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Stormwater management: can we learn from others?

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While there is considerable amount of literature examining how and why American federal and state governments look for information and ideas, there is considerably less knowledge of how these processes operate at the local level. This is particularly true in the case of how ideas related to sustainable water management policies are found and used by local governments. This article attempts to open this area by examining where, how and to what purpose local agents engage in the transfer of low-impact development policies and techniques. This article is organised around four questions: (1) Is there a basic agreement about the pioneers in stormwater management; (2) Where did agents gather information; (3) Did this involve complex understanding; and (4) What emerged as key obstacles to the transfer and learning processes amongst the local authorities involved in this study?

Keywords: cross-national policy transfer; low-impact development; stormwater management; urban sustainability

Introduction

> Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.
>
> Douglas Adams

Policy innovation is of increasing importance for cities and local authorities. This is particularly true in the area of stormwater management where local governments often assume greater levels of responsibility for implementation of state and federal policies. In this, despite the preponderance of best practices models across the USA and Europe, there are few recent examples of policy transfer occurring in the realm of stormwater management (Rose 1993, Dolowitz and Medearis 2009). On the basis of our interviews, what transfer does occur, appears to be accidental, unstructured, and often 'less than rational'. To better understand why this is the case, this article will draw on a range of primary and secondary sources to examine the processes associated with the spread of information between local jurisdictions in the USA and the filters that appear to prevent the importation and use of lessons relating to low-impact development (LID) stormwater management policies.

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Why focus on LID?

The transfer of LID policy and technology was selected for this research due to the amount of policy development relevant to stormwater management occurring in the USA as a result of recent amendments to the Clean Water Act (and specifically those associated with matters concerning the Total Maximum Daily Loads (TMDL) and National Pollutant Discharge Elimination System (NPDES) of 1972. These amendments place US cities under intense pressure to fundamentally rethink their stormwater management (Keeley 2007, 2011). Second, as a result of the range of experiments currently being carried out in the USA in municipalities as diverse as Seattle, Chicago and Philadelphia, the use of LID in the process of stormwater management makes an excellent theme to apply the concepts associated with transfer and learning. Added to this, Northern Europe has been involved in the development of LID type technologies and techniques (supported by comprehensive implementation policies) for over 40 years (Köhler and Keeley 2005) from which US municipalities could draw lessons. Third, it has been estimated by the US Environmental Protection Agency (EPA) that LID will become more important in the future to maintain the nation's water infrastructure between 2000 and 2019. The estimated costs of this maintenance are between $331 billion and $440 billion (American Society of Civil Engineers 2005, National Research Council 2009). Fourth, the EPA currently promotes the development and use of LID as a potentially 'cost effective and environmentally preferable' policy to deal with stormwater and other urban environmental problems (EPA 2007).

What is LID?

LID refers to a range of techniques and technologies that can be used to manage stormwater runoff. LID combines land use planning and engineering designs integrating natural or 'naturalistic' features to infiltrate, filter, store, evaporate and/or detain runoff close to its source (McHarg 1969).[1] Some of the more common approaches are greenroof technologies, bio-swales, rain gardens, the use of rain barrels and downspout disconnection, permeable pavement technologies, waddi technologies, urban forests and parking lot and street design techniques that minimise the speed and flow of stormwater (Figure 1).

What is policy transfer?

Governments have been looking to other jurisdictions for ideas and information since organised political entities formed and people began moving between them. However, the systematic study of this process began in earnest within the past 30 years. Initially, transfer studies focused on the temporal patterns of policy spread across states (Crain 1966, Walker 1969, Gray 1973, Eyestone 1977, Savage 1985) and the analysis of cross-national 'lesson-drawing' and policy-borrowing (Armytage 1967, 1968, Becker 1970, Westney 1987, Goodman 1989, Rose 1993, Rogers 2003). The findings of these initial studies led to a range of advances in our understanding of why and how political systems turn to each other for ideas (Berry and Berry 1990, Levi-Faur 2003, Morrissey and Nelson 2003). Much of this literature is underpinned by the rational actor model, in which agents (individually and collectively) 'actively'

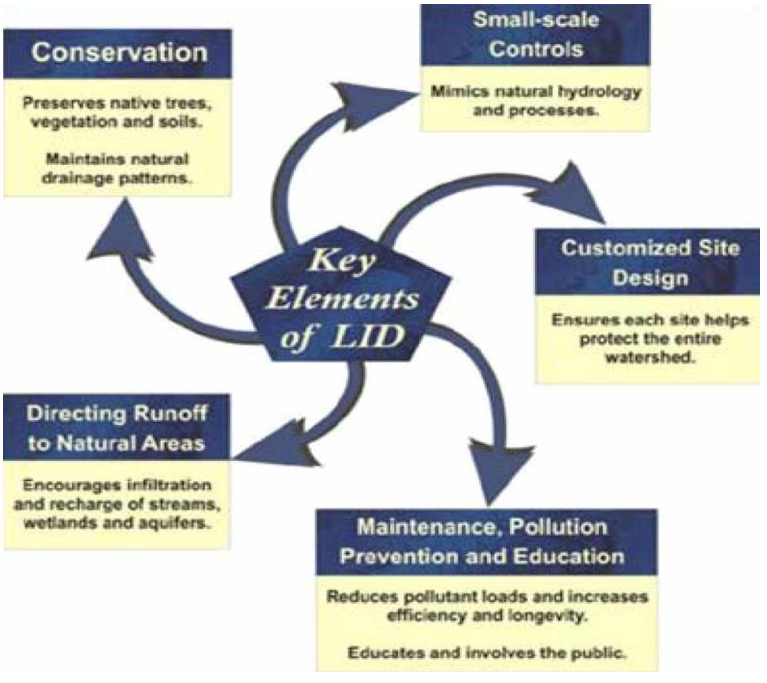

Figure 1. The LID model. *Source*: Guillette (2010).

learn from others and subsequently implement the best possible reform to their existing policy situation (Jacoby 2000, p. 6). Others go further arguing that the search and application of ideas, practices or objects across political boundaries is a deliberate goal-oriented process, which 'starts with scanning programs in effect elsewhere, and ends with the prospective evaluation of what would happen if a program already in effect elsewhere were transferred here in future' (Rose 1991, p. 3).

