



**Wrocław experience in cooperation with  
International Financial Institutions after flood  
1997 – history of recovery and development**

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Odra - Vistula River Basin Flood Protection Project  
PCU Wrocław**

**Wrocław, 24 September 2018**

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- 1. Cities - urban resilience – economic development**
- 2. Floods in Poland & in Odra River basin**
- 3. Odra 2006 & World Bank initiated and IFI supported projects**
- 4. Presentation of results**
- 5. Conclusions**

# Why urban resilience? Because cities matter the most

Cities:

- generate **85%** of global GDP,
- consume **75%** of the world's natural resources and
- account for **80%** of global greenhouse gas emissions.

Today 7.3 billion people live and work in only 7.6% of the global land mass.



7.3 bn



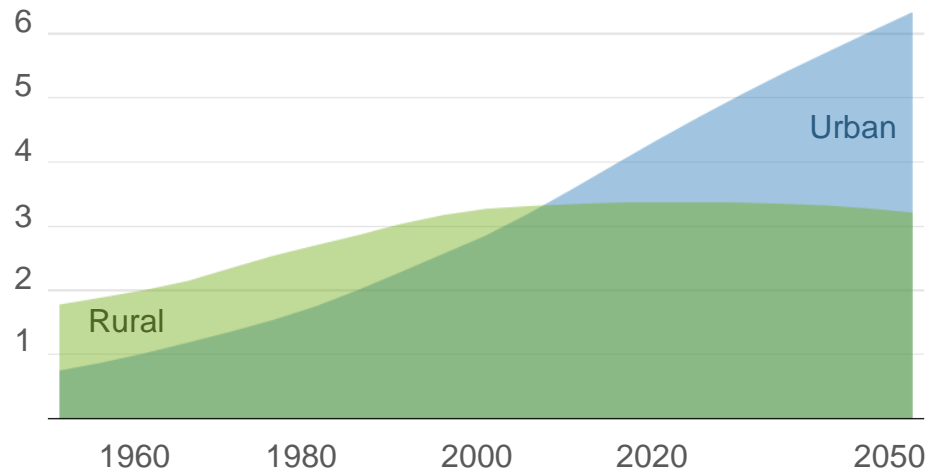
7.6%

**85%** of the global population lives in urban areas

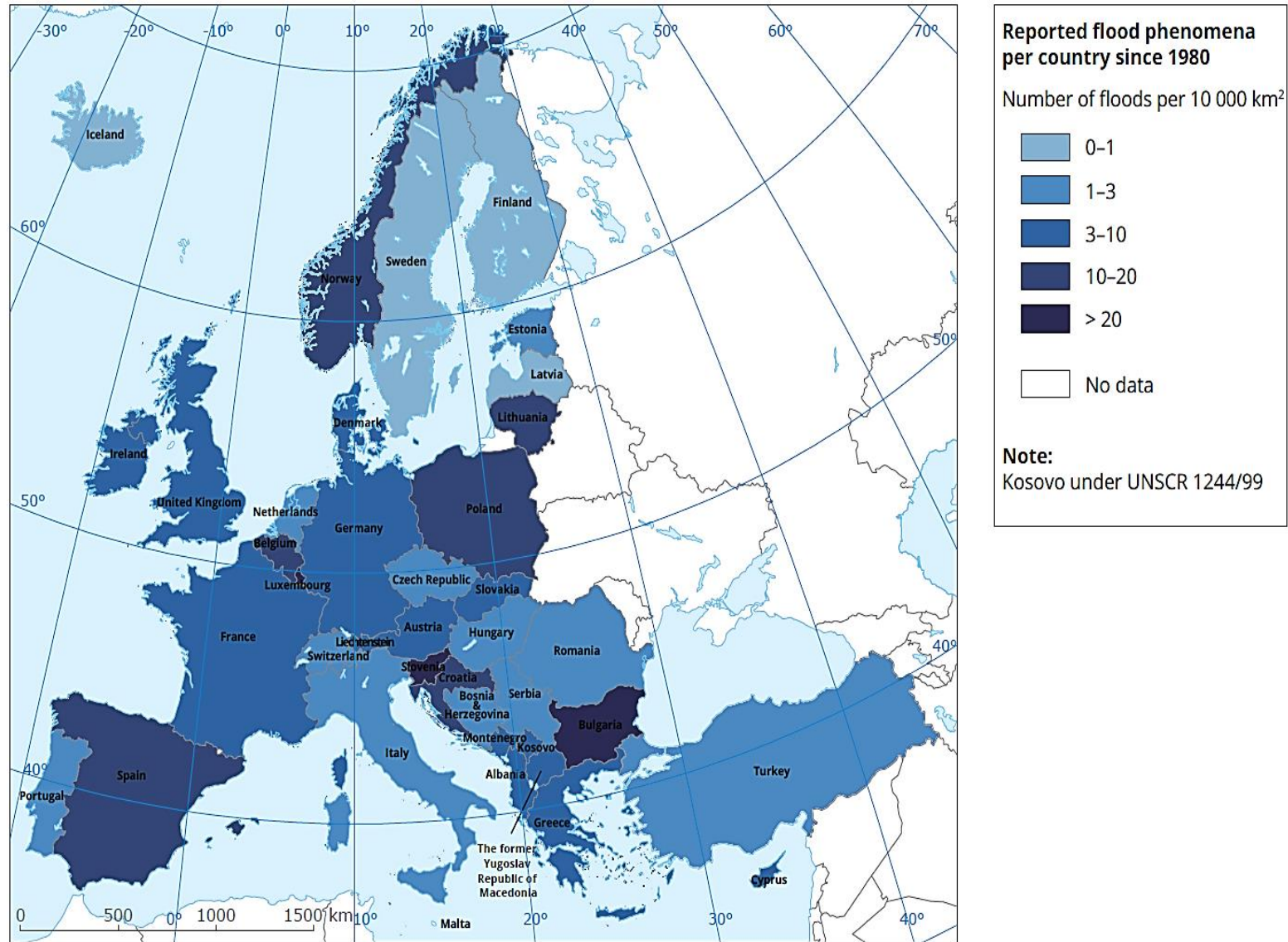
**1.5m** people are added to the urban population every week

Accelerating urbanization is one of the 5 global megatrends shaping our world creating new challenges for urban development and resilience.

Worldwide urban and rural population (billions)



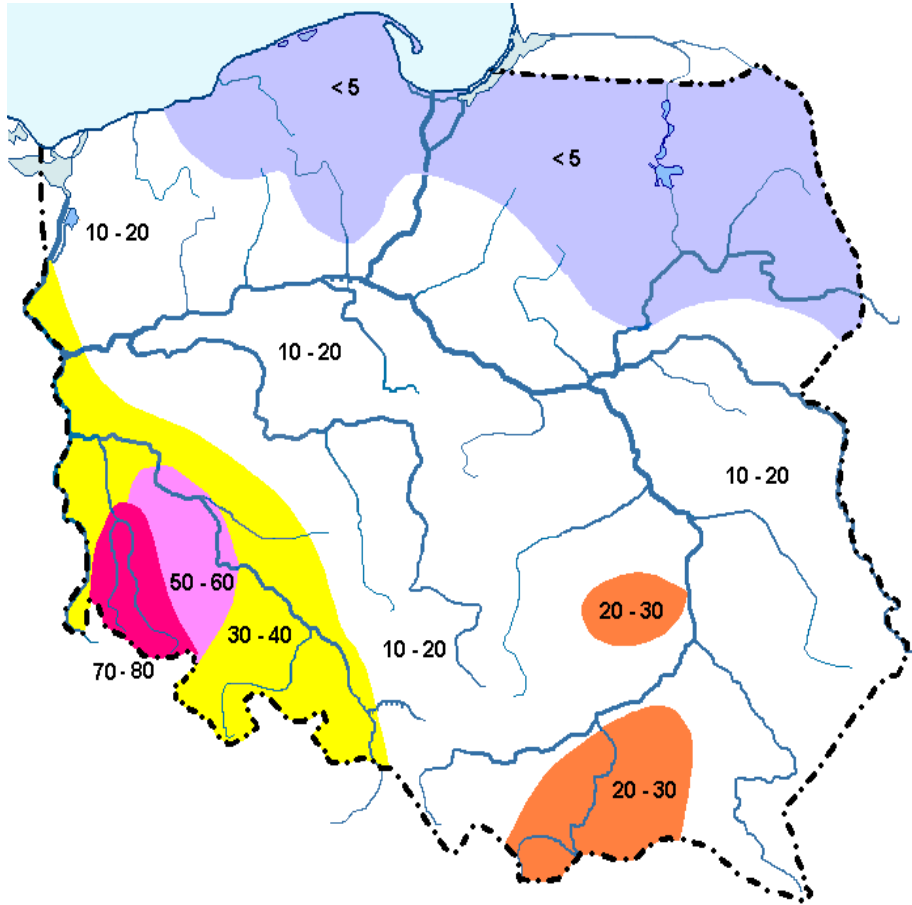
# Reported flood phenomena (number of floods per 10 000 km) per country (since 1980)



