

Receptivity to sustainable urban water management in the Pacific

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ABSTRACT

The need for developing urban centres to adopt Sustainable Urban Water Management is acknowledged by researchers and policy makers. The Pacific region, with its tourist based economy, must endeavour to protect the fringe reefs from environmental degradation associated with urban water systems that are poorly designed and managed. An online questionnaire amongst urban water managers in the region assessed the level of receptivity they had towards the principles of the Water Sensitive City. Results demonstrated that while respondents were highly aware of the current failures of the urban water system, there was very little awareness of sustainable solutions, while levels of association, acquisition and application were also very low. For the principles of the Water Sensitive City to be adopted and mainstreamed in the Pacific urban centres, dedicated effort is required to increase the levels of all components of receptivity. Only when there are increased levels of receptivity will Sustainable Urban Water Management be implemented throughout the region.

KEYWORDS

Developing Countries, Receptivity, Sustainable Urban Water Management

INTRODUCTION

Like many regions in the developing world, the Pacific Region experiences challenges relating to the provision of suitable water supply, sanitation and drainage services (Crawford 1993). The rate of population growth in many Pacific urban centres continues at more than 3.4 percent annually (UNPF 2007), placing pressure on the urban water system to maintain adequate levels of service provision. The growth of industry, and increases in living standards, are resulting in increased water demand and wastewater generation. Greater volumes of urban stormwater runoff are produced due to the growing imperviousness of urban areas and connectivity. These developments are leading to urban environmental degradation. In the developing urban centre context, there is an urgent need for a transition to more Sustainable Urban Water Management (SUWM) (Ujang & Buckley 2002; Nascimento et al. 2007).

There is no definitive target destination for SUWM, but there is a dialogue regarding the principles that SUWM should reflect. This dialogue has resulted in the development of the Water Sensitive City (Brown et al. 2009), which provides direction for development and transition through encouraging adoption of sustainable principles for urban water management (Wong & Brown 2009). The Water Sensitive City promotes a holistic approach to urban water management. It encourages a diversity of water sources, reuse and recycling, water efficiency and waste minimization, treatment of waste at its sources, the use of natural treatment systems, and community or co-governance models of decision making. This is in contrast to the once-through, technology dependent, top down approach, which has characterized urban water management for most of the 20th Century.

This paper uses the concept of the Water Sensitive City as a desirable destination for transitions to SUWM in the rapidly growing urban centres of the Pacific region. It aims to contribute to the continuing dialogue regarding the suitability of the transitions management approach (Loorbach 2007; Loorbach & Rotmans 2006) for enabling urban centres in developing contexts to leapfrog the traditional stages of urban water system development and to directly embrace the concepts of SUWM and the principles of the Water Sensitive City (Duffy & Jefferies 2011). The barriers to, and drivers for, transitioning to Water Sensitive Cities will differ between the developed and the developing world. Whilst there has been research addressing the drivers and barriers to Water Sensitive Cities and SUWM in the developed world (Brown 2005; De Graaf et al. 2009; Brown & Farrelly 2009), this is only now beginning to be addressed in the developing world. To date there has been no research into the drivers or barriers to Water Sensitive Cities in the Pacific Region.

Adoption of Water Sensitive City principles in the Pacific is of critical importance. The close proximity of coral reefs to urban centres and the importance of the reefs for sustaining tourism requires their careful management. Adopting and implementing the principles of the Water Sensitive City in the Pacific could therefore play an important role in protecting near shore coral reefs and in doing so protect the future viability of the tourism sector.

ANALYTICAL APPROACH: RECEPTIVITY FRAMEWORK

The conceptual model of receptivity (Jeffrey & Seaton 2003) has been identified as a social theory that can assist in mainstreaming the principles of SUWM (Brown & Keath 2008). It can be utilised to assess the “extent to which there exists not only a willingness, but also an ability in different constituencies (individuals, communities, agencies) to absorb, accept and utilize innovative options” (Jeffrey & Seaton 2003, p.281). The degree to which urban water managers are receptive of principle of the Water Sensitive City is dependent on the four components of receptivity: awareness, association, acquisition and application (Table 1).