While there are rational reasons to engage in the transfer process and some actors will attempt to engage in as rational a search and analysis as possible, a range of observations led Dolowitz and Marsh (2000, p. 1) to argue against this physical–rational conception of the process. Rather, they attempted to characterise transfer as lying along the continuum presented in Figure 2.

The idea being that agents can be motivated to engage in transfer for any number of reasons ranging from the purely voluntary (e.g. out of curiosity) to completely involuntary (e.g. action in which a jurisdiction is forced/coerced to adopt another nation's policies). In this, the voluntary end of the continuum tends to be portrayed as involving processes of *free choice*. Because of *free choice*, this end of the continuum is often discussed as involving more rational procedures. While there has

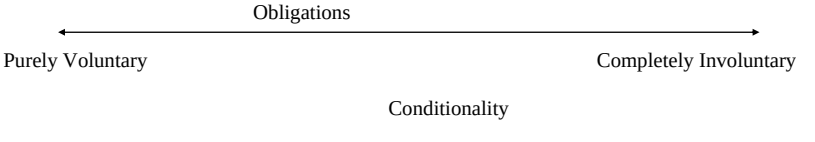

Figure 2. Motivations for transfer.

been little discussion of the validity of the assumed link between voluntary transfer and a rational decision-making, we believe that this view is not necessarily correct. Rather, while some instances of voluntary transfer are certainly characterised by rationality, this study demonstrates that many local policy-makers (at least in this US sample of stormwater managers) appear to engage in less rationality and more experimentation than would be predicted by traditional theorisation of policy transfer. Specifically, we found that in many US municipalities, transfer can be characterised less as a problem-focused or goal-oriented exercise, than an 'un-systemic and unstructured' search for information, often done with an 'insufficient understanding of the way the program interacted with the other elements of the policy system' in the originating system than is needed for a 'successful' transfer (Mossberger and Wolman 2003, p. 432).

Transfer and LID

Since the late nineteenth century, municipalities across the industrialised world have tended to manage urban stormwater through the construction of large-scale engineering conveyances and storage facilities (i.e. gray infrastructure). However, over the past few decades, it has been increasingly common to see cities supplementing engineered systems with a palette of ecological stormwater management techniques.[2] To repeat in order to emphasise, such LID stormwater management practices differ from gray infrastructure because of their reliance on vegetation, soils and bioengineered systems to reduce stormwater flow volumes. LID techniques can range from the large-scale development and maintenance of interconnected urban forests to small-scale rain garden projects. Similarly, the degrees of technological sophistication differ as can be seen in the inclusion of both highly engineered green roof technology and construction all the way to the simple conservation of open space. Because LID stormwater management tends to involve a collection of small-scale practices and fairly decentralised techniques, a functional programme must fundamentally include policy and/or planning instruments that encourage or require implementation throughout the landscape.

In the USA, a range of pioneering cities have been experimenting for 10–15 years with the use LID techniques as a part of their stormwater management procedures. Many have gone on to enhance these initial pilot projects with policies designed to help the locality scale-up from 'demonstration project' status towards full-scale, citywide, implementation. While the USA is fairly new to LID many European municipalities have been using the equivalent of LID techniques [sometimes known as Sustainable Urban Development Systems (SUDS)] to address their stormwater issues for over 25-years, many integrating low-impact techniques on a landscape wide scale (Keeley 2007, 2011). For example, Germany was among the first countries to experiment with constructed wetlands, bio-swales and green roofs (Vymazal 2001, Köhler and Keeley 2005). German cities have also been in the forefront in the development of policies that promote or encourage the implementation of these techniques by local populations. Berlin's *Biotopflaechenfaktor* (Green Area Ratio) policy requires new development in select city neighbourhoods to incorporate LID and other best practices on each parcel (Keeley 2011). Additionally, a majority of German cities assess stormwater fees based on estimates of the amount of impervious surface on each parcel of land. This has been designed to encourage

landowners to reduce impervious surface coverage and manage stormwater on site, often utilising LID practices (Keeley 2007). Further examples can be drawn from municipalities in the Netherlands who have been at the forefront of the use of on-site swale (Wadi) technology and natural and manmade on-site water treatment techniques to reduce stormwater runoff and the pollutant load of runoff that does occur (Boogaard 2009). Similarly, in order to reduce stormwater runoff and pollution loads caused during storm events, Scotland has implemented widespread use of pervious pavement technology across the country (Pittner and Allerton 2009, p. 5).[3]

While trailblazers in the use of LID technologies and techniques for the management of stormwater exist in the USA (McHarg 1969), American interest and investment in LID has been more tentative, less widespread and considerably more recent. Movements towards the use of LID techniques did not properly emerge until the late 1990s following passage of the TMDL and NPDES Amendments to the Clean Water Act. In response, Seattle began a LID programme, which has attained national prominence, particularly their programmes for retrofitting urban streetscapes with swale systems.[4] Portland has also been at the forefront of designing and implementing LID techniques over the past 15 years, including rain barrels, bio-retention systems, downspout disconnection incentives, vegetated swales, rain gardens and acquiring open space for on-site stormwater management. As part of their green efforts Portland revised zoning codes to require landscaping of outdoor parking lots to take advantage of the rainwater retention opportunities these large open spaces provide (for more information see: Puget Sound Partnership at, http://www.psp.wa.gov). Chicago has been a champion of green roofs while Philadelphia recently developed and adopted their 'Triple Bottom Line Assessment' for meeting federal stormwater management requirements through the use of LID technologies and techniques (Stratus Consulting 2009).

