



LESSONS FROM A WINSTON CHURCHILL FELLOWSHIP

EMBRACING INTERNATIONAL PRACTICE TO TRANSFORM AOTEAROA'S STORMWATER MANAGEMENT

Josh Irvine (WSP)



Proudly brought to you by Water New Zealand

Stormwater 2024

15–17 May | Takina Wellington Te Whanganui-a-Tara

Presentation Overview

- A bit about the fellowship
- What cities are leading
- What others are doing
- Key fellowship learnings
- Final thoughts
- Questions / Patai



Oslo waterfront

Fellowship Overview

- Winston Churchill Memorial Trust Fellowship
- Focus on **flood risk** management, **green infrastructure** and **stream restoration**
- Met people and organisations in Stockholm (Sweden), Copenhagen and Lemvig (Denmark), Oslo (Norway), Philadelphia, Baltimore, Humboldt, Oxford, Denver, Boulder and Portland (USA)



What cities are leading?

What cities are leading?

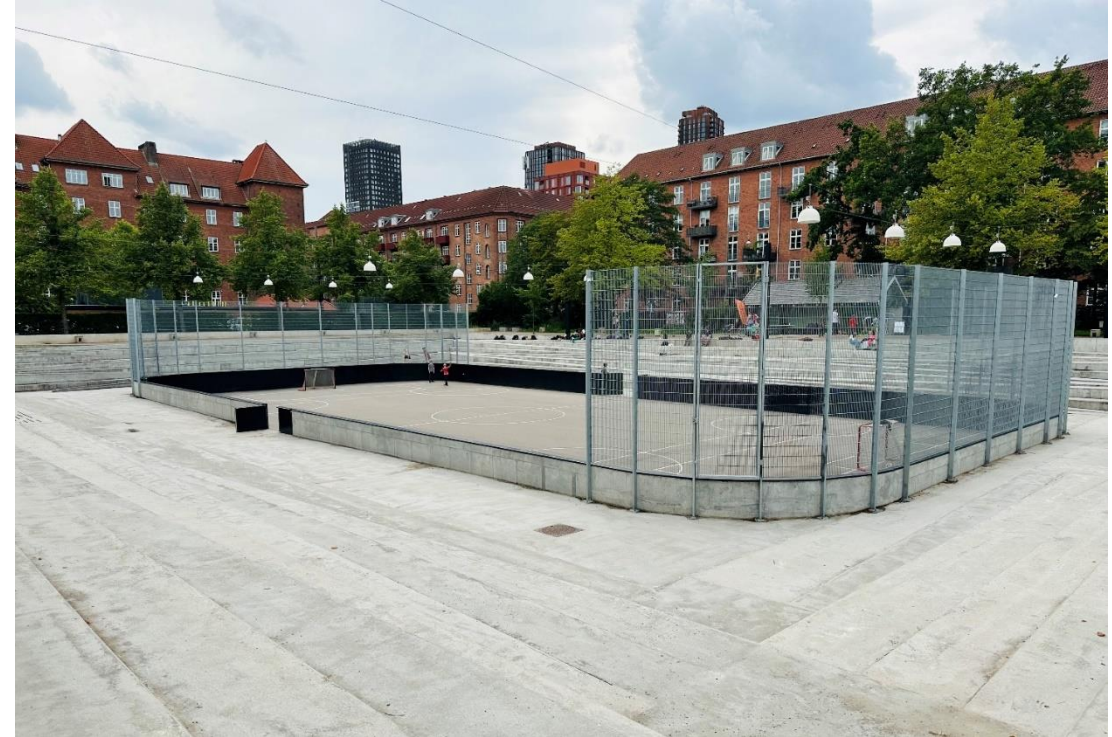
- **Copenhagen** in cloudburst management and the use of public reserves and spaces for water management



*Enghaveparken – Climate Park, Copenhagen
(Source: State of Green)*

What cities are leading?

- **Copenhagen** in cloudburst management and the use of public reserves and spaces for water management
- **Philadelphia** in stormwater management / controls (e.g. retain 1.5-2 inches of rain onsite – but now have a huge maintenance headache!
- **Denver** in the creation of public spaces adjacent to streams and rivers – however there are little development controls



Sunken 'sports' court, Enghaveparken, Copenhagen

What cities are leading?

