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Differences in information needs in a complex urban organization as potential barrier for climate adaptation: lesson learned from Bologna experiences.

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The BLUEAP project
(LIFE11 ENV/IT/119)

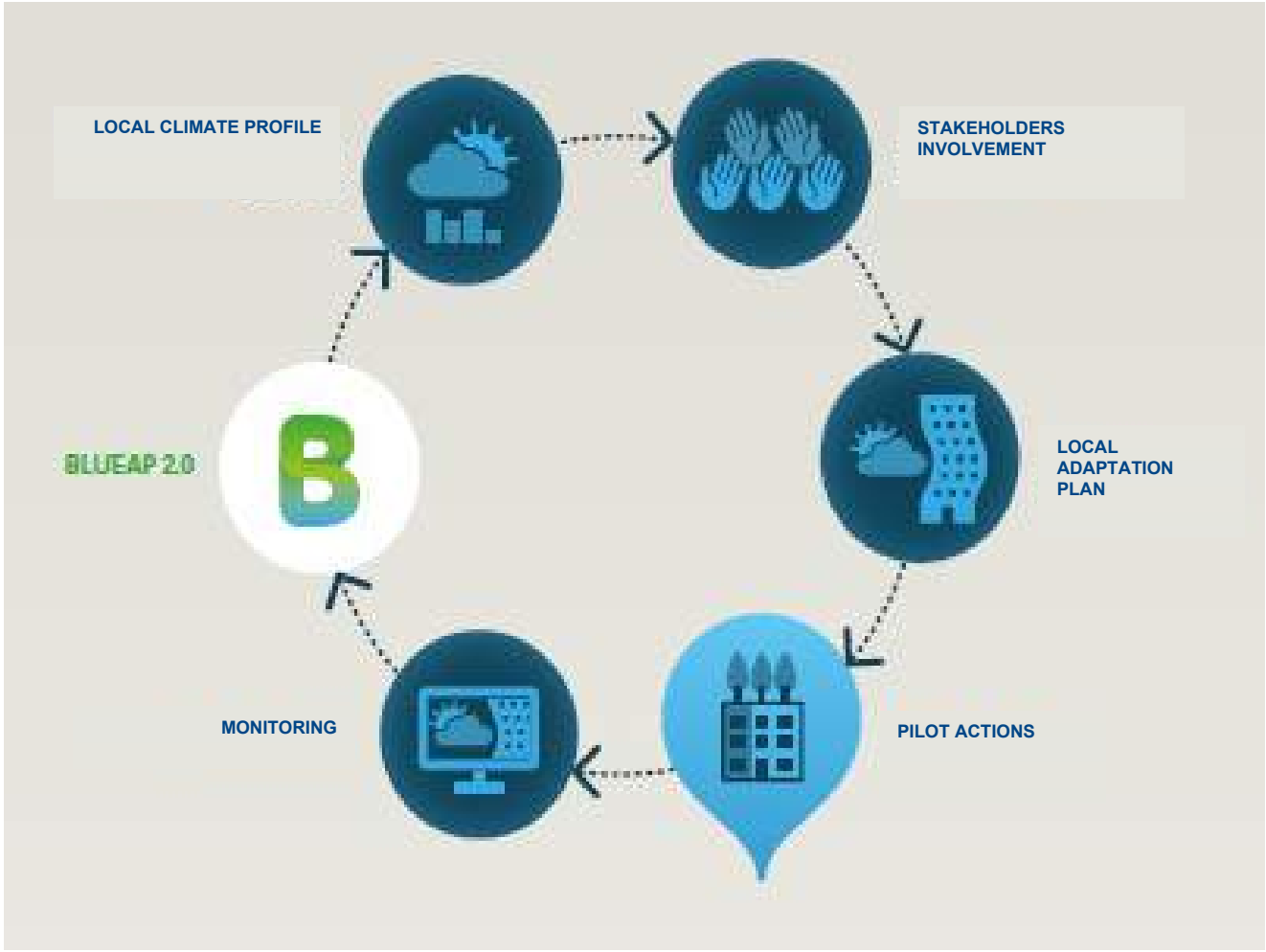
In october 2012 Bologna started **BlueAp LIFE project** for the definition of a Local Adaptation Plan.

