Achieving integrated urban water management: planning top-down or bottom-up?

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ABSTRACT

Integrated Urban Water Management (IUWM) acknowledges a broad range of environmental and socio-economic outcomes but the link between design intentions and operational performance is not always clear. This may be due in part to a lack of shared principles that remove bias and inconsistency in assessing the operational performance of IUWM. This paper investigates the possibility of developing shared principles through examination of shared objectives and shared indicators within two logical and integrated frameworks for urban residential developments that aspire for IUWM and sustainable development. The framework method was applied using very different approaches—one a top-down urban planning process, the other a bottom-up community consultation process. Both frameworks highlight the extent to which IUWM is part of a broad social and environmental system. Core environmental performance objectives and indicators were very similar, highlighting the potential to develop shared principles in reporting and benchmarking the environmental performance of neighbourhood developments. Socio-economic indicators were highly variable due to process and likely contextual differences, thus it is unclear if the influence of IUWM on these variables can transcend the social context unless the practice of urban water management can expand its core responsibility beyond "hard" physical infrastructure.

Key words | assessment, benchmarking, framework, sustainable development, urban water

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INTRODUCTION

Managing the financial bottom line is an integral part of neoclassical economics and capitalism, the dominant political economy in existence today. On paper, this eventually demands measurable results–a relatively easy task for economists, where complexities are typically aggregated into units of currency. Financial forecasts (typically published as an investment prospectus or business plan) can thus be easily compared with operational results, which in turn can be benchmarked against competing projects to reward success. Furthermore, regulatory oversight has managed to produce varying levels of financial transparency and a core set of shared principles in mandatory reporting. "Shared principles" in reporting refer to core guidance statements that produce valid and faithful accounts by removing inconsistency (such as bias), but allow for methodological variations in producing the Figures (e.g. Generally Accepted Accounting Principles).

However, this system of transparent performance reporting and shared principles does not extend much beyond financial outcomes–even though global concerns over, for example, accelerated climate change and socio-cultural inequity are likely to drive higher awareness of improving environmental and social outcomes (expressed alongside financial results as "multiple bottom lines" or "integrated sustainability" assessment). Environmental and social reporting is *en vogue*, but little of it goes beyond disconnected public relations statements in corporate sustainability reports (Porter & Kramer 2006),

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ad hoc assessment tools tailored to an organisation's strengths (Chatterji & Levine 2006), or, for governments, in political party rhetoric. For urban water managers, actions to improve social and environmental outcomes typically only go as far as a permit-to-build (consent) application based on design intentions and simulated performance. Operational monitoring generally remains focused on financial performance or single-discipline scientific case studies.

There are numerous examples of tools aimed at reporting operational performance of multiple bottom lines, but they are almost all at large scales and voluntary in nature (lacking the regulatory oversight that exists for financial reporting). For example, governments have a wide variety of tools and indicators aimed at them, such as the United Nations Millennium Development Indicators (United Nations Statistics Division 2008). Attempts have been made by ecological economists to integrate non-financial indicators within a neoclassical economic context (Frame & Vale 2006), producing alternative measures of integrated sustainability through the World Bank's Wealth of Nations indicator (World Bank 2006) and the Genuine Progress Indicator (Anielski & Rowe 1999). The private sector can report voluntarily on the environmental and social performance of an entire firm using tools provided by the Global Reporting Initiative (2006). These examples are just a few of many voluntary and innovative schemes that attempt to measure integrated sustainability performance at very large scales.

Typically, these tools do not embody shared principles that would allow meaningful comparison of operational assessments produced with different tools (benchmarking). Chatterji & Levine (2006) argue that the proliferation of assessment tools developed simultaneously in identical contexts shows that shared principles for social and environmental reporting do not yet exist—even at large scales. This lack of shared principles is well represented by the New Zealand Ministry for the Environment (2008: 74–75), which shows that New Zealand ranks both among the best (1st out of 133 countries) and worst (141st out of 149 countries) in environmental performance, depending on which methodology is used. Both of these examples demonstrate that comparable non-financial assessment methodologies can display considerable bias and variation—key indications that shared principles are absent.

