Managing water sustainably to strengthen urban resilience

100 Resilient Cities

The urban water cycle as an opportunity for resilience - risks, challenges and ideas for Rome

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Overview

- Climate change and water
- Urban water cycle
- Integration for more sustainability
- Linkages within urban water system
- Linkages of water sector with other sectors
- Benefits
- How? Communication, coordination, management process
- Stormwater management
- Synthesis: Conventional vs. integrated solutions

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Climate change and water

Climate change impacts most felt in changes of the water cycle

Consequences may be, e.g.:

- Less precipitation and higher temperatures → reduced water supply
- More intense, more frequent rainfall → sewer overflows, higher pressures on waste water (if combined sewer and stormwater system)

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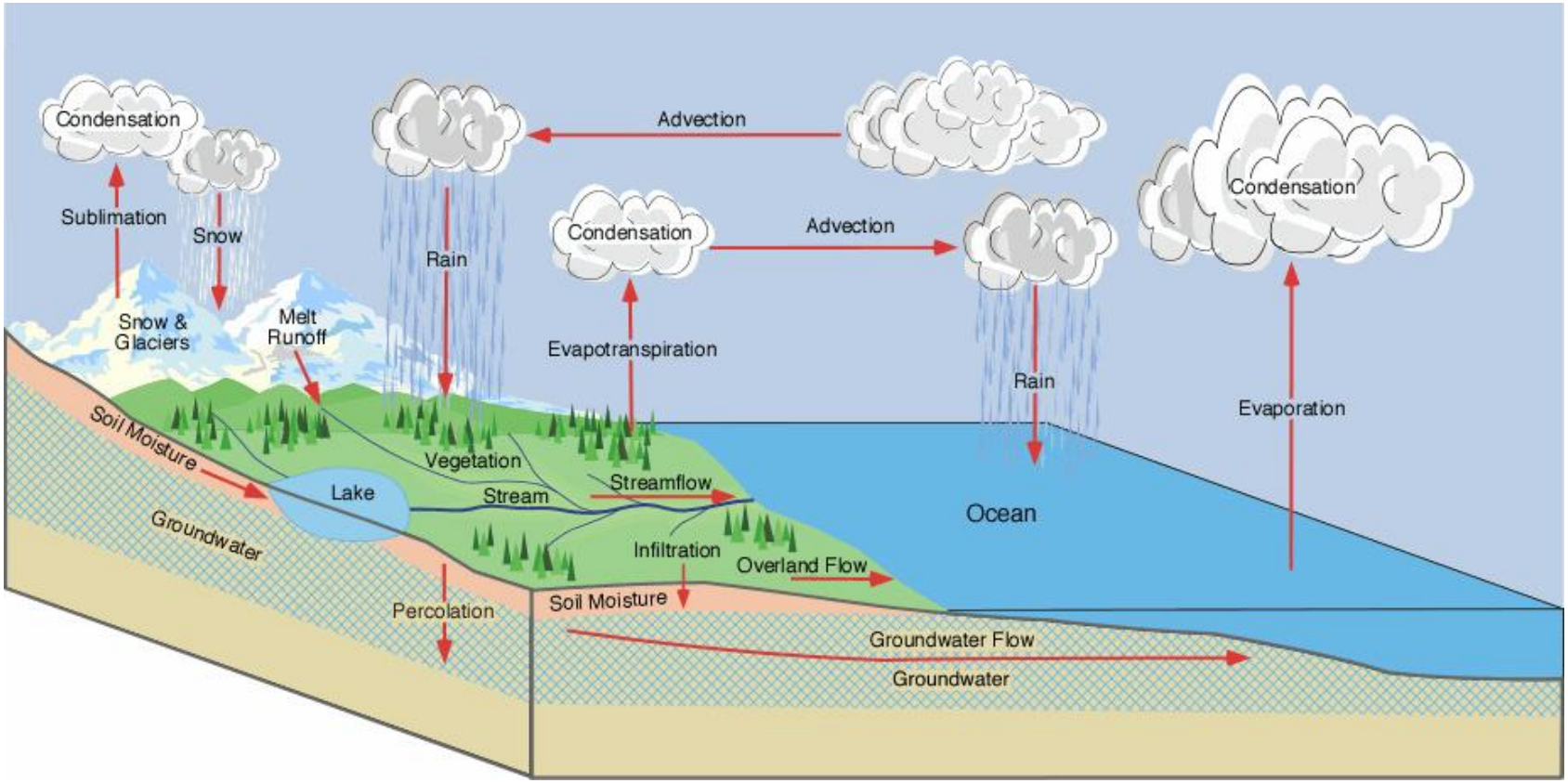
The hydrological cycle/the natural water cycle)



