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Accelerating and upscaling transformational adaptation in Europe: demonstration of water-related innovation packages

Are citizens willing to take action on stormwater management? Adapting climate change in Finland and Norway

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An Adaptation Story

EU MISSIONS
ADAPTATION TO CLIMATE CHANGE

Climate ADAPT
SHARING ADAPTATION KNOWLEDGE FOR A CLIMATE-RESILIENT EUROPE

Analysing citizen preferences on climate change adaptation options in Finland and Norway

Citizens' willingness to act on stormwater management

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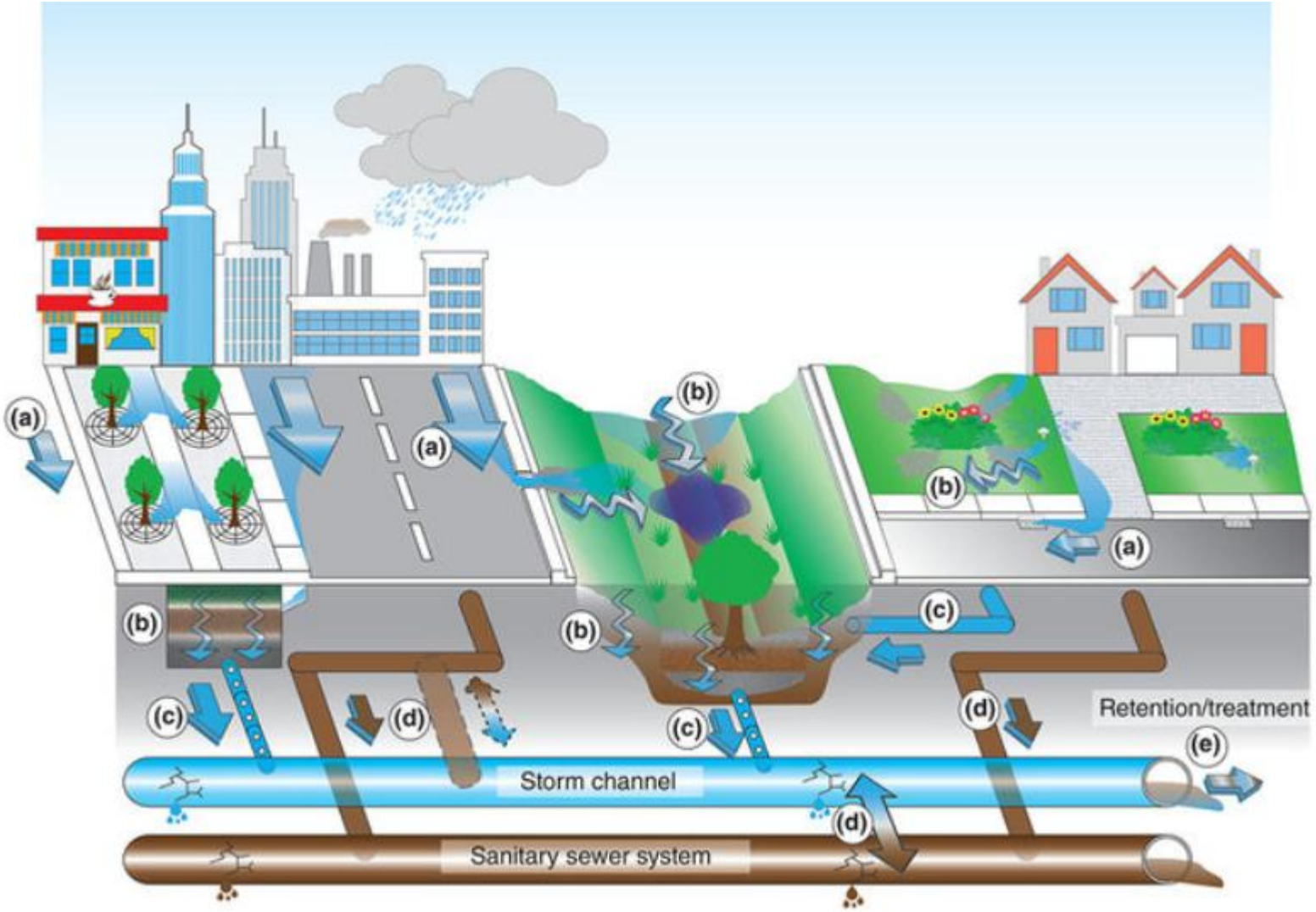
Link to adaptation story

