ECOSYSTEMS
IN AN URBANISING WORLD
challenges and opportunities for symbiosis

Join the conversation! 26 August 2018 at the World Water Week in Stockholm

SESSION 1 | 11.00-12.30 *Working with nature to restructure urban fabrics:* ***local solutions***
SESSION 2 | 14.00-15.30 *Aiming for green cities:* ***planning and governance***
SESSION 3 | 16.00-17.30 *Sofa discussion:* ***envisioning the road ahead***

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SIWI WORLD WATER WEEK

Global Water Partnership

ECOSYSTEMS
IN AN URBANISING WORLD

Session 2: Green cities by design

chaired by José Carrera and moderated by Victor Arroyo

26 August 2018 14.00-15.30, Stockholm City Conference Centre (NL Pillar Hall)

Key Note

Pablo Bereciartua
Secretary of Water Infrastructure and Policy of Argentina

Pitches on Urban Planning & Decision-making Tools

Peter van der Keur, Geological Survey of Denmark and Greenland • Alexandra Campbell-Ferrari, The Center of Water Security and Cooperation • Bojan Srdjevic, University of Novi Sad • Jenny Grönwall, SIWI • Uttam. C. Sharma, Centre for Natural Resources Management • Homero Castanier, Utility of Quito

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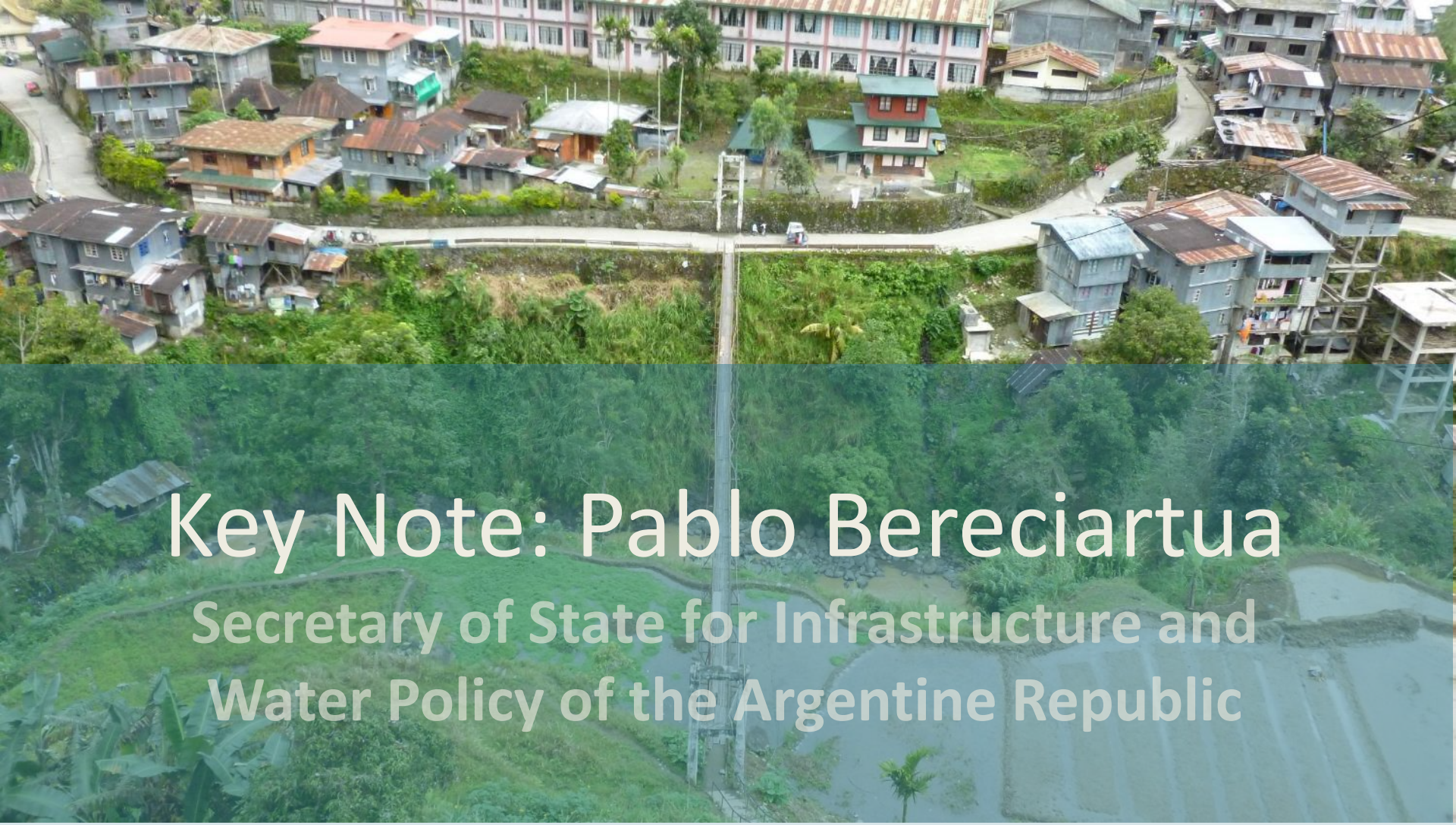