On 4th June 2014 the City Council approved the **signing of "Mayors Adapt":** Bologna was the first Italian city to join the initiative.

In october 2015 the City Council approved the **Local Adaptation Plan**.

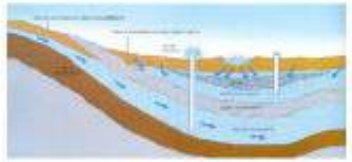
The Plan contains the actions to make Bologna resilient at the **reference year of 2025**.

The Plan valued the support of an international scientific commitee coordinated by CMCC.



In August 2015 a delegation of France Senate visited Bologna for a workshop on BlueAp project experience.

Vulnerability	Strategies
Drought and water scarcity	• Reduce the use of natural water resources • Eliminate parasiting waters and the mixing of black and white waters • Regulate the flow of Reno River • Protect gricoltural production

Main objectives				
Withdrawals from groundwater < 45 million m3 / year 	Minimum water flow in Reno river 1.87 m3 / s 	Network losses < 18%	Domestic water consumption < 130 l / inhabitant / day 	Consumption of drinking water for other uses < 5 Mil m3 / year 

Vulnerability	Strateges
Heath waves in urban areas	• Increase urban greening; protect and enhance urban green areas and urban agricolture. • Increase insulation and greening in public and private buildings. • Reduce vulnerability of population exposed to health risks linked to temperature increase.

Main objectives				
+ 5000 trees 	+ 5 hectars urban vegetable gardens 	Greening interventions on 10 public buildings 	Greening of 4 public spaces in historical center 	Prevention of heath waves effects 

Vulnerability	Strategies
Extreme rain events and hydrogeological risks	• Improve city hydrogeological response • Make the territory more “resistant” to intense rain. • Reduce water pollution carries by rain. • Increase resilience of population and property at risk.

Main objectives				
Limit increase of new waterproofed territory from 3500 to 3700 hectares.	new drainage systems on impermeable surfaces > 11,5 ha	Pollution load due to spillways < 50%	Increase the resilience of infrastructures	Adequate maintenance of cultural heritage
				

EU MACS – Co-design of CS

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Two WS have been organized in Bologna in order to make the actors aware of the different needs – i.e. information needs – around the table.

The complexity of the urban planning

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Urban planning dept.

Accessibility

Public work dept.

Exsting regulation

Max period of impl.

Plans and projects office

Water and energy

Environment & Energy dept.

Traffic load

Cost of maintenance

Green areas maintenance dept.

Sustainable mobility dept.

