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### ► **To cite this version:**

Nina Cossais, Andrew O. Thomas, Frederic Cherqui, Peter Morison, Darren Bos, et al.. Understanding the challenges of managing SUDS to maintain or improve their performance over time. 14th International Conference on Urban Drainage, Sep 2017, Prague, Czech Republic. hal-01722327

**HAL Id: hal-01722327**

**<https://hal.science/hal-01722327v1>**

Submitted on 23 Apr 2021

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## **ICUD Prague – 10-15 September 2017**

### **Abstract proposition**

**19 June 2017**

#### **Topic**

6. Water Management and Society

6.10 Understanding urban water systems

### **Understanding the challenges of managing SUDS to maintain or improve their performance over time**

#### **Authors**

Nina Cossais<sup>1,2,3</sup>, Andrew O. Thomas<sup>4</sup>, Frederic Cherqui<sup>5</sup>, Peter Morison<sup>6</sup>, Darren Bos<sup>4</sup>, Denis Martouzet<sup>1</sup> Elisabeth Sibeud<sup>3</sup>, Anne Honegger<sup>2</sup>, Stephanie Lavau<sup>7</sup>, Tim D. Fletcher<sup>4</sup>

<sup>1</sup> Univ Tours, CNRS, UMR 7324 CITERES, F-37000

<sup>2</sup> Univ Lyon, CNRS, UMR 5600 EVS, F-69362

<sup>3</sup> Métropole de Lyon, France, F-69003

<sup>4</sup> Waterway Ecosystem Research Group, School of Ecosystem and Forest Science, The University of Melbourne, Victoria, Australia

<sup>5</sup> Univ Lyon, INSA-LYON, Université Claude Bernard Lyon 1, DEEP, F-69621, F-69622, Villeurbanne

<sup>6</sup> Melbourne Water, 990 La Trobe Street, Docklands 3008 Australia

<sup>7</sup> Faculty of Science, School of Ecosystem and Forest Sciences, The University of Melbourne

#### **Keywords**

Asset management, Integrated Water Management, Public stakeholders, Stormwater, WSUD.

#### **Biography**

Nina Cossais is a French engineer, who specialized in geosciences and civil engineering. After working in the construction area, she completed a Master's degree in urban planning, then started a PhD in urban planning from the University of Tours, France, under the supervision of Prof. Denis Martouzet, urbanist (laboratory CITERES), and Prof. Anne Honegger, geographer (laboratory EVS, Lyon). A research agreement was signed with the metropolis of Lyon to work on barriers to SUDS implementation, and to search for pathways to help establish more widespread adoption of water sensitive approaches.

#### **Extended abstract**

##### **Summary**

Sustainable Urban Drainage Systems (SUDS) are increasingly popular, but their adoption faces many barriers, including their operation and maintenance (O&M) requirements. Their operation raises issues concerning task demarcation, and managers often struggle with asset status assessment and rehabilitation, leading to poor performance or extra-costs. To address this issue, we provide insights regarding the following areas: reality of O&M task demarcation and responsibilities, application of the science of asset management to SUDS, conservation of performance over time, and development of long-term management funding arrangements.

##### **Introduction**

Sustainable Urban Drainage Systems (SUDS) are increasingly popular, but their adoption faces many barriers. Available literature suggests that negative perceptions about their operation and maintenance (O&M) limit uptake. Knowing that poor O&M could jeopardise future implementation of SUDS, we set

out to answer some fundamental questions about their short, medium and long-term O&M. Are they actually managed? By whom and under what conditions? What barriers limit the adequacy of O&M that SUDS receive? We apply different investigation methods and asset management concepts to overcome barriers and identify strategies that improve the O&M and long-term performance of SUDS.

**Materials and Methods**

In Melbourne, Australia, we undertook a literature review on the O&M of SUDS and its link with operational performance, and initiated a pilot study investigating the condition of SUDS at eight municipal councils. We then conducted 35 interviews with local government practitioners to better appreciate the perceptions and issues impacting their ability to manage SUDS.

In Lyon, France, we spent four months in the field with SUDS O&M workers to identify implemented techniques, demarcation of tasks, and successes and failures of stormwater management.

Consolidating our findings, we then identified global needs concerning SUDS O&M, and combined these with insights drawn from traditional asset management approaches (e.g. from sewer systems) to identify priority areas for improving the O&M and performance of SUDS.

**Results and Discussions**

The literature review identified only two studies that directly addressed SUDS O&M practices (Schlüter and Jefferies, 2005; Flynn *et al.*,2012). Both identified a significant deficiency in current practice. The pilot study found similar results: five of the eight councils had no reliable data; the other three had high proportions of assets being in poor condition. Subsequent investigations has identified multiple challenges (Fig. 1) including: inadequate industry-wide capability and capacity; deficiencies in asset management, and a general lack of awareness from the general public of SUDS and their purpose.