- **Copenhagen** in cloudburst management and the use of public reserves and spaces for water management
- **Philadelphia** in stormwater management / controls (e.g. retain 1.5-2 inches of rain onsite – but now have a huge maintenance headache!
- **Denver** in the creation of public spaces adjacent to streams and rivers – however there are little development controls
- **Portland** in the past around green infrastructure and disconnecting downpipes – but has a big funding and maintenance issue, and now societal challenges



Tanner Springs Park, Portland
(Source: Portland Parks Foundation)

What are others doing differently?

What are others doing differently?

- Implementing smart asset management e.g. retrofitting Smart Ponds that control water pond levels remotely (Maryland but across USA)



What are others doing differently?

- Implementing smart asset management e.g. retrofitting Smart Ponds that control water pond levels remotely (Maryland but across USA)
- Prevalence of green roofs, 'climate roads', tree pits (USA/Scandinavia, Stockholm)
- Stormwater charging based on the impervious surface percentage (Philadelphia and Portland)
- Big focus on reducing the maintenance of green infrastructure (Philadelphia)



Cira Green, Philadelphia ('park in the sky') – green roof, urban park and 'roof top' bar (Source: greenroofs.com)

What are others doing differently?

- Renewals approach – restricted to lining and green infrastructure/stream to convey stormwater (Oslo)



Oslo – daylighted stream conveying stormwater diverted from the combined system

What are others doing differently?

- Renewals approach – restricted to lining and green infrastructure/stream to convey stormwater (Oslo)
- Implementing stream management corridors – based on calculating the anticipated width that streams/rivers need (Denver)
- Using development contributions to widen the streams in preparation of increased flows (Denver)



Westerly Creek, Denver (Source: Mile High Flood District)

Key learnings

Key learnings

- 1** **Understand the context of implemented practices**
well enough before considering adopting

Key learnings

1

Understand the context of implemented practices well enough before considering adopting

- We have similar challenges, but solutions will diverge
- Factors such as the climate, permeability of soils, combined or separated systems, drivers, people/culture etc
- Define the 'problem' correctly

IVF-verdier for Oslo - Blindern Plu (SN18701), 94 moh.
Data fra 1968 - 2021, 52 ses. Oppdatert 2021-12-31.

ARI	Varigheter (minutter) Storm duration (min)															
	1	2	3	5	10	15	20	30	45	60	90	120	180	360	720	1440
Gjentaksintervall (år)																
2	1,5	2,6	3,5	4,8	7,0	8,3	9,5	11,1	12,8	14,3	16,4	18,3	21,2	26,2	31,8	38,7
5	2,1	3,7	5,0	6,9	10,3	12,6	14,4	16,7	19,2	21,2	23,8	26,1	29,6	35,7	41,7	49,3
10	2,6	4,4	6,0	8,4	12,7	15,7	18,1	21,1	24,3	26,6	29,4	32,0	35,7	42,2	48,6	56,9
20	3,0	5,2	7,0	10,0	15,1	18,9	22,1	25,8	29,7	32,6	35,6	38,2	41,8	48,6	56,0	64,4
25	3,1	5,5	7,4	10,5	15,9	19,9	23,4	27,4	31,5	34,6	37,6	40,2	43,8	50,8	58,5	66,9
50	3,6	6,2	8,5	12,2	18,4	23,5	27,8	32,6	38,0	41,7	44,3	46,9	50,5	57,4	66,1	74,7
100	4,0	7,1	9,6	13,9	21,0	27,4	32,6	38,4	45,2	49,6	51,7	54,3	57,5	64,2	74,3	83,0
200	4,5	7,9	10,7	15,7	23,7	31,6	37,8	45,0	53,4	58,6	60,2	62,1	65,3	71,3	83,2	91,4

That's 83mm for the 24hr 100yr ARI storm (Auckland is 2 or 3 times that)

Rainfall totals for Oslo, Norway

Key learnings

2

Need to focus on the **prevention of issues** rather than reliance on mitigation or adaption options