Different and conflicting goals could lead to empasse in the planning process

Different information needs

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Information	Land use regulations	Rainfall modelling	Rainfall monitoring	Temperature data monitoring	Temperature modelling	Construction requirements	Storm water management requirements	Urban zoning	Urban climate assessment	Adaptation guidelines	Climate scenarios	Building costs	Adaptation measures benefit assessment	Adaptation measures cost assessment	Green areas state assessment	Monitoring measure effects
European Invest. Bank	Low	High	Medium	Low	Low	Low	Low	Medium	Low	Medium	High	Low	High	High	Medium	High
Regional Environmental Protection Agency	Medium	High	High	High	High	Low	Low	Low	High	High	High	Low	Low	Low	High	Low
Regional Auth. Water resources manag.	Low	High	High	Low	Low	Low	High	Low	Medium	Medium	High	Low	High	High	Low	Medium
Private consultants	High	High	High	High	High	Low	High	High	High	High	High	Low	High	High	Low	Low
Water utility	Low	High	High	Low	Low	Low	High	Medium	Low	Low	Medium	Low	High	High	Low	High
Municipality - Urban regeneration dept.	Medium	High	Medium	High	High	Low	Medium	Medium	High	High	Medium	Low	High	High	High	High
Municipality – Environmental Protection and Energy dept.	Medium	Medium	Medium	Medium	Medium	Low	Low	Medium	High	High	Medium	Low	High	High	High	High
Municipality – Urban transportation dept.	Low	Low	Low	Low	Low	Low	Medium	Low	Low	High	High	Low	Medium	Medium	Low	High
Municipality – Civil protection dept.	Low	Low	High	High	Low	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Low	High
Municipality – Urban planning dept.	High	Medium	Low	Low	Medium	Low	Medium	High	High	High	Medium	Low	Medium	High	High	Medium
Municipality – Public work dept.	Medium	Low	Low	Low	Low	Low	High	High	Low	High	Medium	Low	Medium	Medium	High	Medium
Private financial investors	Low	High	Medium	Medium	High	Low	Medium	Low	Medium	High	High	Low	High	High	Low	High
Public research centres	Low	High	High	High	High	Low	Low	Low	High	Low	High	Low	High	High	Low	Low
Water drainage network management company	Low	Medium	High	Low	Low	Low	High	Low	Low	High	High	Low	High	High	Low	Low
Practitioners association	High	Low	Low	Low	Low	High	High	High	Medium	High	Medium	High	High	High	Low	Low
Local community	Low	Low	Medium	Medium	Low	High	Medium	Low	Low	Low	Low	High	Medium	Medium	Medium	Low

The priorities in collecting and using information for CC adaptation are different in a municipality. These strongly reduces the capability of the different depts to share information as basis for the collaborative planning process.

Current initiatives

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Multi-actors process for the Renovation of urban areas → The Lazzaretto experience

Current initiatives

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#	Climate Risk	Options	Effectiveness/Performance	Capital costs (CAPEX)	Operational Cost (OPEX)	Funding options	Time to implement	Technical feasibility	Stakeholder acceptance	Co-benefits for secondary risk	Environmental impact	Social-economic impact	Uncertainty
1	Heat	Watering for green areas to improve thermoregulation	++	++	-	0	++	++	++	0	0	0	0
		White roofs	+	++	++	0	++	++	+	+	0	+	0
2	Drought, Heat, Heavy rainfall	Water sensitive re-design of green areas: Rainwater diversion in ponds and dry-wet retention basins in green area to reduce peak flow and to store water for irrigation	++	+	+	++	+	+	-	++	++	+	0
3	Drought, Heat	Centralised greywater treatment with CWs in green areas to reuse treated water for irrigation	++	-	+	+	-	+	-	+	+	0	0
		Decentralised greywater treatment in the lots and reuse for local watering/WC	++	-	+	+	+	+	+	+	+	0	-
		Decentralised rainwater harvesting and reuse for local watering/WC	+	-	++	+	+	++	++	++	+	0	-
4	Drought	Water saving design, educational campaigns, metering strategies	+	++	++	+	++	++	++	0	+	+	0
5	Drought, Heat	Impermeable SUDS on roads and parking to reduce peak flow and improve water quality	++	+	+	++	+	+	++	+	++	+	-
6	Drought	Treated rainwater connected to Ghisiliera canal to improve water quality	+	+	++	0	-	+	++	+	+	0	
7	Heat, Heavy rainfall	Green roofs	++	- -	-	+	+	+	+	++	++	++	-
8	Drought, Heat	Green walls for greywater treatment	++	- -	-	++	+	+	+	++	+	++	-
9	Heavy rainfall	Decentralised CWs for the treatment of the first flush	++	+	+	+	- -	+	-	+	+	0	

Climate information for Multicriteria Decision Analysis

Current initiatives

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The European Investment Bank (EIB) is supporting initiatives to adapt to climate change