Source: http://www.eoearth.org/view/article/153627/ - accessed on 15.03.2015)

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The urban water cycle

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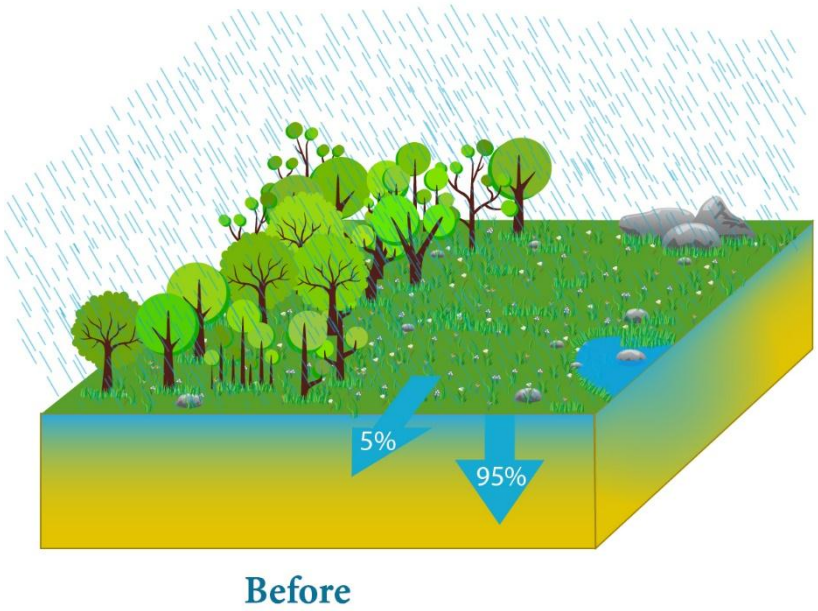
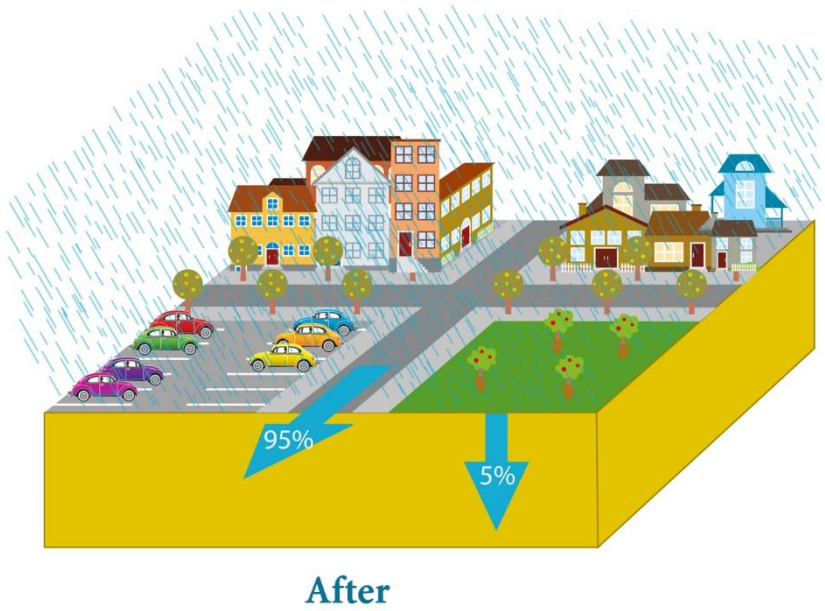
Change of drainage in urban settlements





Source: http://www.hidrologiasostenible.com/sustainable-urban-drainage-systems-suds/ - accessed on 15.03.2015