Urban Stormwater management: quick overview



Jiang et al. (2015) http://dx.doi.org/10.1002/wat2.1107

- Stormwater sewers classical solution
- Sustainable Urban Drainage (SuDs)
- Nature-based water retention
- Most investment on public land with public money
- Large potential for stormwater management on private land
- Questions on ownership & who invests?
- What incentives could a local authority provide?

TransformAr Pilot Solutions in Lappeenranta, Finland

What was tested?

- **URB (Biofiltration Field):** First NBS of its kind in city center; filters runoff before it reaches groundwater.
- **SWMM (Monitoring):** Sensors & public cameras for real-time flood & water quality data.
- **CAF (Citizen App):** Public engagement via updates on flooding, street works, and air quality.
- **CEI (Choice Experiment):** Survey on citizen willingness to invest in local NBS.

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Discrete choice experiment on stormwater management in Finland and Norway

- This survey was conducted to **ask citizens their opinions on acting on adaptation to climate change**

- How much are Finnish and Norwegian citizens **willing to invest in stormwater management measures on their own properties?**

- **Sample size:**

→1013 citizens in Finland

→1000 citizens in Norway.

Which solutions on private property?
Grey & Green solutions

1. Permeable surface
2. Redirecting the drainpipe
3. Rain garden
4. Sump pump
5. Green roof
6. Green wall
7. Green ditch
8. Rainwater tank
9. Stormwater chamber

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What benefits are important for households?

Flood protection – Reduce the risk of water damage to homes and properties

Cost savings – Avoid expensive repairs from climate-related disasters and conserve water through e.g. rainwater harvesting

Health & environmental benefits – Improve local water quality, reduce pollution, and support local ecosystems

Property value & aesthetics – Green infrastructure can enhance aesthetics and increase home values while creating habitats for wildlife

What did we specifically ask?

Hypothetical scenario

"You are considering purchasing one of the below stormwater management measures for your private property to capture increased rainfall and stormwater. You own a detached 120m2 house with a garden."

Then, in survey,

- **Respondents choose**
- **Random distribution of choice sets**

	Reduced risk of damage to the house	Reduced stormwater run-off and pollution	Improvement of aesthetics of the property and community	Frequency of maintenance required	Price (investment cost)
A	-50% risk of damage	No reduction	No	Every 6 months	€ 1000
B	-25% risk of damage	No reduction	No	Every 2 years	€ 500
C	No new stormwater management measure				

What did we find? (summary)

- Preferences for investing in stormwater management to deal with the increased frequency of extreme weather events assessed among 2.013 citizens in Finland and Norway.
- Results show a **strong preference for acting on adaptation and a very high willingness to invest in stormwater management on private properties**.

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What did we find?

Prioritisation of attributes:

1. Citizens in both countries **prioritise the reduction of flooding risk to their properties as the most important factor**: they are more likely to invest in solutions that offer immediate protection to their homes.
2. The second most important factor in both countries when choosing a measure is **low maintenance and time requirements play a critical role in citizens' decision-making.**
3. Citizens' **third priority** for investing in measures **are those more likely to reduce stormwater runoff and improve water quality**.
4. Citizens **finally prefer measures that improve the aesthetics of their property and community**, but this is not their primary concern when choosing which measure to invest in.

What was their willingness to pay?