One notable exception to the lack of shared principles in non-financial reporting is the growing attention given to greenhouse gas inventory reporting. Shared principles in this area are developing around ISO 14064 and related guidance (see World Resources Institute and World Business Council for Sustainable Development 2004).

This study is interested in a wide scope of non-financial performance assessment and explores the possibility of producing shared principles for operational indicators of an urban development incorporating the principles of integrated urban water management (IUWM) that can be used to report results at the neighbourhood (developer) scale. Currently, the IUWM development process is analogous to developing a financial prospectus. Yet, reporting of operational results (other than cost) is rare, thus it is difficult to reward projects that actually reduce environmental damage and improve social outcomes. Non-financial operational results of IUWM developments are necessary for integrity, especially as they allow more comprehensive benchmarking or comparisons between projects that share a vision of IUWM.

Assessing integrated urban water management

Integrated urban water management (IUWM) is a response by urban water managers to societal and statutory demands for multiple-bottom-line outcomes. It recognises that actions to improve urban water systems can include a broader range of social, economic and other environmental outcomes beyond improving water quality and managing quantity (e.g., reducing greenhouse gas emissions; Taylor & Barrett 2008). Some examples of IUWM might include the potential for exposing natural urban water flows to increase amenity, thereby creating a more "liveable" city; the potential for urban water devices to reduce global resource consumption by extending the life of existing urban water infrastructure; or, the potential for urban water devices to improve urban biodiversity. IUWM fits within societal desire for "sustainable development", which was formalised by Agenda 21 at the 1992 United Nations Earth Summit and has now been translated into New Zealand statutory legislation. Multiple-bottom-line

outcomes (environmental, social, economic, and cultural) are being integrated into urban water management activities as a result of the Resource Management Act 1991 and the Local Government Act 2002.

As the range of outcomes has broadened, so has the scale to which urban water managers must expand the boundaries of their systems. The single-device scale becomes less appropriate. This increase in scale, from the single-device to the neighbourhood development (and larger), facilitates a much more complete scope of performance indicators, as it allows design considerations and assessment of collective action such as community infrastructure, non-point pollutant sources, and social networks (Frame & Vale 2006).

However, assessments of multiple bottom lines in IUWM at the neighbourhood scale should not rely on surrogate indicators that may actually hinder efforts towards IUWM. Surrogate indicators refer to design attributes (e.g. specified devices such as a stormwater bioretention strip or domestic rain tank) that have *potential* to improve operational performance. In IUWM, these surrogate indicators are typically a set of modelling results; there is a perception that such results are accurate enough to be used as a cost-effective method of demonstrating compliance with standards and regulations. The danger with accepting modelling results as a system's actual performance is that behind the modelling results are a number of assumptions regarding operating conditions, user behaviour, and other variables. To use a financial analogy, surrogate indicators (modelling results) can be seen as a business plan or investment prospectus. By accepting surrogate indicators in perpetuity, developments incorporating IUWM could be rewarded perpetually without ever having to publish operational results or explicitly disclaim, as most financial prospectuses do, that actual outcomes may vary.

Therefore, assessments of IUWM must include ongoing monitoring of direct indicators that represent the actual operational performance of the system; for example, domestic water consumption (and sources) or the transport mode share for cycling/walking (to represent an IUWM development designed for pollutant source control through increased walkability). Operational assessment is not only critical to enable honest reporting, but also to facilitate performance benchmarking. Ongoing financial performance is frequently the key benchmark when assessing the success of similar financial investments, thus the operational indicators of a development including IUWM become analogous to financial performance as benchmarks when comparing developments (e.g. to assess leadership in IUWM).

