



**GDAŃSK UNIVERSITY
OF TECHNOLOGY**



URBLUME

Blue Green Cities

Towards Mitigation of Eutrophication Problem



Urbanisation and water

Urban impact

PURE 2009

Problems

Solutions

WSUD restores

WSUD integrates

WSUD elements

URBLUME

Aims

Questions

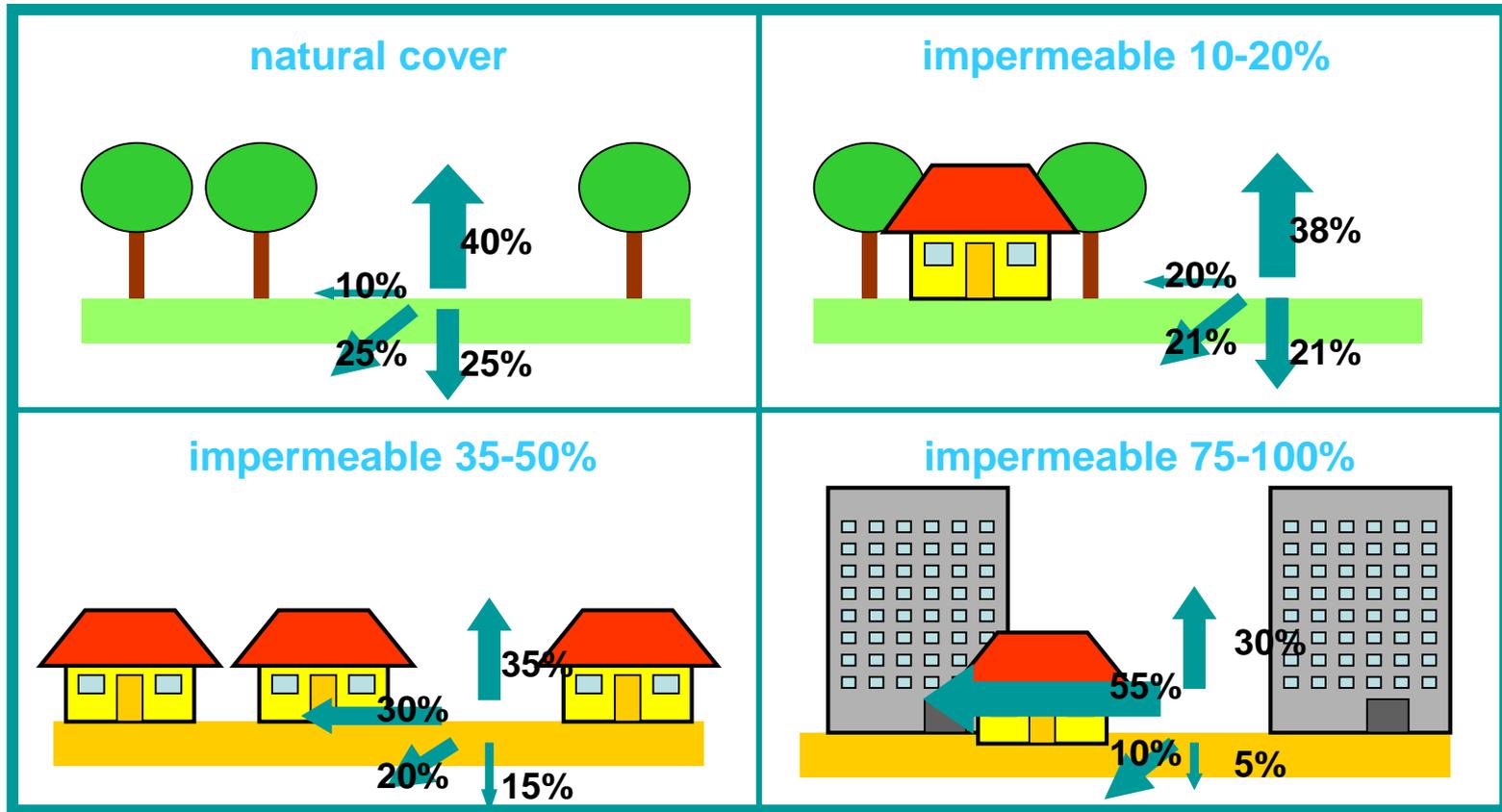
Goals

Outputs

Partners

Contacts

URBANISATION AFFECTS STORMWATER RUNOFF



Reduced evapotranspiration

Large volume of poor quality runoff

Reduced | underground outflow

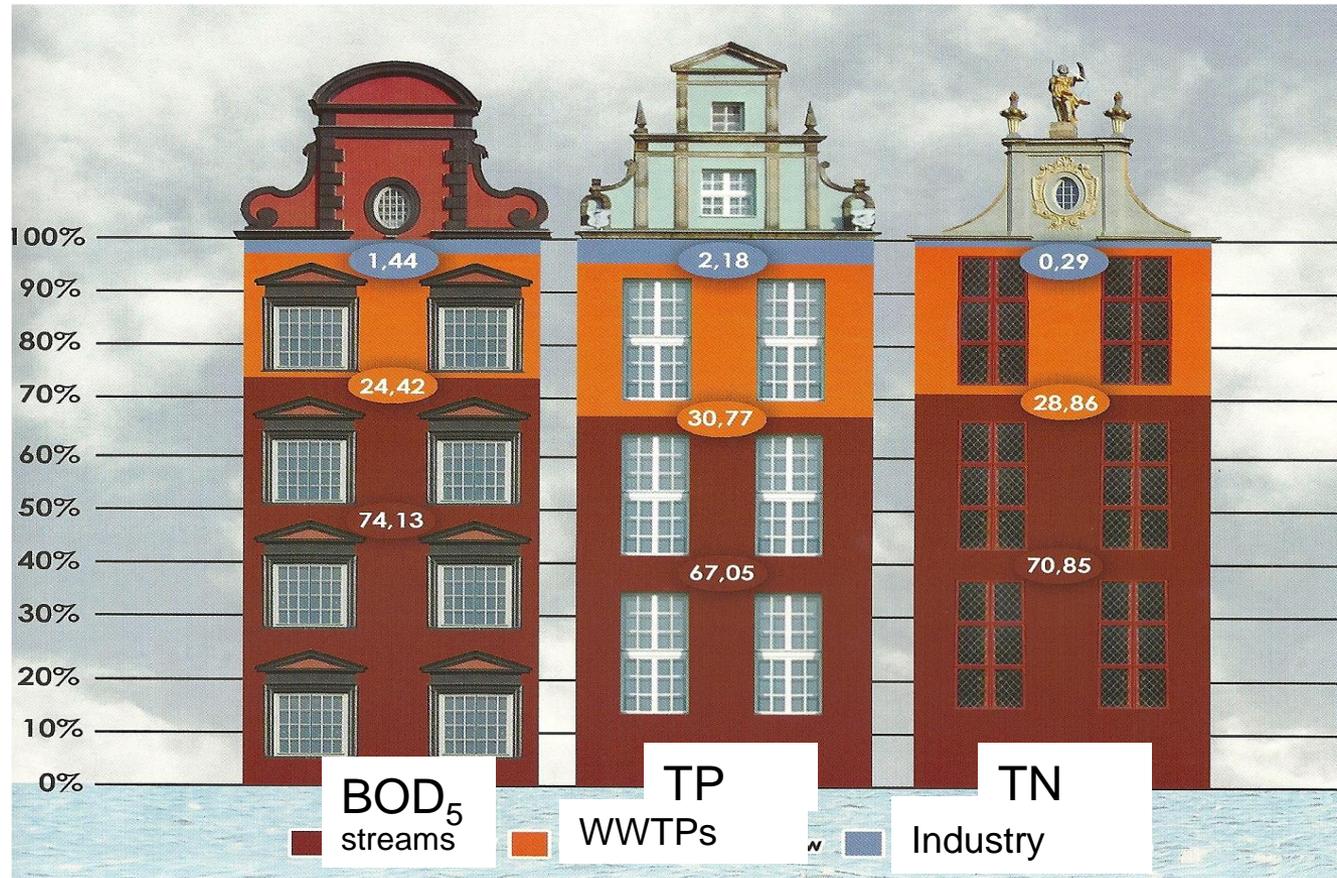
Reduced infiltration

Wojciechowska et al., 2015



Stormwater as a source of different pollutants

Total Suspended Solids, Organics, Poliaromatichydrocarbons, Biogenic and Persistent Organic Pollutants



PRIMARY SOURCES OF POLLUTION OF THE BAY OF GDANSK, %

The load of pollutants discharged to the Baltic Sea, May 2011” PURE project on urban reduction of eutrophication



Problems

Environmental degradation , lack of biodiversity, pollution

Treatment of runoff – different pollutants: OM, TSS, N, P, POPs, PAHs

WE NEED TO LOOK FOR :

Sustainable solutions: space limitation/diversity/resistance

Low costs, low energy and multifunctional

Effective , friendly, easy to maintain





WSUD

a land planning and engineering design approach which integrates the **water management** and **urban design**.