Table 1: Summary of the Receptivity Framework components

Component	Definitions	Example – SUWM in developing urban centres
Awareness	<ul style="list-style-type: none"> • Knowledge of a problem; • Knowledge of innovative solutions 	<ul style="list-style-type: none"> • Knowledge of urban waterway health degradation; and • Knowledge of innovative technical and non-technical solutions e.g. Stormwater treatment systems, wastewater treatment systems, water demand management techniques
Association	<ul style="list-style-type: none"> • Recognition of the benefit knowledge of solutions and options bring to the local context resulting in higher level support and commitment 	<ul style="list-style-type: none"> • Understanding that the urban water system is directly influencing the water quality of coastal water quality; • Knowledge that coastal water quality offers services to local residents and tourists; • Understanding that innovations may improved water quality and improved water management and water quality will have lasting financial benefits; • Resulting in high level political support, effective leadership, involvement of citizens and national level priorities.
Acquisition	<ul style="list-style-type: none"> • Ability to acquire the skills and knowledge to implement, operate and maintain innovations 	<ul style="list-style-type: none"> • Access of Government employees to professional networks for support and training; • Access to skills and capabilities through regional organizations (SOPAC, ADB)
Application	<ul style="list-style-type: none"> • Motivation and capacity to apply and implement solutions in the field 	<ul style="list-style-type: none"> • Knowledge of relevant legislation and policies relevant to urban water management; • Access to required funding programs (Government oraid based) for the implementation of urban water technologies or for establishing non-structural interventions

Therefore, the principles of the Water Sensitive City will only be implemented and mainstreamed in the urban centres of the Pacific region when there is a high level of receptivity amongst urban water professionals. Without a willingness and ability to implement sustainable urban water practices, urban water decisions will continue along the current development trajectory. The current development pathway is based on the western, industrialised cities' model, which is path dependent, linear and 'technocratic': a development pathway that has resulted in significant environmental degradation. The careful analysis of receptivity is therefore an important initial step in promoting and enabling the transition to Water Sensitive Cities in the Pacific region.

METHODS

To investigate the receptivity of urban water managers in the Pacific to the principles of SUWM an online survey was conducted, as outlined below. This questionnaire was directed towards urban water practitioners working in countries right across the Pacific region.

Online Questionnaire

The questionnaire, containing 89 questions, was hosted online by the SurveyMonkey service. The first section aimed at collecting data regarding educational history, employment and the respondents' organisations. The second section was designed to implicitly assess the current levels of awareness, association, acquisition and application through practical questions addressing topics such as current service provision, communication, sustainable solutions and future challenges. Finally, the questionnaire asked a series of questions explicitly relating to receptivity of urban water managers to SUWM implementation. This receptivity section was based upon research conducted within the Dutch urban water sector (De Graaf et al. 2009). De Graaf had developed a list of generic factors essential for enabling SUWM from literature on urban water management change. Originally designed for use in a developed European context, some of these generic factors were adjusted to be better suited to Pacific Region, as now shown in Table 2.

Table 2: Factors contributing to receptivity classified into Awareness, Association, Acquisition and Application – modified list from De Graaf et al. (2009) for the Pacific region

Awareness	Acquisition
1. Organisation's knowledge of the local urban water system	11. Trust between partners and stakeholders
2. Other stakeholders' knowledge of the urban water system and management	12. Connection between water management and urban planning
3. Reliable scientific knowledge about the urban water system	13. Availability of networks and opportunities for stakeholder cooperation
4. Knowledge of innovative technologies available for urban water management	14. Quality of design skills in urban water management
5. Knowledge and understanding of urban water management legislation	15. Quality of negotiating skills in urban water projects
Association	Application
6. Enthusiasm of leaders in urban water management	16. Financial incentives and support from national government
7. Support and commitment from elected officials and politicians	17. Accountability of all stakeholders in urban water management
8. Involvement of citizens in urban water management	18. Commercial viability for private organisations
9. Organisational culture that promotes sustainable urban water management	19. Binding targets for water quantity and quality
10. Availability of an overarching national urban water	

strategy

Respondents were asked to value both the current quality and the importance of the listed factors on a 10 point likert scale. The results of the implicit questions were analysed using simple statistical methods.