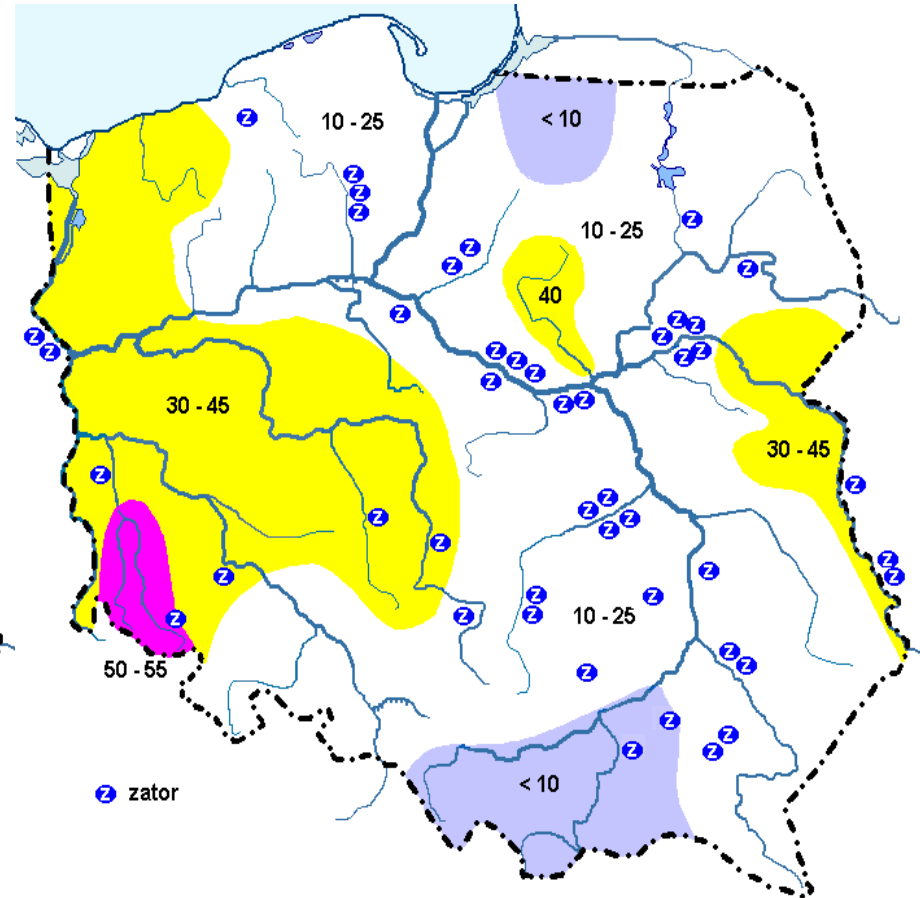
Source: Flood risk and environmental vulnerability, EEA Report 1/2016

# Floods in Poland 1945-2005

(IMGW)