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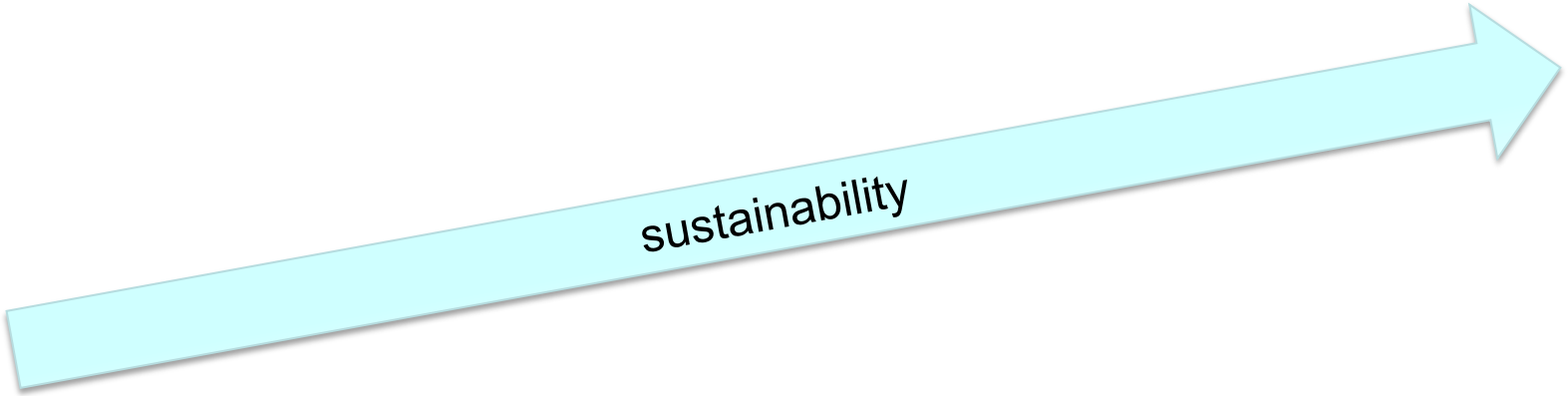
Managing urban water in a systems approach:



Managing

individual elements of the system *separately*

Managing
the *entire* urban water system *as a whole*

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The urban water cycle – linkages within system

Stormwater

- Water quality
- Potential resource

- Sewer capacities
- Water treatment standards

The Urban Water Cycle

Water supply

Wastewater

- Potential resource
- Wastewater volume

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Melbourne – Whole-of-water cycle approach

- Growth: With a growth rate of 1.8% its population is predicted to increase by 60% between now and 2050 -> 6.5 million more inhabitants!
- Capital constraints: Scarcer resources for public investment
- Climate: Climate change already brings higher climate variability with significant differences in rainfall and catchment inflows
- Community: Drought has raised awareness and public consciousness on the value of water as have price increases

Vision

A smart, resilient water system for a liveable, sustainable and productive Melbourne

Whole-of-water-cycle approach

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Melbourne. Outcomes to be achieved by numerous initiatives:

1
A community engaged in whole-of-water-cycle management

Ensure meaningful community involvement in local water cycle planning

Improve transparency and information provision

Improving disclosure of the water performance of homes for sale and rent

Partner with communities

Support community activities and projects

2
Suburbs – old and new – designed with water in mind

Plan to use local water locally

Incorporate integrated water cycle management into growth area planning

Green our suburbs

Improving stormwater management in new developments

Reduce urban flooding

Influence design guidelines for stormwater quality and flooding

Support opportunities to link local water, energy and waste cycles

3
Sensible use of water in our homes and businesses

Encourage households to use local water sources

Facilitate the use of local water in public buildings

Establish world-class water use for Melbourne's sporting grounds

Work with businesses to adopt cost-effective local water options

Increase peri-urban farms' use of non-drinking water

Minimise energy use in the water cycle

Establish regulatory support for local water use

Reform the structure of water bills to reward water efficiency in the home

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Melbourne. Outcomes to be achieved by numerous initiatives:

4
Resilient water systems

Invest in and fast-track projects that enhance water system resilience

Change the incentives of our water authorities

Overhaul water planning and regulation

Embed good water management in public buildings and major projects

Improve investment certainty and the efficient allocation of urban water

Reform bulk water arrangements

Address knowledge gaps and other barriers to improved water system resilience

5
Improved natural waterways

Engage the community on waterway health

Reduce adverse impacts of stormwater on our waterways

Fund improved stormwater management

Make better use of treated wastewater

Protect our catchments and plan for the long term management of our waterways

Measure, monitor and publish the level and composition of stormwater runoff

6
Reduced inefficiency and waste

Increase transparency about water sector costs and performance

Better allocate water sector investment

Develop new design guidelines for water and sewerage infrastructure

Improve leak detection, asset management and maintenance

Ensure our water authorities are focused on driving productivity and lower cost delivery for consumers

Enhance collaboration and sharing of research and data

Simplify and streamline regulation, and expand competition and the use of markets in the water sector