RESULTS AND DISCUSSION

The online questionnaire had a response rate of 62.5% totalling 30 respondents from those emailed. The real response rate might be less, as in the introductory letter respondents were invited to advise other urban water managers of the online survey. The respondents represented 8 countries and 14 urban centres across the Pacific region. The distribution was relatively equal from 7 of the countries, the exception being Vanuatu, which had 9 respondents.

Receptivity to Sustainable Urban Water Management

The results of the receptivity section of the questionnaire are plotted in Figure 1. The four quadrants in Figure 1 related to the following four categories:

- High priority – factors with a high level of importance and a high difference between current practice and level of importance
- Maintain – factors with a high level of importance but with a low difference
- Low priority – factors with a low level of importance and a high difference
- No Priority – factors with a low level of importance and a low difference

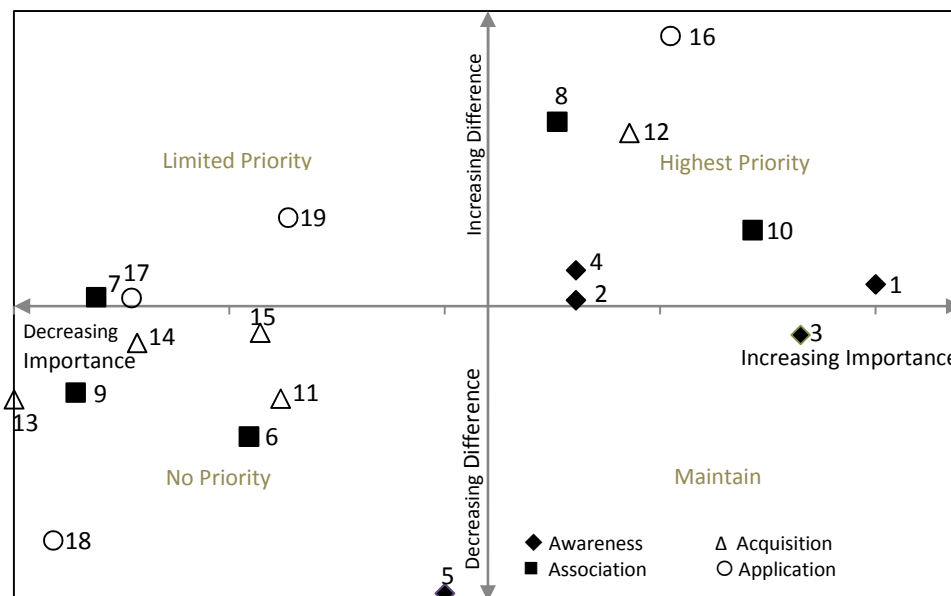


Figure 1: Principle factors to SUWM plotted by their perceived level of importance and 'difference scores'. Refer to Table 2 for number definitions

Awareness

Awareness is an important aspect that must be increased to promote receptivity: both awareness of the current state of affairs and awareness of potential sustainable solutions. Unfortunately, respondents perceived that, besides water supply services, other urban water services were poorly functioning and had a poor level of coverage (as shown in Figure 2). These results indicate that there is a high level of awareness of the current problems and of the need for improved service delivery and management.