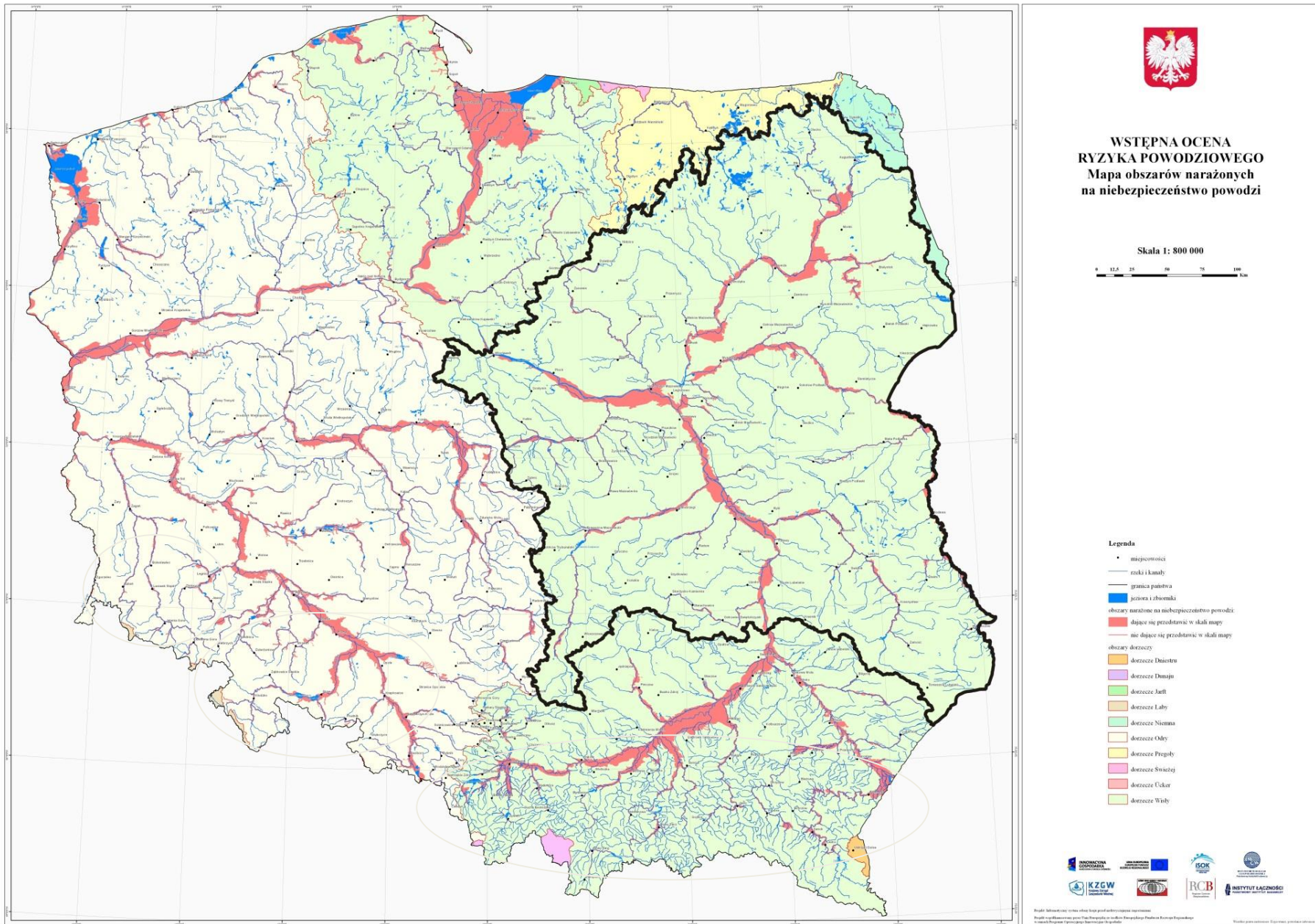


Precipitation based



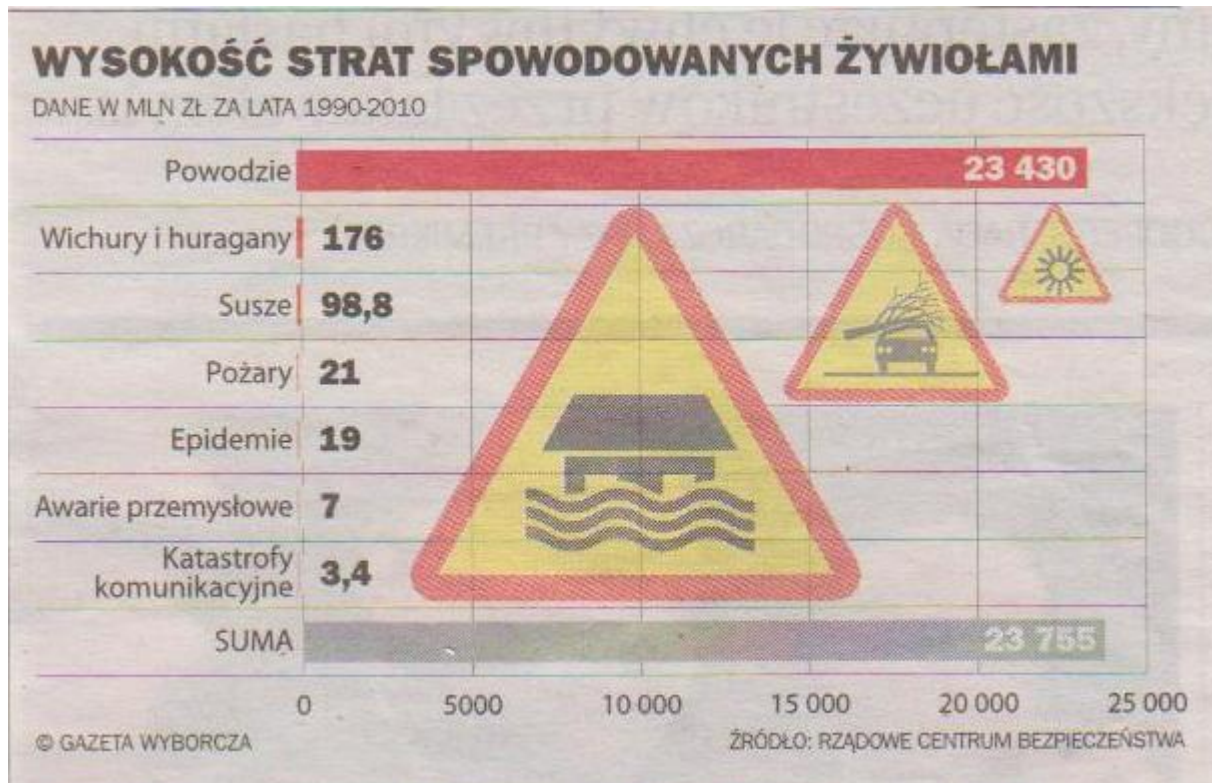
Winter floods

# Poland - Map of Areas exposed to flood hazards



# Flood losses in Poland 1990-2010

- 23 430 Million PLN
- 1 270 Million PLN per year
- 98,5% of all natural disaster losses
- Underestimated!!



Dane RCB

# The 1997 Flood on Odra River Basin in Poland

**54** human lives

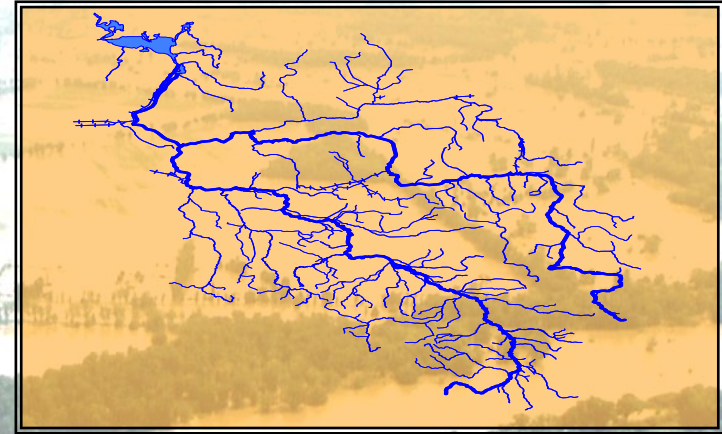
**680 000** dwellings affected by flood

**2,34 mln** inhabitants

**4 000** institutions (schools,  
hospitals, theatres, museums, etc.)

**9 000** companies employed more  
than 5 employees

**143 000** small enterprises





# The 1997 Flood on Odra River Basin

## POLAND:

ENTERPRISES ≈ 730 mln \$

GOVERNMENT & MUNICIPAL INSTITUTIONS ≈ 1300 mln \$

AGRICULTURE AND FORESTRY ≈ 50 mln \$

and another: + costs of the action during and after the flood

+ losses of churches and other non-profit organisations

+ losses of profits

loses: approx. 3,5 billion \$

## GERMANY:

loses: approx. 511 million \$

## CZECH REPUBLIC:

loses: approx. 850 million \$

# Racibórz



# Racibórz



# Racibórz





Wrocław

# Wrocław



# Wrocław



# Wrocław





# Wrocław





Poland, May 17, 2010



Poland, Kraków, May 17, 2010



# Vistula catchment, May 17, 2010



# Vistula catchment, May 17, 2010



# Auschwitz/Oświęcim, May 18, 2010



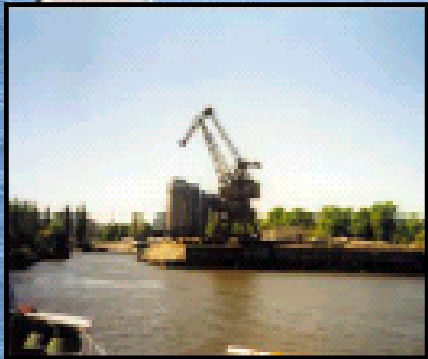
# Vistula catchment, May 20, 2010





# PROGRAM DLA ODRY 2006

On July 6<sup>th</sup> 2001 Polish Parliament adopted the Act on establishing the multi-annual „Programme for the Oder 2006”.

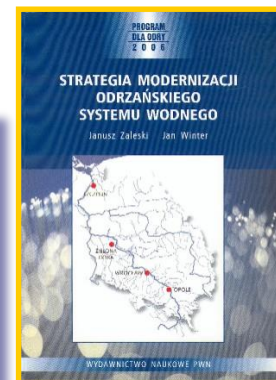




# PROGRAMME FOR THE ODER 2006

## Main Objectives

- **Construction of passive and active flood management systems**
- Nature preservation & water quality
- Flood recovery
- Preventive land use planning and ecosystems re-naturalization
- Increase of wooded areas
- Maintenance and development of the inland navigation
- Utilization of rivers for power generation
- **Regional and local economic development**



# **Flood Protection Projects supported by World Bank**

## **1. Flood Recovery Project 1997 – 2005 (Flood Warning & Monitoring System)**

Project cost: ca. \$500 million,  
including ca. \$200 million from World Bank loan

## **2. Odra River Basin Flood Protection Project 2006 – 2018**

Project cost: €712 million plus a contingency of €52.66 million,  
including ca. €140 million from World Bank loan  
including ca. €205 million from Council of Europe Development  
Bank loan

