville respectueuse de l'eau" est également développée ici, de même que les obstacles au développement et à la généralisation de pratiques innovantes en matière d'eaux pluviales. A ce jour, les priorités portent sur les ouvrages qui permettent d'améliorer la qualité des eaux pluviales, tels que les zones humides et les jardins pluviaux, le renforcement des compétences dans les institutions locales, les partenariats de recherche pour l'exploration de solutions nouvelles, les changements réglementaires pour minimiser les effets du trop-plein d'eaux pluviales, des programmes de formation et de sensibilisation et enfin, une tentative pour mettre à plat les questions liées aux eaux pluviales au moyen de forums réunissant des acteurs d'origines diverses et l'assistance apportée à tous ces acteurs dans leur travail sur les eaux pluviales. Le renforcement des compétences au sein de la Société des Eaux de Melbourne s'est également révélé primordial. La philosophie selon laquelle "nous ferons le voyage ensemble" s'est avérée cruciale dans cette approche. Apprendre à produire et utiliser la confiance mutuelle et l'énergie du moment sont les éléments essentiels de ce processus pour la Société des Eaux comme pour tous les autres acteurs. L'article indique que si de grands progrès ont été accomplis dans de nombreux domaines, il reste encore un gros travail à effectuer pour généraliser cette tendance encore marginale, et pour passer de la phase du projet à celle de l'intégration.

ABSTRACT

This Paper looks at the issues that the Melbourne Water Corporation has focused on in trying to achieve more sustainable stormwater management. The bigger issue of where stormwater management "fits in" in the move towards a water sensitive city is also examined, along with consideration of the barriers to developing and "mainstreaming" innovative stormwater practices. The priorities to date have included works to improve stormwater quality such as wetlands and rain gardens; capacity building in local institutions; research partnering to explore innovative solutions; regulatory changes to minimise additional stormwater impacts; provision of training and educational programs; and trying to "champion" stormwater issues in a range of forums with a wide range of stakeholders, as well as assisting others to champion stormwater. Building capacity in Melbourne Water has also been a key task. The philosophy of "the journey starts with us" has been a key part of this approach. Learning how best to generate and utilise trust and momentum have been key parts of the journey for Melbourne Water, both inside the organisation and with our stakeholders. The paper argues that whilst great progress has been made in many areas, there is still considerable work to be done to move the issue of stormwater "from the periphery to the mainstream"; to move it from the project phase to the integrated phase.

KEYWORDS

Capacity building, Leadership, Stormwater management

1.0 INTRODUCTION

Melbourne Water is a statutory corporation fully owned by the State Government of Victoria, Australia, and is a water resources manager, providing water, sewerage and recycled water services to retail water businesses and waterways and drainage services to the greater Melbourne community. It is a significant business, managing approximately \$8 billion in water supply, sewerage and drainage assets. Its drainage and waterway assets include more than 8,400 kilometres of waterways, 123 wetlands and 77 urban lakes. The Victorian Government, in its *Our Water Our Future* action plan (Government of Victoria, 2004), designated Melbourne Water as caretaker of river health with responsibility for waterways, drainage and floodplain management. This requires Melbourne Water to demonstrate leadership in stormwater management, protecting the health of the region's rivers and providing an integrated overview of all activities impacting on river health. A key task for Melbourne Water is to reduce the impacts of stormwater runoff on the bays and waterways around Melbourne, especially on Port Phillip Bay.

The focus to date of Melbourne Water's stormwater programs has been on waterway health; acknowledging that in urban and suburban areas, stormwater runoff is a primary stressor on surface waters, and that conventional urban stormwater drainage systems often transport runoff directly to streams and rivers, thus exacerbating pollutant inputs and hydrologic disturbance, and resulting in the degradation of ecosystems (Roy et al 2008). In addressing these waterway impacts of stormwater, Melbourne Water's programs have to date largely focused on the areas of setting up demonstration projects, working with local government, building relationships and trust, building capacity in Melbourne Water and other organisations, ensuring that training is available, addressing regulatory issues, providing funding, providing staff, setting up and supporting regional partners, leading by example, and partnering with a range of stakeholders including research organisations. This Paper provides details on these approaches and some discussion on the lessons learned from them.