In response to the need for shared principles that would guide selection of the appropriate direct indicators, this paper now investigates the application of a framework method that logically connects high-level goals with measurable indicators. This method may help to identify the potential for shared principles via an analysis looking at similar objectives and indicators identified by two radically different approaches (a top-down "planner's approach" and a bottom-up "community approach") to urban development and IUWM.

METHOD OF DEVELOPING DIRECT INDICATORS FOR IUWM VIA A NEIGHBOURHOOD SUSTAINABILITY FRAMEWORK

There are several important issues to be addressed when creating integrated performance indicators. Operational indicators (especially non-financial ones) are only useful if they can be reliably measured with some degree of accuracy and comparability (Chatterji & Levine 2006).

There may be an issue of feasibility (accuracy) in monitoring the performance of direct environmental indicators at the neighbourhood scale. This has been addressed for monitoring direct socio-economic indicators as typically the neighbourhood scale is the smallest unit used to collate national socio-economic statistics, which are used to describe direct social and economic performance. A feasible method of measuring key environmental indicators for large urban scales is discussed in Rutledge *et al.* (2008).

This study focuses on shared principles that facilitate comparability. As discussed, confusion over comparability is typically addressed through reference to a set of shared principles, such as Generally Accepted Accounting Principles (in finance), that perform quality control and quality assurance processes to remove inconsistency

and bias. This study reasons that a transparent framework is necessary to explore the possibility for shared principles in developments aspiring for IUWM that would allow benchmarking. Once many logical frameworks have been developed, the presence of shared indicators that link to shared objectives can be used to identify the presence of shared principles, which could then be described in future research.

Neighbourhood developments aspiring for IUWM typically begin with a broad vision for the development to be sustainable. It is this vision that is usually announced in policy rhetoric; however, linking these aspirational visions to operational actions and indicators can be difficult (see Feeney *et al.* 2008). Frameworks are used to allow a logical unpacking from a high-level sustainability vision all the way down to measurable objectives and performance indicators. Measurable objectives are critical because they act as statements that define the scope of a prospectus to the development incorporating IUWM. The logic of a framework method is exposed through a defined hierarchy, as demonstrated in Figure 1. At the top is the vision of a sustainable development incorporating IUWM. Next, the vision must be explained to place boundaries on "sustainability", as it is a very broad term with many interpretations. This creates multiple spheres (e.g. social, environmental and economic) that make explicit the degree of integration contained within the vision. Some of these spheres have multiple dimensions to them that can be used to categorise objectives; for example, the environmental sphere is also very broad, thus dimensions can draw boundaries around certain environmental services such as energy, water, and waste. From these dimensions, clear measurable objectives could be written that explain long-term targets being considered during design. Finally, each objective can be broken down into specific performance-based indicators to monitor progress during operation and to provide context these are benchmarked.

RESULTS: TWO FRAMEWORKS IN USE

The logical framework method described above has been used by two residential developers in the Auckland metropolitan area who are striving for a sustainable urban development and IUWM at the neighbourhood scale. Both developments share the characteristic of being medium-density infill developments on mainly greenfield sites; however, Development A is being developed from a top-down strategic plan, while Development B is being developed by an indigenous community that went through a long process of tribal consultation to arrive at a comprehensive vision of integrated sustainability for the development from the bottom-up.

Development A: top-down master planner's approach

Development A is a large master-planned neighbourhood of around 2000 residential dwellings, along with commercial buildings (mostly retail), schools, mixed use, and an area of industrial development. The vision for IUWM on this site has been driven by the developer from the "top down", meaning the vision was not arrived at through extensive consultation with local or future residents, but rather from a strategic directive by the development company to work with researchers (including the authors) to develop the entire framework.

As a result of this approach, the neighbourhood sustainability framework for Development A (Table 1) fits conventional New Zealand government boundaries to sustainable development. The four spheres are modelled after New Zealand central government policies, such as the Local Government Act 2002, which dictates four well-beings: environmental, economic, social and cultural. Many of the objectives are aimed to fit within local government's strategic plans, such as the transport objective to support the Auckland Land Transport Strategy.