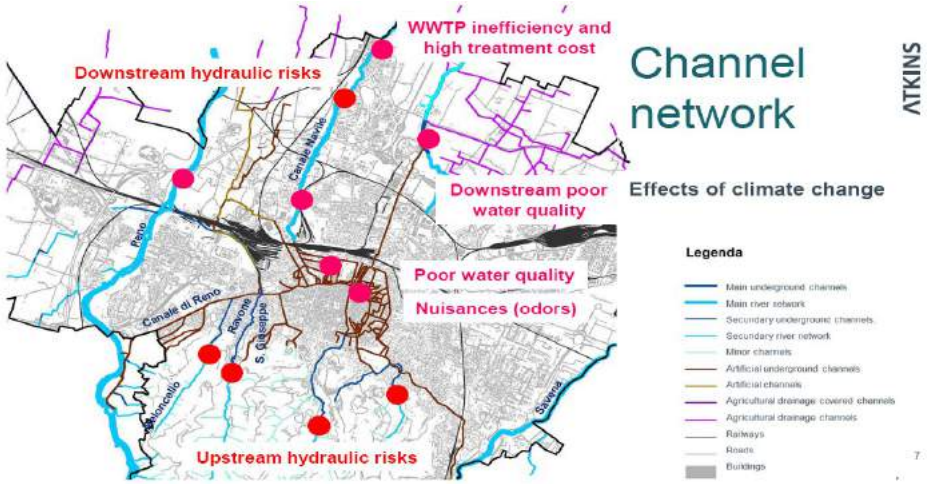
ATKINS

Climate Change Adaptation and Resilient Cities

Inception Report

European Investment Bank

24 February 2017



European Investment Bank

Newcastle City Council

Comune di Bologna

ATKINS

IRIDRA S.r.l.

hcl CONSULTANTS

Newcastle University

Current initiatives

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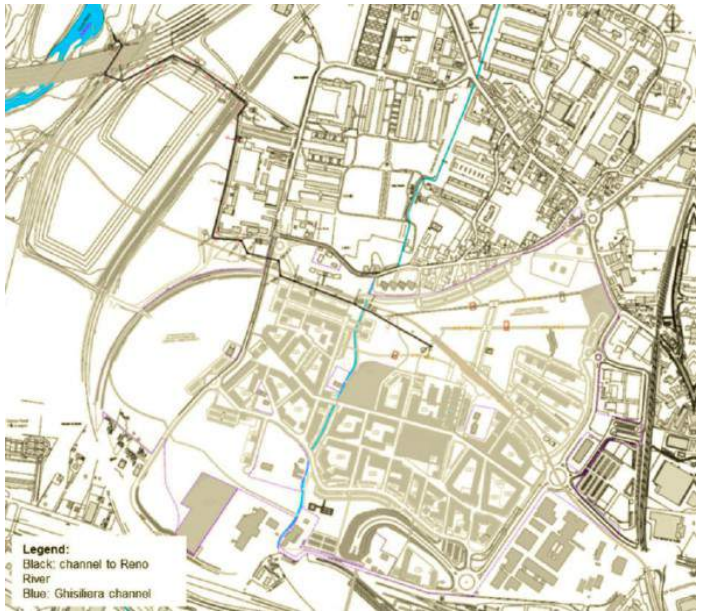
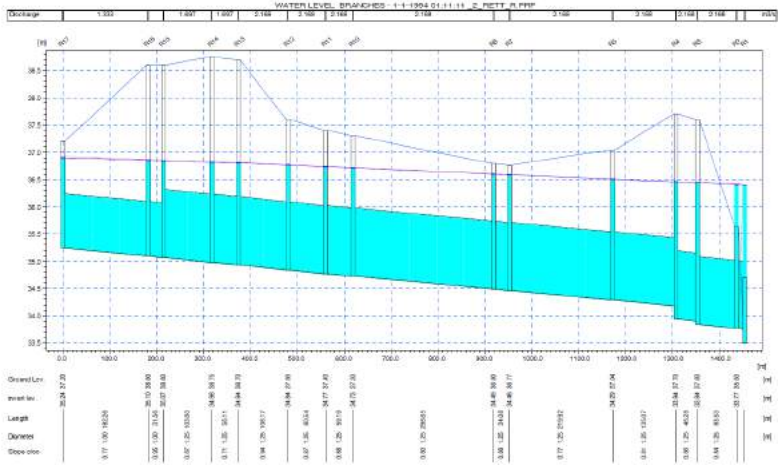
Lazzaretto drainage approach