2.0 THE CURRENT CHALLENGE

Melbourne Water's vision is "*working together to ensure a sustainable water future*". A key part of achieving this vision will be implementing more sustainable forms of urban water management and integrating the urban water management cycle. Achieving sustainable stormwater management is a key part of this transition towards a sustainable and integrated water future and, in the case of Melbourne, to a water sensitive city. As Morrison (2008a) has commented, an advantage of the integrated urban water management approach is that it provides legitimacy for urban stormwater management as an equal in the urban water management regime. Numerous terms have been coined to describe the application of this new paradigm of sustainable water management including water sensitive urban design (WSUD) and integrated urban water management (Taylor 2008). WSUD incorporates a number of aspects including stormwater management; as Wong and Brown (2009) have noted, WSUD brings 'sensitivity to water' into urban design, as it aims to ensure that water is given due prominence within the urban design process through the integration of urban design with the various disciplines of engineering and environmental sciences associated with the provision of water services including the protection of aquatic environments in urban areas.

2.1 Why is stormwater a problem ?

Stormwater management is a key issue to be addressed in the move towards a water sustainable future. Stormwater is a problem and a challenge to manage because it is polluted with a cocktail of sediments and chemicals; it flows at the wrong times (big, frequent flushes every time it rains, and not enough flow when it is dry); and perhaps the most difficult problem is that there is too much of it (University of Melbourne 2009). The problems caused to freshwater ecosystems by stormwater runoff in urban environments are a result of stormwater management policies that emphasize expedient removal of stormwater from communities for the protection of human health and property, but place a low priority on ecosystem preservation (Roy et al 2008). In relation to Melbourne Water's area, stormwater is discharged into the environment at more than 1,000 locations across Melbourne, of which nearly 400 discharge directly into Port Phillip Bay; and stormwater is the greatest source of pollutants to the Bay (Morrison, 2008a).

2.2 Where does Water Sensitive Urban Design fit into this ?

The development of the WSUD approach has been well described elsewhere (Wong 2004). The key

principles of WSUD adopted by Melbourne Water are those in the “Urban Stormwater - Best Practice Environmental Management Guidelines” and are *“to protect natural systems, integrate stormwater treatment into the landscape, protect water quality, reduce runoff and peak flows, and add value while minimising development costs”* (CSIRO,1999). The concept of the water sensitive city has evolved from the principles of WSUD. It is a goal of the Australian Government’s National Water Initiative (Council of Australian Governments, 2004). In relation to “water sensitive cities”, a recent definition is: *“a water sensitive city is a city which integrates water supply, sewerage, stormwater and the built environment. A city that respects the value of urban waterways and a city whose citizens value water and the role it plays in sustaining the environment and society”* (Water Sensitive Cities Tour 2009).

However, achieving the vision of WSUD is not without its challenges; transitioning to more sustainable urban water management requires a complex array of values and factors to be considered: environmental integrity, social equity, landscape aesthetics, economic efficiency, integration of different professions, organisations and water systems, community engagement, and physical uncertainty (Van de Meene, Brown and Farrelly, 2009).

In moving towards more sustainable management of stormwater, one key driver for Melbourne Water has been the results of the Port Phillip Bay Environmental Study completed in 1996, and the Nitrogen reduction targets required for the waterways entering the Bay (Harris et al, 1996). Following the completion of the Environmental Study, the target of achieving a 1,000 tonne annual reduction in Nitrogen loads entering the Bay was adopted by Melbourne Water, with 500 tonnes of this reduction to be achieved from Melbourne Water’s sewage treatment plant at Werribee, and the remainder of the reduction to be achieved from stormwater programs (Edwards and Francey (2008).

3.0 THE COMPONENTS OF THE PROGRAM TO DATE

3.1 Working with local government

As well as being the designated caretaker of waterway health in the greater Melbourne region, Melbourne Water is also the designated manager of stormwater infrastructure for catchments greater than 60 hectares, with local government responsible for catchments of less than 60 hectares. Melbourne Water’s area includes 38 local government areas, and given the important role that Councils play in managing stormwater in their communities, achieving success with Councils has always been seen as critical for the sustainable stormwater program. These 38 Councils all have different perspectives on the emphasis they should give to sustainable stormwater projects, and they quite often have differing expectations of exactly how Melbourne Water should be assisting them. This jurisdictional model of Melbourne Water having responsibility for catchments greater than 60 hectares and local government having responsibility for catchments smaller than 60 hectares can be problematic, and some authors have stated that it deters Melbourne Water from investing in these smaller catchments, even though they affect the condition of the bigger catchments into which they drain (Roy et al 2008).