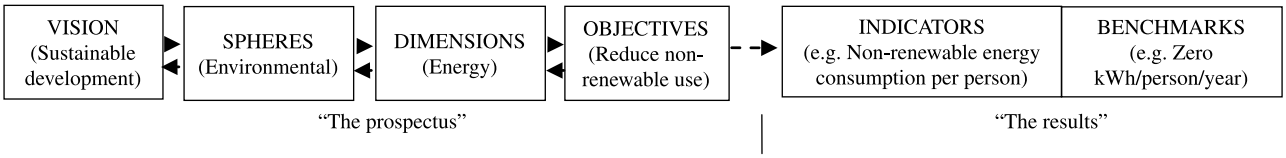

Figure 1 | Hierarchy of a logically designed neighbourhood sustainability framework. Below the boxes, we show how this method is analogous to developing a financial plan, producing a prospectus that can later be assessed in-use. An example of one logical path is in brackets.

Table 1 | Sustainable development framework for development A

Sphere	Dimension	Objectives	Indicators
Environmental	Ecology	Create an integrated natural habitat	1) % of open space in natural habitat
		Increase indigenous biodiversity	2) Native bird/invertebrate species population counts
			3) Population counts of endemic plant species
	Energy	Reduce non-renewable energy use	4) Energy consumption per kWh/household/year
		Produce renewable energy	5) Energy use in kWh/person/year for private transport
			6) % of energy consumption generated on-site
	Water	Reduce water consumption	7) % of stormwater treated through a stormwater quality chain
		Improve water quality	8) Water consumption in Litres/household
			9) Concentration of suspended sediments and heavy metals
	Waste	Recycle and renew existing buildings and other infrastructure	10) Proportion of existing buildings retained/reused off-site or recycled
		Reduce off-site waste disposal	11) Amount of solid waste to landfill/person/year
			12) Amount of recycled waste generated/person/year
			13) Sewage volumes sent off-site/person/year
Economic	Growth	Maximise contribution to Aucklaud's economic growth	14) Number of local businesses by activity type (including home businesses)
		Maximise local economic independence	15) Contribution to regional GDP
			16) % of total household income spent within a defined catchment
	Employment	Create new employment opportunities for all society	17) Number of jobs available, by type of employment
		Maximise opportunities for local employment	18) % of working population employed within a defined catchment
	Viability	Generate a commercially acceptable return	19) Financial rate of return to investors
		Demonstrate the overall benefits of a sustainable urban development approach	20) Total Cost Benefit Analysis (Quadruple bottom-1ine analysis)
		Demonstrate the impacts of a sustainable development approach on household spending	21) % of household income spent on housing, transport, energy and consumer items
			22) % of household income going into savings
	Transport	Support Auckland Land Transport Strategy	23) Amount of space dedicated to motor vehicles
		Minimise dependence on motor vehicles	24) Relative km of appropriately designed vehicle, cycle and walking routes
			25) Transport mode share taken up by Single Occupancy Vehicles
			26) Car ownership/household

Table 1 | (*continued*)

Sphere	Dimension	Objectives	Indicators
Social	Inclusion	Create opportunities for all sectors of society to live on-site	27) Housing type availability and affordability by sector
		Maximise community participation	28) Number of community facilities (type and uses)
			29) % of households participating in community activity
	Quality of life	Promote a healthy and safe living environment	30) Occupancy "crowding index"
		Ensure the public realm is attractive and accessible	31) Safety measures (Crime Prevention through Environmental Design) in place
		Become a learning community	32) Number of learning opportunities per age cohort
			33) Number of households participating in learning opportunities
			34) Proximity to appropriately designed public open space
	Accessibility	Ensure accessibility for all stages of life and ability	35) % of housing targeted at extended family living
		Ensure all residents have enhanced access to essential services	36) % of housing with options for enhanced accessibility
			37) % of dwellings within 400m of a learning facility
			38) % of homes within 800m of a public transport service
			39) % of homes with access to leading-edge information technology
Cultural	Sense of place	Create a distinctive identity	40) Use of unique and authentic urban design and architecture
			41) Extent of prominent landscape features and views preserved
			42) Place names drawn from local associations
	Custodianship	Acknowledge the indigenous people of the area	43) Participation & consultative processes in place during design and afterwards
		Promote participation in local government	44) Level of participation/representation in community management bodies
	Heritage	Ensure the development's future reflects its past	45) Extent to which earlier history is interpreted and celebrated in design
			46) Extent to which existing heritage buildings are retained and integrated
	Cultural life	Promote a diverse range of cultural, sporting and other opportunities	47) Number and type of cultural/sporting events and % local participation
			48) Number and type of local events that are accessible to community members