- 3 separate network (wastewater, runoff water from road and parking, rainwater
- First flush tanks for first flush rainwater from road and parking
- New underground channel with final discharge in Reno River
- Total retention capacity 170 m3/ha



Current initiatives

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Selection of alternatives

	Alternative 1 - options	**Alternative 2 - options**
Drought	rainwater reuse for WC	dec greywater reuse for WC
	water saving measures	water saving measures
	centralized greywater treatment and reuse	water sensitive re-design of green areas
Heat	watering for green areas	watering for green areas
	centralized greywater treatment and reuse	**water sensitive re-design of green areas**
	white roofs (90% of the roofs) - green roof 10%	white roofs (95%) - green roof (5%)
Heavy Rainfall	rainwater reuse for WC	water sensitive re-design of green areas
	impermeable SUDS on roads and parking	impermeable SUDS on roads and parking
	green roofs (10% of the roofs)	green roofs (5% of the roofs)

Current initiatives

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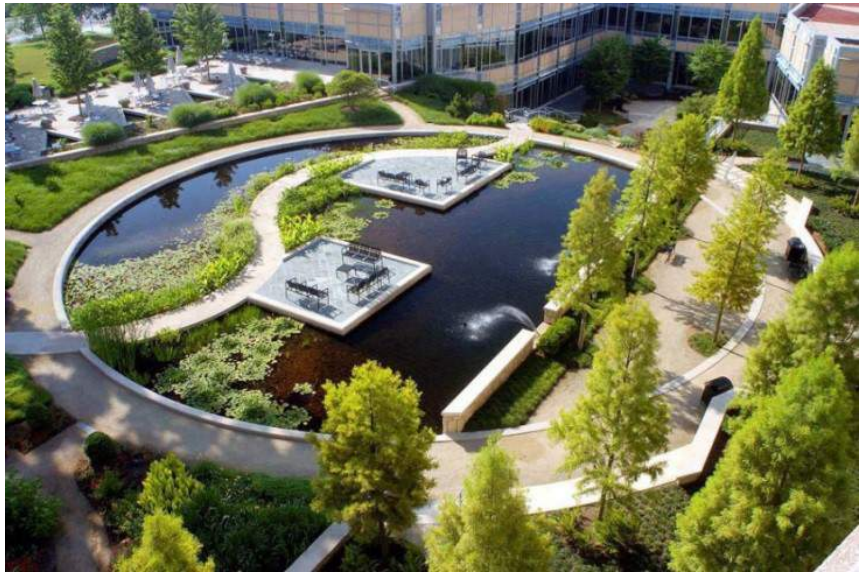
water sensitive re-design of green areas