The main objective is to minimise environmental degradation and enrich the urban areas through aesthetic and recreational appeal

**RETENTION
INFILTRATION
SAVING, PROTECTION AND
RECHARGING OF WATER
RESOURCES**



https://pl.wikipedia.org/wiki/Woda#/media/File:Water_droplet_blue_bg05.jpg

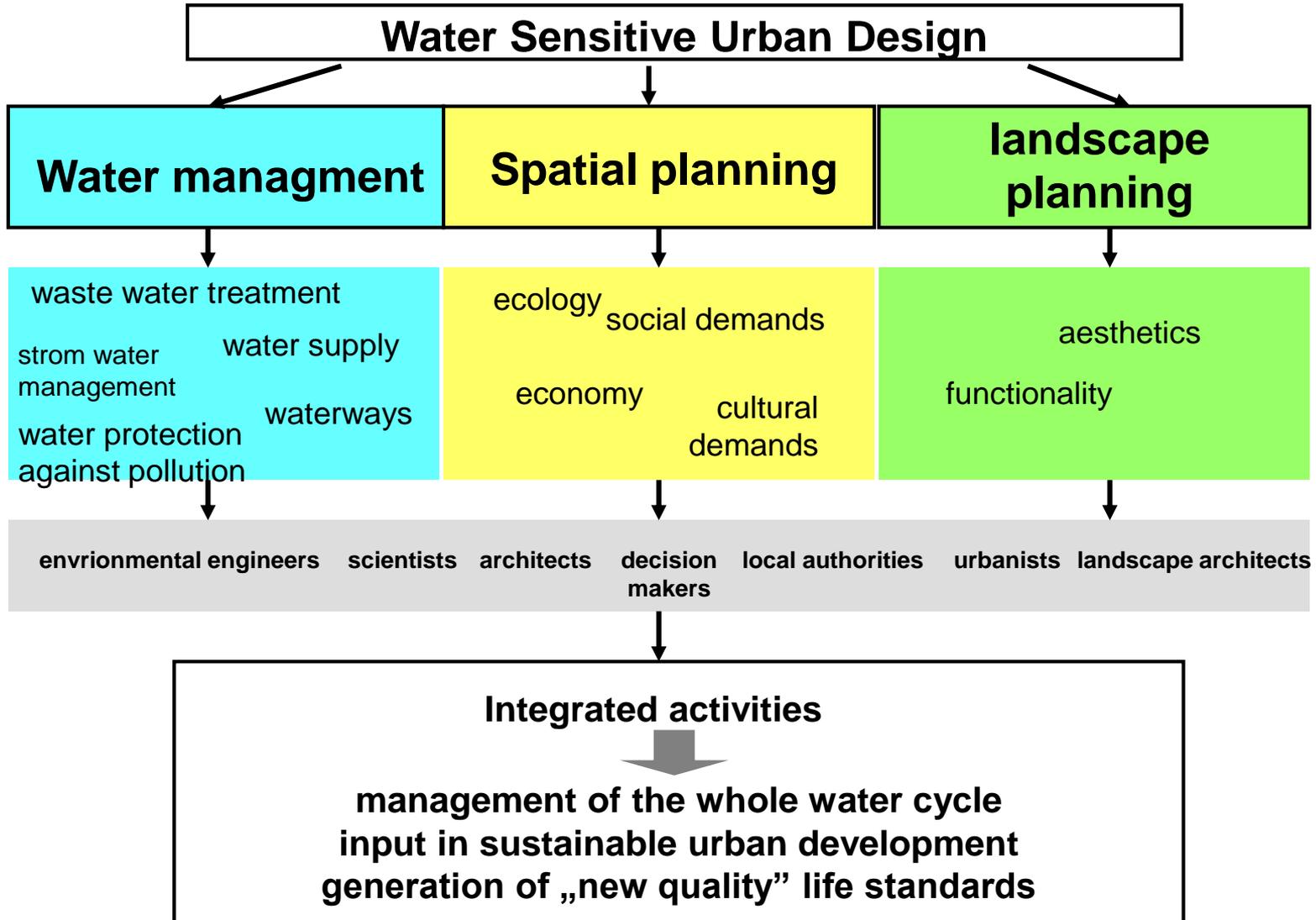


RESTORE OF NATURAL WATER CYCLE IN THE URBAN AREAS

- ✓ flooding risk control
- ✓ runoff treatment
- ✓ recharging of ground water resources