Development B: bottom-up community approach

Development B is a proposed medium-density residential development within the Auckland metropolitan area for the *tangata whenua*, or indigenous Māori residents of New Zealand on their traditional land, to house approximately 9,000 tribal members. Unlike the top-down process described for Development A, all tribal members were invited to discuss their goals and visions for the future development. This consultation eventually produced core values and measurable objectives that were fed into the framework methodology described above, with the authors of this study helping to translate the objectives into operational indicators. This process of establishing a vision can be described as a "bottom-up" approach.

The resulting framework (Table 2) bases the spheres of sustainability not on the national government's four well-beings, but rather on six cultural values the tribe would like to sustain: *Rangatiratanga* represents the tribe's ability to self-sustain, through strong leadership and a core identity; *Kaitiakitanga* is tribal guardianship of the environment in which they live; *Manaakitanga* is care for tribal members, ensuring their health and vitality; *Kotahitanga* represents the tribe's desire to be unified; *Whanaungatanga* shows tribal value of their ancestry, or *whakapapa*; and *Wairautanga* is respect for the special nature and spirituality of the land.

DISCUSSION

The two case studies show how IUWM fits within sustainability frameworks that have the broader scope of multiple-bottom-line outcomes and how integrated approaches to urban water management should consider a diverse range of impacts. As would be expected, both developments acknowledge responsibility in operational monitoring of conventional water management outcomes, including sewage volumes, stormwater quality, stormwater quantity, open space ecology, and water supply sources (Table 1, indicators 7, 8 and 9; Table 2, indicators 9, 11, and 14). However, the framework method acknowledges that design decisions for provision of water management services must consider operational outcomes beyond these traditional water management indicators. The practice of IUWM expands these outcomes to other environmental indicators such as energy consumption (including transport) and solid waste management on top of social outcomes such as local economies, equity, health, education, culture, and well-being. While the influence of IUWM on some of these indicators may seem irrelevant, consideration of the entire urban system, including user behaviour and social outcomes, should be a key part of IUWM.

Potential for shared principles in non-financial IUWM assessment

Comparing the indicators and associated objectives in these two frameworks allows consideration of the potential for developing shared principles in reporting *ex post* performance of non-financial outcomes for IUWM at the neighbourhood development scale. Both frameworks show wide differences in measuring economic and social outcomes, though they had many similar objectives. Conversely, environmental indicators and their associated measurable objectives were relatively similar.

In economic assessment, Development A showed a very neoclassical economic bias through objectives that the development must demonstrate GDP growth and a "commercially acceptable" rate of return for the developer (associated with indicators 15, 19, and 20 in Table 1). On the other hand, Development B's economic objectives do not mention economic growth, and its indicators generally aim to measure objectives of self-sufficiency and tribal unification through local employment, local services, and affordable housing (e.g. indicators 7, 8, and 24 in Table 2).

Social indicators in Development A were strongly based on a generalised checklist of "best practice" infrastructure provision, indicating that if development (including IUWM design features) simply contained community facilities, learning opportunities, participatory processes, nearby access to public transport, "appropriately designed" urban spaces and locally relevant street names (among other things), then the community would be more inclusive and accessible, and this would result in a higher quality of life (indicators 28, 32, 34, 37, 38, 40 and 43 in Table 1). These are strongly surrogate, not direct, indicators, though there are exceptions in indicators 29 and 33.