Key Note: Pablo Bereciartua

Secretary of State for Infrastructure and Water Policy of the Argentine Republic

Seminar 9: Ecosystems in an Urbanising World
Stockholm World Water Week 2018

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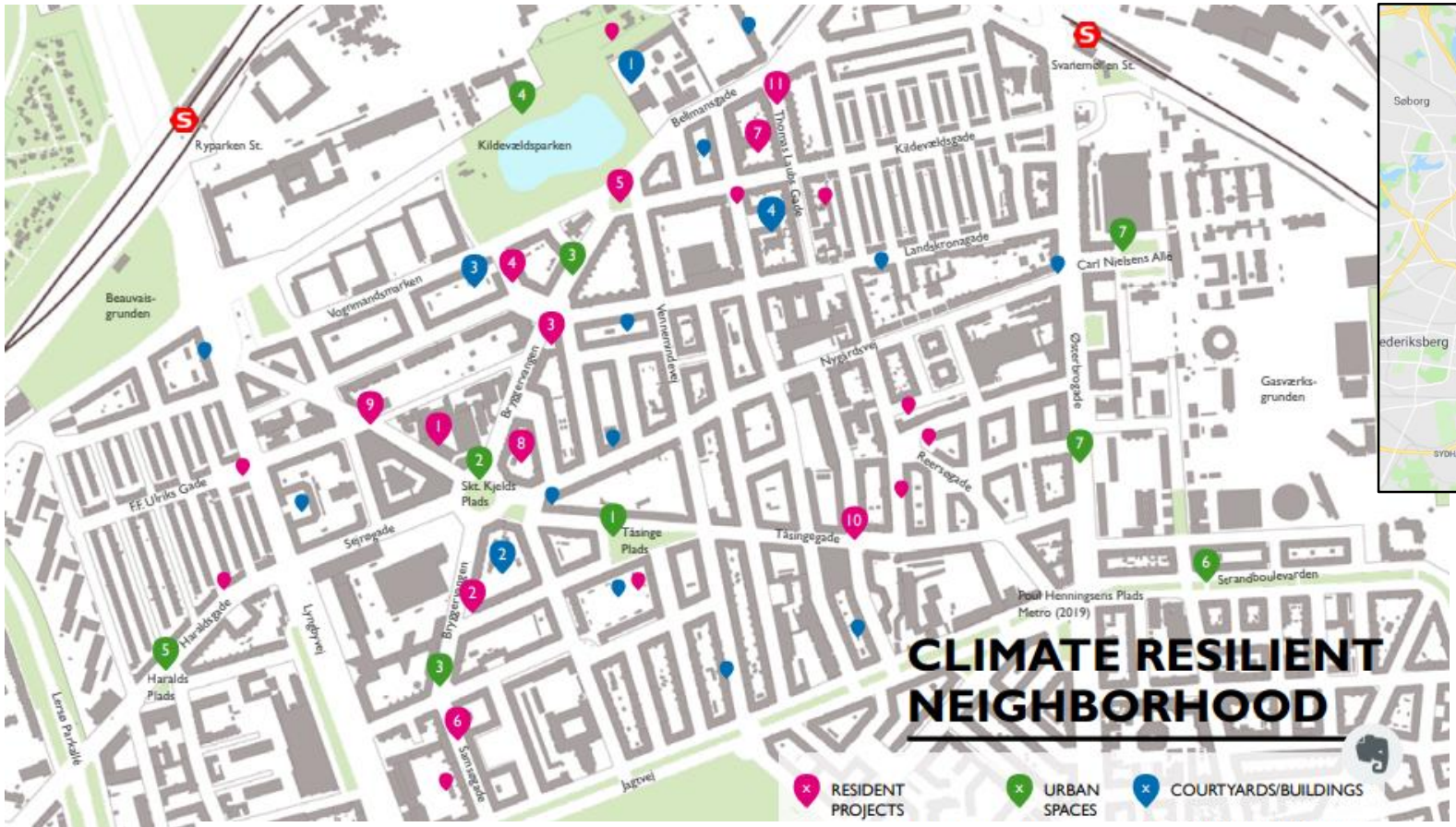
NAIAD: Nature Based Solutions in Copenhagen, Rotterdam and Łódź

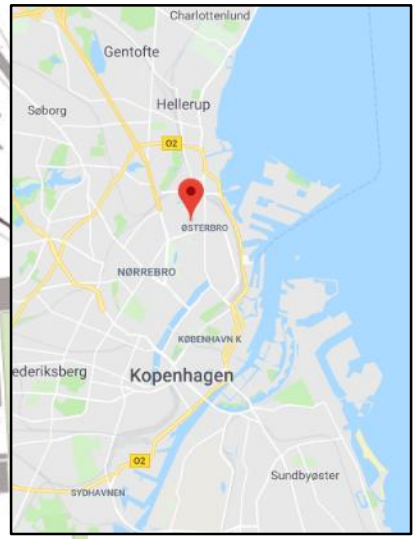
Aiming for green cities: what change is needed in planning and governance

challenges and opportunities for symbiosis between urban development and ecosystems

Peter van der Keur, Senior Scientist, GEUS, Denmark
Karina Peña, Design Director, Field Factors, The Netherlands
Kinga Krauze, Professor, University of Lodz, Lodz, Poland

Seminar 9, session 2, International Water Week, Stockholm, 26/8/2018





Copenhagen

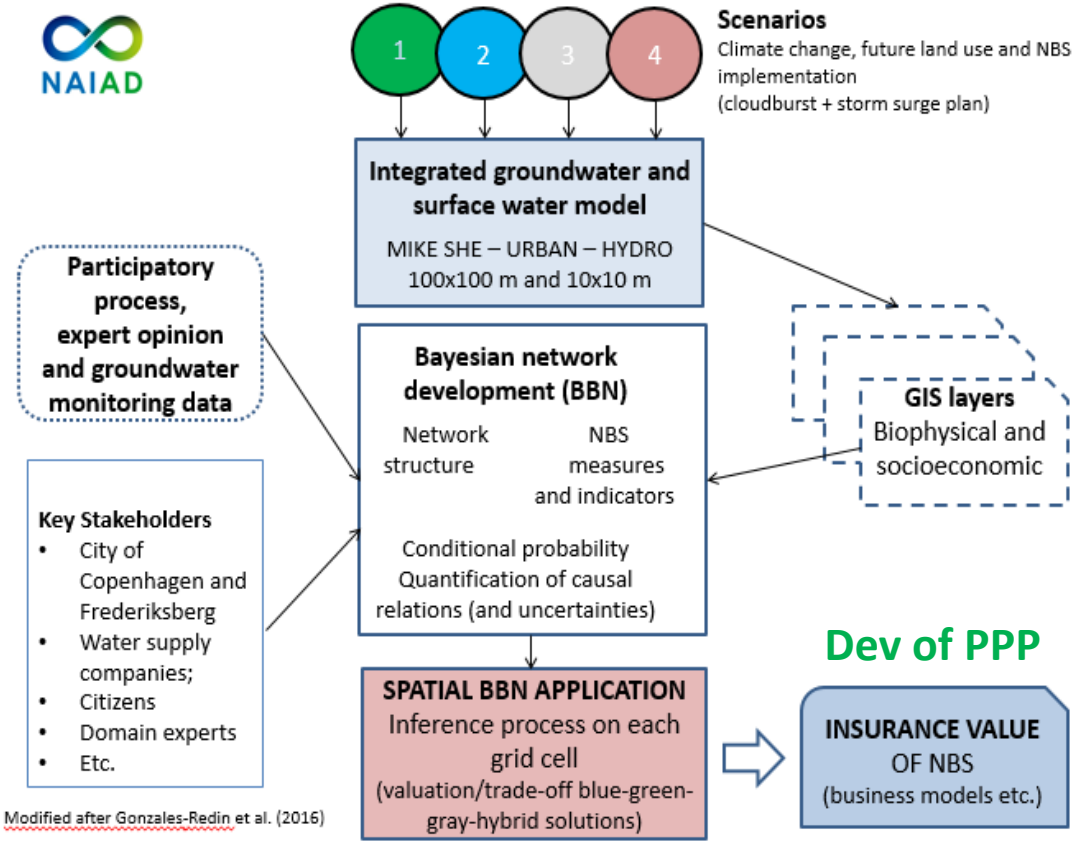
THE CLIMATE ADAPTATION PLAN

Report from IPCCon future climate change → National processing of IPCC report → Climate adaptation plan of Municipality of Copenhagen

- Incorporation into municipal plan
- Requirements in lokalplaner
- Incorporation into other planning work (e.g. wastewater plan, preparedness plan etc.)
- Municipal administration and climate plan projects