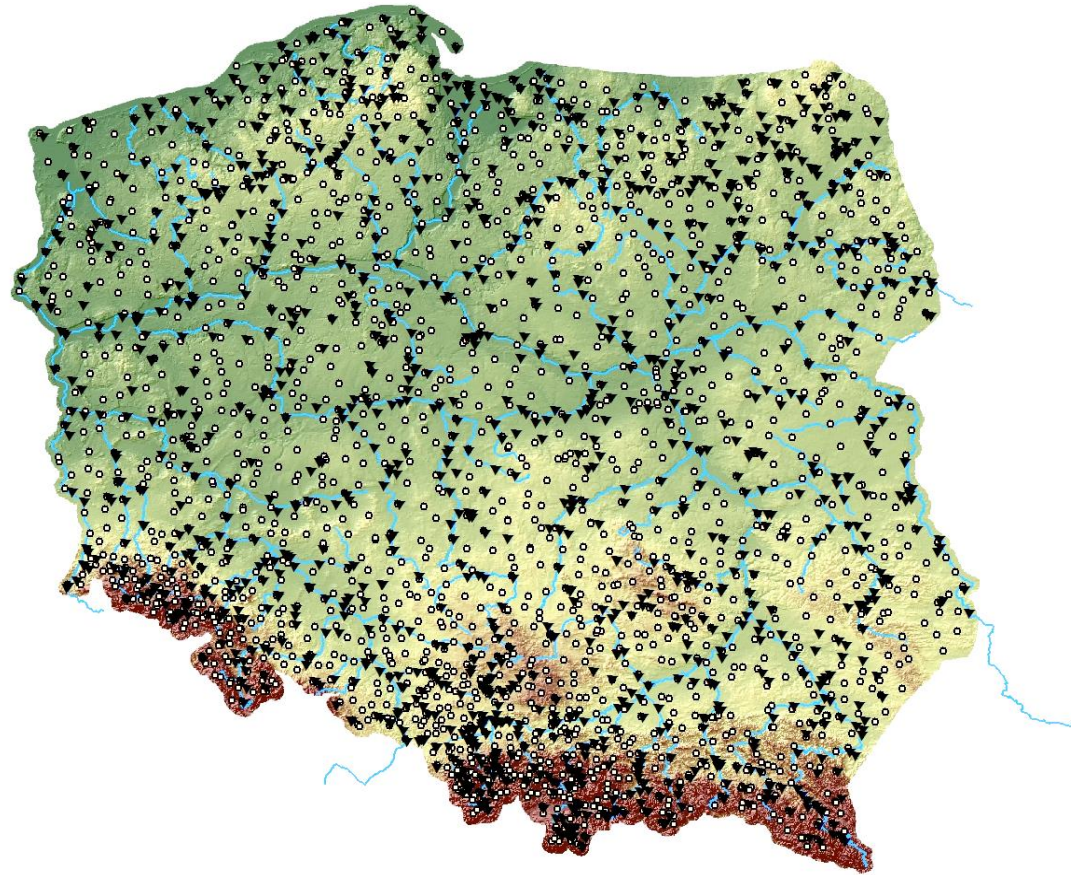
## **3. Odra – Vistula Flood Management Project 2015 – 2022**

Project cost: ca. €1 202 million,  
including ca. €460 million from World Bank loan  
including ca. €300 million from Council of Europe Development Bank loan

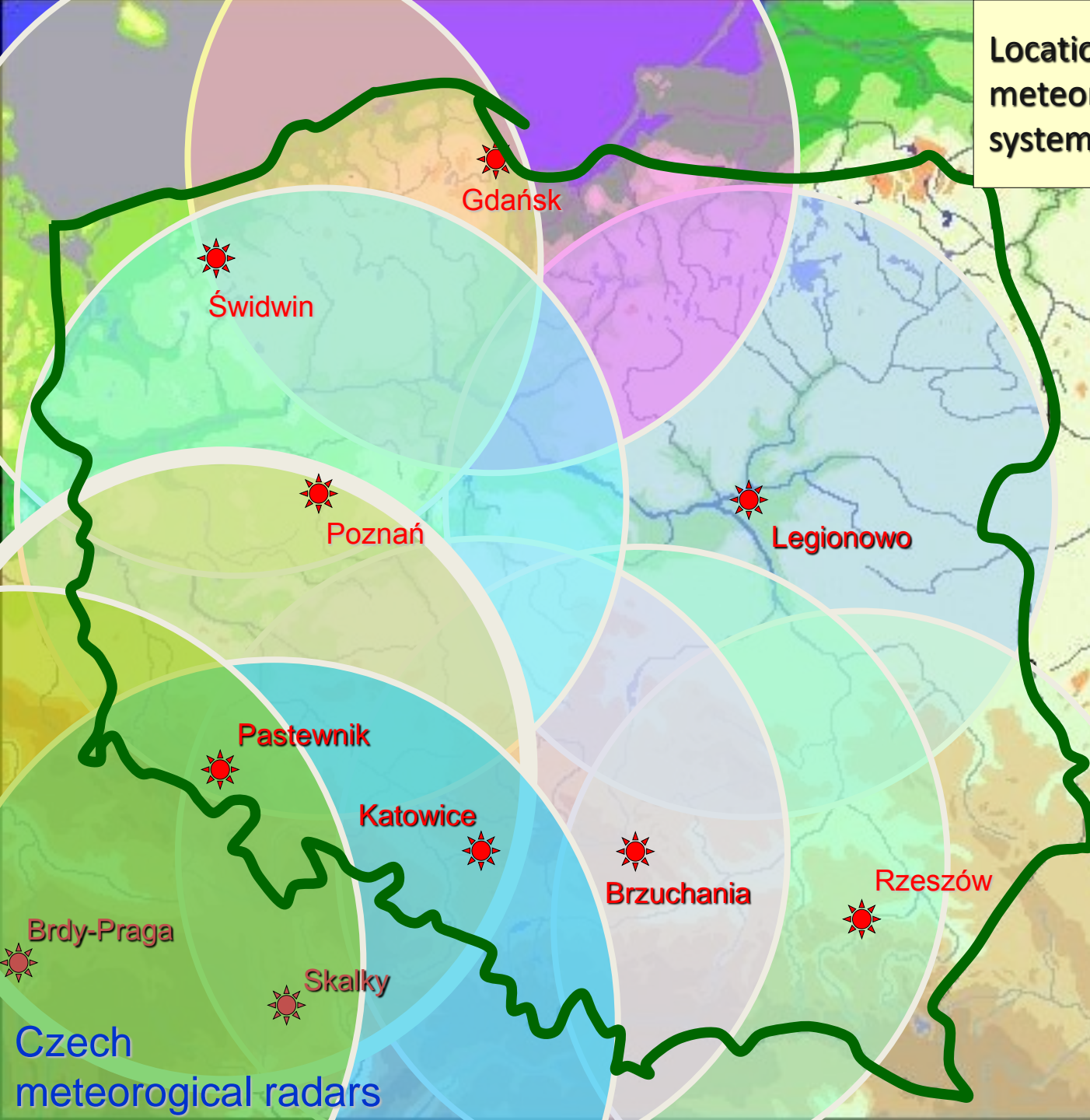
# Automatic Telemetry System in Poland

consists of:

- ◆ 570 water level stations,
- ◆ 181 stations for water temperature monitoring in the rivers
- ◆ 41 groundwater stations (wells, piezometers),
- ◆ 379 rain gauging stations with heated and non-heated rain gauges
- ◆ 129 meteorological stations executing meteorological measurements ( air temperature, humidity, velocity and wind direction, ground temperature )
- ◆ 100 automatic meteorological stations MAWS.