Melbourne Water realised that it needed to be well aware of the individual perspectives and needs of these 38 Councils, and accordingly developed a process that enabled the particular WSUD needs of each Council to be identified and documented. A needs analysis tool was developed, with input from local government, and then used to identify and track changes in the capacity of Councils to deliver sustainable improvements in stormwater quality management (Edwards and Francey 2008). Melbourne Water was able to use this tool to provide projects and assistance that met the individual Council’s needs, including capacity building, project assistance, intra-organisation cooperation and awareness raising. Melbourne Water’s own stormwater planners acted as support and change agents within Councils – fostering Council interest in WSUD and how to begin implementing it. In attempting to raise the profile of WSUD activities within local government, Melbourne Water has always seen the need to support capacity building and leadership in local government. The findings from research organisations on these issues has greatly assisted Melbourne Water to implement these actions. In his research on leadership in sustainable urban water management (SUWM), Taylor (2008) has recommended a number of strategies to create the required supportive leadership context, including fostering a supportive dominant organisational culture that values learning and collaboration; encouraging project champions to build strong social networks, laterally and vertically; and implementing a strong policy framework for SUWM. This is an approach that Melbourne Water strongly supports and is currently trying to implement.

Capacity building is seen by Melbourne Water as a key factor in driving awareness of, and enthusiasm for, WSUD. An example is the work undertaken by Melbourne Water as part of the implementation of the Yarra River Action Plan with the five local government organisations in the lower reaches of the Yarra River in Melbourne. As part of this Plan, Melbourne Water developed and implemented a model of institutional capacity building that is now being successfully implemented across all 38 Councils. Further capacity building in local government was achieved by Melbourne Water providing funds to fully or partly fund WSUD officers in Councils, primarily to act as an internal resource to Councils, and to foster “growth from within” in terms of the individual Council’s involvement in WSUD. Similarly, establishing on ground projects and demonstration sites has always been seen by Melbourne Water as a critical component of implementing WSUD with Councils. Melbourne Water’s Living Rivers Stormwater Program works with the 38 Councils throughout the Port Phillip and Westernport Region to build understanding, skills and expertise in best practice environmental management of stormwater. This program has been operating since 2006 and has funding through until 2013. As part of this Program, Melbourne Water is also working to build the capacity of local government and inform relevant stakeholders and processes, and to assist in the successful implementation of Clause 56.07 of the Victoria Planning Provisions. Clause 56.07 was introduced into the Victoria Planning Provisions on 9 October 2006 and forms the Integrated Water Management provisions relating to residential subdivision. This clause aims at managing water more responsibly and sustainably, and is vital in protecting the health of our waterways and bays by reducing pollutants and excessive flows. The Clause requires that all new subdivisions of greater than two lots must treat stormwater onsite to the best practice standard, as defined in the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO, 1999). To help Councils do this, a Melbourne Water Stormwater Policy Advisor is available to Councils to help improve processes and systems relating to Clause 56.07 implementation. In addition, Melbourne Water in conjunction with its training partner provider Clearwater, has developed an Implementation Toolkit to assist Councils with these planning provisions.

As Morrison (2008b) has noted in relation to WSUD issues, garnering the participation of municipalities to implement state government policy relies on two prerequisites: first, each of the local communities shall be predisposed to the relevant policy, thereby influencing the local elected officials; and second, the capacity of individual municipalities to implement the policy must be sufficient to effect commitment. Hence it has been important for Melbourne Water to work on both of these aspects, ie influencing officials and decision makers, and building capacity in Councils.