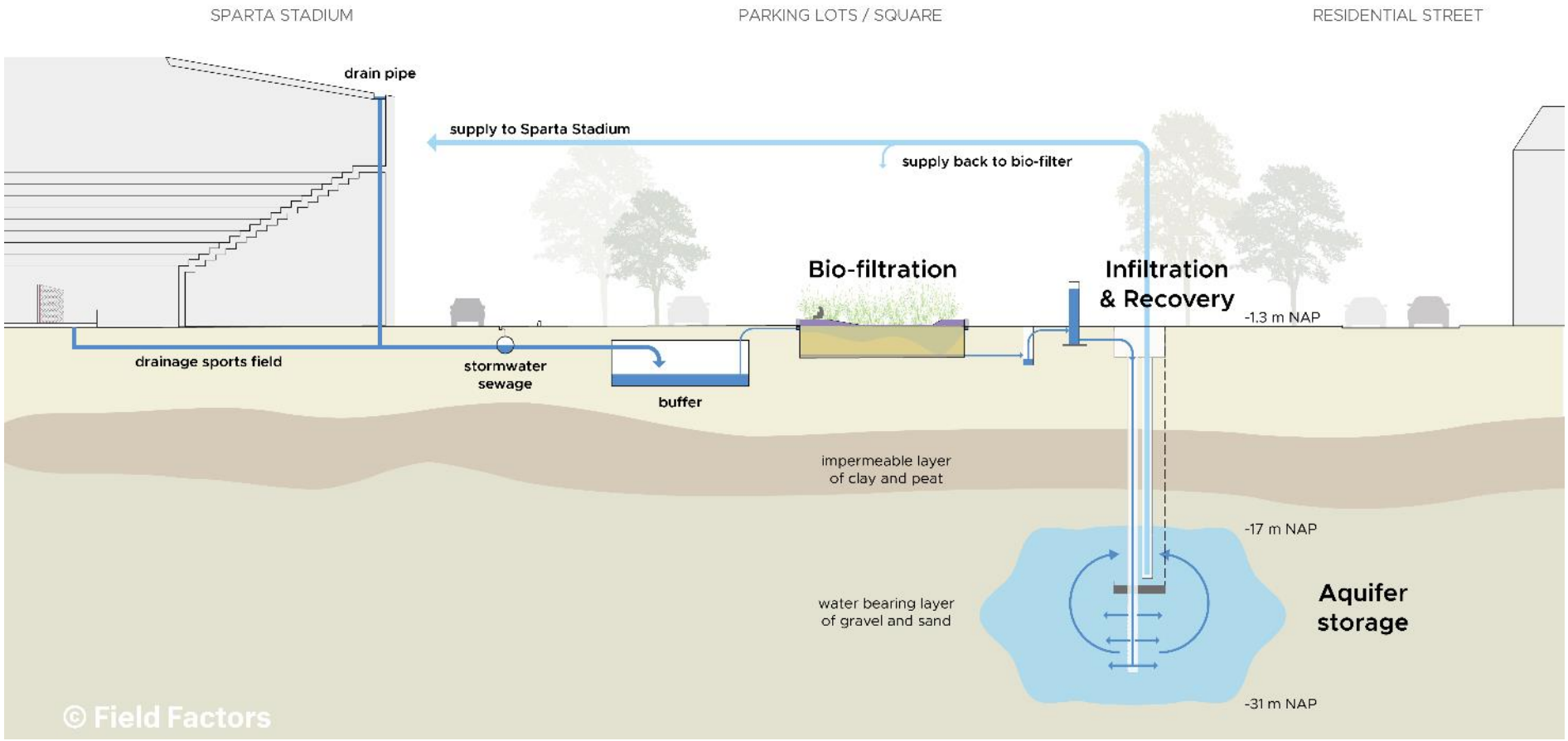
Copenhagen

Governance and urban planning at water basin scale approach



Rotterdam

Urban Waterbuffer: an integral approach to reducing risk of pluvial flooding and mitigating drought



Rotterdam

Opportunities for urban development and NBS

Łódź

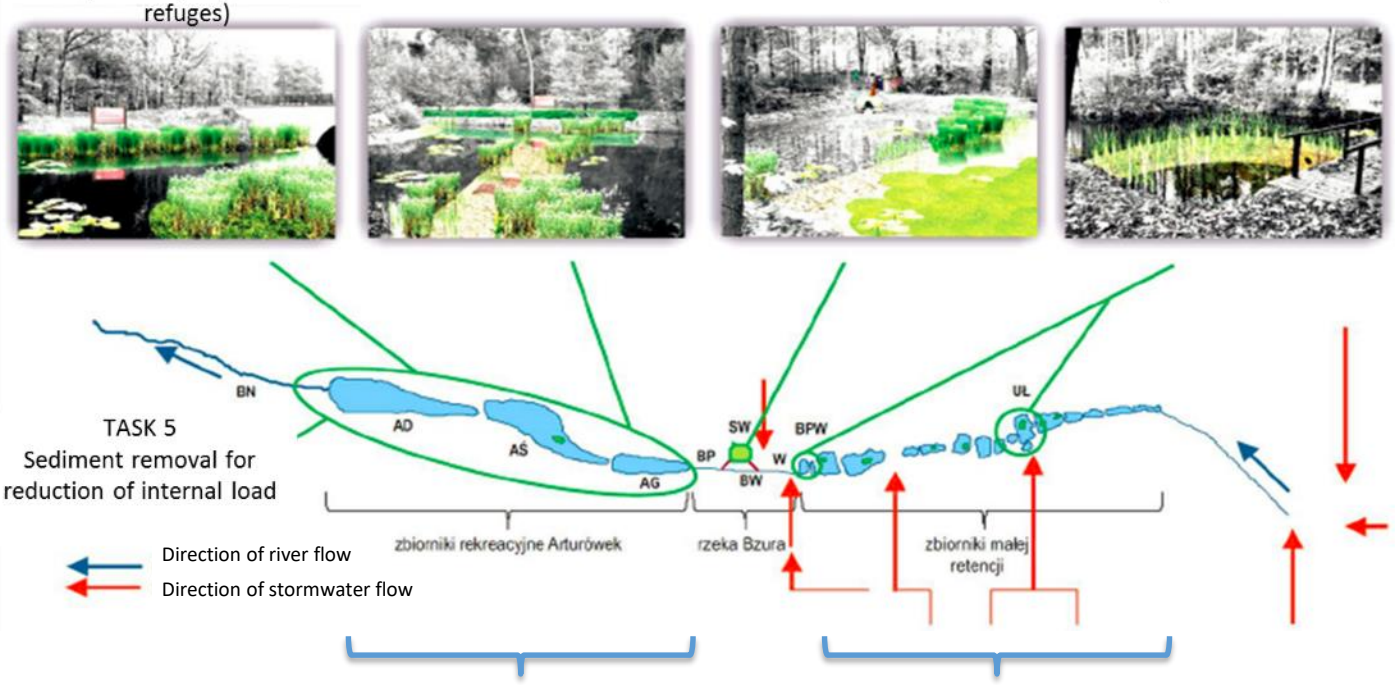
Implementation of NBS along the reservoirs in the upper Bzura river valley – USE OF LOCAL KNOW-HOW AND HUMAN CAPITAL

TASK 1
Construction of buffering zones with biogeochemical bariers, and floating vegetation (zooplankton refuges)

TASK 2
Ecohydrological adaptation of reservoir structre for self-purification purpose

TASK 3
Sequestional biofiltration system for lowering stormwater pollution

TASK 4
Ecohydrological adaptation of small retention ponds for enhancement of self-purification



CYANOBACTERIA BLOOM

NBS - BIOFILTERS

ACHIEVED WATER QUALITY

Final effect: improvement of water quality for biodiversity and recreation in 3 reservoirs