Methodology and data

For this study data was collected from academic literature; official federal, state, and local governmental documents and planning statements; questionnaires consisting of 28 closed-ended and 5 open-ended questions completed by 15 individuals working on the development and implementation of LID programmes in federal agencies, local government departments, water companies and relevant Non-Governing Organizations (NGOs); and the online resources they referred to in their responses. The questionnaires were developed to elicit an understanding of the jurisdiction type of each practitioner, their role in water management, their knowledge of programmes and activities occurring in other US municipalities, and their knowledge of and interest in the programmes and activities occurring in overseas jurisdictions. The questions explored whether:

(1) The individual had been involved in a search for information or was aware of a search within their organisation;
(2) The means by which any search was conducted;
(3) The type and level of analysis that has been conducted in relation to the information that was collected;

(4) The individual's understanding of urban environmental and planning policies that operated in both their own and other jurisdictions; and,
(5) The obstacles or incentives affecting the transfer process as they observed them.

Surveys were distributed via email to professionals representing 59 local governments (clustered around the Washington DC, Philadelphia and Chicago areas), state institutions, and the US Environmental Protection Agency (US EPA).[5] Participants were selected on the basis of their involvement (nationally and locally) in the development and implementation of LID stormwater management policies and technologies. While this introduced an element of bias, this is outweighed by the advantages of guaranteeing that there was a degree of 'conceptual equivalency' in the types of knowledge the participants had and were able to draw upon (Waterhouse 1978, Masser 1986, Williams 1986, p. 27, Hallett 1988). Each returned questionnaire (and five subsequent follow-up questionnaires sent for clarification and expansion of initial response) was reviewed and coded so as to identify discernable trends and patterns relating to the presence or absence of learning and transfer.[6]

Results and discussion

In the following section, we answer and discuss four questions: (1) Is there a basic agreement about the pioneers in stormwater management; (2) Where did agents gather information; (3) Did this involve complex understandings; and (4) What emerged as key obstacles to the transfer and learning processes amongst the local authorities involved in this study. Before proceeding, we would like to point out that almost every respondent indicated that their municipality had actively 'looked around' to see how other municipalities were responding to EPA rules and regulations relating to stromwater management. Most of these reflected being particularly interest in seeing how others were using or integrating LID technologies into their existing stormwater management systems.

Is there a basic agreement about the pioneers in stormwater management?

While most participants discussed looking around to see what other jurisdictions were doing, the data suggested a preference to look at how cities and states perceived (or discussed in the literature) as *trendsetters* were applying LID policies and technologies. Of the cities discussed as being trendsetters, Portland, Oregon (60% of those who mentioned a model) and Seattle, Washington (50% of those who mentioned a model) were seen as clear leaders in the minds of those involved in the management of stormwater. A representative response to the question as to where individuals were looking for LID information: 'Portland and Seattle offered the best models for helping in the development and implementation of stormwater management practices (BMPs), to meet NPDES and TMDL requirements'. Asked the same question, another official stated: 'Portland Oregon is foremost in implementing LID techniques . . . lots of interesting information from Oregon'. It should be stressed that while Portland and Seattle were the most likely municipalities in the USA to be seen as having potential lessons (in relation to LID), they were not alone. Austin, Texas and Fairfax, Virginia were also mentioned by multiple

participants as being active in their efforts to develop LID techniques in response to the Phase 2 NPDES and TMDL requirements.[7]

An interesting observation about this finding is that while Portland and Seattle (and a few other cities) were seen as trendsetters and models worth emulating, they often did not provide the models used by our case study municipalities. Rather the questionnaire data revealed a preference for represented localities to look for lessons in cities residing within their state. The logic behind this was reported (regardless of accuracy) to lie in the belief that staying close-to-home would minimise the efforts associated with the implementation and use of transferred ideas and techniques. Some of our respondents even suggested that the effort needed to adapt a policy operating in a distant jurisdiction (as opposed to one in a jurisdiction lying within their state) would outweigh the benefits that could emerge. As one administrator put it, 'Stormwater fees are highly political and mostly a local issue. The examples we have found most helpful have been in neighboring jurisdictions that are under similar regulatory systems'. Their argument was based on the 'most-similar idea' that borrowing something that operates under the same political, social and/or legal conditions is easier than using one operating under different conditions. This logic would appear to fit the lesson-drawing literature (Walker 1969, Rose 1991, Mossberger and Wolman 2003). However, instead of a directed and purposeful search occurring, leading to the best possible policy being borrowed, as suggested by lesson-drawing, our data presented a picture in which searches were less about best practice and more about convenience and perceptions of similarity.