Key learnings

2

Need to focus on the **prevention of issues** rather than reliance on mitigation or adaption options

- Re-introduction of ecoli in Oslo and Portland
- Stream restoration learnings in Denver and Portland (riffles, online wetlands and meandering)
- Maintenance burden



Fenced rain gardens





Key learnings

2

Need to focus on the **prevention of issues** rather than reliance on mitigation or adaption options



6ppd-quinone – a toxic chemical found in tyres has been recently discovered to be deadly to coho salmon (Source: Dep. Of Ecology, Washington)

Key learnings

2

Need to focus on the **prevention of issues** rather than reliance on mitigation or adaption options

Initiatives like:

- impervious surface charging
- education and awareness of issues
- stronger landuse, floodplain and riparian controls



Westerly Creek, Denver (Source: Mile High Flood District)

Key learnings

3 Importance of education and awareness of the issues

Key learnings

3

Importance of education and awareness of the issues



Flood column marking peak water levels in Ribe, Denmark

Key learnings

3

Importance of education and awareness of the issues

- 'People' don't know where their water comes from, where it goes, what the issues are, how to help etc
- To influence behaviours and secure funding
- Targeted approach to all levels of society (schools, community, politicians/media)



Flood column marking peak water levels in Ribe, Denmark

Key learnings

3

Importance of education and awareness of the issues



Water Education Training Centre, Tennessee



High water marks, Washington DC

Key learnings

3 Importance of education and awareness of the issues



Effect of channel straightening demonstration at West Tennessee River Basin Authority