3.2 Provision of training and education

For Melbourne Water, a key part of the move to encourage a range of organisations to take up sustainable stormwater management, has been to ensure the provision of a wide range of relevant training and education programs. This has been important due to the technical nature of parts of the WSUD approach, such as the use of computer models like MUSIC (Model for Urban Stormwater Improvement Conceptualisation), a conceptual design tool that estimates both stormwater pollutant generation and the performance of stormwater treatment measures.¹

The training programs that Melbourne Water has seen as instrumental for implementing WSUD have largely been delivered by “Clearwater”. The Clearwater program was established in 2002 as part of the Victorian Stormwater Action Program ; Melbourne Water commenced funding the program in 2006 and Clearwater is now housed in the Melbourne Water offices. Clearwater operates as an information exchange and also develops and implements education and training programs for industry, Councils and Government agencies to help deliver best practice stormwater management and WSUD. Its aim is to help accelerate the uptake of sustainable urban water management.²

3.3 Working across all of Melbourne Water

The stormwater programs in Melbourne Water are delivered through its Waterways Group, one of the eight business groups across Melbourne Water ; with the other business units being Asset Planning, Business Services, Capital and Delivery, Communications and Community Relations, Operations and

¹ More information on MUSIC is available at <http://www.toolkit.net.au/Tools/MUSIC/features>

² Clearwater website at <http://www.clearwater.asn.au/index.cfm>

Maintenance, People and Safety, and Strategic Planning. To date, these business groups have operated without too much collective effort on integrated urban water management across the entire business. There is now an increasing awareness and action by the business groups that, in addition to the great projects done in their own areas of the business, there is also a real need to get more cross-business perspectives and projects going. An example is the recently formed "Alternative Water Sources" Steering Committee which has been formed to provide leadership, innovation and coordination across Melbourne Water in relation to the management of issues and projects concerning recycled water, stormwater and groundwater. The Committee provides integrated thinking across all of Melbourne Water's business groups, to develop, encourage and support exciting and innovative projects on alternative water sources. It is also developing Melbourne Water policy positions on key issues, and makes it easier for alternative water source projects to be implemented. It is hoped that the increased focus in Melbourne Water on integrated urban water management will provide an opportunity for the various business groups to come together to achieve a "whole of organisation" response and focus. Achieving such a focus is not easy, either inside and organisation or outside of it; as Brown (2008) has commented: *"the idea of managing urban water as a "total water cycle" is brazen, for it challenges traditional and technical management practices"*.

3.4 Nitrogen Reduction Programs

Mention has already been made of the Port Phillip Bay Environmental Study, and the actions arising out of this for Melbourne Water in relation to reducing the Nitrogen outputs entering into the Bay. As part of this, in 2000 Melbourne Water committed to a \$60 million wetlands program aimed at achieving a 100 tonne reduction in nitrogen loads by 2010. This program is on track to reach its goal of a 100 tonne reduction by late 2010.

Melbourne Water has also established a stormwater quality offset program in the Port Phillip Bay and Westernport catchments. Essentially, if developers cannot treat their stormwater to best practice within the development, they are required to pay an offset to Melbourne Water, and treatment can either be at an individual lot scale or at the streetscape scale (Francey et al 2006). This Nitrogen Offsets program oversees the construction of stormwater treatment systems to offset the impact of developments where WSUD is required but not undertaken, and is funded through financial contributions from developers.

The Threatened Catchments Program commenced in 2009 and has funding through until 2013. The program is focussing on priority catchment scale threats that impact on receiving waterways that encompass both the quality and quantity of stormwater. This program recently received \$8 million in funding from the Department of Sustainability and Environment to undertake a range of water quality actions, including \$4 million allocated to urban stormwater projects with a particular focus on waterways that have immediate threats from stormwater. Projects will include addressing the stormwater impacts on waterways from directly connected impervious areas, construction site sediment control, and addressing stormwater impacts from commercial premises.

3.5 Raingardens

Raingardens are one example of the range of biofilter systems that have been widely implemented in the last few years as a source control technique to manage stormwater runoff in urban areas (Le Coustumer et al 2009). Raingardens are a very important part of the move towards sustainable stormwater management. As the University of Melbourne has noted: *"the solution to protecting creeks from the ravages of stormwater runoff is to retain as much of it as possible in the catchment to allow it to filter through the soils, to get to the creek slowly, to provide a more natural, clean base flow. Raingardens are the perfect tools for achieving this."* (University of Melbourne, 2009).