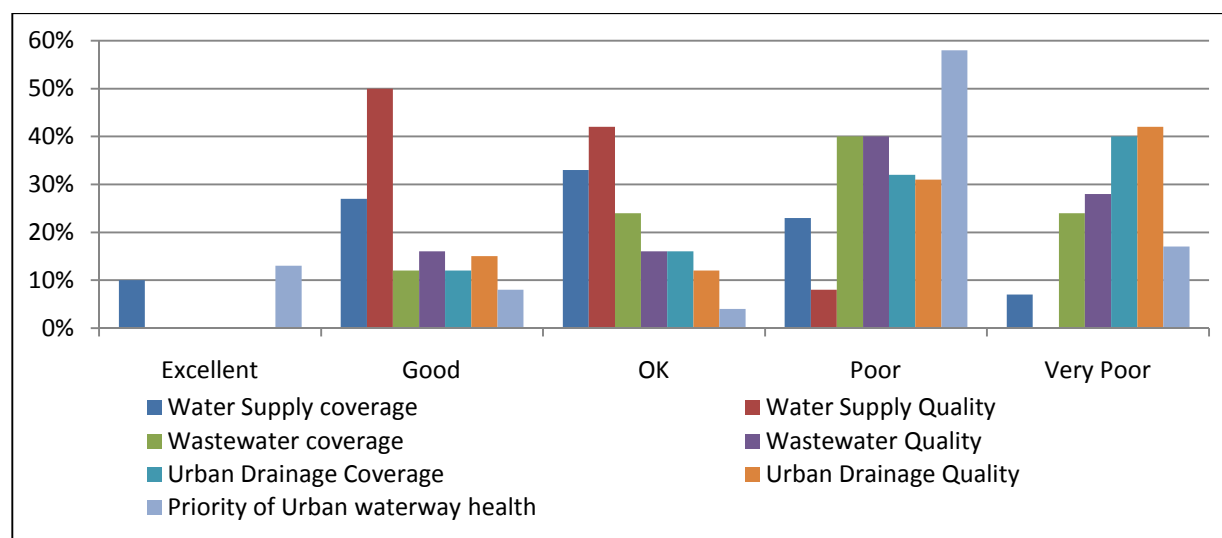


Figure 2: Perceived coverage and quality of urban water services

Figure 1 shows three of the five awareness factors are located in the High Priority quadrant, with one in Maintain and one in No Priority. Factor 4 (awareness of innovative solutions) is rated in the High Priority quadrant. When, in a related question, respondents were asked if they were aware of “sustainable solutions” to the urban water problems, only 30% answered affirmatively, the remaining 70% stating that they were unaware of any sustainable solutions to urban water problems. An analysis of the qualitative responses of the “sustainable solutions” (Table 3) identifies that there is a lack of awareness of sustainable alternatives and technologies for urban water management. One response included treated water reuse, decentralised approaches to wastewater management and quantity and quality control for urban drainage management, however these responses were provided by the only respondent with a Masters degree in the field of urban water management. This participant’s responses highlighted the value of education and awareness of modern approaches to urban water management.

Table 3: Qualitative responses regarding "Sustainable Solutions"

	Water Supply Systems	Wastewater Systems	Drainage systems
Responses	Improved /increased system (4/9);	Centralised WWTP (6/9);	Improved/increased system (5/9);
	Legislation/enforcement (3/9);	Improved treatment (4/9);	Improved planning (2/9);
	Additional supply sources (2/9);	legislation/enforcement (3/9);	Reduced urban flooding (2/9);
	Prepaid water meters (1/9);	Infrastructure maintenance (1/9);	Quantity/quality measures (1/9)
	Re-use of treated water (1/9)	Decentralised treatment (1/9)	

Besides this sole respondent, the other “sustainable solutions” all reflect development along the traditional centralised approach, requiring increases in the current system rather than a transition to more sustainable approaches.

The perceived poor levels of service coverage highlight that, unlike fully developed cities in the West, these urban centres are still in the ‘city building’ phase of development. As such, they are not in the technical lock-in that developed urban centres face. These urban centres will continue to develop infrastructure to provide increased service delivery and will either provide the traditional infrastructure, innovative sustainable technologies or a hybrid combination of both. These cities are currently located in a situation where technical leapfrogging to best practice, sustainable urban water management approaches is possible. However, the lack of awareness of sustainable solutions indicate that these cities are facing a

socio-political lock in. The current expectation is development along the traditional centralised development pathway.

Association

The association factors are split between the High Priority quadrant (8,10) and the Limited or No Priority region (6,7,9), as shown in Figure 1. This is unexpected, as these factors appear to be intrinsically inter-related. It would be assumed that the involvement of citizens and the development of a National Strategy would reflect strong leadership, organisational culture and political support. Rather, respondents perceive the former to be of high importance and the latter to be of low or no importance. The perceived importance of factors 8 and 10 are likely to be related to the emphasis that has been placed on community involvement and overarching policy development by SOPAC and funding bodies respectively.

Comparison of responses from Samoa, which is acknowledged as having very strong water leadership and political support, in contrast to the rest of the Pacific, displays a difference in perceived importance of these factors (Table 4). For the 5 association factors, Samoan responses exceed those of the other nations. It appears that the weak or lacking leadership, political support and organisational culture has resulted in a lack of understanding of its importance. In contrast, where there is strong leadership and political support the importance of leadership and political support is acknowledged.