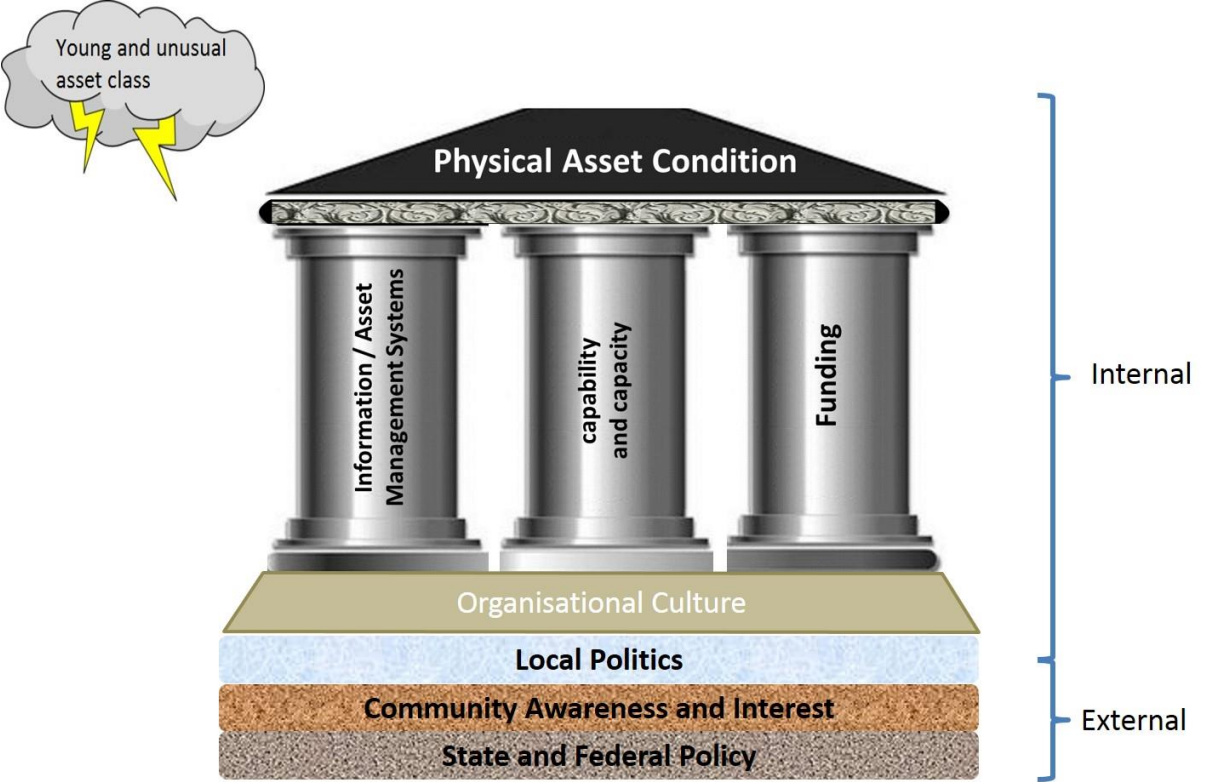


Fig. 1: factors affecting SUDS O&M. Author: A. O. Thomas

The fieldwork showed that different types of SUDS had different O&M issues. As SUDS are multifunctional assets, some tasks must be completed by different teams, increasing the complexity of O&M. Tab. 1 shows the demarcation of tasks between services or departments in charge of cleaning public space, sanitation, green spaces and roads in Lyon. Distribution of tasks, cost and responsibilities has been identified as a key issue. Further, SUDS O&M can involve crucial changes in the nature of tasks and their relevant professions.

		Cleaning Department	Sanitation Department	Green Space Service	Roads Department
Soakaways		C1 Surface and storm drains cleaning (when needed)	S1 Hydraulic structures maintenance (when needed)  + S2 Hydraulic structures cleaning or flushing (when needed)	-	-
Soakage trench				-	-
Swales	grassy	C1 C2 Trash collection (depending on dirt and requirement) G1 Mowing (1 to 4 times/yr)			
	vegetated (herbs, shrubs, trees)	C1 C2		C2 / G1 G2 Pruning (about 1 to 2 times/yr) G3 Weeding (when needed) G4 Watering	
Buried basins		C1	S1	-	-
Open-air basins	enclosed	-	S1/S2/C2/J2 V1 Fences and signs maintenance S3 Self-monitoring	-	-
	open to the public	C1 C2	S1/S2/S3	C1/C2 G1/G2/G3/G4	-
Pervious pavement		C1 / G3 R2 Pavement maintenance	-	-	R1 Pavement repair R2/S2

Tab. 1: distribution of maintenance tasks in Lyon. C=Cleaning task, S=Sanitation task, G=Gardener task, R=Roads task, V=Various tasks. The meaning of each task (e.g C1, S2, etc.) is specified once below the sign. Author: N. Cossais

According to Schulting and Alegre (2007), asset management in the water sector can be described as “*managing infrastructure... to minimize the total cost... while delivering the service levels customers desire*”. In comparison to traditional sewer, this study shows how difficult defining SUDS performance and operational targets can be. SUDS are a special case because they tend: to be diffusely located; have highly variable size, shape, composition and functions; and, thus, require a diverse range of O&M.

Many barriers to O&M appear to be common between the French and Australian cases, including: deficiencies in information and asset management practices, a lack of industry capability and capacity, poor community awareness, and a lack of clarity in the demarcation and delegation of responsibilities between departments and tiers of government. Hence, both countries stand to benefit from working together to addressing these barriers by identifying and trialling different solutions and, in so doing, transitioning SUDS from an innovative concept to a mainstream technology.

We identify the following areas as priorities for further investigation and the exploration of potential solutions:

1. Formal review of classic asset management frameworks in various jurisdictions around the world to identify opportunities for application to SUDS O&M
2. Recognising that SUDS O&M requires specialist skills in both “grey” and “green” components through the establishment of multi-skilled SUDS O&M teams and formal training programs
3. In France, demarcation of responsibilities regarding performance and, in particular, hydraulic aspects
4. Consideration of long-term O&M implications at the planning stage, including “maintenance in design”, likely catchment pollutant loads, O&M funding sources, and the commitment of all parties before construction
5. Review of existing government SUDS policy in terms of its impact on long-term O&M.

## **Conclusions**

Despite Melbourne and Lyon having different arrangements for stormwater management, both studies indicate similar challenges. While there are some distinctive differences that can be traced to local factors, most issues are shared between both cities. Overall, this joint study suggests that O&M and the lasting performance of SUDS assets over time may be a universal problem experienced in cities incorporating SUDS across the globe.

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