Over the 2008 - 2013 period, Melbourne Water proposes to build community and local government capacity by providing support for the construction of 10,000 raingardens across Melbourne. Part of this program involves working with local governments to ensure raingardens are installed with regular street upgrades. The main objective of this 10,000 Raingardens program is to inspire collaboration and community involvement in simple stormwater management measures. The program will act as an umbrella program that will track stormwater infrastructure outcomes of a number of Melbourne Water's stormwater quality programs. To increase knowledge within the community about actions that can be undertaken to improve stormwater quality, and the possible role of raingardens, Melbourne Water has

undertaken a number of flagship community projects to build raingardens. One of the key challenges here has been to generate community and local government interest and understanding of why features like raingardens are important.³ Another key challenge is to address the concerns regarding the sustainability and long term performance of raingardens and other biofilters – this has been highlighted as an issue by a number of authors including Le Coustumer et al (2009).

3.6 The Better Bays and Waterways Plan

In June 2009, Melbourne Water finalised *Better Bays and Waterways*, a Water Quality Improvement Plan for the Port Phillip and Westernport region. This is a joint project with Environment Protection Authority of Victoria and the Federal Department of Environment, Water and the Arts aimed at creating an integrated water quality plan for Western Port, Port Phillip Bay, and the rivers and estuaries within the catchment. The plan sets out actions for improving water quality across the whole region, particularly catchment based actions. This five year water quality improvement plan has been developed in collaboration and consultation with a wide and diverse group of stakeholders from Government (Australian, State and Local), industry (predominantly water retailers), environment groups and the community. In the *Better Bays and Waterways* Water Quality Improvement Plan, Melbourne Water has detailed the measures it will take to further address the issue of sustainable stormwater management.

Given the key importance of better controlling diffuse source pollution due to the adverse impacts on waterway health, Melbourne Water has included actions in *Better Bays and Waterways* that extend Melbourne Water's involvement in diffuse source pollution issues. In relation to diffuse source pollution, the *Better Bays and Waterways* Plan notes that *“effective management of diffuse sources to prevent pollution will be improved through collaboration and establishment of clear lines of responsibility amongst authorities, improved education and appropriate enforcement. A review of the existing management and compliance framework for the management of diffuse source pollution will be undertaken, assessing the effectiveness of the prevention of diffuse source pollution from industrial, commercial and construction operations.”* This review will be led by Melbourne Water. Other relevant actions in *Better Bays and Waterways* that Melbourne Water has committed to include:

- Implement a stormwater pollution education and enforcement program for small to medium industrial sites within targeted municipalities;
- Provide awareness, education and training to local government and the development industry to build institutional capacity to achieve improved stormwater management practices;
- Work with the 38 Councils in Melbourne Water's service area to enable 50% of them to have a commitment to WSUD implementation targets for pollutant loads, urban flow and effective imperviousness;
- Encourage the community to install rain gardens and other infiltration and reuse options through education and incentive programs;
- Investigate opportunities and considerations to implement household downpipe disconnection program including mapping land capability for land infiltration, reviewing statutory and institutional considerations, and establishing a pilot program with local government.

3.7 Study tour

In April 2009, a Melbourne Water-led group of 12 water professionals conducted a 14 day study tour examining sustainable water management in The Netherlands, Germany, the United Kingdom, Spain and Singapore. The group consisted of emerging water industry professionals from a range of government, industry and environmental areas across Australia. The tour visited sites that provided examples of sustainable water management, particularly showcasing demonstrated community involvement in water management; insights into governance arrangements required to develop water

³ The project is similar in scope to the “10,000 Raingardens” project currently being implemented in Kansas City in the USA. This five-year project was launched by the Kansas City Mayor in November 2005, and was described in the February 2006 issue of House & Garden magazine as the most ambitious horticultural project in the United States. More information at www.rainkc.com

sensitive cities; and sites that allowed water, environmental and community benefits to be clearly visualised. A key decision made by Melbourne Water was not just to lead the organization of the tour, and fund the costs for three Melbourne Water staff to be on the tour, but also to work with the other participating organisations to pay the tour costs of a staff member of a not-for-profit environment group.

3.8 Support for community groups

There is considerable community interest in waterways and stormwater management, and Melbourne Water has always seen community engagement in stormwater issues as a high priority. An example of community support provided by Melbourne Water is the financial assistance given to the Yarra Riverkeepers over the last few years. The Yarra Riverkeeper Association is the community-based association that is working to look after the long-term health of Melbourne's main river, the Yarra, from its source to its mouth, and their vision is "*a Yarra River with tributaries that is healthy, ecologically sustainable and valued by the community*".⁴ Melbourne Water's support for the Yarra Riverkeepers has included funding to assist in the employment of an Executive Officer, and also for the purchase of a small motor boat for the Riverkeepers to enable them to be out "on the river" as often as possible. Provision of support to community and stakeholder groups is seen by Melbourne Water as a very important part of its stakeholder engagement, and of recognising that we will achieve more by working collaboratively.