# Location and range of Polish meteorological radars of POLRAD system



# ODRA RIVER BASIN FLOOD PROTECTION PROJECT 2008 - 2018

## Project components & Costs

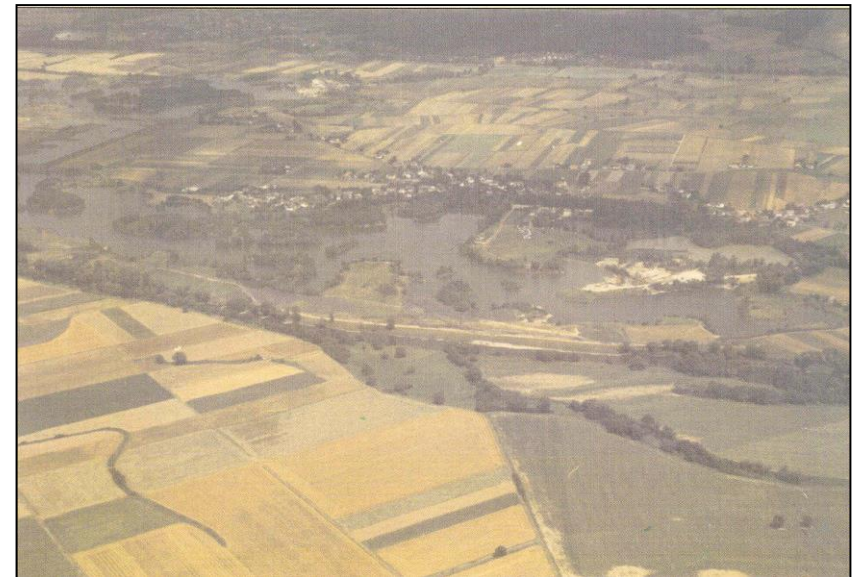
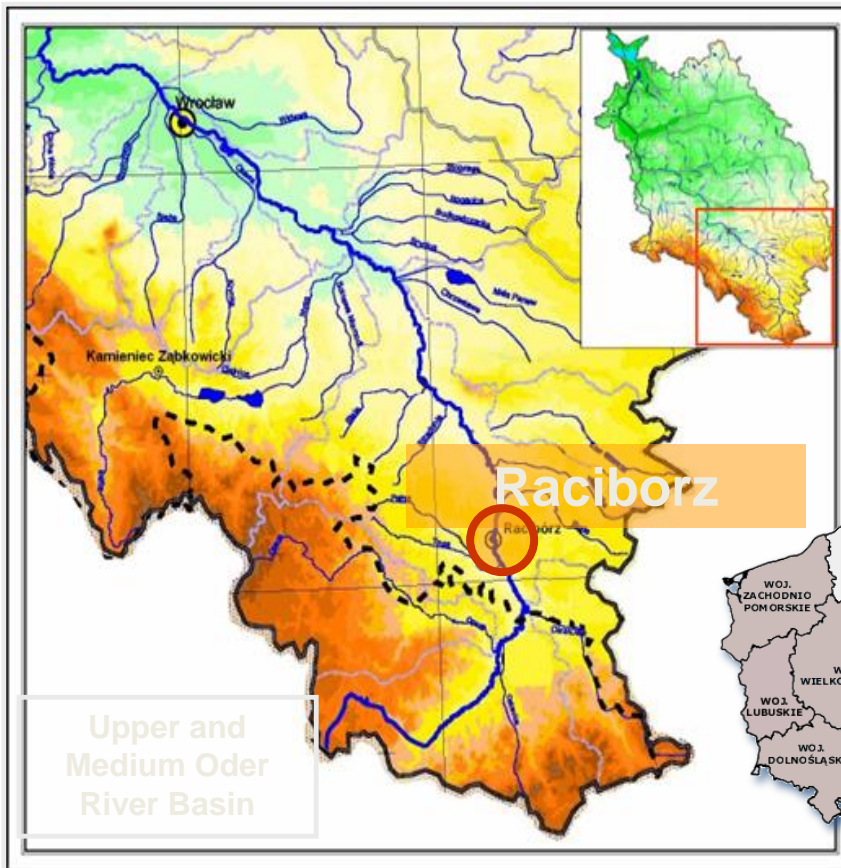
<b>Project Components</b>	<b>Total cost (Million Euro)</b>
<b>A. Construction of Raciborz dry retention flood reservoir</b>	<b>218.3</b>
<b>B. Modernization of Wroclaw Floodway System (WFS)</b>	<b>253.9</b>
<b>C. Improvement of flood management, monitoring, evaluation and supervision of the implementation of Environmental Management Plan (EMP) and Resettlement Action Plan (RAP)</b>	<b>26.6</b>
<b>D. Project management, technical support and training of Implementing Agencies</b>	<b>5.1</b>
<b>Total project costs</b>	<b>505.0</b>

€111 milion in VAT and other taxes

# ODRA RIVER BASIN FLOOD PROTECTION PROJECT 2008 – 2018

## Component A

### Construction of Raciborz Dry Retention Flood Reservoir Location



**Raciborz reservoir is crucial for safety of Upper Oder Basin**

# ODRA RIVER BASIN FLOOD PROTECTION PROJECT 2008 – 2018

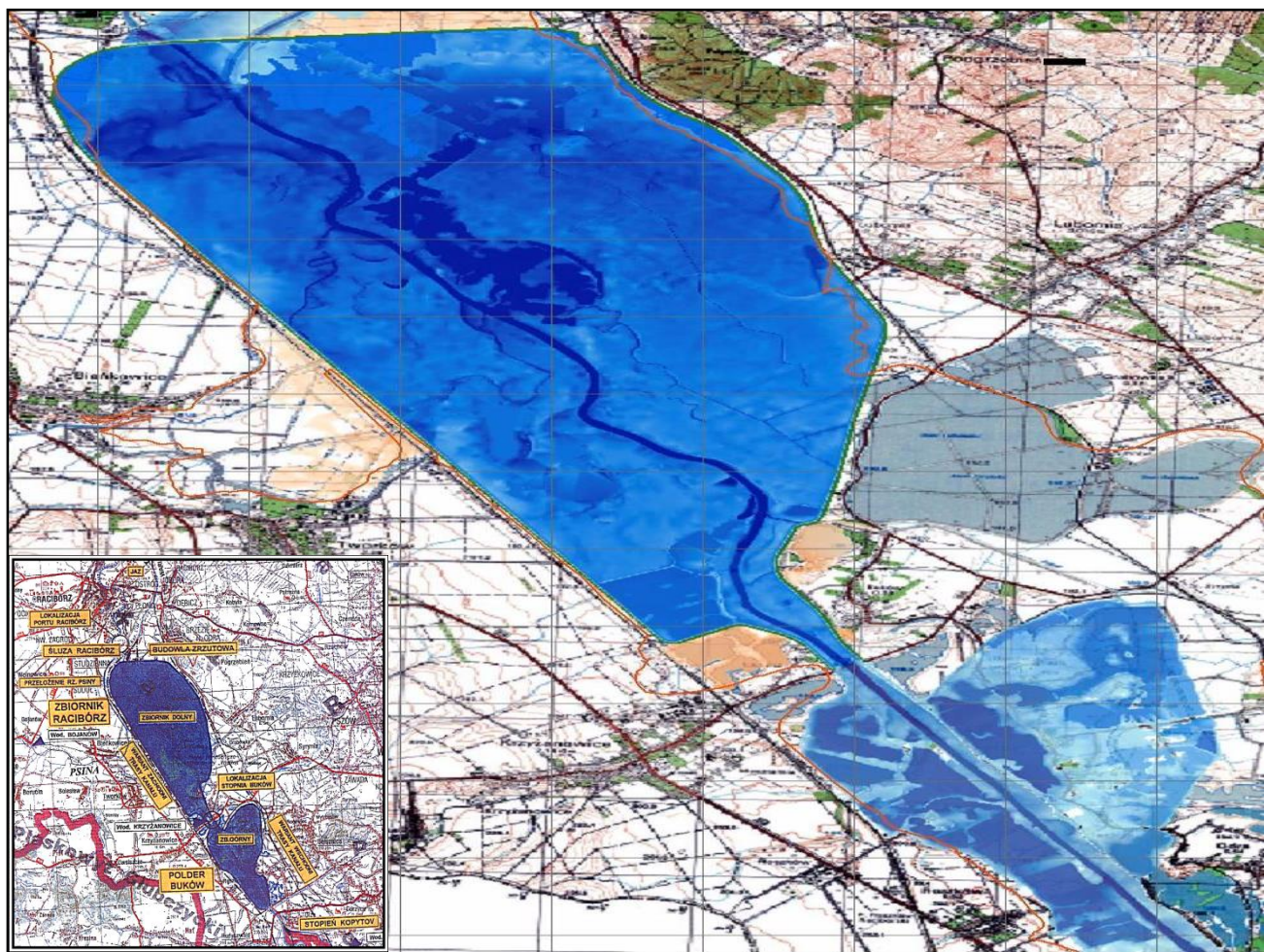
## Component A

### Construction of Raciborz Dry Retention Flood Reservoir

Parameters:

- Storage capacity of **185 million m<sup>3</sup>**
- Total area **26.3 km<sup>2</sup>**
- Dam across the Odra channel **4.0 km long**  
**10.5 m high**

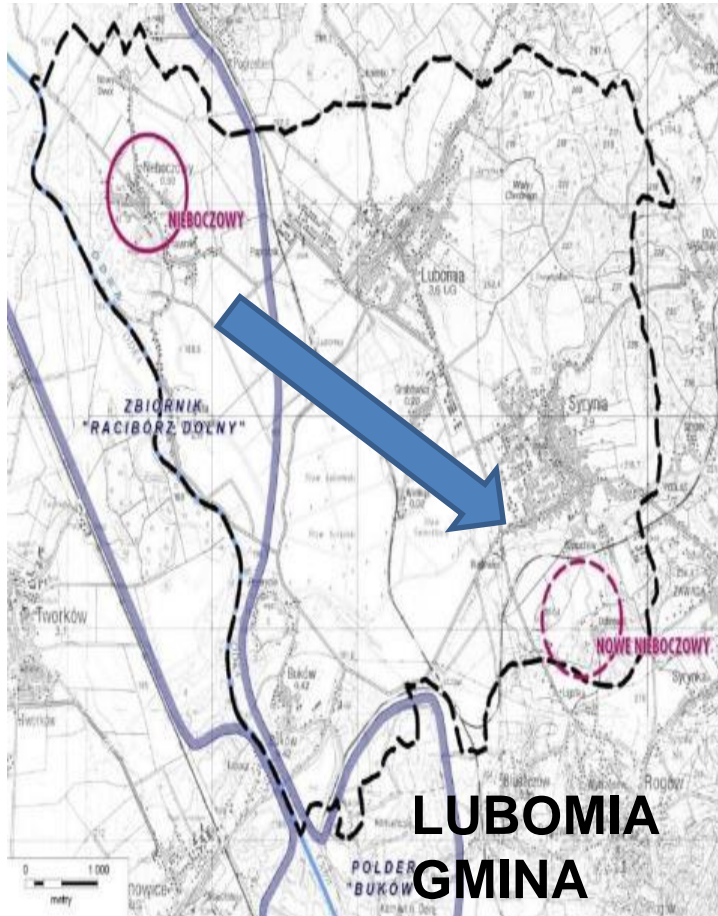
Estimated costs:  
**€ 64.9 milion**







## New Village



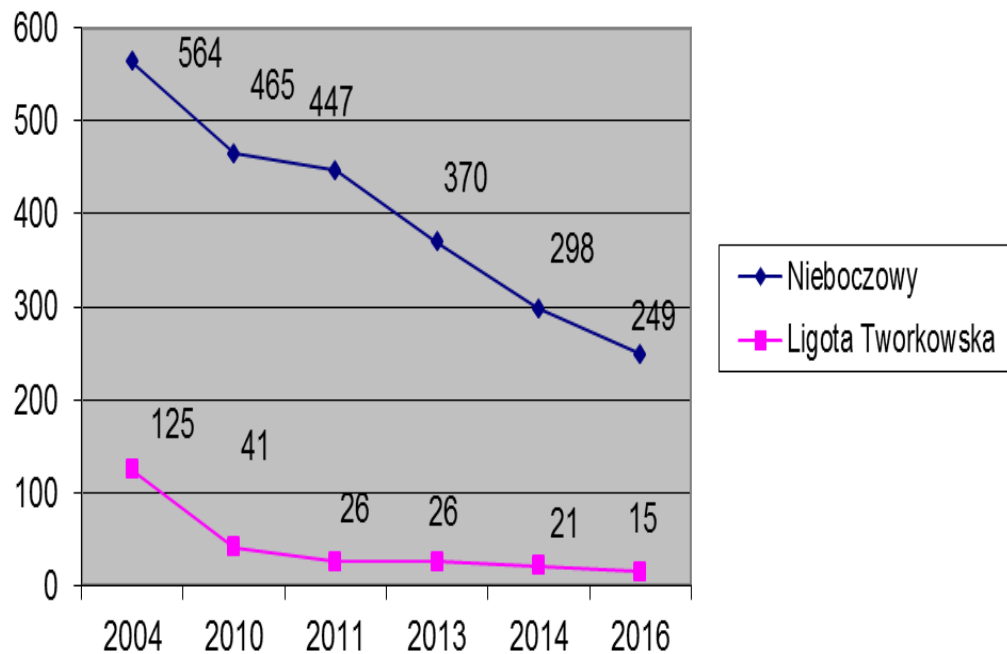
The New Village will be set up for the residents to be resettled from the area of the planned Racibórz dry polder, i.e. from the villages of Nieboczowy and Ligota Tworkowska.

In its character, the New Village will resemble the existing village of Nieboczowy.

Almost 200 people will resettle to the New Village and some of the resettled residents will live in a municipal apartment building (about 10 tenants). A part of the residents (approx. 300 people, i.e. 90 families) will purchase houses/apartments in other cities/villages using compensation for their houses sold.

# The changes of population in the years of 2004-2016

## Population changes in the affected villages



- Number of affected people – 689;
- Number of families to be moved to the New Village – 44;
- Number of people to be moved to comunal multifamily buildings – 9;
- Rest of the people have moved themselves using compensation payments.

# The construction of the New Village

- The Implementation of the New Village encompasses:
  - individual houses constructed by affected people – financing by compensations
  - roads and pedestrian precinct,
  - technical infrastructure,
  - sewage treatment plant,
  - cemetery,
  - comunal multifamily buildings for nine families,
  - fire station with the common room and a day care centre for children,
  - sport fields with sport club facilities,
  - park management,
  - public space management,
  - construction of the church.