- **A high willingness to pay for a one-off investment**, as long as they meet their expected criteria:

Attributes	WTP (Euro)/ per household (one-time investment)	
	Finland	Norway
-25% risk of damage	3083	1350
-50% risk of damage	4209	1690
-75% risk of damage	4820	2130
-25% run-off	1592	1140
-50% run-off	3736	3550
-75% run-off	3143	3050
Improve aesthetics	1257	615
Maintenance 2 months	-3677	-3590
Maintenance 6 months	-1629	-3060
Maintenance 1 year	-838	-1270

How did the results differ regarding socio-economic demographics?

- Age was negatively associated with support for investing in SWM measures: **older people overall less supportive and willing to invest** – younger people more inclined to adopt innovative solutions.
- Residents with **higher incomes showed more interest in investing in SWM measures** on their private properties.
- Residents with **higher education levels supported improving SWM on their properties** but were not willing to invest a high price.
- Residents with **previous flood experience** expressed a higher preference for investing in SWM measures.
- Respondents with **high market-value properties were more supportive of investing in SWM measures.**

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Which stormwater measures do people prefer?

1. Permeable surface (most respondents in both countries indicated this as their first choice – 32 %)
2. Redirecting the drainpipe (30 %)
3. Rain garden (26 %)
4. Sump pump (19 %)
5. Green roof (17 %)
6. Green wall (16 %)
7. Green ditch (13 %)
8. Rainwater tank (12.5 %)
9. Stormwater chamber (10 %)

Which stormwater measures do people prefer? And Who?

1. **Permeable surface (32 %):** highest preference among 30-40 yr olds, secondary education, monthly income <€3000
2. **Redirecting the drainpipe (30 %):** highest preference FIN: men 50-60/60+, secondary education, monthly income <€3000; NO: men 50-60 with higher incomes < € 4500 and higher education
3. **Rain garden (26 %):** highest preference among highly educated women aged 20-40
4. **Sump pump (19 %)** highest preference among men aged 20-40, income <€3000 in both countries
5. **Green roof (17 %) and Green wall (16 %):** highest preference among 30-40 yr olds, secondary education, income <€3000
6. **Green ditch (13 %)**
7. **Rainwater tank (12.5 %):** highest preference among 20-30/50-60, high income <€4500, lower university degrees
8. **Stormwater chamber (10 %):** highest preference NO: men aged 60 +, incomes <€3000; FI: women 30-40 with higher incomes < € 4500

What do the questionnaire findings mean?

- Both countries prioritise permeable pavement and redirecting the drainpipe as top solutions: focus on low-cost, low-maintenance and high functional SWM measures.
- There is still a high preference for grey infrastructure, especially among men in both countries.
- Green infrastructure such as rain gardens preferred among women in both countries
- Property ownership (own vs rent) is not a critical factor in supporting SWM measures, reducing biases related to whether respondents rent or own their property when faced with the hypothetical scenario

What did we learn?

- Citizens show a **high willingness to take action on and invest in SWM** on their own properties, as long as they reduce risk of damage to their house, decrease stormwater runoff and improve aesthetics and do not require much maintenance
- **Results are very encouraging: indicate strong citizen willingness to contribute -** useful to know in the **development of alternative policies**, e.g. stormwater fees
- **Maintenance is a key barrier**: **incentives or maintenance support** to be made available by gov to enhance action and investment?
- **Preferences are influenced by age, income, and education, and whether or experienced floods**, e.g. older generations and lower-income residents show less interest in SWM. **Education and awareness** can encourage action all age groups, and whether or not experienced floods.
- **Residents with higher-value properties show higher preferences for SWM investments**, suggesting the need for **targeted approaches, i.e. subsidies for lower-income residents to create more inclusive action.**

Practical implications

- Municipalities can work with household to also invest on stormwater management on their land
- Citizens in NO & FI already willing to invest, but may need a little push, e.g.
  - Supporting for maintenance
  - subsidies for lower-income residents to create more inclusive action
  - Encouraging to choose green or hybrid
  - Practical support in the specific design and implementation
  - Educational campaign

THANK YOU

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