7
Accelerated innovation and world recognition of expertise

Establish Melbourne as a global leader in water cycle management

Establish an investment portal for innovative water cycle management

Promote our expertise to the world

Enhance research and policy capacity

Invest in and reorient the Smart Water Fund

Further build skills and capability in the water sector

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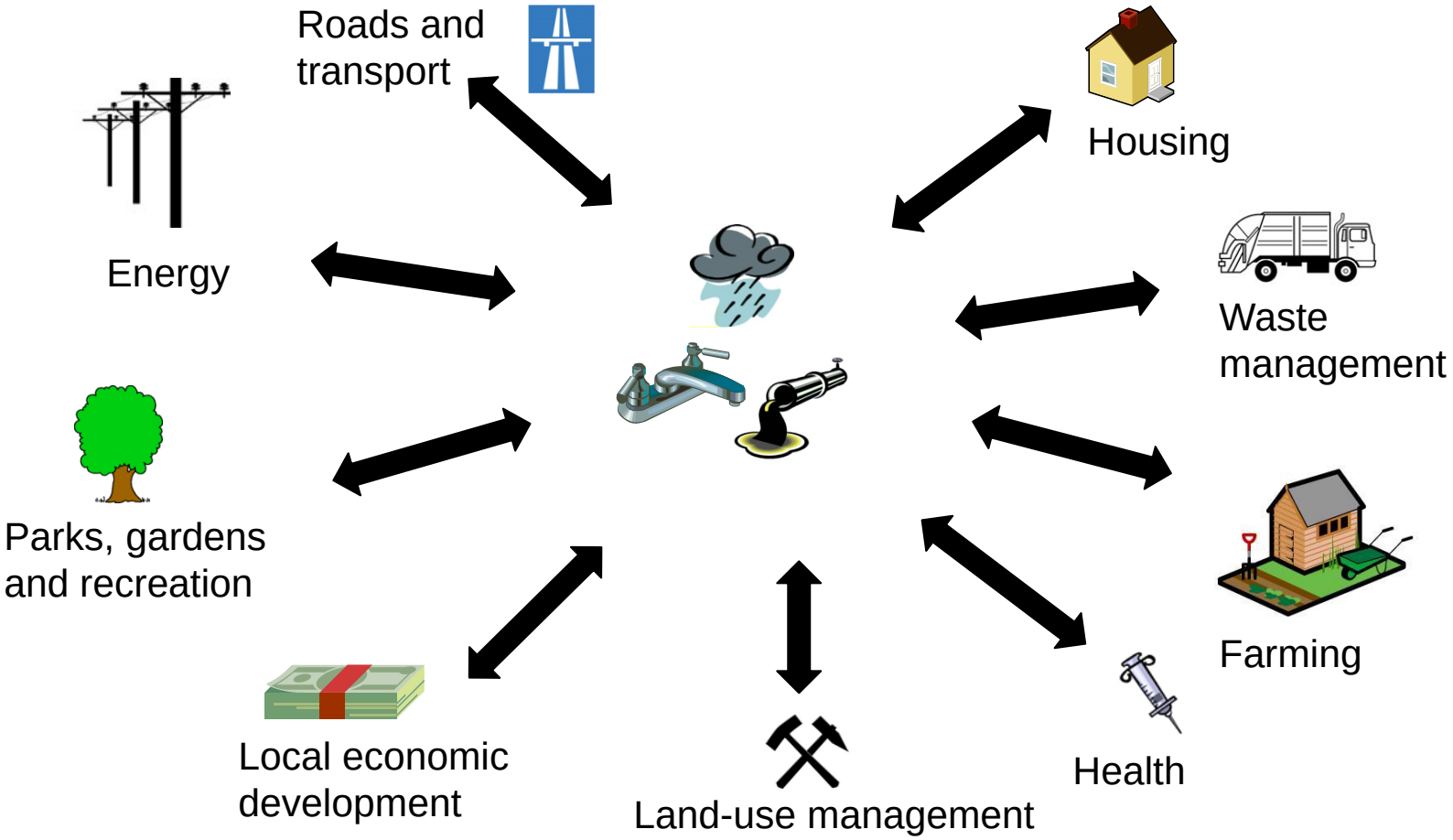
The urban water cycle – linkages with other sectors