# THE CONSTRUCTION OF DETACHED HOUSES



**43 new houses**

# COMPLITION OF THE NEW CEMETERY CONSTRUCTION



Completed covering of the main  
entrance to the cemetery



# NEW CHURCH COMPLITION

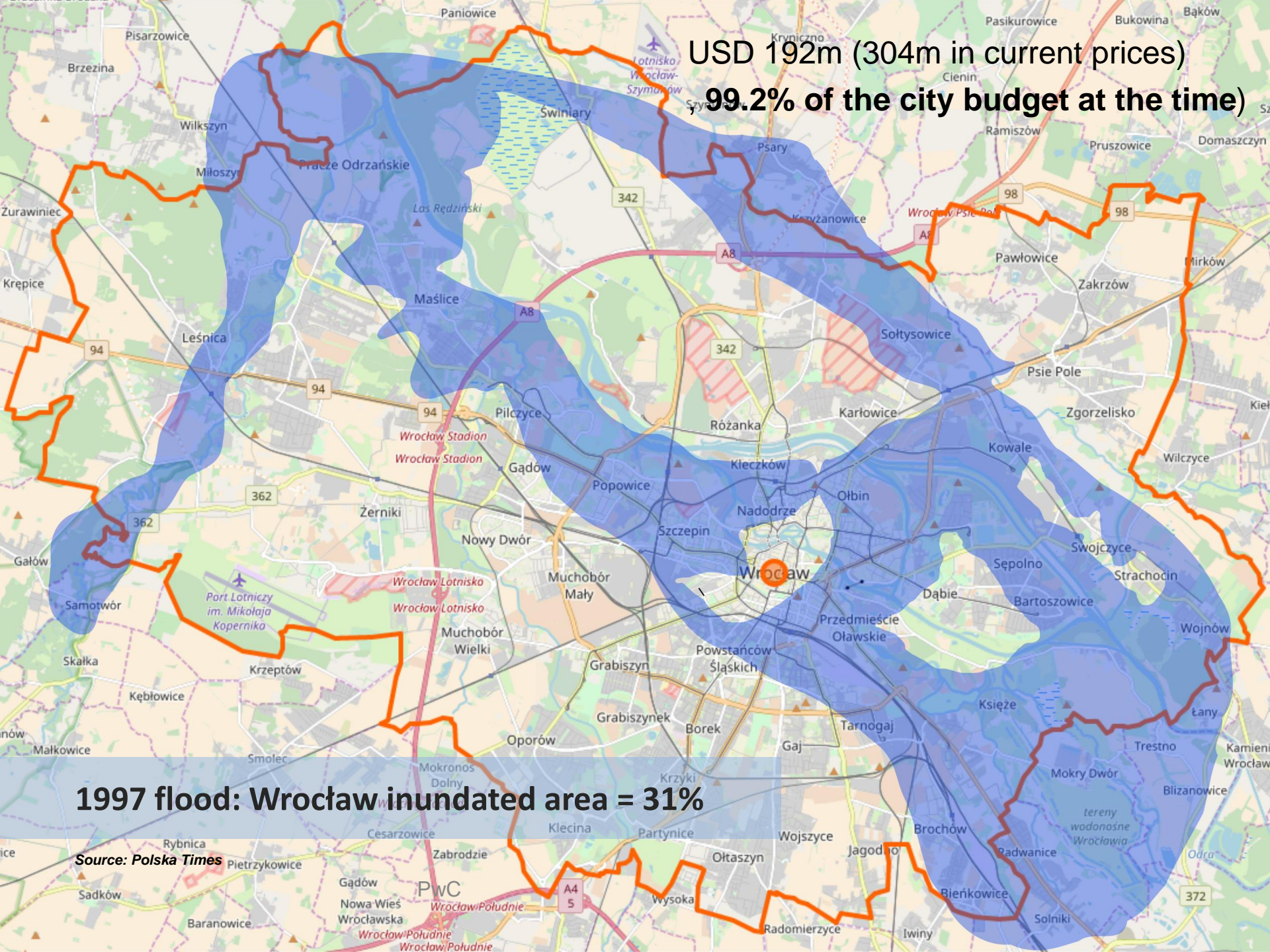


# POPDO - A2 „New Village”





USD 192m (304m in current prices)  
**99.2% of the city budget at the time)**



**1997 flood: Wrocław inundated area = 31%**

Source: Polska Times

# ODRA RIVER BASIN FLOOD PROTECTION PROJECT 2008 - 2018

## Component B

### Modernization of the Wroclaw Floodway System (WFS)



**B.1. Modernization of dikes and boulevards**

**B.2. Modernization of the Odra channels**

**B.3. Widawa bypass channel**

**Improvements**

**B.4. Design, construction supervision and administration**

**B.5. RAP Costs**



## POPDO - Component B1





6



7



8



9



www.programodra.pl



# Boulevards in city center



# Flood canal modernization





# POPDO - contract B2-4.2





- Contract B2-2.1 Modernization of Śródmiejska Odra retaining walls
- Implementing Agency: RZGW Wrocław



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- Contract B2-2.1 Modernization of Śródmiejska Odra retaining walls
- Implementing Agency: RZGW Wrocław
- Contractor: JV Pol-Aqua S.A., Dragados S.A.



Source: Po-Aqua S.A., prezentacja z Misji Banku Światowego, Wrocław, 26.03.2015

- Contract B2-3.1 Improvements and increasing of the Flood Channel and Old Odra capacity from the downstream side of the Psie Pole weir to the Poznańskie railway bridges
- Implementing Agency: RZGW Wrocław



- Contract B2-3.2 Dredging and expansion of WFS channels and improvement of hydraulic condition at the Rędzin barrage for flood water conveyance
- Implementing Agency: RZGW Wrocław



- Contract B2-3.2 Dredging and expansion of WFS channels and improvement of hydraulic condition at the Rędzin barrage for flood water conveyance
- Implementing Agency: RZGW Wrocław



- Contract B-4.2 Other WFS hydraulic structures
- Implementing Agency: RZGW Wrocław



## Component B3 – dikes and bridges modernization



**Visualization of improvements to one of the bridges:**

Road bridge MD 41.1 in Swojczycka Street





## Effect of the works

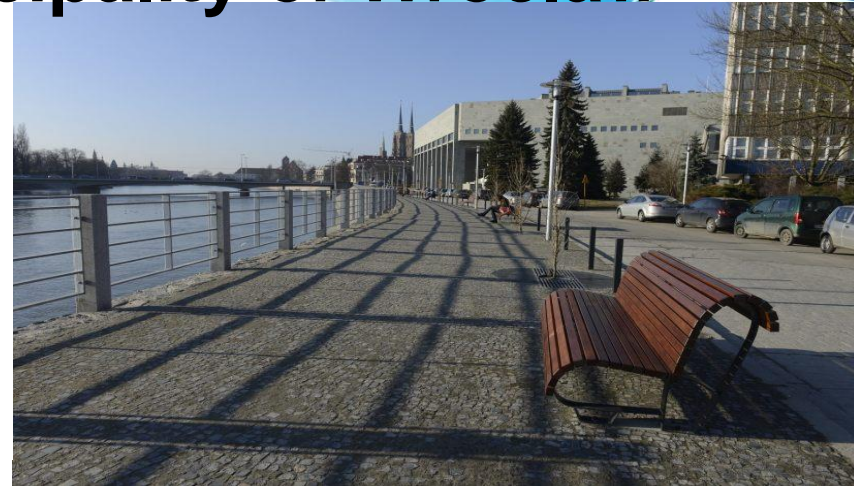




# Cooperation with the Municipality of Wrocław

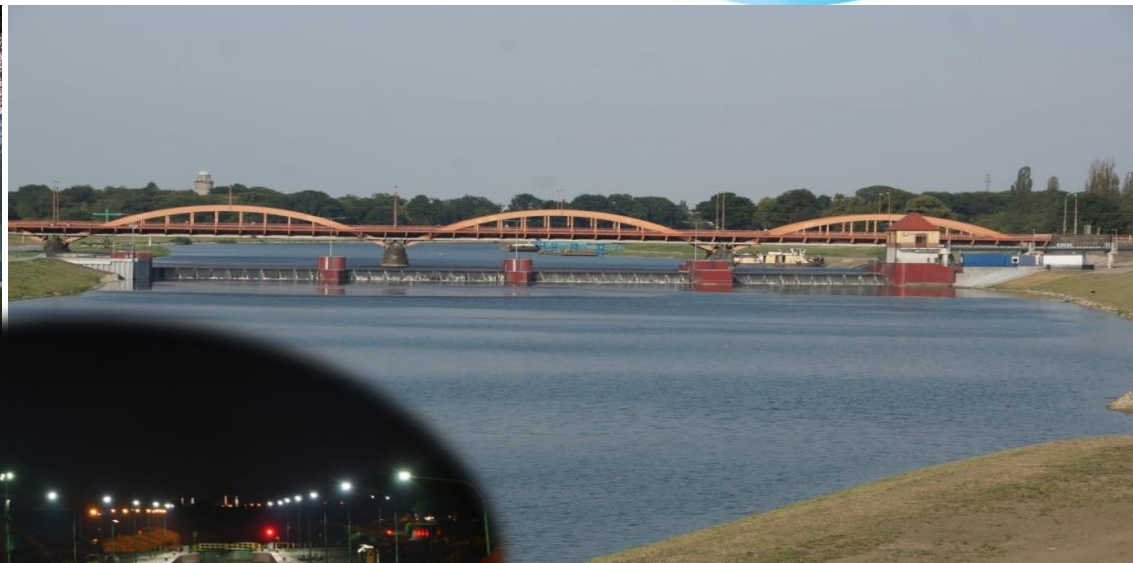
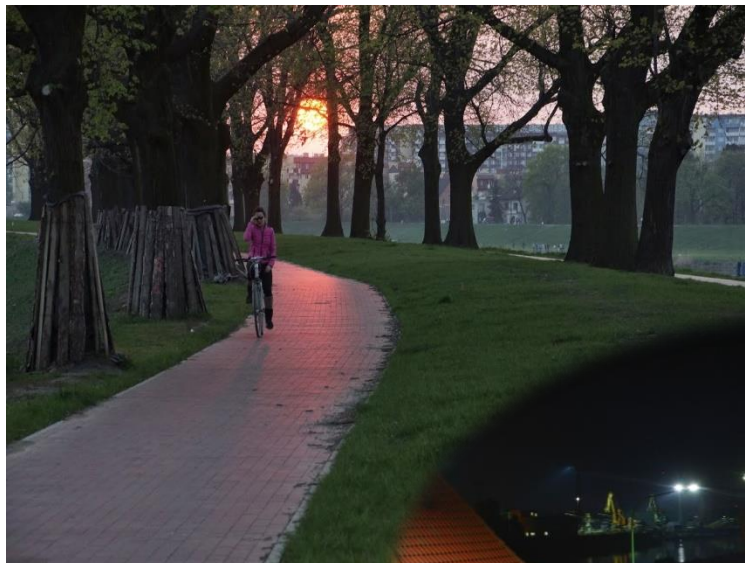
## Examples:

- Redevelopment of X. Dunikowskiego Boulevard;
- Redevelopment of the pier along Fryderyka Joliot-Curie Street;
- Compensation planting of over 1 700 specimen (total of above 2 000 pcs);
- Development of pedestrian and bicycle routes over a length of over 8 km.