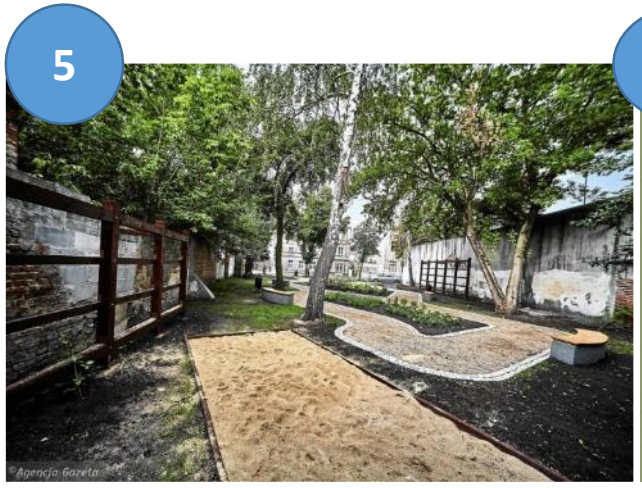
Intermediate effect: reduction of road flooding, and flush of pollutants into water systems

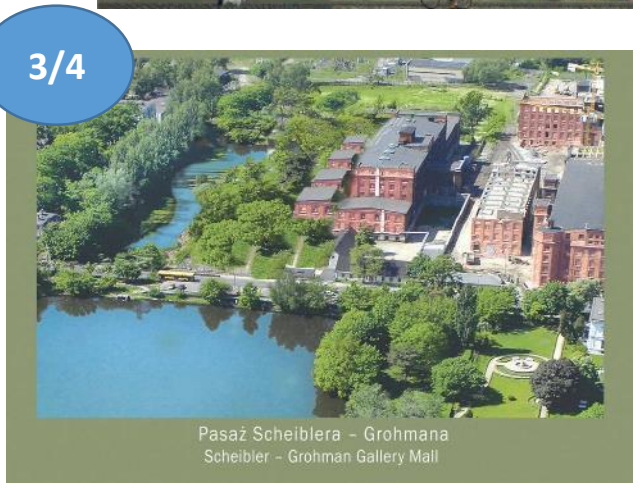
Jurczak, Zalewski 2012

Łódź

Chance for multiplication of NBS and their impact – CATCHING THE MOMENTUM (funding & demand)

1) One of the biggest city revitalization projects in Europe
2) Development of national level city climate change adaptation strategy with involvement of city authorities
3) Increasing urgency to develop the water management strategy at the city level, including rivers and stormwater system
4) Just launched river revitalization action
5) Developing programme of pocket parks for people, water and nature





Summary

Symbiosis between urban development and ecosystems (NBS)

Challenges	Opportunities
An integral approach to integrating co-benefits of NBS into business case needs to be embedded in urban development	Moving from a singular approach to finance water management towards an integral investment case for multiple stakeholders and public-private partnerships
Grey solutions still needed next to NBS. Extensive and expensive construction work (especially in city centre).	Integrating urban planning and CCA, more attractive and climate proofed city. Flooding / drought symbiosis

Summary

City (NBS)	**Challenges (C) and opportunities (O)** for symbiosis between urban development and ecosystems (NBS)
Rotterdam (Urban Water Buffer)	(C) Integrating co-benefits of NBS into business case (O) From singular approach to finance water management towards an integral investment case for multiple stakeholders and public-private partnerships
Copenhagen (Green / Blue infrastructure)	(C) Grey solutions still needed next to NBS. Extensive and expensive construction work (especially in city centre). (O) Integrating urban planning and CCA, more attractive and climate proofed city. Flooding / drought symbiosis
Łódź (River Restoration / Green / Blue infrastructure)	(C) Price as the main determinant of customer choices doesn't stimulate private companies to invest in NBS and space for nature (O) Programmes of city revitalization and awareness building, BD rich and extensive green spaces inside and around the city, high frequency of extreme events – awareness of CC

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Sanitation: for the community, for the environment

Alexandra Campbell-Ferrari
Executive Director, The Center for Water Security and Cooperation
World Water Week 2018
acampbellferrari@ourwatersecurity.org

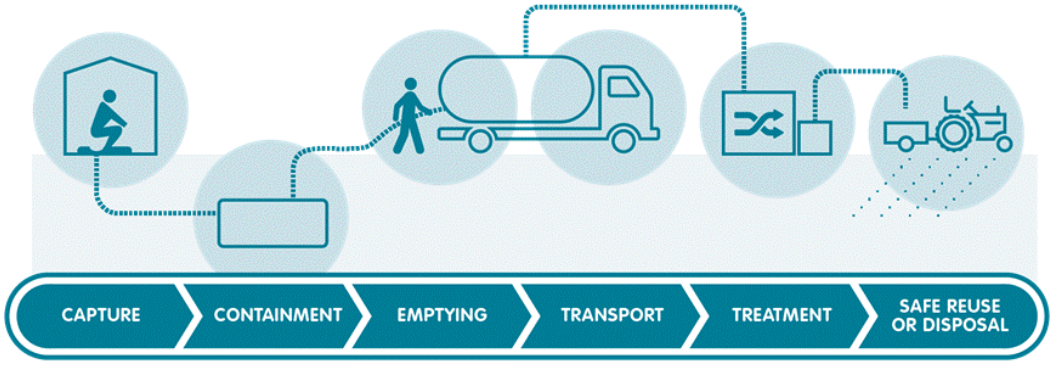
THE CENTER FOR WATER SECURITY AND COOPERATION

THE CENTER FOR WATER SECURITY AND COOPERATION

What is **"sanitation law"**, where do you find it, and why does it matter for urban planning?

Sanitation law is found in:

- Water quality laws
- Water allocation laws
- Infrastructure laws
- Environmental protection laws
- Catchment strategies
- Urban development strategies
- Planning and zoning laws
- Housing and building codes
- Land use laws
- Procurement and financing laws
- Local governance laws
- Constitution



THE CENTER FOR WATER SECURITY AND COOPERATION

Case Study: South Africa

Governance

- National Gov't (acting through the Dep't of Water and Sanitation)
  - public trustee of South Africa's water resources
  - responsible for managing and protecting water quality and quantity and establishing the CMAs
  - provides bulk water
  - can set nat'l standards re: water services provision
- Catchment Management Agencies
  - established by the Minister; where no CMA established or not functional, powers vest in Minister
  - implement Catchment Management Strategy
  - oversee water use registrations and authorizations
  - limit use during a water shortage
- Provincial Gov't (9 provinces)
  - environmental protection
- Municipal Gov't (metros, districts, locals)
  - provide water and sanitation services

Laws

- Constitution
- National Water Act: manages water resources
- Water Services Act: manages water services
- Catchment Management Strategy
- National Environment Management Act (NEMA)
- National Sanitation Policy
- National Development Plan
- Integrated Development Plan, Spatial Development Frameworks
- Municipal Finance Management Act
- Municipal Structures Act
- Municipal Systems Act
- Municipal Water and Sanitation Bylaws
- Division of Revenue Bill
- Spatial Planning and Land Use Management Act

Lessons learned, challenges, next steps

- Increased access to sanitation and improved management of wastewater is essential to improving the water quality of river basins.
- Laws, as written, and governance structures, as created do not necessarily leverage the symbiosis of WASH targets and river basin management goals/purposes.
- But before we can align these missions, we need to understand how existing laws address sanitation across existing sectoral and jurisdictional silos.