Table 2 | Sustainable development framework for development B. Note that many Māori language terms are used, including *Te Reo* (Māori language), *waiata* (songs), *haka* (dances), *mōteatea* (chants), *paepae* (speaker, speaking platform), *whānau* (family), *kaumātua* (elderly male), *kuia* (elderly female), *whakapapa* (ancestry), and *mauri* (special nature)

Sphere	Dimension	Objectives	Indicators
Rangatiratanga	Identity	Te Reo is the dominant language	1) Attendance at gatherings conducted in Te Reo
		Most tribe members will be able to perform a number of tribally relevant waiata. haka and mōteatea	2) Number of members able to perform relevant waiata, haka and mōteatea 3) Number of tribal performances (waiata, haka and mōteatea) per month
			4) % of time spent by tribe members conversing in (a) English and (b) Te Reo
	Leadership	Paepae is full of speakers	5) Number of speakers at the paepae
			6) Attendance at speaking events
	Self-sufficiency	All able-bodied tribe members will be employed, especially in local, tribally owned Businesses	7) Proportion of able-bodied tribe members (a) employed and (b) on unemployment benefit 8) Proportion of working tribe members employed within a defined catchment
Kaitiakitanga	Guardianship	All community buildings and a majority of whānau housing will treat their own wastewater Zero waste Create natural habitat Sustain use of traditional resources	9) Sewage volumes pumped off-site/person/year 10) Amount of solid waste sent to landfill/person/year 11) Concentration of suspended sediments and heavy metals in discharged stormwater 12) Percentage of open space in natural habitat 13) Number of tribe members using traditional resources
	Sustainability	100% self-sufficient for potable water 100% of energy from renewable sources Housing of good quality with reduced costs	14) Mains supply water consumption/person/year 15) Imported fossil-based energy use in kWh/person/year for (a) household use and (b) transport 16) % of household income spent on housing costs 17) Annual spend on defensive housing maintenance
Manaakitanga	Care	Kaumātua/Kuia housing is similar in standards to conventional retirement villages	18) % of housing targeted at extended family 19) % of housing with enhanced accessibility 20) Local crime rate
		Promote a safe environment	
	Health	Promote healthy whānau	21) % of tribe members with health insurance
		Broad range of health services on site	22) Health statistics equal to (or better than) those of non-Māori populations 23) % of health-related consultation conducted within a defined catchment
Kotahitanga	Unity	All tribe members who choose to are able to live on site	24) % of homes accessible to low-income whānau, based on ratios of income to (a) rent or (b) purchase price
			25) Number of tribe members living on site
			26) % of total tribe members living on site
			27) Number of tribe members on waiting lists for accommodation on site
Whanaungatanga	Relationships	Most tribe members know their whakapapa and the general history of their tribe The tribe will have many organised events that bring its members together	28) Extent to which tribal history is made available on site 29) Number of tribal gathering events and attendance at each event 30) % of members participating in tribal events
Wairuatanga	Respect	All development will respect the gods and mauri of the land	31) Participation and consultation during design with tribal kaumātua kuia, and spiritual advisers
			32) Extent to which spiritually important features arc included within development

Conversely, the bottom-up process of Development B resulted in a more concrete list of direct social indicators. As an illustrative example, both developments had measurable objectives related to a healthy and safe living environment. Development A will report on surrogate indicators (30 and 31 in Table 1) related to a measure of crowding (the "crowding index") and provision of infrastructure design guided by a concept called Crime Prevention through Environmental Design (maximising passive surveillance of public spaces). Development B, however, ties health and safety objectives to direct indicators such as the crime rate, health insurance coverage, and conventional health statistics (indicators 20, 21, and 22, Table 2).