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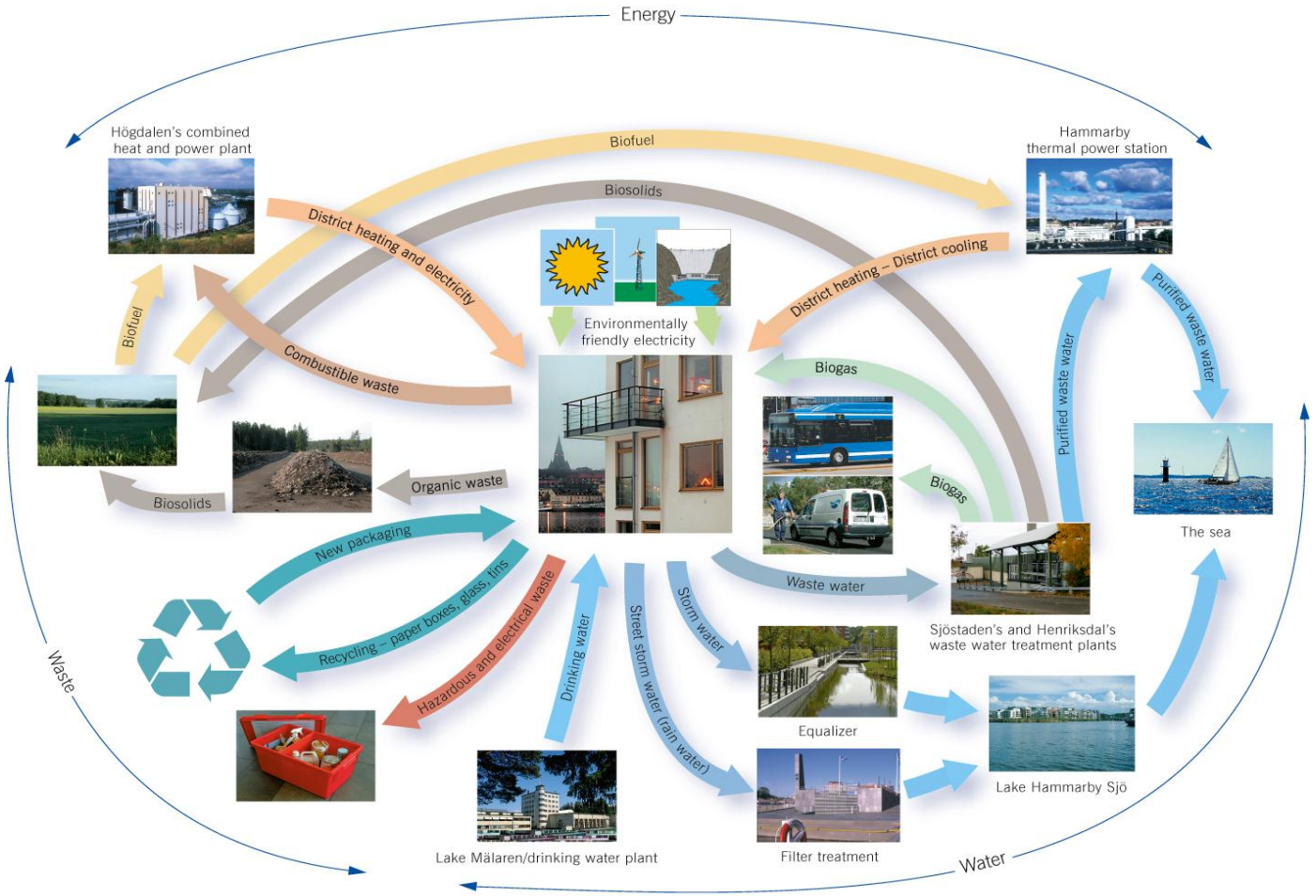
The urban water cycle – linkages with other sectors

Example: Integrated urban planning in Hammerby Sjöstad (Stockholm)