- ✓ increasing evapotranspiration
- ✓ positive impact on micro-climate of urbanized areas- mitigation of heat islands
- ✓ potential rainwater reuse (rainwater harvesting)
- ✓ city aesthetical and recreation values



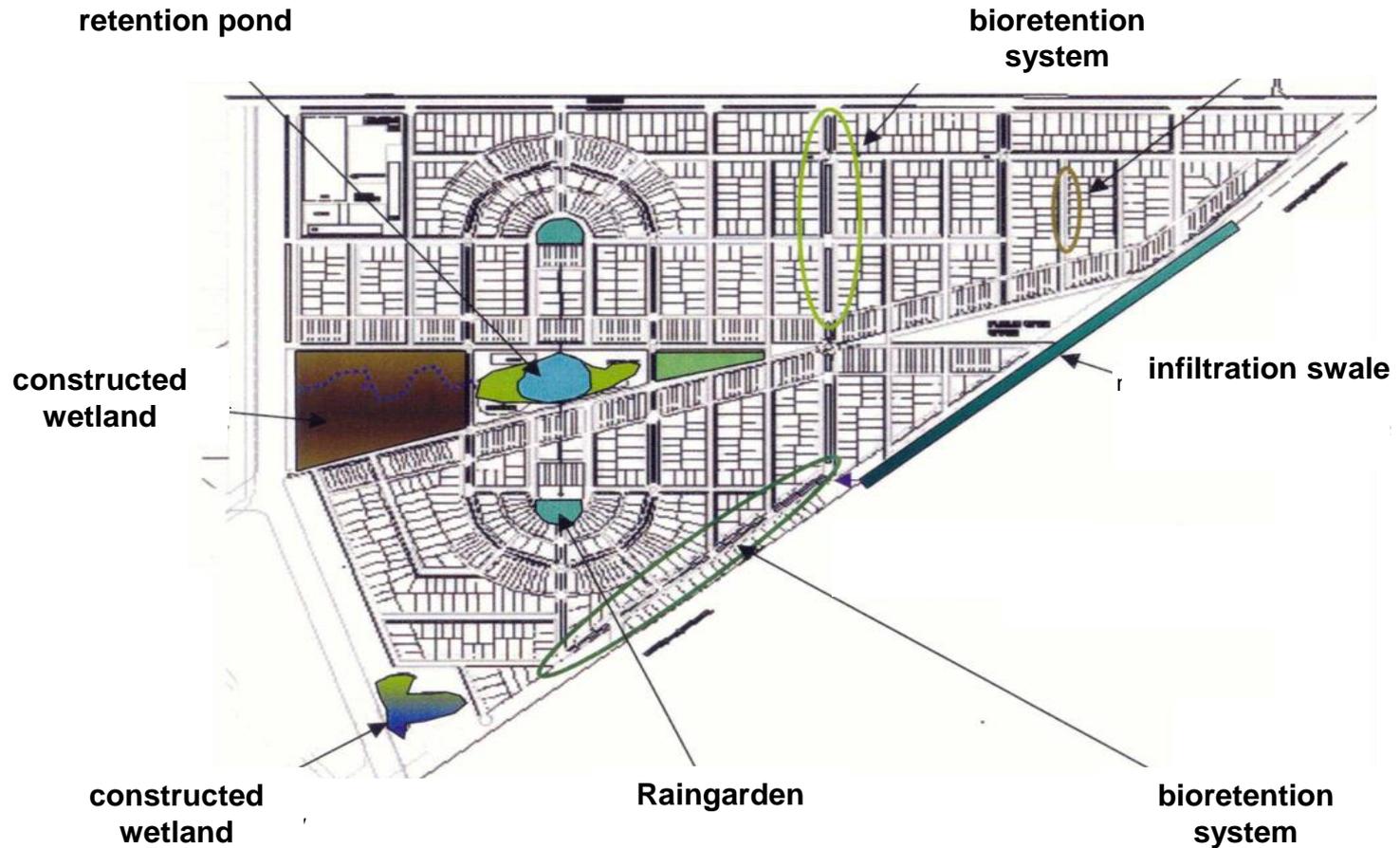
WSUD integrates





WSUD elements

Possible elements applied in WSUD





PROBLEM: WE DO NOT HAVE TOOLS for **WSUD** implementation
WE NEED spatial planning and water management methods and technological solutions.