Table 4: Comparison of Association Factors' responses

	Enthusiasm and Leadership	Political Support	Involvement of Citizens	Organisational Culture	National Strategy
Samoa (n=3)	10.00	8.00	9.00	9.33	8.66
Others (n=27)	6.20	6.00	7.10	5.79	7.63

Implicit questions relating to association factors demonstrate that urban water managers are able to associate the importance of urban water management with public and environmental health deterioration. Over 40% of respondents identified the issues of decreasing water availability, public health risks due to poor sanitation, groundwater pollution and decreasing urban water quality. However, they have not communicated the importance of these challenges. Therefore there is an overall lack of support, leadership and organisational culture regarding the adoption of SUWM. For association factors to increase their receptivity, there needs to be more effective communication of the importance of urban water management to those in powerful decision making positions so that better support, leadership and co-ordination can be facilitated to support SUWM.

Acquisition

Only one acquisition factor is rated as important: experience connecting planning and urban water management (Figure 1). The importance of the connection between urban planning and urban water management approaches is consistent with the growing push to include urban planning as a primary stakeholder in urban water projects. When in a separate question respondents were asked to rate the themes that had most increased in the past 5 years, urban water planning was rated as the second highest, confirming its perception as an High Priority factor.

The lack of perceived importance given to design and negotiation skills (factors 14 and 15) is explained by the dependence on external organisations for design works for new urban water systems in the region. In a related question regarding the use of external organisation, the average response was 2.4 (1 - always external through to 5 – never). Urban water managers in the Pacific do not feel it is a skill they require, as external consultants come in to do the design and negotiation.

Application

Application factors were divided between High Priority (16), Low Priority (17, 19) and No Priority (18). The presence of factor 16 (Financial incentives and support from national government) in the High Priority quadrant correlates with 50% of respondents identifying lack of financial resources as a barrier to the implementation of plans and programmes. In the developing context of the Pacific, financial resources are limited, often depending on aid funding from donors (e.g. AusAID or NZ AID) or loan agencies (ADB or World Bank) for large technical projects.

The low priority given to factor 18 reflects the perception that provision of urban water services is the role of the government rather than that of private organisations. Therefore commercial viability is seen as insignificant. Only two respondents (7%) stated that private organisations were involved in management of urban wastewater or urban drainage, with private organisations involved in water supply services in 4 urban centres (27%). It is perceived that private organisations do not play a significant role in urban water management, thus financial viability of systems is of little importance.

Throughout the region it continues to be perceived that the single most significant factor for the application and implementation of programs is access to adequate financial systems and funding sources. For receptivity to be improved, there will need to be explicit funding for sustainable technologies made available through either government systems, aid bodies or loan agencies.

CONCLUSIONS

This study aimed to gain an understanding of the perceived need and ability for urban centres in the Pacific region to transition. The majority of urban water managers identify the sector as performing sub-optimally across the region. Urban water professionals are aware that the pressures of urban population growth, pollution and other pressures are going to increase stress on the sector in the next 5-10 year.

The urban water sector was assessed to evaluate its receptivity to transitioning to the Water Sensitive City. The urban water sector in the Pacific has a very limited receptivity to the principle of the SUWM and therefore will face significant challenges in transitioning to the Water Sensitive City.

Urban centres in the region remain in the 'city building' phase of urban development and therefore not facing the technical lock-in facing and are technically well positioned to leapfrog. However, a lack of awareness of sustainable solutions has resulted in expectations within the region of centralised sewerage and drainage systems, leading the region towards a socio-political lock-in.

To counteract the latter, and enable the transition to more sustainable urban water management approaches in the Pacific region, there must be considerable effort undertaken to improve the receptivity of those involved. The highest priority is increasing awareness and association of those involved in urban water management. Without a concerted effort to increase the receptivity of the region, the principles of the Water Sensitive City will not be widely mainstreamed. Without increased receptivity, urban water development will proceed along the traditional, environmentally degrading development pathway and these cities will not be able to leapfrog to the Water Sensitive City.

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