An interesting distinction can be made here between small and large municipalities. While a small sample, none of the municipalities under 100,000 looked out of their own state for ideas, while all of the municipalities of over 500,000 engaged in a process best described as broad ranging. Specifically, our data found that each of the municipalities with over 500,000 households reported 'extensive searches' involving a 'range of different local authorities'. While these data gathering exercise always involved exposure to information (by means of direct examination or viewing compiled reports and presentations) the true target often appeared to be another predetermined large municipality. It is possible to explain this in part by the similarity of urban infrastructure needs that are unique to large metropolitan areas. Or as noted by a respondent representing a metropolitan area of over a million households:

> A major challenge in the implementation of stormwater management practices (BMPs), to meet NPDES and TMDL requirements, [for large metropolitan cities] is [is that they all have] an urban setting where open space and opportunities to reduce impervious surface are a significantly limiting issues.

As such, even though many of the techniques being utilised by small and medium sized cities had advantages and were seen as being of 'high quality' none of the participants representing municipalities of over 500,000 believed 'they would be useable in their jurisdiction if transferred to a larger urban setting'. For instance, when discussing why one large city relied on Chicago, instead of the innovative techniques they discussed as liking about the Austin model, they stated 'what we were looking for were models of how to combine site integrated LID in a decentralized municipal infrastructure', which mitigated against the use of Austin. On the same lines, another respondent argued that they looked to other similarly

sized municipalities rather than smaller cities because they had similar issues with the 'coordination of all agencies (Sewer, Health District, Building, Road Engineers, State and Local levels, Stormwater Districts, and Planning and Zoning etc.) that would [presumably] not be needed in smaller cities and municipalities'.

While much of the focus of study was on the transfer of ideas and policies from local municipalities to local municipalities in the USA, almost 95% of our respondents reported having a general interest in European initiatives and techniques. While interested in Europe, few operated in institutions or organisations that had followed this general interest with any actual formal searches. Excluding the US EPA, fewer than 10% of our respondents had followed through their interest through to concrete studies of overseas models. This was the case even among many of the respondents in cities that others saw as being leaders in the implementation of LID techniques. What we found was little understanding of the techniques being used overseas, and what data were gathered tended to lack follow though analysis of how the practice might fit into the local context.

In sum, what we observed was a tendency to look to either a 'big player', such as Seattle or Portland or at jurisdictions in the same political, economic, social and legal regime. This was true regardless of the quality of the programme or its relevance to the observer. In fact, despite awareness that there were a number of excellent path-breaking programmes, awareness was often not enough to trigger transfer.

Where did agents gather information?

While an almost limitless number of sources exist for the acquisition of information on the operation of LID technologies and programmes, and how these function across USA and foreign municipalities, our study found that a considerable amount of information is collected from secondary, tertiary or non-verifiable sources. Not only was a considerable amount of information on US-based programmes gathered from non-primary sources, but over 80% of our respondents reported that when they received information on the activities of other municipalities (domestic and/or foreign) it came from the activity of consultancy firms or online sites.[8]

Following closely behind consultancy firms and online sites as an information source were conference presentations (approximately 70%). Given that the purpose of a workshop or conference is to bring people together to share information, it is interesting that approximately 60% of respondents said they relied solely on PowerPoint presentations for information. Fewer than 5% of our respondents mentioned face-to-face discussions with either the PowerPoint presenters or individuals directly involved in the development of LID policies and techniques. More surprisingly, not a single respondent mentioned (even after prompting) the use of informal contacts as a way in which they gathered information at conferences (or in their day-to-day jobs). Given the relatively soft nature of the information that can be conveyed though time limited presentations relying on PowerPoint, it is not surprising that our respondents were able to discuss the generalities of what is occurring elsewhere, but appeared to have considerably less in-depth knowledge of what was occurring on the ground. In relation to policy, it is possibly more telling (yet not surprising) to find that on reflection, many of these same respondents felt that despite the evident disadvantages of the information that can be conveyed in a brief PowerPoint presentation, that they 'were well informed on what was occurring

elsewhere' as a result of attending the presentation/s (Tufte 2003, Norvig 2004, Hammes 2009, McKendrick 2009, Frommer 2012).

As will be expanded upon below, it appears that a disjuncture exists between how information is collected and the depth or detail of knowledge that actors believe they are acquiring as a result of this activity, particularly in regard to the information on non-US-based programmes. This disjuncture was expressed not only by individuals who discussed conferences and workshops as their primary source of information, but also, by those who utilised the Internet and journal searches for information. In one instance, a participant stated that his agency had 'actively engaged in a formal, necessary and most comprehensive' search for information. This same individual stated that the primary source of information utilised in this comprehensive search was the Internet and journal articles. Upon further questioning it emerged that this agency had actually relied on a single Internet site for all their information, which was also the source of the journal article they had reviewed. The individual did not believe that this was in anyway a disadvantage for the agencies ability to acquire knowledge since the 'site had gathered *all available information* in one interactive website' (emphasis added).

Did this involve complex understanding?

Over 60% of respondents believed that they (or their unit) had engaged in a 'detailed' study of another jurisdictions LID policies. However, without apparent irony, these same individuals reported that their detailed study consisted of little more than the collection of information 'at conferences' and/or the examination of 'journal articles'. Almost no local jurisdiction that reported having engaged in a comprehensive investigation of another jurisdiction undertook site visits or organised formal presentations outside those provided by a preferred consultancy firm. While the presentations provided by consultancy firms or viewed at conferences were generally reported to provide 'prospective analysis about how the country/city/organization's policies could be applied', often the 'learning' was reported to amount to a 'simple examination of performance benchmarks or measures' with no analysis or study of what policies or practices underpinned the benchmark. In fact, one participant argued that their jurisdiction had undertaken 'prospective analysis about how the country/city/organization's policies could be applied'. He added that they had gathered little more than elementary information about the 'performances and function of the innovation from other localities'.