CWSC THE CENTER FOR WATER SECURITY AND COOPERATION

Roundtable Discussion Question:

What change in planning and governance is needed to prevent pollution of urban water bodies? Is such a changed needed or just a better understanding of the intersecting relationships and impacts of laws?

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SIWI WORLD WATER WEEK

26 – 31 August, 2018, Stockholm, Sweden

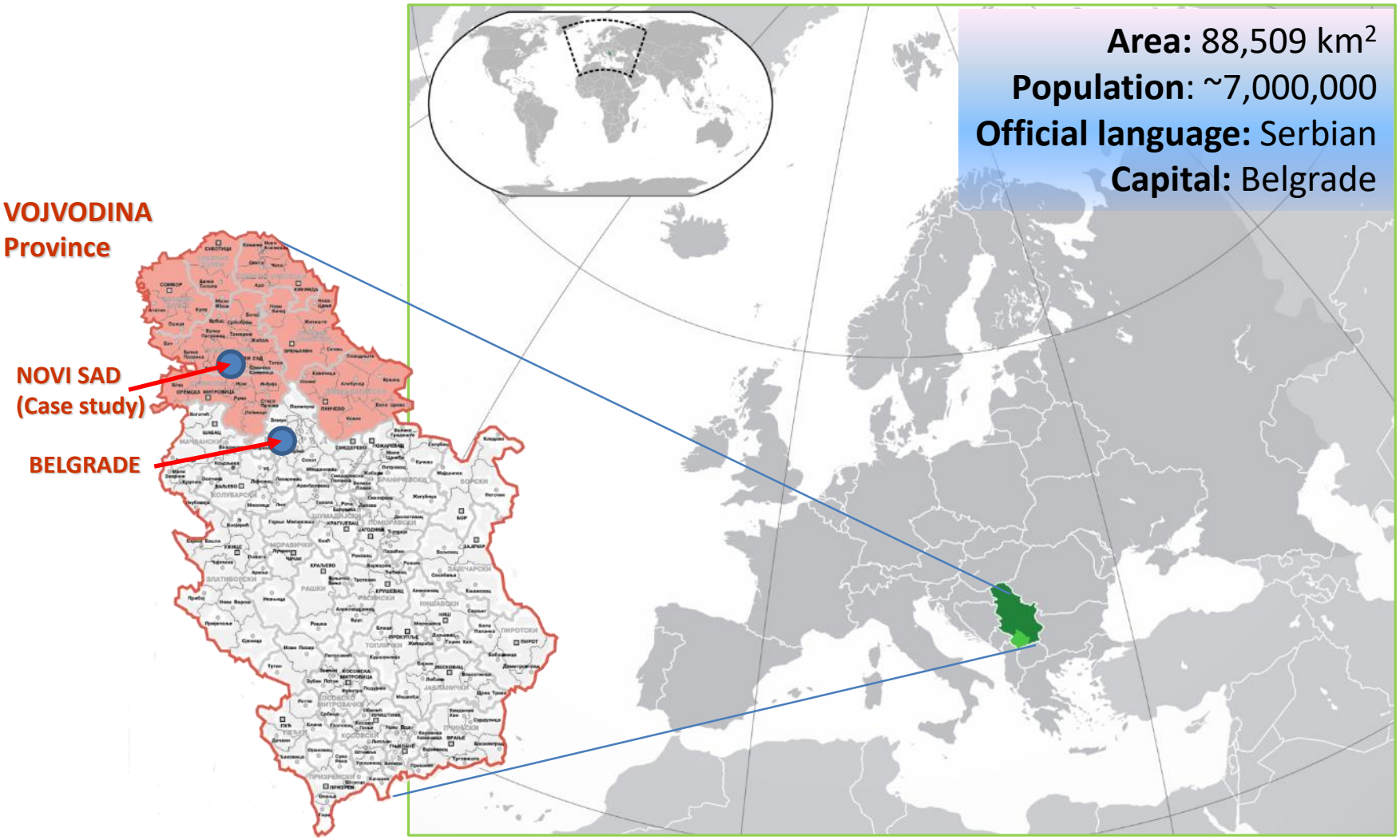
Is really ecosystem development hand in hand with urbanization?

Bojan Srdjevic[1], Zorica Srdjevic[1], Milena Lakicevic[2]

[1]University of Novi Sad, Faculty of Agriculture, Department of Water Management, Group for Systems Analysis and Decision Making, Trg D. Obradovica 8, 21000 Novi Sad, Serbia

[2]University of Novi Sad, Faculty of Agriculture, Department of Fruit Science, Viticulture, Horticulture and Landscape Architecture, Trg D. Obradovica 8, 21000 Novi Sad, Serbia

Serbia in the World



SIWI WORLD WATER WEEK

THE NOVI SAD CITY

URBANIZATION AND ECOSYSTEM DEVELOPMENT

Serbian City Novi Sad is experiencing problems in managing its ecosystems, affected mainly by urbanization, institutional organization and societal behavior.

Earlier research indicated options to improve maintenance of parks, distribution of fresh and purification of polluted water, fostering resilience of ecological systems, and reducing and protecting the environment.

Need to explicitly relate urban and ecosystem development indicators with management of city areas covered by public parks, to quantify their mutual impact and to trace the road toward synergy.

Way forward is recommended via implementing participative decision-making framework to motivate residents to work hand-in-hand with institutions. Awareness of hesitancy is present in judging criteria, attributes and action options – so proper scientific methodology will be implemented.

APPROACH/METHODOLOGY/OUTCOME

Participative decision-making framework is required to motivate residents to work hand in hand with institutions.

The hesitant analytic hierarchy process methodology for multicriteria decision-making is applied to derive priorities of urban and ecosystem development indicators.

/'hesitant' here means 'uncertain', 'unsure', 'doubtful', but in a way also 'sceptical', 'reluctant'/

Applied methodology is considered adequate because it manipulates qualitative and quantitative decision elements, commonly expressed in non-commensurate units, and because it provides trustful environment for involved participants while making decisions.

APPROACH/METHODOLOGY/OUTCOME … cont.

Priorities of indicators, once determined by stakeholders/interest groups will enable focused discussion towards reaching consensus between representatives of authorised city bodies and professional experts (including academia experts) regarding recommendations to be given to the city government on how to harmonize urban and ecosystem development.

Outcome of the process will expectedly be an answer to the question **Is really ecosystem development hand in hand with urbanization?** and this should trace the strategy how to achieve it in sustainable and synergistic way.

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Developing urban water ecosystem sustainability indicators: water ecosystem health assessment

U.C. SHARMA

Centre for Natural Resources Management

Aerial view of Jammu city

Urban Water Ecosystem Indicators

1. Indicators are tools of information, which summarize important properties, visualize phenomena of interest, quantify trends and communicate them to relevant target groups.
2. Urban water ecosystems (UWE) perform functions like water supply for production and cleaning, removal of fecal matter, handling of wastewater, drinking water provision, prevention of flooding by drainage water etc.
3. Cities have complex systems that deliver vital goods and services to a large, dense population, being in that sense comparable to ecosystems.

Study Site and Methodology

The study place is the city of Jammu, India.