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Reduced demand

Reduced water treatment and pumping costs

Reduced water bills

Ecological restoration

Economic development

Improved quality of life

Improved service

Reduced flood risk

Improved water quality

Reduced runoff

Increased water availability

Recreation facilities

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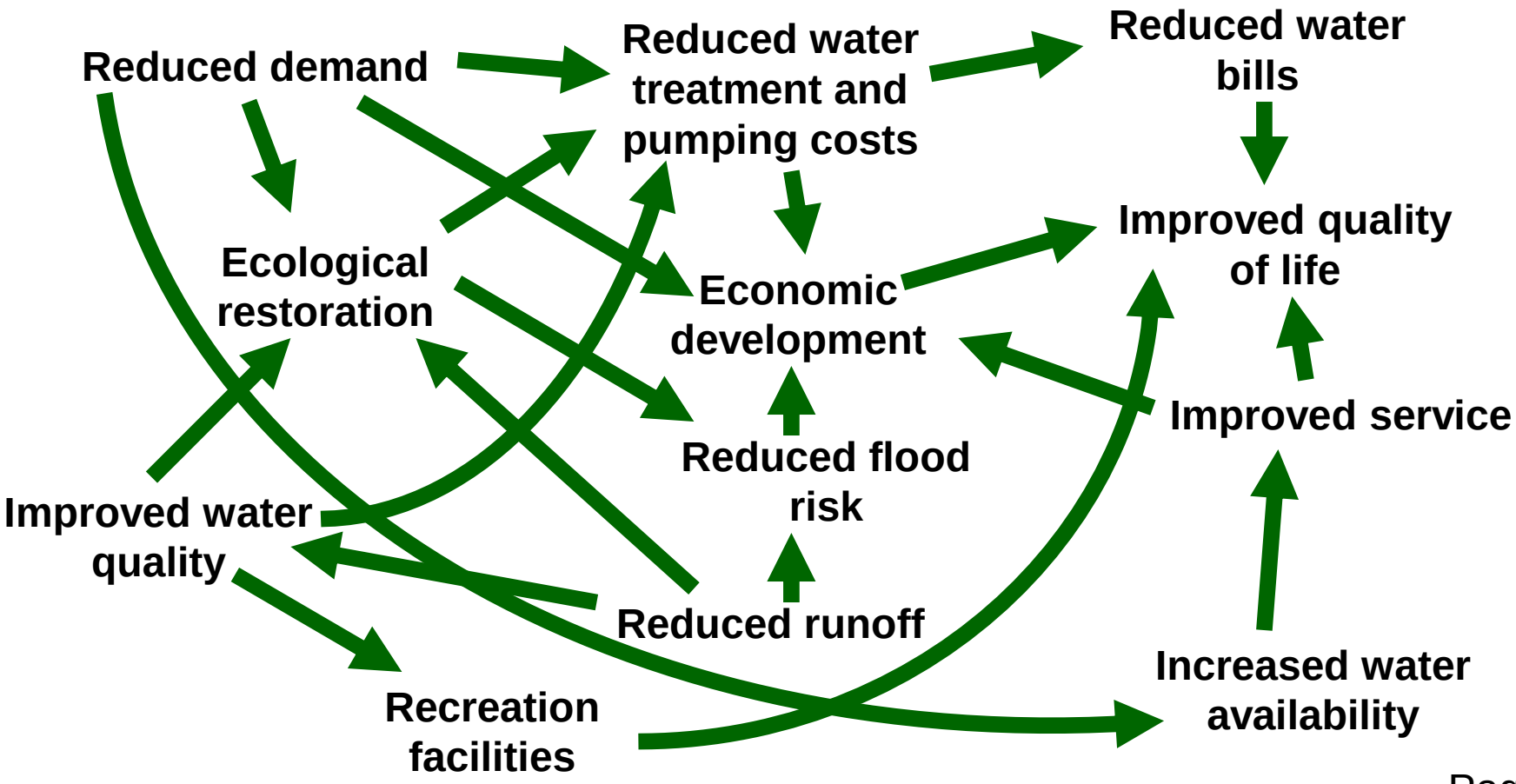

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What does it take?

Integration → recognising all linkages

→ recognising all relevant actors

Good communication

and

coordination are key!

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What does it take (contin.)?