Key learnings

3

Importance of education and awareness of the issues



Klimatorium, Denmark

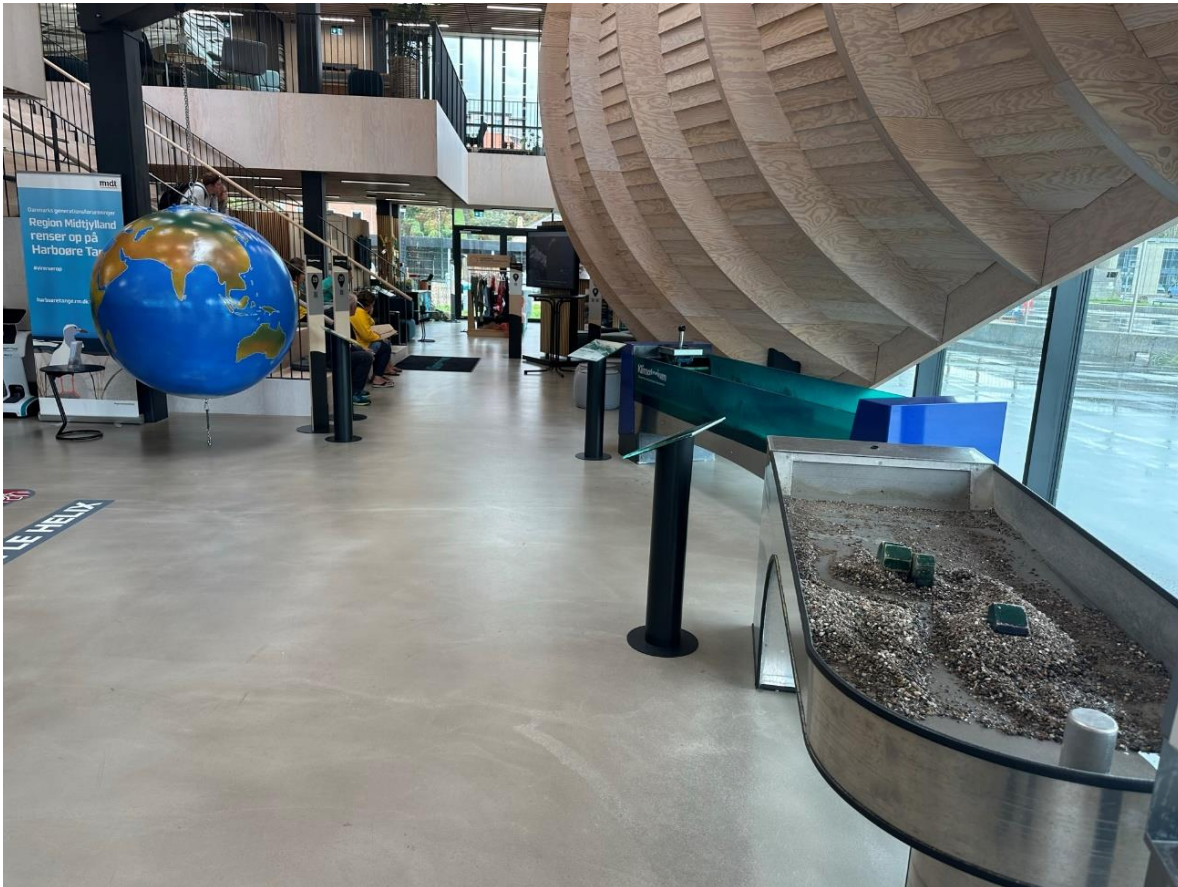


*Educational flume at West Tennessee
River Basin Authority*

Key learnings

3

Importance of education and awareness of the issues



Klimatorium, Lemvig

Key learnings

3

Importance of education and awareness of the issues



Denmark sea level rise demonstration at the Klimatorium, Lemvig

Key learnings

4

Need to **connect people to water**

- If it is absent, dirty or unclean it will eventually not be an important part of people's lives
- If people see and interact with water they are more likely to value it e.g. don't hide stormwater in pipes – prefer open channels over pipes