Major factors considered for UWE indicators were;

1. **Status (source and quantity of water bodies),**
2. **Quality (extent of pollution),**
3. **Dimensions of sustainability (environment, society and economy),**
4. **Economic accounting (monetary aspects),**
5. **Biophysical (natural resources),**
6. **resource and material, and,**
7. **Pressure (effects considered as negative).**

The Magnitude of the Problem…..

- **Against a demand of 2.985 X 10^5 m^3 day^{-1} for drinking, sanitation, other domestic uses and industrial units, only about 2.385 X 10^5 m^3 day^{-1} or 79.9%, is available.**
- **About 15 to 25% available water is lost in transit due to leakage from pipes and, only 64% of the demand is met.**
- **The water supply is constrained by natural water scarcity, conflicting demands, development, spurt in population growth, dilapidated infrastructure, allocation among users in time, aquifer recharge capacity, contamination and land subsidence.**

Development of Urban Water Ecosystem Norms: five causes of worry

Major causes of worry for Jammu are;

1. System boundaries,
2. Objectives,
3. Time frame of projects,
4. External pressure and,
5. Needs and interest of stakeholders.

Water Ecosystem Sustainability Indicators for Jammu City

(i) socio-economic or threat to water resources due to societal needs

(ii) meteorological,

(iii) environmental, as droughts,

(iv) resilience or ability of the system to maintain water resources despite major disturbance and stability under stress conditions

(v) policy domain and management, including developmental works, spatial and intergenerational equity and relationship between people and policy makers.

Canals carry polluted water


Thank you very much

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INTEGRATING LAND USE AND WATER MANAGEMENT PLANNING WITH MULTI CRITERIA ANALYSIS

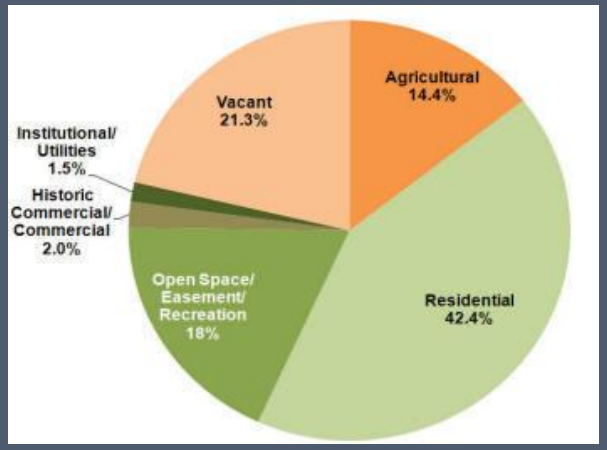
Homero Castanier
Environmental Management Department
Water and Sanitation Public Company of the City of Quito
August 2018

Pressures of **population growth and climate change** urge attention to the relationship between where and how people live and **the water they need**.

Land use planning and water resources planning are processes widely applied, however they often lack of **connection**, which leads to deal with problems of water quality and supply.

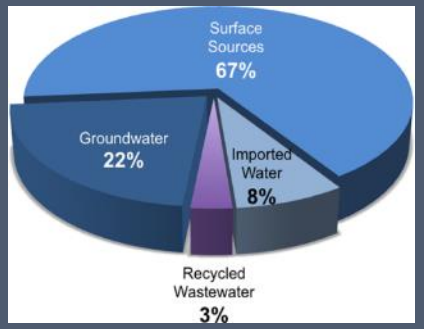
Land and water resources are complex systems comprised of **natural, social, economic, political, and physical** subsystems that dynamically and continuously interact.

LAND USE

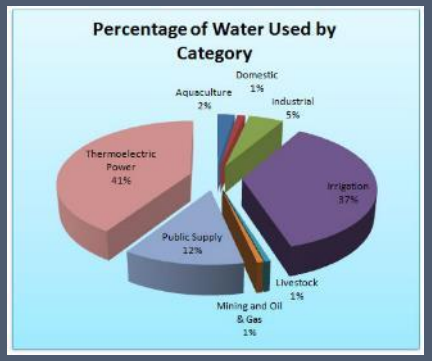


Source: West Pikeland Comprehensive Plan Addendum 2006

WATER MANAGEMENT



http://www.townscapeinc.com/land-usenatural-resourceconservation-planning/



Source: Estimated Use of Water in the United States 2005, USGS 2005

BIOPHYSICAL AND SOCIOECONOMIC CHARACTERISTICS

Land use decisions

- Must take into account **where the necessary water will come from**, and at what cost (economic, environmental and social).
- Should be coordinated on a **large-landscape scale across jurisdictional boundaries**.
- Have to be mindful of water supply constraints, and prioritize development that is most consistent with maintaining water quality and **ensuring sustainable supplies**.

Land use and water management decisions

With the large number of elements that have to be considered, a large number of combinations of potential management actions is possible, being fundamental the **application of a multi criteria decision making tool**.

The results allow the optimization of resources and investments and set priorities related to water management when planning for land use.

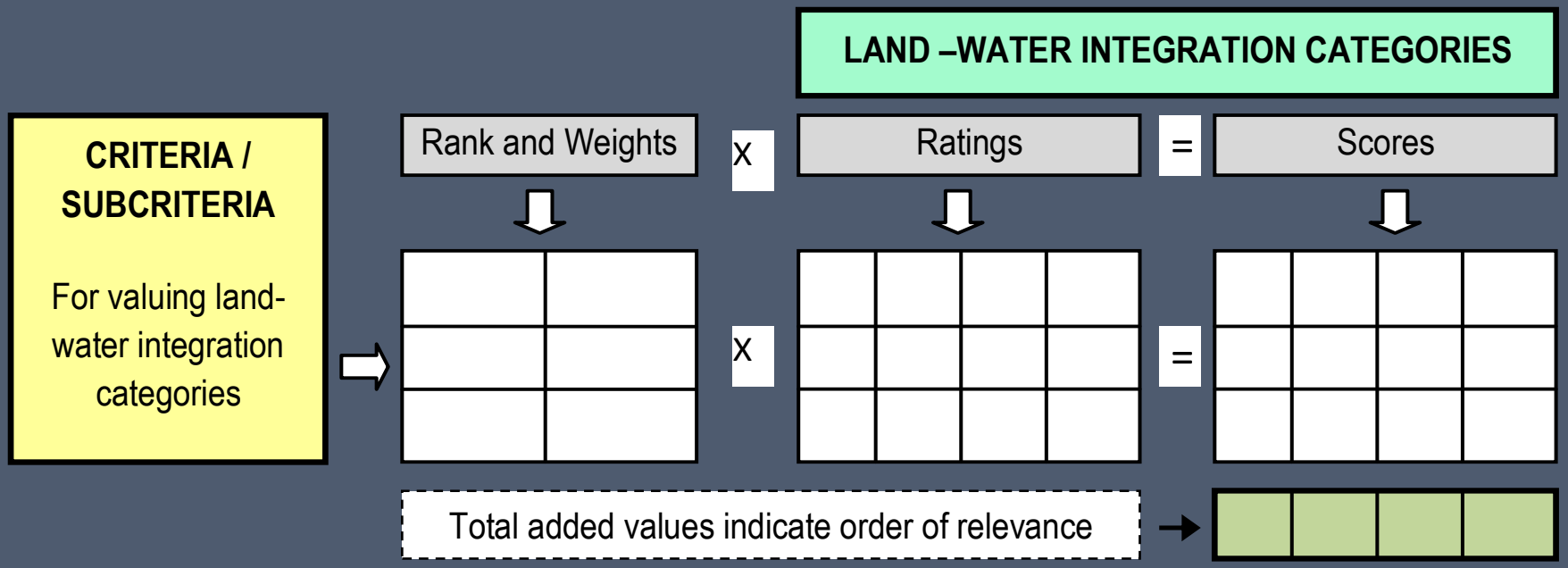
Alternatives of **Integration Categories**