In a similar vein, another administrator appeared unable to look past the barriers to using specific LID techniques to see how policies or other information might translate. He argued that while his locality looked to the west coast they saw little use in the process because the LID techniques being used there could not operate in his locality in the Northeast. He said, 'anything green will turn brown, either by mortality or seasonal changes, then what is the effectiveness of the BMP. Rain barrels only work for 6-months of the year due to freezing'. As a result of these fairly basic search and reviews of LID policies and performances in a limited number of West Coast jurisdictions, they dismissed them rather than seeing these techniques and/or the policies that support them as adaptable. This is a critical finding and suggests the importance of factors beyond the viability of transfer in the decision-making processes. We say this because the argument made by the administrator against 'West

Coast in Northeast jurisdiction is contradicted by the fact that many of the techniques discussed as 'not viable' actually are used in similar jurisdictions throughout the Northeast and upper Midwest, including Chicago, Philadelphia and Milwaukie.[9] All told, our data appear to suggest that even when transfer leads to a policy change, the information involved tends to be considerably less than reported. In this, where lessons were being taken away from a search, they tended to be confined to general rather than detailed information. Thus it appeared unlikely that the degree of learning needed to properly analyse and understand the ramifications of the adoption (or not) of another jurisdiction's model was actually occurring.

What emerged as key obstacles to the transfer and learning processes amongst the local authorities involved in this study?

It is clear that a considerable amount of searching for innovations is occurring. However, it is equally apparent that much of this: (1) involves less rational and comprehensive evaluations of what is occurring elsewhere than initially appears; and (2) that much of what is taken away undergoes little follow-up or analysis of its overall place within the initial jurisdiction. These conditions are partly due to the sources used to study what is occurring elsewhere and the range of obstacles policy-makers and policy exporters face when attempting to convert information into concrete policy action.

The obstacle to successful policy transfer mentioned most often was the 'lack of unified policies and legislation regarding integrated water resource management'. This was seen as preventing large-scale integration of LID programmes across a watershed, particularly when the policy or technique required it to be implemented across municipal boundaries. The lack of standard policies and legislation was also seen as preventing the borrowing of 'best practices' from cities seen as 'leading the way in the use of LID in stormwater management'. While there is a clear argument for localised stormwater management (given the importance of local environmental context), we believe that part of the reason this issue is so prevalent in the minds of our participants is the nature of the searches undertaken.

Much of the information collected was of a cursory nature or was presented to organisations by paid consultants who have a given remit that may exclude an examination or presentation of the more innovative projects (or the ease with which some small-scale LID techniques can be adapted). For this reason, the adaptability of the programmes to local legal and policy terrains was possibly misunderstood or seen as being more of an obstacle than it would have been if transfer attempts had actually been undertaken.

Stormwater management efforts and the agencies responsible for this are also hampered in their efforts by a general 'lack of funding for programs' or 'low program funding'. Funding restrictions are a critical impediment to the transfer process in so far as agencies lack the staff and time necessary to engage in the transfer of ideas and LID technologies. Moreover, lack of funding for programmes appeared to lead to a heavy reliance on consultancies and little in-house review of what information had been collected. This appeared true even when these data were presented in summary documents compiled and available via the US EPA. Moreover, due to time delays and poor search techniques, much of the technical information that was being

produced by the EPA and subsequently used by local officials was several years old and seen by some as no longer relevant to the current situation.

More limiting for the transfer of LID technologies, many of the documents mentioned by our discussants appeared to be compiled so as to present a 'biased' picture of what was occurring elsewhere or had other significant limitations. Many of the documents appeared to either discuss only positive impacts of programmes or to present only the problems encountered during the development and application of a LID projects, rather than assessing programmes more holistically. For instance, when examining the use of rain barrels, one participant discussed the ease of rain barrel systems. However, his concerns about the applicability of this technique in his own municipality illustrated that a more rounded discussion of rain barrels, which included a balanced discussion of problems (like system freezing or the reliance on property owners) and possible workarounds would have been more useful and effective. Alternatively, a discussion of the incentive programme that was used to promulgate the use of rain barrels, or other administrative, land use planning or policy strategies behind the rain barrel programme might have been found relevant. All told it has been argued that much of the data available on LID technologies and techniques are relatively meaningless without an understanding of the overall policy and market contexts (Jacoby 2000).

One of the primary obstacles to the use of information and transfer itself appeared to be a lack of awareness of the adaptability of LID technologies and policies to different political and environmental conditions. For instance, one sentiment that was repeated in a number of our questionnaires was the belief, expressed in the words of one respondent, that her own jurisdiction 'had to be the trailblazers, nothing we found in the ala carte approaches of other communities would be enough to help us'. However, when asked to describe that locality's data collection process and the kind of information they had collected, it became apparent that the search conducted was less than comprehensive and had perhaps even been conducted in a manner to support the assumptions of exceptionalism. Primarily, the unit in question had examined online sources to find information that they described as 'elementary . . . [consisting] of a simple examination of performance benchmarks or measurements'. This does not suggest the kind of complex understanding of programmes, techniques and the environmental and administrative conditions under which they developed necessary to argue that there was no information available relevant to their situation. In fact, data from across our study indicates a tendency to gather information online without questioning its accuracy, usefulness, validity or whether it presents a complete picture LID programmes or techniques. It is clear that while agents in our study believe that their search of the Internet led to *complex* understanding of what was occurring elsewhere, this is likely not the case (Cline and Haynes 2001, Carr 2008, 2011, Hought 2011).