Waterfront swimming lanes, Oslo

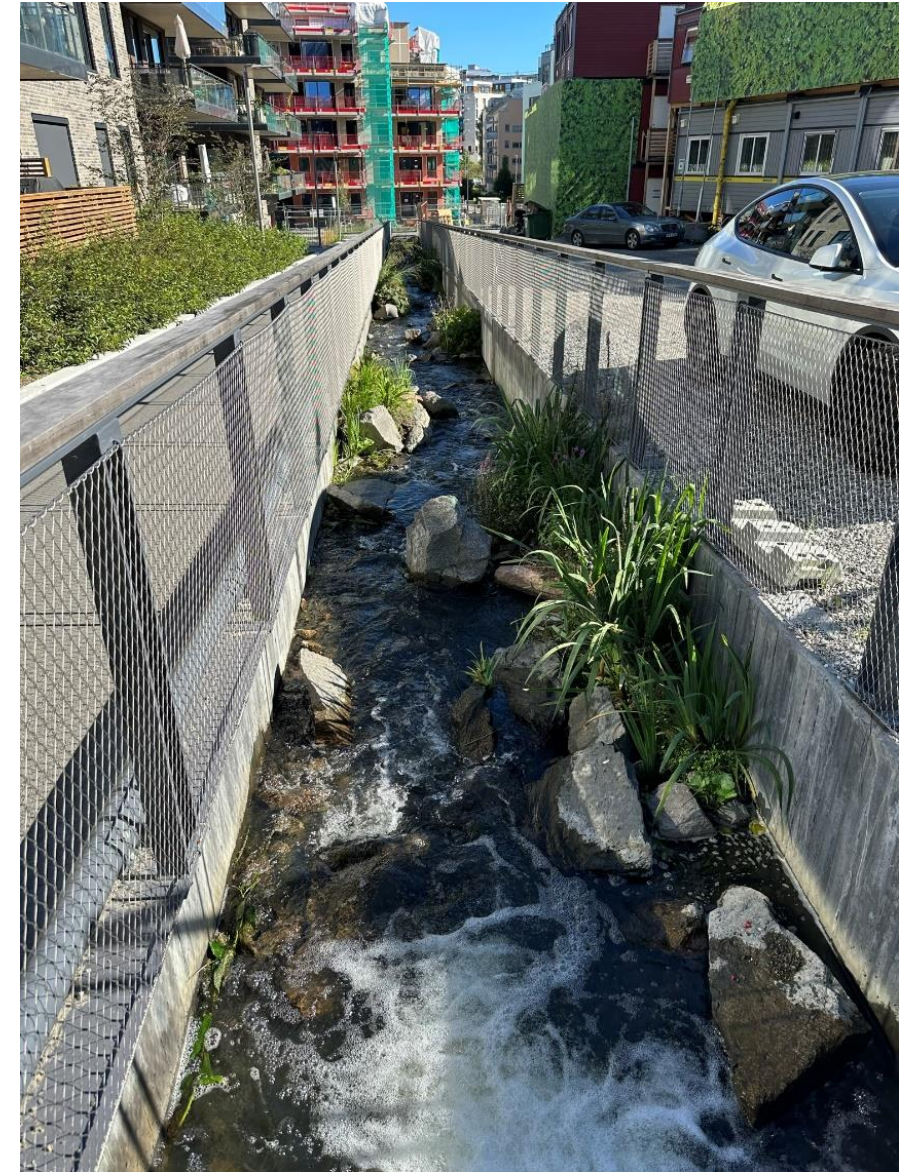
Key learnings

4

Need to **connect people to water**



Copenhagen waterfront

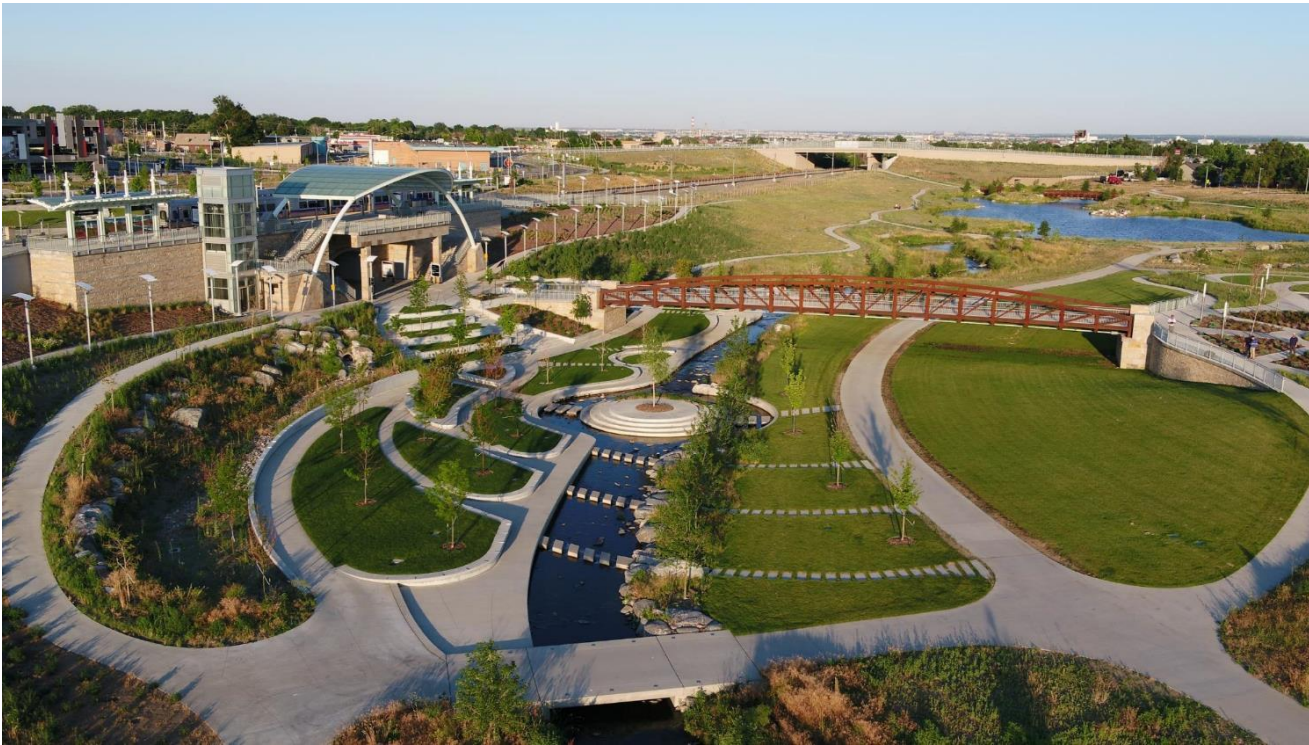