The **main aim of the project** is to
develop the methods and technologies to prevent water pollution and enriching water biodiversity by implementing **WSUD** systems in urban areas located around Baltic Sea.

Requirements	Objectives
<ul style="list-style-type: none">• storm water management in the city should be as close as possible to natural water cycle	sustainable storm water management
<ul style="list-style-type: none">• aesthetics of urban landscape• well-fitted in the landscape	aesthetics
<ul style="list-style-type: none">• utility, depending on the local demands• easy maintenance• easy adaptable to changing conditions	functionality
<ul style="list-style-type: none">• new recreation places and/or biodiversity promotion	utility benefits
<ul style="list-style-type: none">• social demands should be addressed• engagement of citizens in the planning process• the costs of sustainable solutions should not be higher than conventional ones	social acceptance



technological solutions

- How to refine technologies in order to clean water as well as to protect and enhance natural water systems in urban developments taking into account the effectiveness and costs? **Identification of pollutants (TSS, N, P Organics, POPs) and how the pollution should be removed?**

interdisciplinary approach

- How spatial and urban planning and water management frameworks can be reformed and integrated to effectively support the implementation of WSUD?
- How to integrate the stormwater treatment into landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of developments while reducing the uncontrolled runoff from urban areas and preventing floods?



Long – term

- **improvement of water quality:** development and improvement of treatment components of WSUD system
(in other to enrich water biodiversity and pollution removal);
- **improvement of water retention:**
 - development and improvement of water collection and storage
(including their impact on flooding risks);
- **improvement life quality in highly urbanized area:**
 - mitigation of heat island effect,
 - creation of recreation area
 - increasing biodiversity,
 - increasing market value of the area.



focus on

Promoting WSUD

Defining standards /procedures for planning integrity of spatial planning , water managment and landscape planning

Defining standards / procedures /methods for adopting WSUD to local requirements

output

The set of technical solutions

New planning methods



**GDAŃSK UNIVERSITY
OF TECHNOLOGY**

URBLUME partners

Leader

Gdańsk University of Technology

Partners

Town Hall of Gdansk, Gdynia

Union of Baltic Cities

Design Offices

Universities : Lublin Life Science University

Grupa LOTOS S.A

Building company ROBYG

Gdańsk Urban Drainage Company (Melioracje Gdańskie)



GDAŃSK UNIVERSITY
OF TECHNOLOGY

URBLUME contacts

Thank You

Project leader and contact information:

Faculty Of Civil
and Environmental Engineering
Gdańsk University of Technology,

Ph.D.D.Sc Magdalena Gajewska
Department Water and Waste-Water
Technology

Tel: +48 58 347 15 09

T-mobile: 508 084 149

e-mail: mgaj@pg.gda.pl

Ph.D.D.Sc Ewa Wojciechowska
Department of Sanitary Engineering

Tel: +48 58 347 27 93

T-mobile: 503 816 796

e-mail: esien@pg.gda.pl

PhD architect Dominika Wróblewska
Gdańsk University of Technology,

Department of Geodesy

Tel: +48 58 347 17 31

T-mobile: 509779251

e-mail: dommi@pg.gda.pl

Hoyer J., Dickhaut W., Kronawitter L., Weber B. (2011): Water Sensitive Urban Design. Principles and Inspiration for Sustainable Stormwater Management in the City of the Future Manual. Elaborated in the context of the research project SWITCH – Managing, Water for the City of the Future. Hamburg: Hafencity Universität.

The load of pollutants discharged to the Baltic Sea, May 2011”
PURE project on urban reduction of eutrophication

Wojciechowska E., Gajewska M., Żurkowska N., Surówka M., Obarska-Pempkowiak H. (2015). Zrównoważone systemy gospodarowania wodą deszczową. Wydawnictwo Politechniki Gdańskiej. 147 s. ISBN 978-83-7348-631-7