Turning to the use of international ideas, not only were resource and policy terrains seen as issues inhibiting the transfer process but the data also revealed a number of self-imposed constraints. Even amongst the participants who said that they would be interested in overseas ideas and technologies, there was a widespread belief that actually, little could come from this process due to the *exceptionalism* of the USA in general and the specific conditions faced by their locality.[10] This notion of American *exceptionalism* was re-enforced by a widespread lack of knowledge about even basic environmental and political conditions existing in overseas

jurisdictions. For instance, several of our Northeast respondents discussed how local environmental conditions mitigated against adopting specific LID practices being used effectively in Germany and the Netherlands. Interestingly, during follow-up questioning some of the same individuals also admitted that they had never studied the truthfulness of these assertions, nor could they describe the actual environmental conditions in the regions they discussed as being inappropriate models for their municipalities.

Jurisdictions which said that they would not be interested in looking overseas for ideas also had a tendency to assume that European political situations, administrative conditions and/or land use conditions were too dissimilar to justify the resources needed to investigate these systems. Multiple respondents stated that they did not consider engaging in the transfer of overseas ideas because it would be too burdensome given the possible political and legal differences that would have to be overcome. As one administrator stated: 'ultimately we must comply with US laws and regulations and local environmental conditions' making it almost impossible to look to European cities and municipalities for ideas or policies. When asked why European or foreign models were not utilised, the most common answer was that 'I and/or my staff would not feel that European administrative conditions are similar enough to the US'. This perception was reinforced by a similar assumption that 'Politicians/the public would not perceive the European experience as relevant to conditions here'. One administrator from a jurisdiction with a population over 500,000 went so far as to argue that they did not think information about European experiences and programmes would be of use because their jurisdiction was unique. The core of this argument can be interpreted to be that the jurisdiction had to go through a 'collaborative process with the X individual jurisdictions in X County that participate in our Stormwater District' to guarantee they would get 'the kind of . . . support . . . [needed] to get them to separately act on what was developed thought collaboration'. In other words, the political process involved so many partners that the prospect of importing a solution from abroad was immediately ruled out as a viable option.

Combined, the assumptions held by local actors appeared to lead them to engage in a less than complete problem-focused, goal-oriented tactics even when they did engage with other political systems, particularly those in Europe and Australia. All told, the data from this study did not produce an abundance of examples in which, as Rose (1991, p. 3) suggests, the practitioners undertook 'prospective evaluation of what would happen if a program already in effect elsewhere were transferred in the future.' Rather, the process appears more erratic and unsystematic than is suggested by much of the theoretical and case study literature.

Conclusion

On the basis of the reported activities of individuals involved in the development of LID policies across a range of urban settings, it appears a deeper understanding of the transfer process needs to be formulated. While not generalisable across all nations or policies, at least in relation to the movement of LID techniques and technologies amongst urban conglomerates in the USA, unlike many discussions of intergovernmental relationship, we did not find transfer occurring as if states and local governments were acting as 'laboratories of democracy'. Rather, the data

indicated that when imported information was found, best practice models were rejected in favour of ideas drawn from regional or local jurisdictions. This turned out to be the case even when the actors in question knew that more appropriate technologies and techniques were in use elsewhere. As such, the importance of perceptions of acceptability and relevance need to be integrated fully into transfer studies. Just because a model is considered best, does not indicate it is the model that will spread or be used by those who know about it. This will help explain what makes a less appropriate or successful model spread and how this feeds into overall programme outcomes.

Second, when searches are undertaken, they are best characterised as relying on anecdotal or benchmark data rather than quantitative, empirically reviewed or assessed sources. For empirical analysis, most of our participants reported a reliance on the analysis of consultants. Seldom was the reliability or depth of the analysis questioned or discussed. For those who undertook their own searches for information, the majority relied on Internet searches and visual images from presentations at conferences. In this context, it would appear that there is little comprehensive or substantive activity by US policy-makers to formally review and analyse the relevance of other American jurisdictions models for appropriateness in their own municipality. Rather, what we observed was searching that involved little more than cursory examinations, which loosely fed into the subsequent policy-making and implementation processes. Where there are more serious efforts to transfer water infrastructure and related policies, these have tended to be confined to the technical staff involved in the implementation of the policy/programme.

Part of the explanation for this lack of analysis (when searches did occurr) was that those responsible for examining what was occurring elsewhere believed that the political, environmental, legal and institutional differences between jurisdictions (even within a state) would prohibit any useful information emerging or being applied by officials if gathered. With the notable exception of the US EPA, these concerns were greatly magnified by the few individuals interested in or actually looking to overseas models. Respondents appeared to be biased against overseas jurisdictions as a result of misunderstandings as to what was available and how different overseas political, social, environmental and judicial systems were. These misperceptions appeared to be to be heightened by a range of institutional and cultural filters that predispose these practitioners, technical experts and policy-makers against systemically gathering and reviewing even those overseas lessons actively promoted by the EPA. Because of this, despite its quality and relevance there was little take-up of this information by local officials or water managers. All told, it appears that the evidence provided by these officials contradicts the views: (1) that transfer is now ubiquitous with the advent of modern technologies and travel, and (2) that transfer, when it occurs, is a fairly straightforward process. Rather, what we have found is that the structure of a political system can have considerable impacts on the transfer and use of information. Thus, in the USA while the EPA has actively borrowed, analysed and promoted foreign models, local jurisdictions appeared less interested in the use of these ideas. As such, in the process of transfer, it must be realised that looking and being aware of a model does not equate with the use of that information.