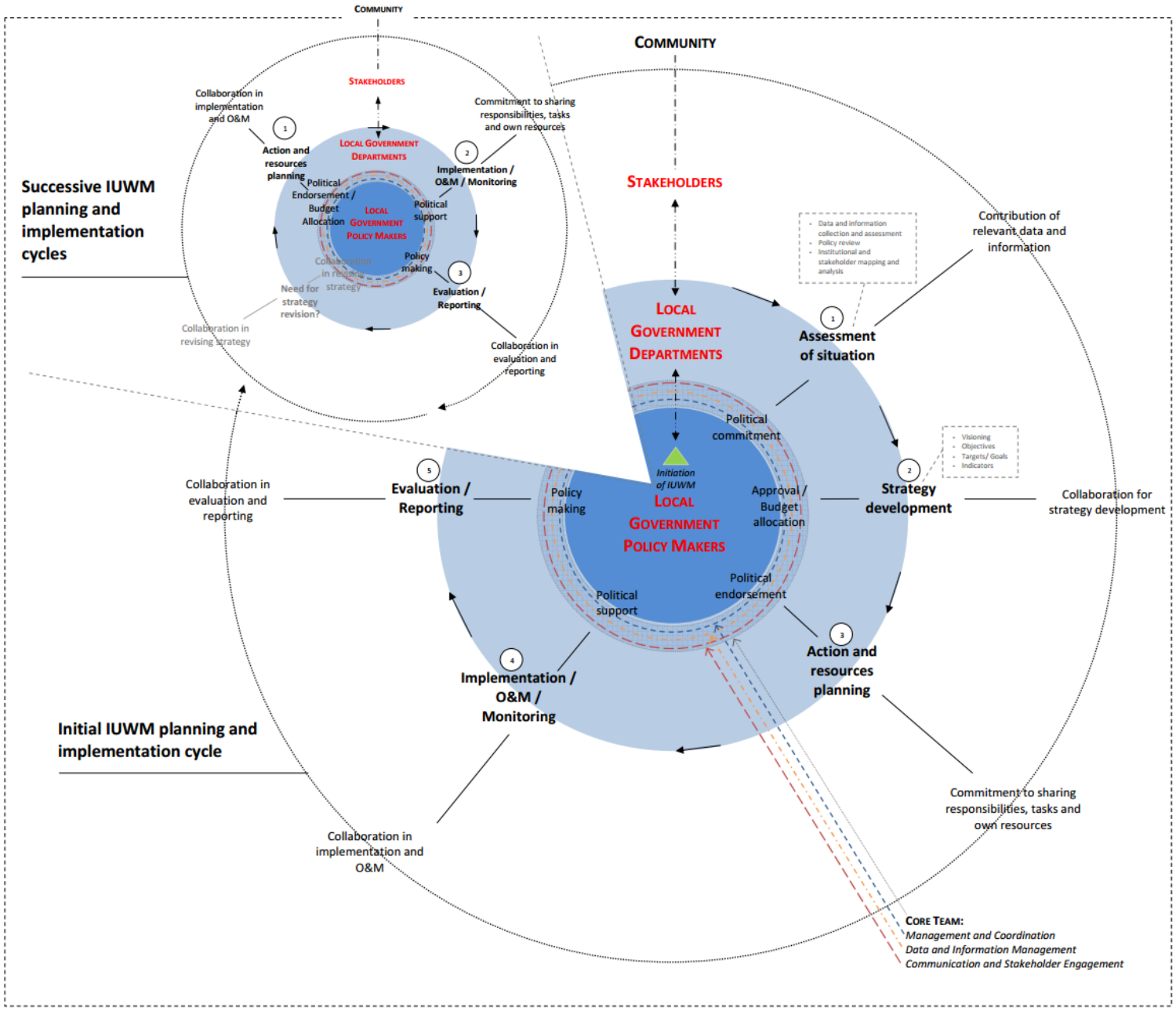
One unit/team within administration to coordinate engagement:

- within administration - all relevant departments
- outside administration - all other institutions contributing to water management and all major water users

Integrated Urban Water Management

Diagram (DRAFT)

[29 July 2014]



Explanation:

- Local government policy makers (= political level)
- Core team (= coordination of IUWM in city)
- Local government departments (= departmental and administrative level)
- Stakeholders (= direct and indirect interest in and/or affected by urban water)
- Community (= citizens, etc.)

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The urban water cycle – linkages within system

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Stormwater management – a glimpse on integrated solutions

Conventional approach: Conveying and disposing stormwater as rapidly as possible

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Drawbacks of conventional solutions:

- Increased downstream flood risk
- Erosion
- Pollution of receiving water bodies

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Missed opportunities

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Missed opportunities

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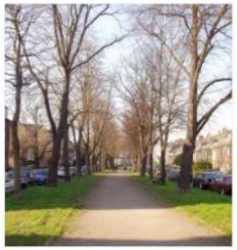
Integrated storm water management

Examples from the City of Herten, Germany















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Conventional vs. Integrated approach

	Conventional approach	IUWM
Overall approach	Integration by accident	Integration by design
Stakeholders	Collaboration = public relations	?
Infrastructure	Made of concrete, metal, plastic	?
Stormwater	Stormwater = a nuisance	?
Human waste	Collected - treated - disposed of	Resource: energy generation, nutrient recycling
Water demand	More water through investment in new supply sources and infrastructure	?
Technological solutions	Standard engineering solutions	Diversity of solutions (grey and green); linking urban water management with urban design and landscape architecture

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Conventional vs. Integrated approach

	Conventional approach	IUWM
Overall approach	Integration by accident	Integration by design
Stakeholders	Collaboration = public relations	Collaboration = engagement
Infrastructure	Made of concrete, metal, plastic	Also green infrastructure: soils, vegetation, eco-systems …
Stormwater	Stormwater = a nuisance	Stormwater = a resource
Human waste	Collected - treated - disposed of	Resource: energy generation, nutrient recycling
Water demand	More water through investment in new supply sources and infrastructure	Priority for reducing water demand, harvesting rainwater and reclaiming wastewater
Technological solutions	Standard engineering solutions	Diversity of solutions (grey and green); linking urban water management with urban design and landscape architecture