3.9 University and other research links

Having access to, and input in to, key research programs is a key part of Melbourne Water's approach to sustainable stormwater management. This involves activities including setting up partnerships and research collaborations, sponsorship and supervision of Ph.D candidates, and the provision of funding. Work by Melbourne Water to date has been with a number of organisations including the National Urban Water Governance Program at Monash University, the Facility for Advancing Water Biofiltration at Monash University, and the Department of Resource Management and Geography at the University of Melbourne.

A current example of Melbourne Water's partnerships with research organisations is the Little Stringybark Creek project at Mount Evelyn to which Melbourne Water will contribute around \$1.5 million over the next few years. This project is led by the Department of Resource Management and Geography at the University of Melbourne and is described as "*a world-first demonstration of restoring an urban creek by fixing up its biggest problem first: urban stormwater runoff*." (University of Melbourne 2009). The project's approach comes from knowledge that stormwater runoff is the primary degrading influence on stream ecosystems in the eastern suburbs and fringes of Melbourne, and that Little Stringybark Creek is degraded by urban stormwater runoff delivered to the stream through the stormwater drainage system. The project team modelled the response of a range of ecological indicators to piped stormwater drainage, and found that impervious areas like roofs and roads have much less effect on streams if they don't drain directly to a stream through stormwater pipes (Walsh, Fletcher and Ladson, 2005). Accordingly, the project set out to reduce the area of directly connected impervious areas of the catchment, knowing that this could reduce stormwater impacts to Little Stringybark Creek to about the same level experienced by streams of the region that are in very good condition. Reducing the impervious areas in the catchment was achieved by offering financial payments to householders and business owners located in the project area, via a competitive tendering process, that covered the cost and installation of rainwater tanks or raingardens (biofiltration systems). In addition to providing considerable funding for the project, Melbourne Water had a staff member on the Project Team who worked one day a week at the University of Melbourne. This close support was considered highly desirable if Melbourne Water was to be a genuine partner in this project.

The Facility for Advancing Water Biofiltration, FAWB⁵, is a joint venture between EDAW consultants and Monash University whose main aims are to provide scientific "proof of concept" for the application of stormwater biofilter technologies, and to facilitate industry-wide adoption and implementation of the

⁴ More information on Yarra Riverkeepers is available at <http://www.yarrariver.org.au>

⁵ More information is available at <http://www.monash.edu.au/fawb/about/index.html>

technology. Melbourne Water is one of FAWB's six industry collaborators, and is a member of FAWB's Stakeholders Committee. Melbourne Water has provided funding support for a number of projects with FAWB over the last few years and has recently committed to providing Aus\$1.5 million to them over the next four years, as part of their "Cities as Water Supply Catchments" research program. This funding is part of the stormwater research program with a number of research partners including FAWB, the National Urban Water Governance Program, the University of Melbourne and the University of Queensland.

The National Urban Water Governance Program (NUWGP) is a social research program at Monash University aimed at facilitating progress towards Water Sensitive Cities. Melbourne Water is involved in a number of ways with this program including providing sponsorship and co-supervision for a Ph.D candidate, and providing sponsorship for initiatives of the Program⁶. An example of sponsorship is the "Water Sensitive Cities Workshop" held in Melbourne in February 2009, for which Melbourne Water provided \$10,000 in funding. The Ph.D research that Melbourne Water is sponsoring surveyed levels of trust in stormwater management stakeholders and concluded that *"the perceived level of trust between municipal officers and Melbourne Water is high and contrasts with other stakeholders"* (Morrison 2008b). This research focused on measuring trust because of the demonstrated importance into intergovernmental environmental programs that established trust as a primary factor for implementation success.