28.000 m3/y available for watering of 9 ha green areas

Current initiatives

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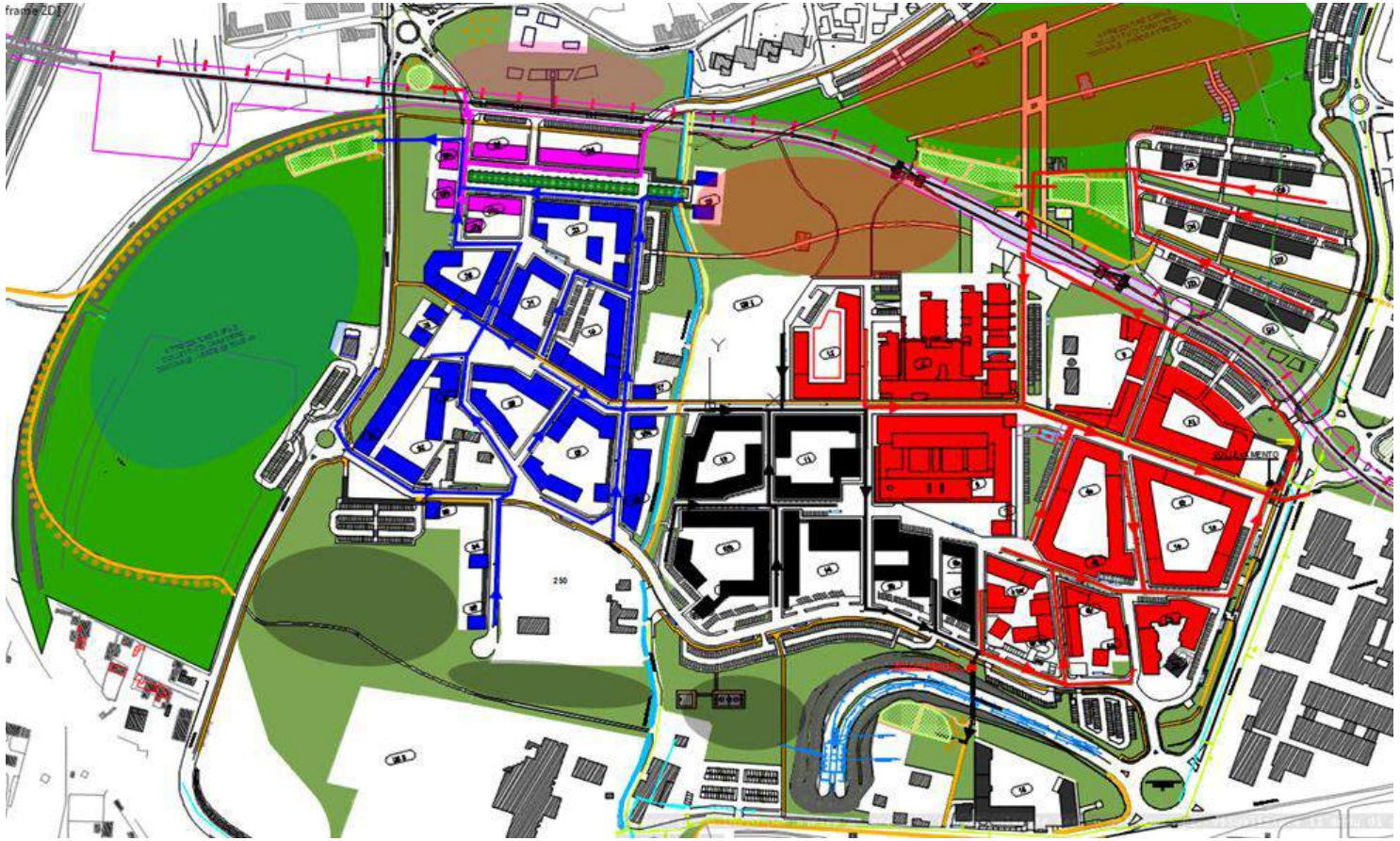

centralized greywater treatment and reuse by n°4 Constructed Wetlands

60.000 m3/y available for watering of 20 ha green areas + other 60.000 m3/y available for other uses

Current initiatives

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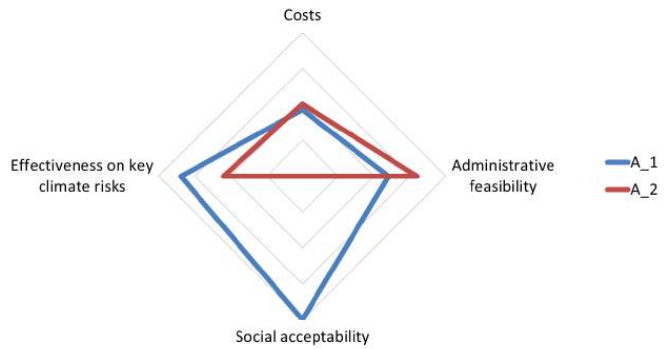
COST		
Attribute	**Relative importance**	**Weight**
CAPEX	5	0.33
OPEX	10	0.67
Total	**18**	**1.00**
Social acceptability		
Attribute	**Relative importance**	**Weight**
Open water surface (considered as source of nuisance by the local community)	2	0.40
Management burden on the final users	3	0.60
Total	**5**	**1.00**
Effectiveness on key climate risks		
Attribute	**Relative importance**	**Weight**
Hydraulic risk reduction; Contribute to store runoff locally (storage volume)	4	0.20
Heat reduction; available volume for watering	8	0.40
drought; water consumption per capita	8	0.40
Total	**20**	**1.00**