This willingness to measure more direct social indicators may be because the developers of Development B are also respected tribal community leaders and thus are additionally responsible for provision of "soft" social infrastructure, such as tribal governance and the practice of cultural traditions. Development A appears to have defaulted to core responsibilities of only providing "hard" physical infrastructure, a practice that prior studies have shown to be questionable in its ability to improve socio-economic outcomes (e.g. Scott & Park 2008).

Despite differing processes, both development frameworks resulted in very similar environmental objectives and indicators. Furthermore many of the shared indicators within the environmental sphere are representative of direct operational indicators. Energy and water are reported via actual measurements of resident consumption, not on design intentions or model simulations (see Table 1, indicators 4, 5, 6, and 8; and Table 2, indicators 14 and 15).

The existence of similar objectives and direct indicators in the environmental sphere, despite a large variation in process and social context, leads to the possibility that shared principles exist and can be developed to compare the performance of IUWM developments across a wide range of environmental impacts and outcomes, irrespective of the social context and process employed in design. The stronger influence of direct environmental indicators in both frameworks may indicate that environmental outcomes of IUWM are much more influenced by design (and ongoing management) of a local place than are socio-economic outcomes, which are related to the wider context. We do not suggest that environmental performance is completely divorced from social context, as user behaviour is a key element that determines environmental performance (James & Desai 2003), but do acknowledge that more direct performance monitoring is needed to see if, as these two frameworks suggest, environmental outcomes can be comparable regardless of socio-economic context.

As for shared principles in socio-economic reporting of IUWM developments, the wide variation that the development process has on socio-economic indicators suggests socio-economic outcomes are, at the least, process-dependent, but are also likely to be context-dependent. Shared principles that allow for comparability via benchmarking may not be present for IUWM because a single development may not be able to alter the wider socio-economic context in which the development exists. For example, a development placed within a marginal socio-economic area will likely exhibit poor social performance relative to a wealthy socio-economic area because the design of place is unlikely to alter this bigger context, unless the designers also have influence over the larger context.

Each neighbourhood's design and IUWM strategy is targeted towards its certain context as, even without a framework, the developers must consider relevant social and economic issues. Within today's neoclassical economic paradigm, incentives exist for the developer to build an economically sustainable development, because if she does not, then her financial performance reporting will put an end to her business. As part of that incentive, if the developer does not consider the social context and potential beneficial social outcomes of a development, then people may choose not to live in that development. However, besides complying with existing regulation (the consent-to-build process), there is little incentive in current development practice to consider or monitor environmental outcomes. Therefore, the broad scope of environmental performance indicators should be the initial focus of operational monitoring and benchmarking of IUWM at the neighbourhood scale.

Future implications for IUWM

Conventional roles in water management design (exemplified by Development A and its reliance on physical infrastructure provision only) may not be well-positioned

to handle the integrative aspects of IUWM because sole provision of water infrastructure may not have much influence on the wider social context in which the development sits. Checklist-based surrogate indicators for socio-economic performance may provide a reliable indication that designers are not confident that their design will influence the wider context. Development B hints at an unconventional development process that may lead to shared principles in socio-economic reporting because its developers are involved in the wider social context that is likely to enable meaningful assessment of socio-economic outcomes.

CONCLUSIONS

This paper investigated the possibility of developing shared principles by examining shared objectives and shared indicators within logical and integrated frameworks for urban development that aspire for IUWM and sustainable development. The framework method was applied to two developments using different approaches; one a top-down urban planning process, the other a bottom-up community consultation process. The frameworks highlight the extent to which IUWM is part of a broad social and environmental system. The analysis indicates many socio-cultural and economic differences within comparable geographical and political contexts, thus comparability of these indicators is likely to be influenced by socio-political factors operating at larger scales–the social context. For example, a private sector decision to close a nearby manufacturing plant would have far greater impact on the socio-economic status of urban residents than a development designed to the principles of IUWM. However, the frameworks demonstrate that there may be a core set of environmental variables that transcend socio-economic contexts, allowing for comparability that can lead to valid demonstrations of IUWM at the neighbourhood scale.

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