While there appears to be some interest in learning about LID policies and techniques in other jurisdictions, there is less analysis, and engagement in the transfer

of best practice models than might be expected. This itself appears to be the result of a series of institutional and cultural barriers among American practitioners, technical experts and policy-makers which mitigate against a formal gathering and reviewing of information regarding what is occurring outside their individual jurisdiction. It is these impediments to the process of transfer that future studies must examine. It is important to begin examining these impediments, as they appear to be vital to the outcome of the transfer process.

Notes

1. For good overviews of LID and stormwater management see: EPA 2000, Kloss and Calarusse 2006, Rutheford 2007; Staff of the Metropolitan Sewer District of Greater Cincinnati, Hamilton County, Ohio Cincinnati, Ohio, and their respective legal counsel, 2007, NRDC 2006.
2. While these cover a range of policies and techniques they tend to be referred to in the USA as LID techniques and SUDS in Europe.
3. Note: European programmes have been initiated by or benefited from the European Water Framework Directive and Floods Directive.
4. Policy-makers in Seattle turned to Berlin's *Biotopflaechenfaktor* to inform in the development of the Seattle Green Factor programme (Keeley 2011).
5. See Appendix 1 for the questionnaire.
6. To code the data the authors developed what Miles and Huberman (1994) discuss as the 'chain of evidence', building on published material to develop the categories used to code and analyse the data. As part of this the authors looked for evidence related to either rationality or anarchy of the search by local agents for relevant LID policies; the filters, if there were any, influencing the transfer; and, the subsequent use of transferred information (Lofland 1971, Creswell 1998). This has been subsequently combined with a range of data relating to coherent themes that emerged in relation to the implementation and performance of LID stormwater management practices in government and NGO documentation.
7. While beyond the scope of this article, it should be stressed that these are particularly interesting given the acknowledged bias within our sample.
8. Though an in-depth study of the nature of consultant deliverables is beyond the scope of our study, it is worth stressing that roll of consultants in the data gathering process should call attention to the quality and types of information being transfered between municipal governments in the area of LID principles. First, while consultants can provide high quality data and information sessions, the general nature of the firms being used, the tailored nature of the information requested and the packages being provided, would (without further investigation) appear to provide for a substantially lower quality of learning than has been seen in situations where a truly free flow of information occur between jurisdictions that are in direct contact with each other. Second, even with the best intentions, bias is going to be introduced though the consultation process.
9. Some stormwater managers surveyed may not be able to see past the BMPs in question to look at administrative and policy issues, even though we are finding the latter to be major barriers to improved stormwater management.
10. This belief can be seen in the works of Lipset (1996), who argues that many of the policy makers in the USA consider the USA 'exceptional' because of its anti-statist, individualistic and anti-egalitarian culture.

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Appendix 1

Section I

1. Could you please briefly characterize the stormwater challenges confronting your organization or jurisdiction?

2. In the context of addressing stormwater challenges, has your organization looked for information concerning solutions **WITHIN** the United States?

☐ The experience of other cities in the US [please specify]
☐ The experience of other States in the US [please specify]
☐ Consultants (domestic) [if possible could you please specify]
☐ We have not looked for information within the United States

3. In the context of addressing stormwater challenges, has your organization looked for information concerning solutions **OUTSIDE** the United States?

☐ Other country in the Americas [please specify]
☐ Other country in Europe [please see question 4]
☐ Other country in Asia [please specify]
☐ Consultants (foreign) [if possible could you please specify]
☐ We have not looked for information outside the United States [please skip ahead to question 16]

4. If you gathered information from Europe, where specifically:

☐ Germany [if specific region or city/s please specify]
☐ Netherlands [if specific region or city/s please specify]
☐ Denmark [if specific region or city/s please specify]
☐ Sweden [if specific region or city/s please specify]
☐ Other/s [please specify]

5. Who conducted the search, or review and analysis of the stormwater innovations?

☐ Existing staff from within the water utility
☐ Existing staff from within the municipal government
☐ A consulting firm with whom we regularly have contact
☐ A consulting firm specializing in that specific stormwater solution
☐ Other [please specify]

6. Could you please briefly characterize the types of stormwater innovations for which you were looking?

7. What did you know about the functions and applications of the innovation (domestic or foreign) before your search?

☐ We knew nothing
☐ We knew very little [anecdotes/images/etc.]
☐ We knew about the general practices and performances of the policy
☐ We had full comprehension of the innovation's development, performance, and applications and had given consideration to its use in our organisation/jurisdiction.

8. What were your (or your) organization's objectives when searching for stormwater innovations?
- ☐ We wanted to 'totally' replicate the administration and performance of city/country/organization
- ☐ We wanted to collect just ideas and notions to inform policymakers and technical staff
- ☐ We wanted to combine elements from a range of different policies that we learned about.

9. How would you characterise the search for information about the policy?
- ☐ Accidental
- ☐ Fairly random
- ☐ Formal but with little structure or direction
- ☐ Formal and structured

10. Were alternatives to the importation and application of the stormwater innovation(s) (foreign or domestic) ever considered?
- ☐ Yes
- ☐ No

11. If YES could you please explain what they were and why they were or were not adopted?

12. The sources of information collected to understand stormwater policies consisted of [please select all that apply]?
- ☐ Anecdotes
- ☐ Images from presentations and conferences
- ☐ Formal Presentations [e.g. PowerPoint]
- ☐ Case studies
- ☐ Journal articles
- ☐ Organised site visits
- ☐ Other [please specify]

13. How would you characterize the information gathered about the performance and function of the innovation from other localities?
- ☐ Totally absent
- ☐ Elementary
- ☐ Detailed
- ☐ Very detailed
- ☐ Fully comprehensive