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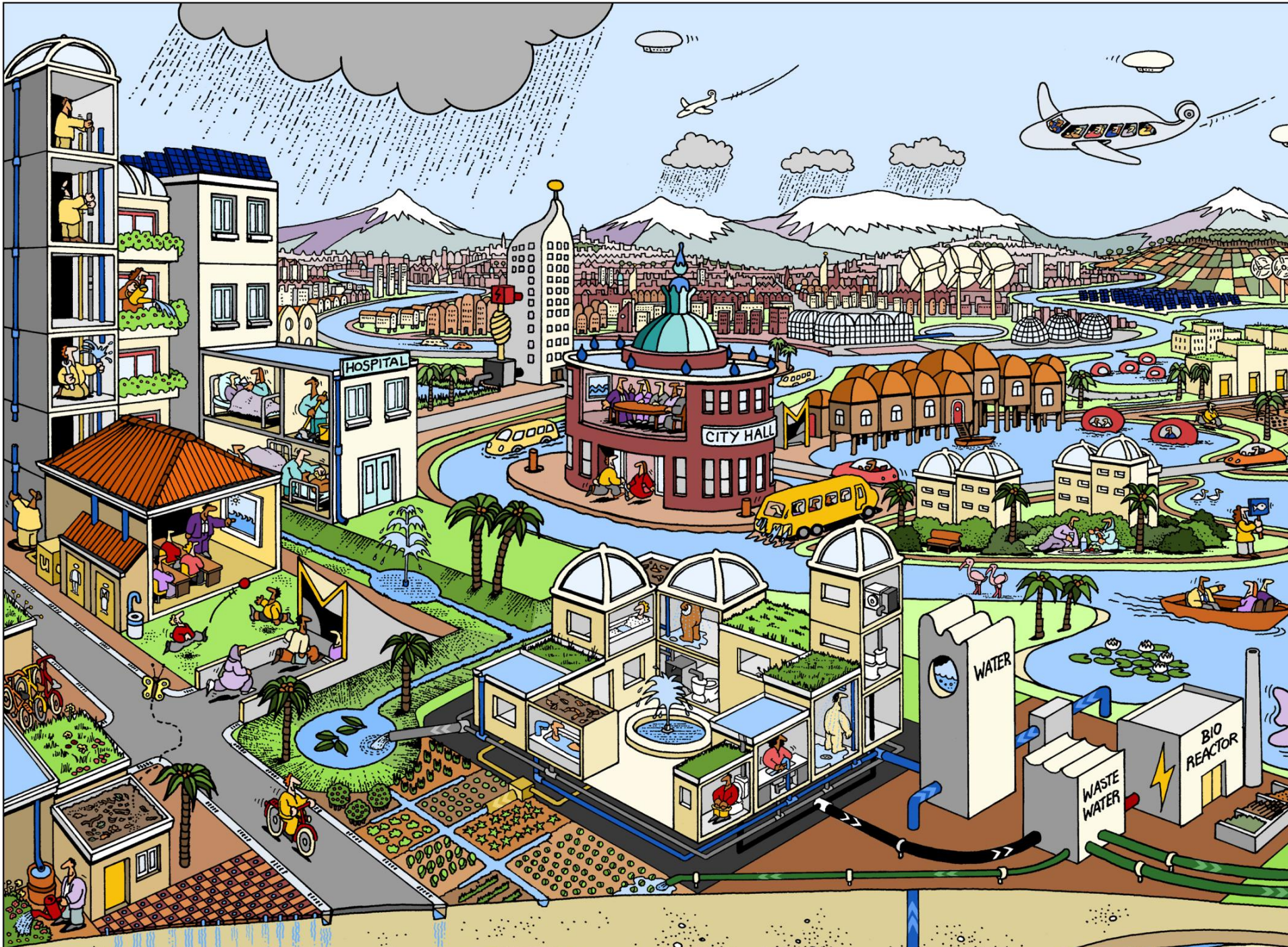
Final messages:

- Integrated UWM → IntegratING UWM
- Political commitment at all levels
- Good communication and coordination is key – inside the administration and with external stakeholders
- Holistic understanding of urban water cycle
- Comprehensive knowledge management
- Pooling of local expertise and local capacities
- Locally tailored solutions


HOSPITAL
CITY HALL
WATER
WASTE WATER
BIO REACTOR