Open watercourse adjacent to apartments in Oslo

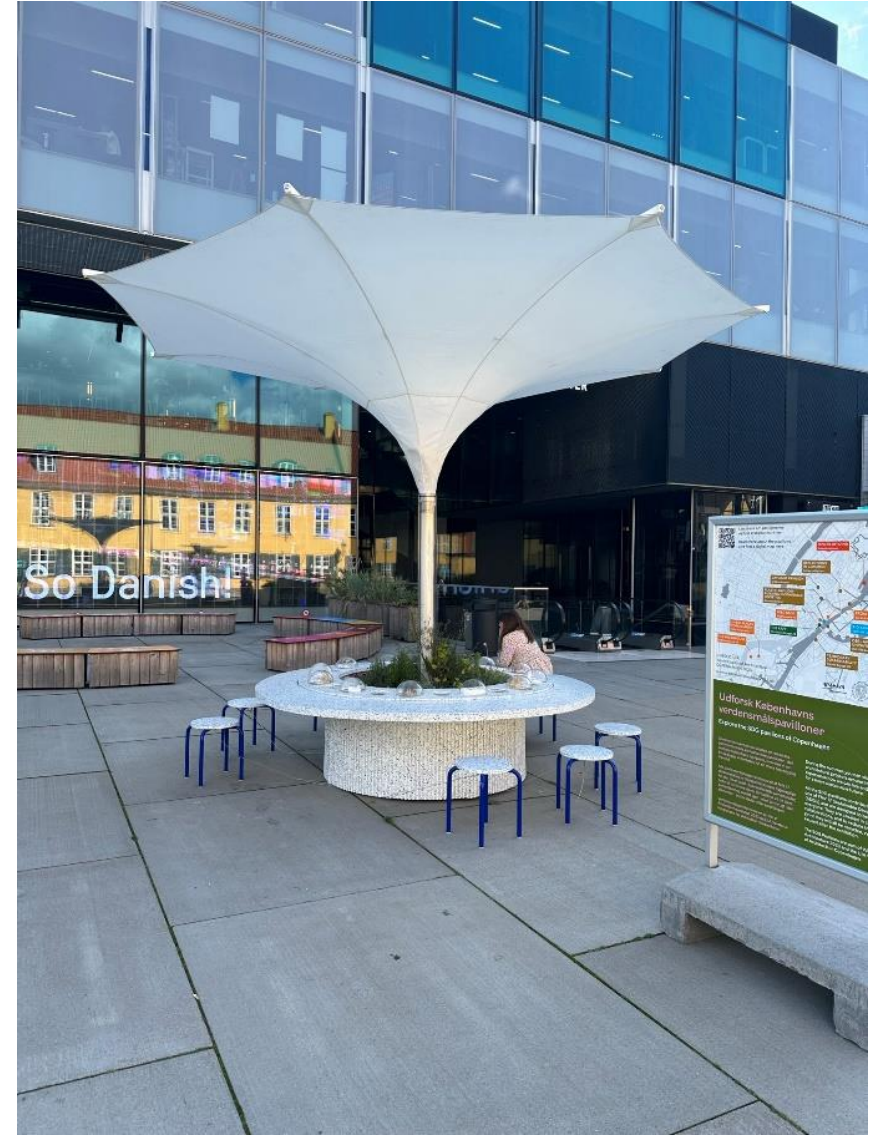
Key learnings

4

Need to **connect people to water**



Westminster Station Park, Denver (Source: Mile High Flood District)