4.0 CHALLENGES AND MOVING FORWARD

In relation to Melbourne Water achieving sustainable stormwater management, there are a number of major issues still to be resolved and addressed. In relation to the progress made, Wong and Brown (2009) have concluded that the transition to WSUD in stormwater management over the last 15 years has been quite remarkable, especially considering that in this short timeframe, we have seen the philosophy, technology and language of WSUD developed to industry standards and referenced in policies across all levels of government in Australia. However, whilst much may have been achieved in relation to sustainable stormwater management and WSUD, considerably more still need to be done. The challenges facing sustainable stormwater are part of the broader challenge that sustainable water management is experiencing. As has recently been noted: *"today, urban water policies are beginning to reflect the sustainable urban water management philosophy, yet the rhetoric is often not translated into practice with consistent failure to go beyond ad hoc demonstration projects. Implementation impediments typically highlighted include institutional fragmentation, undefined organizational responsibilities, limited political incentives and disincentives, poor organizational commitment, technological path dependency, poor community capacity to meaningfully participate, and an overall lack of experiential knowledge with facilitating more sustainable urban water management approaches"* (Brown 2008).

The 2009 Water Sensitive City Study tour returned from Europe with a number of examples of what could be achieved in Melbourne. Central to moving towards a water sensitive city is the concept of leadership. Some examples of leadership from Europe were observed in "Learning Alliances." The term Learning Alliances comes from a European Union program called SWITCH which is a project it to catalyse change towards more sustainable urban water management in the "City of the Future."⁷ The study tour observed how Learning Alliances have been successful in bringing in non-traditional partners to work on city wide initiatives.

In supporting the social research being carried out through the National Urban Water Governance Program at Monash University, Melbourne Water has been particularly keen to determine the barriers to achieving sustainable stormwater management in local government across the Melbourne region. This research identified a number of barriers preventing the widespread practice of urban stormwater policy; of these, the four most outstanding issues concerned the lack of sustainable funding for

⁶ In relation to the sponsorship of the Ph.D thesis, this candidate has been conducting research into the intergovernmental stormwater quality programs in Melbourne. This has involved surveying and interviewing 156 local government officers and mayors from the 38 local councils in the Melbourne Water area, and then mapping and ranking them on their relative capacity and commitment to implementing stormwater quality programs.

⁷ More information is available at <http://www.switchurbanwater.eu/>

stormwater improvement (particularly by local councils), incoherent intergovernmental responsibilities for stormwater management, incomplete legislative and policy drivers to consistently implement WSUD, and weak community understanding of the stormwater problem and its solutions (Morrison 2008b). Institutional reform is a key issue that needs to be examined in relation to sustainable water management in general including sustainable stormwater management, eg Brown and Farrelly (2009). As Wong and Brown (2009) have similarly commented, institutional reform for integrated urban water cycle management remains elusive, and, like most reform agendas, this is an area that requires consideration of options that are not immediately intuitive, technically or otherwise.

5.0 CONCLUSION

Melbourne Water considers that considerable progress has been made in the journey towards sustainable stormwater management; however it also believes that it needs to address a number of key issues in order for sustainable stormwater management to further progress; specific examples of these issues are long term funding, community understanding, policy development and government response and coordination. These issues need to be firmly on Melbourne Water's agenda for discussion with the key stakeholders and the development of responses that further advance these issues and help to "mainstream" sustainable stormwater.

Melbourne Water is now giving serious thought to what sort of leadership is required to move past the current set of complex problems. In particular, the leadership components of the sustainable water programs being implemented in some European cities provide a potential model for how Melbourne can integrate complex problems and show leadership. The European approach is to treat the whole city as a pilot project, not set up isolated pilot projects that don't get replicated. This addresses the problem where WSUD is still not integrated and 'mainstreamed'. The question that needs to be asked now – noting the huge range of interventions that Melbourne Water has been involved in within the stormwater management sector – is how can Melbourne Water continue to build alliances and continue the leadership with non-traditional partners and not undermine the good work done to date?

As this Paper has detailed, the challenge of moving from demonstration projects to a situation where WSUD is "mainstreamed" across the key organisations is still being addressed. Melbourne Water has tackled the challenge on a number of fronts, including ensuring that Melbourne Water itself is acting as an innovative leader in this field, partnering key research institutions, providing funding for projects and capacity building within local government, ensuring that the required training is readily available, and ensuring that Melbourne Water itself stays informed of world's best practice in relation to WSUD and stormwater.

Melbourne Water will need to continue to foster innovation and integration across its businesses to ensure that the current momentum and focus on sustainable stormwater management continues. The journey to a water sensitive city goes on.

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