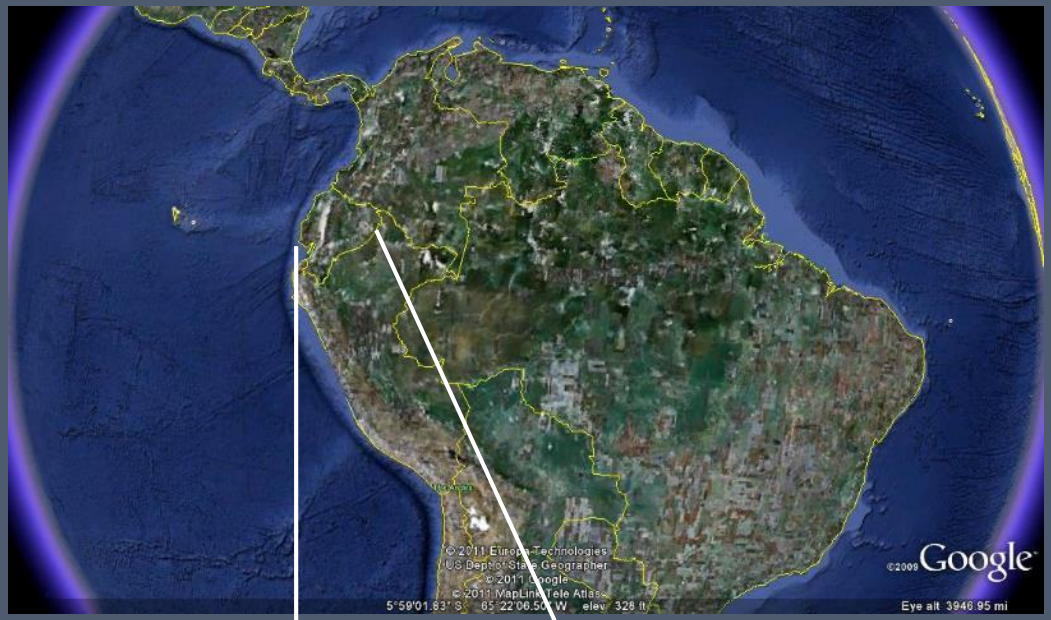
1. **Water Supply Assessment:** Determine adequate water availability.
2. **Water Supply Development:** Expand storage and delivery capacity, increase water supply.
3. **Rate Structures:** Rates and fees.
4. **Comprehensive Planning Efforts:** Connected land use and water management plans.
5. **Growth Management and Densification:** Urban growth and conservation.
6. **Regional Structures:** Inter-institutional agreements and water councils.
7. **Resource Use Efficiency:** Water efficiency and incentives.
8. **Education:** Education to all levels.

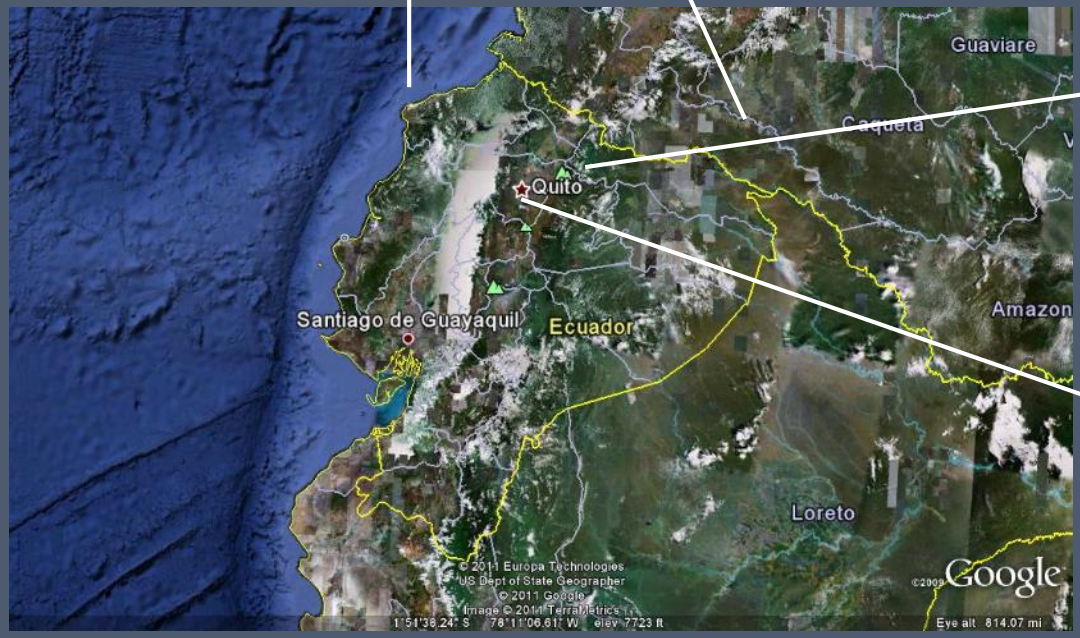
Criteria that reflect the values associated with the consequences of each water and land use integration categories:

1. Required Baseline Information
2. Existing or Required Planning
3. Environment
4. Economic Values
5. Legal and Policy Framework
6. Socioeconomic and Environmental Feasibility

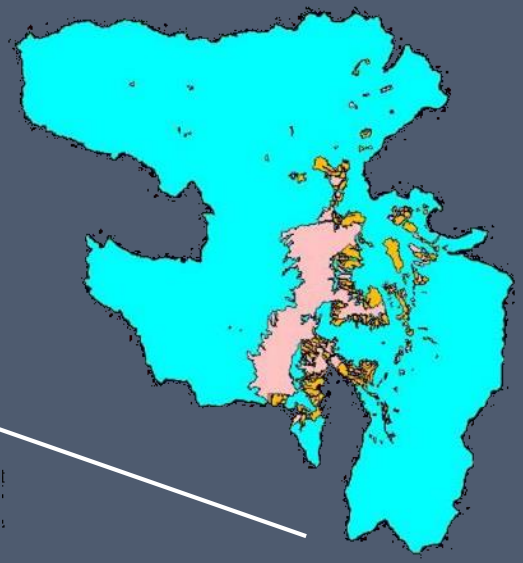
MULTI CRITERIA ANALYSIS (MCA) MODEL FOR WATER MANAGEMENT AND LAND USE PLANNING INTEGRATION