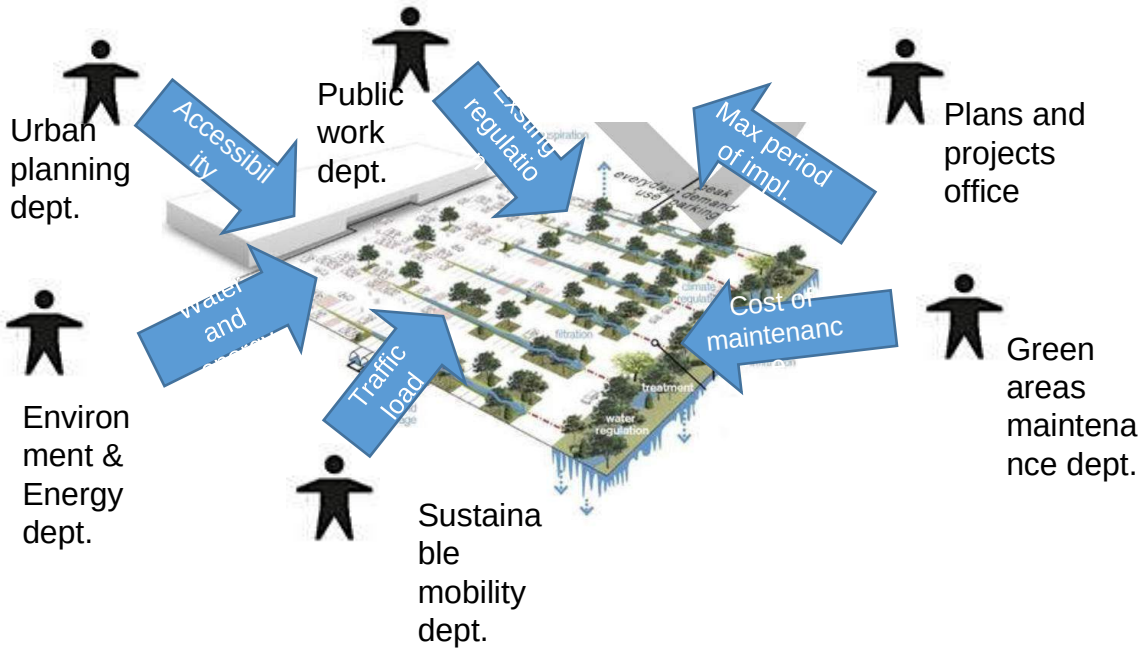
FINAL INDEX			
Objectives/ Criterias	**Relative Importance**	**Weight**	**Weight (%)**
COST	7	0.32	32%
Administrative feasibility	3	0.14	14%
Social acceptability	2	0.09	9%
Effectiveness on key climate risks	10	0.45	45%
Total	**21**	**1.00**	**100%**

MCA of the alternatives

	EVALUATION MATRIX OF THE CRITERIA	
Criteria	**A_1**	**A_2**
Costs	0.46	0.50
Administrative feasibility	0.60	0.80
Social acceptability	1.00	0.00
Effectiveness on key climate risks	0.85	0.55
FINAL RANK	**0.71**	**0.52**



Concluding remarks



- Urban planners are now facing new challenges dealing with **climate risks and urban resilience**
- To this we have to add the need for coping with **urban sprawl** and **regeneration of brownfields**
- **Urban materials** are renovating: there is a great expectantion on **NBS** but their benefits are still difficut to be evaluated and recognized
- Traditionals tools for urban planning are uneffective for dealing with these challenges but **standardized new tools are not available**.
- Traditional tools have produced a silos approach that needs now to be re-thought (e.g. Green areas are not only for leisure and water retention basins are not only part of the sewage system ...)