14. How would you rate the quality of the information that was collected about the stormwater challenges from other locations?
- ☐ Little more than background information
- ☐ Simple examination of performance benchmarks or measurements
- ☐ Complex comparisons to similar performance benchmarks in the US
- ☐ Prospective analysis about how the country/city/organization's policies could be applied to your organization/city
- ☐ Reviewed the applications and analyzed the differences between your city/organization and the comparator system – with considerations as to how best to apply the information

15. What elements of the imported innovation were you able to transfer or apply?
- ☐ Nothing
- ☐ Nothing but ideas

- ☐ A few basic program elements
- ☐ A moderate amount of program components
- ☐ A large number of program components

Section II

16. What is the basis for you user fees?
- ☐ Flat Fee
- ☐ Water Use
- ☐ Impervious Area
- ☐ Both Impervious and Gross Area
- ☐ Gross area with runoff factors or intensity of development factored in
- ☐ Other [Please specify]

17. If your user fees are area-based, what primary resources did you use to create and maintain your customer data base and compute charges?
- ☐ Property tax assessor records
- ☐ Aerial ortho photographs
- ☐ Geographic Information Systems (GIS)
- ☐ Planimetric map take-offs
- ☐ On-site property measurement by personnel
- ☐ Customer surveys or property measurements by customers
- ☐ Other [Please specify]

18. Are **RESIDENTIAL** stormwater charges based on individual parcel characteristics or class average characteristics?
- ☐ Individual parcel
- ☐ Class averages

19. Are **COMMERCIAL** stormwater charges based on individual parcel characteristics or class average characteristics?
- ☐ Individual parcel
- ☐ Class averages

20. When did your utility begin assessing fees using your current basis and according to your current assessment of individual parcel or class average characteristics (NOT simply when your rates were last revised)?
- ☐ Within the last 4 years (2006 and more recent)
- ☐ 5–10 years ago (2000–2005)
- ☐ 10–20 years ago (1990–1999)
- ☐ 20–30 years ago (1980–1989)
- ☐ Over 30 years ago (before 1979)

21. What was the average monthly stormwater charge for **RESIDENTIAL** customers in 2008? Write in amount:

22. If you are in the considering assessing fees based on individual parcel characteristics, or do so already, at what stage in the implementation process are you?
- ☐ Just starting to learn about assessing fees based on the assessment of actual stormwater burden
- ☐ Beginning to assess fees based on the assessment of actual stormwater burden

- ☐ Implementation is well underway towards assessing fees based on the assessment of actual stormwater burden
- ☐ The assessment of fees has been fully established within the jurisdiction(s) in which we work.

23. If you are not assessing fees based on individual parcel characteristics, why not?
- ☐ High start-up cost of getting necessary data
- ☐ We don't have the manpower necessary to manage this kind of fee structure
- ☐ Political/public pressure
- ☐ We think that the difference between that method and the one we use currently will be small for most parcels
- ☐ Other [please explain]

24. It is estimated that approximately 60% of stormwater fees for residential water customers in some European countries are based on an estimation of stormwater burden generated from each individual parcel. Do you think that information about the procedures used and outcomes in these European cities would be (or would have been) helpful to your organization?
- ☐ Yes
- ☐ No

25. If you think that the information about European stormwater fee experiences presented in Question 17 would **NOT** be helpful, why (Check all that apply)?
- ☐ Politicians/the public would not perceive the European experience as relevant to conditions here
- ☐ I and/or my staff would not feel that European **administrative conditions** are similar enough to the U.S.
- ☐ I and/or my staff would not feel that European **land use conditions necessitating parcel-based estimations** are similar enough to the U.S.
- ☐ I and/or my staff believe that **outcomes** of such parcel-based stormwater fees, for example on promoting on-site stormwater management, could be very different in Europe and the U.S.
- ☐ Other [please specify]

26. If you think that the information about European stormwater fee experiences presented in Question 17 **WOULD** be helpful, why (Check all that apply)?
- ☐ I and/or my staff believe that politicians/the public would welcome case studies of this methodology
- ☐ I and/or my staff would welcome examples of **administrative conditions** under which this methodology has worked
- ☐ I and/or my staff would welcome examples of the kinds of city **land use conditions** where individual parcel assessments have been used
- ☐ I and/or my staff would welcome examples of how the **public has received this kind of fee structure**
- ☐ I and/or my staff would welcome an understanding of the **outcomes** of such parcel-based stormwater fees, for example on promoting on-site sotrmwater management.
- ☐ Other [please specify]

27. In what ways do you think information on European stormwater fees would be (or would have been) helpful to you (please check all that apply)?
- ☐ As a source of general information
- ☐ In order to better understand the various mechanisms for assessing stormwater burden that are available

- ☐ In order to understand the conditions in which different mechanisms for assessing stormwater burdens are applied
- ☐ Understanding how such billing systems are received by the public
- ☐ Case study of working billing system
- ☐ To understand how different fee systems might or might not create incentives for on-site stormwater management
- ☐ Other [please specify]

28. What is the approximate size of the population served by your stormwater utility?
- ☐ Less than 10,000
- ☐ Between 10,000 and 25,000
- ☐ Between 25,000 and 100,000
- ☐ Between 100,000 and 500,000
- ☐ Over 500,000

29. Could you please comment on any aspect of the development of stormwater fees, and of fees based on individual parcel characteristics in particular that we have not covered?

THANK YOU FOR YOUR TIME!

May we contact you for any additional information concerning this research or to follow-up on further questions if necessary?