Public water feature, Copenhagen

Key learnings

4

Need to **connect people to water**



Stream adjacent to the footpath and road in Oslo

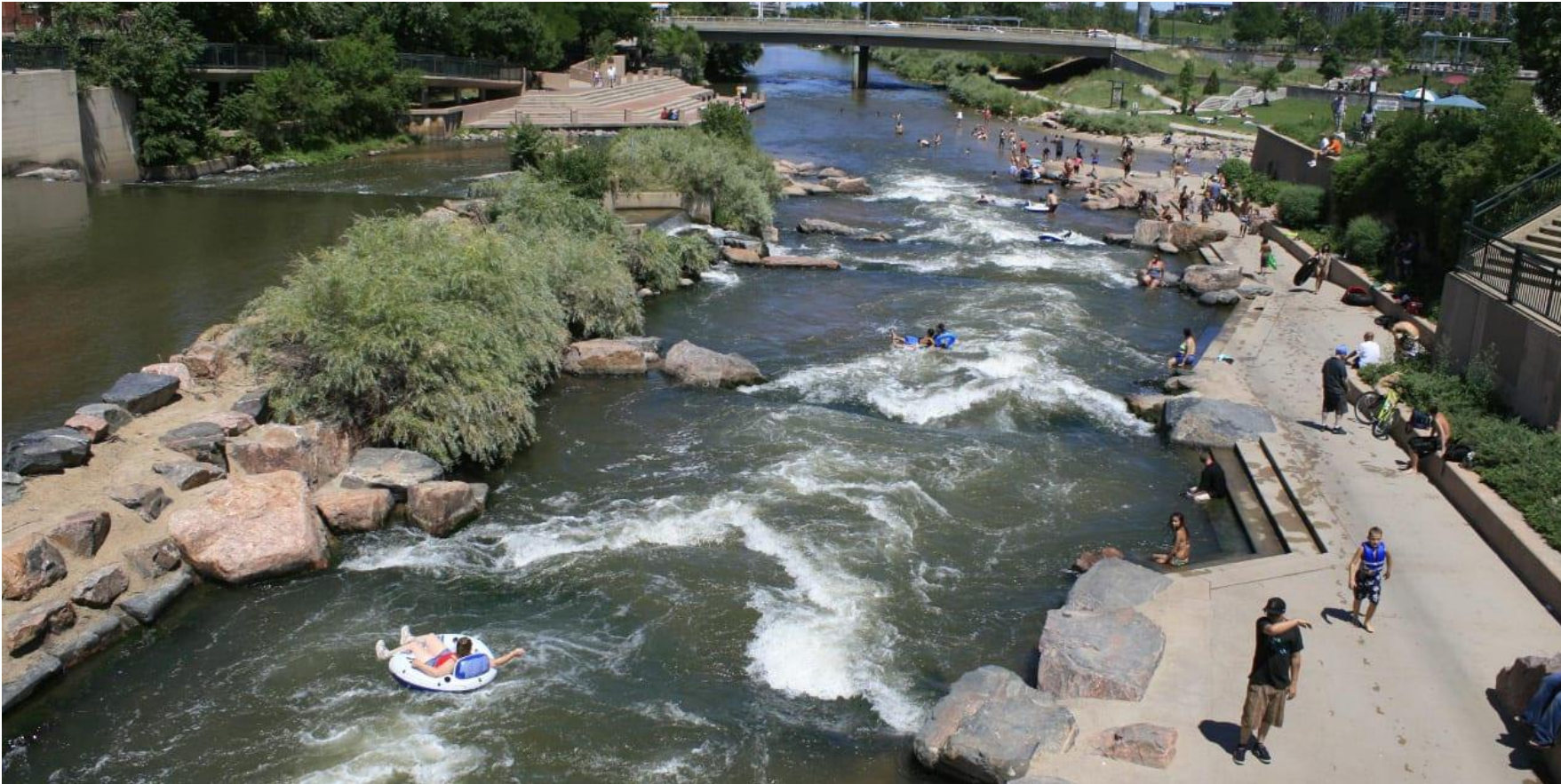


Water sculpture park in Oslo

Key learnings

4

Need to **connect people to water**



South Platte River at Denver's Confluence Park (Source: BeerAndLoathing)

Final thoughts

- 0 Embrace **international practice**
- 1 Understand the **context of practices**
- 2 Focus on **prevention of problems**
- 3 Importance of **education and awareness**
- 4 Need to **connect people to water**



Stream management corridor, Denver (Source: Mile High Flood District)

Thank you!
Questions? Patai?