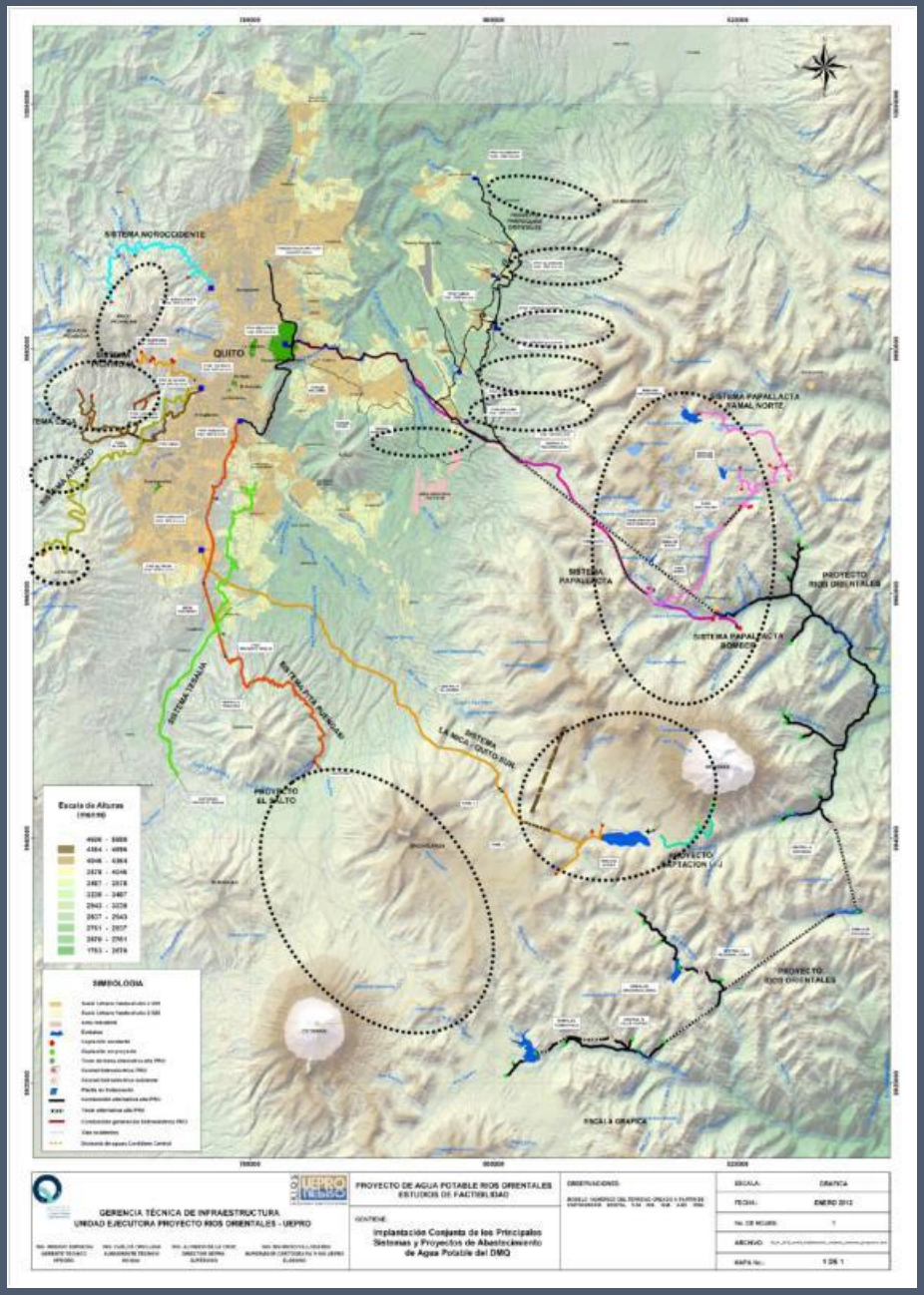


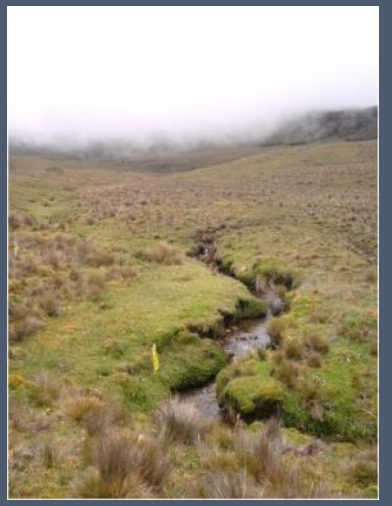


METROPOLITAN DISTRICT OF QUITO



Water supply systems and watersheds schemes of the city of Quito





Level of relevance of land and water integration components
City of Quito

Ranking	Land and Water Integration Categories	MCA Score
1st	Water Supply Assessment	1580
2nd	Water Supply Development	1547
3rd	Regional Structures	1448
4th	Comprehensive Planning Efforts	1410
5th	Growth Management and Densification	1323
6th	Rate Structures	1319
7th	Education	1272
8th	Resource Use Efficiency	1021

QUESTIONS ?

What would be the advantages or limitations of the application of a Multi-Criteria Analysis in order to optimize resources and set priorities related to water management when planning for land use?

If there was one single most important factor to be addressed in order to integrate land use and water management planning, what would it be?

Thank you!

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Accra's groundwater

A strategic resource for improved (peri-) urban resilience

Dr Jenny Grönwall

Ecosystems in an urbanizing world: Challenges and opportunities for symbiosis

26 Aug 2018

SIWI

For poor urban households, *resilience* is a matter of ensuring water access from different sources, for different purposes

In stressed urban water scenarios, ***diversification*** is vital
to spread risks and improve preparedness

Managed aquifer recharge (MAR)
& groundwater source protection form the backbone of conjunctive use

City planners must learn & understand actual coping mechanisms of end-users

$\rightarrow$ adaptation

$\Rightarrow$ resilience

Grönwall & Oduro-Kwarteng, 2018

Groundwater as a strategic resource for improved resilience: a case study from peri-urban Accra

Env Earth Sci 77: 1 10.1007/s12665-017-7181-9

Feedback from roundtables

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Roundtable discussion chaired by presenters

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Roundtable discussion

Roundtable with Dr. Peter van der Keur - In what way can we assess the insurance values of NBS in green cities? How to develop business models for attracting investment in NBS

Roundtable with Ms. Alexandra Campbell-Ferrari - What change in planning and governance is needed to prevent pollution of urban water bodies?

Roundtable with Prof. Bojan Srdjevic - Who will be bearing the costs implementing NBS/green infrastructure in the urban setup, especially those costs related to retrofitting of old infrastructure?

Roundtable with Dr. Uttam C. Sharma - What are the merits of health assessments and indicators for integrated urban water management; and *how* do we translate this to policy and practice?

Roundtable with Homero Castanier - If there was one single most important factor to be addressed in order to integrate land use and water management planning, what would it be?

Roundtable with Jenny Grönwall - How can cities improve their resilience in the face of water scarcity or flooding?

Concluding remarks

Seminar 9: Ecosystems in an Urbanising World
Stockholm World Water Week 2018

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SIWI WORLD WATER WEEK

Global Water Partnership

ECOSYSTEMS
IN AN URBANISING WORLD
challenges and opportunities for symbiosis

Join the conversation! 26 August 2018 at the World Water Week in Stockholm

SESSION 1 | 11.00-12.30 *Working with nature to restructure urban fabrics:* ***local solutions***
SESSION 2 | 14.00-15.30 *Aiming for green cities:* ***planning and governance***
SESSION 3 | 16.00-17.30 *Sofa discussion:* ***envisioning the road ahead***

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