# Effect of the works





## Effect of the works

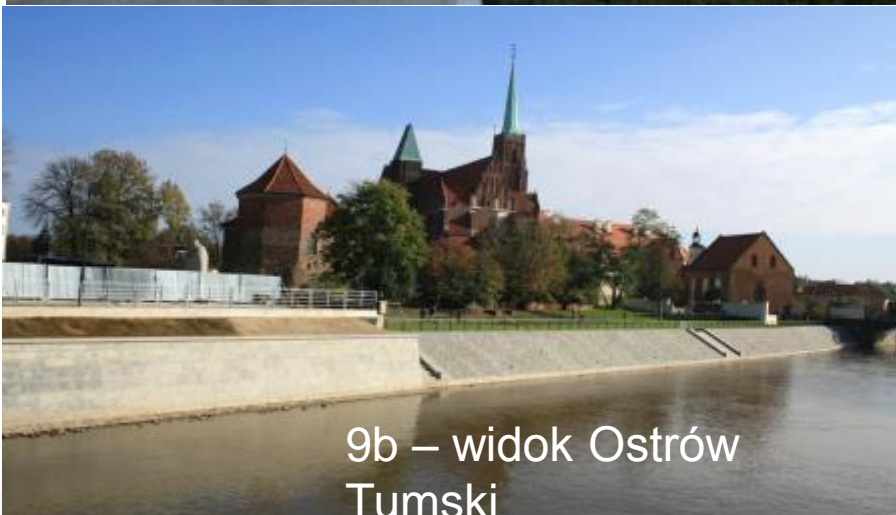


9a – Ogrody Kardynalskie

2015/08/29



9d – okolice  
Elektrociepłowni



9b – widok Ostrów  
Tumski



9c – okolice m. Sikorskiego

2015/08/30



nabojaszowa



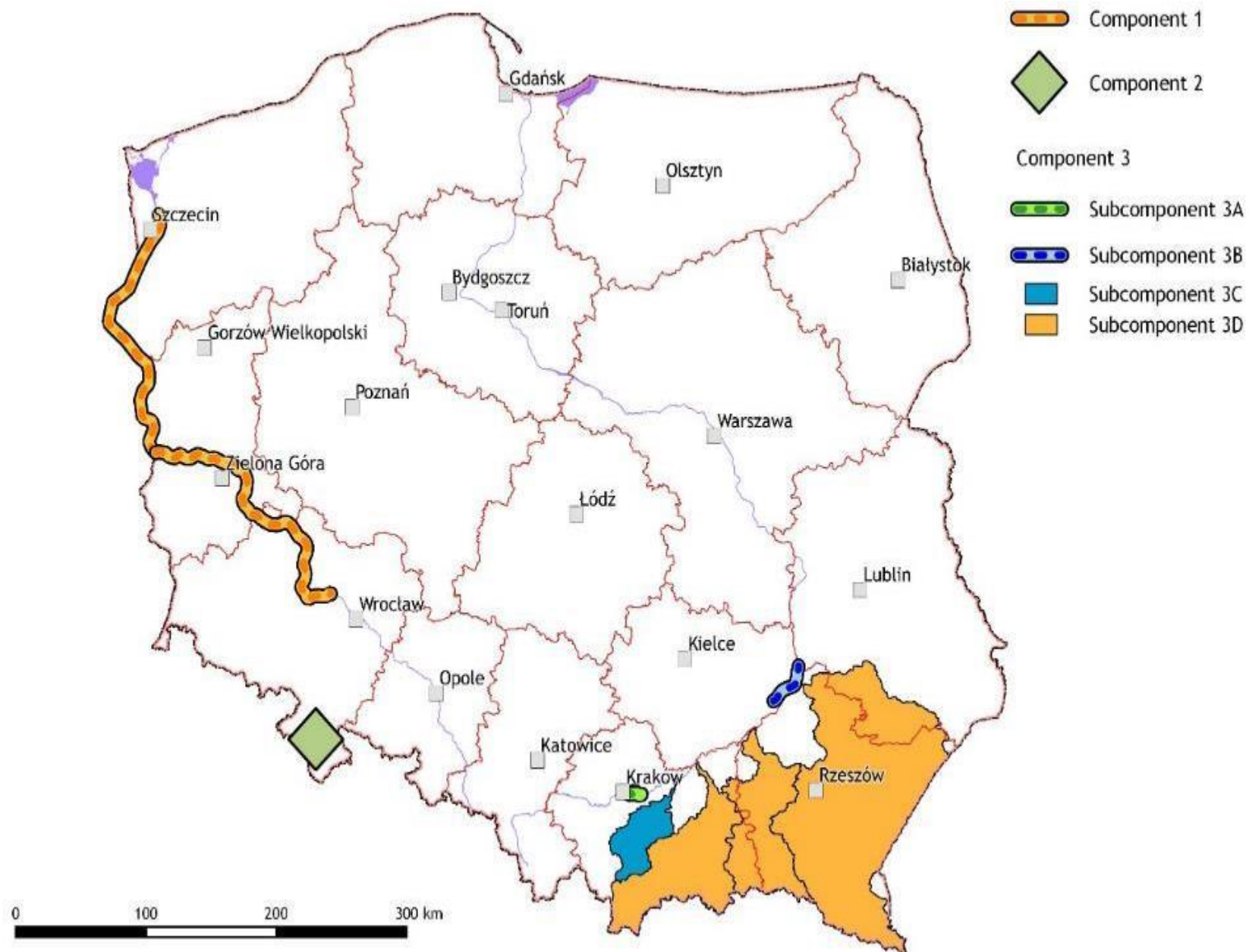
nabojaszowa



# ODRA-VISTULA FLOOD PROTECTION PROJECT 2016-2022

Component	Objective	Costs [mln €]
<b>Component 1: Flood Protection of Lower and Middle Odra River</b>	Protect Szczecin, Słubice, Gryfino, and other towns	495
<b>Component 2: Flood Protection of Nysa-Kłodzka valley</b>	Protect Klodzko and other valley towns, and Bardo Protect the downstream Wocław metropolitan area	265
<b>Component 3: Flood Protection of Upper Vistula</b>	Protect Cracow metropolitan area, Sandomierz-Tarnobrzeg area, and selected towns on tributaries	221
<b>Component 4: Institutional Strengthening &amp; Enhanced Forecasting</b>	Improve early-warning for flash-floods , operational centers for Odra and Vistula basins, Identify priority structural measures	136
<b>Component 5: Project Management and Studies</b>	Preparation of new projects, necessary studies and research	83

# AREA OF IMPLEMENTATION OF THE PROJECT



Źródło: Podręcznik Operacyjny Projektu (draft v. 8.2.), Biuro Koordynacji Projektu Ochrony Przeciwpowodziowej Dorzecza Odry i Wisły, 1 września 2015r.



# 3B.1 Flood protection of Sandomierz



2012-07-22

Biuro Koordynacji Projektu Ochrony Przeciwpowodziowej  
Dorzecza Odry i Wisły

## 3B.3 Flood protection of Tarnobrzeg

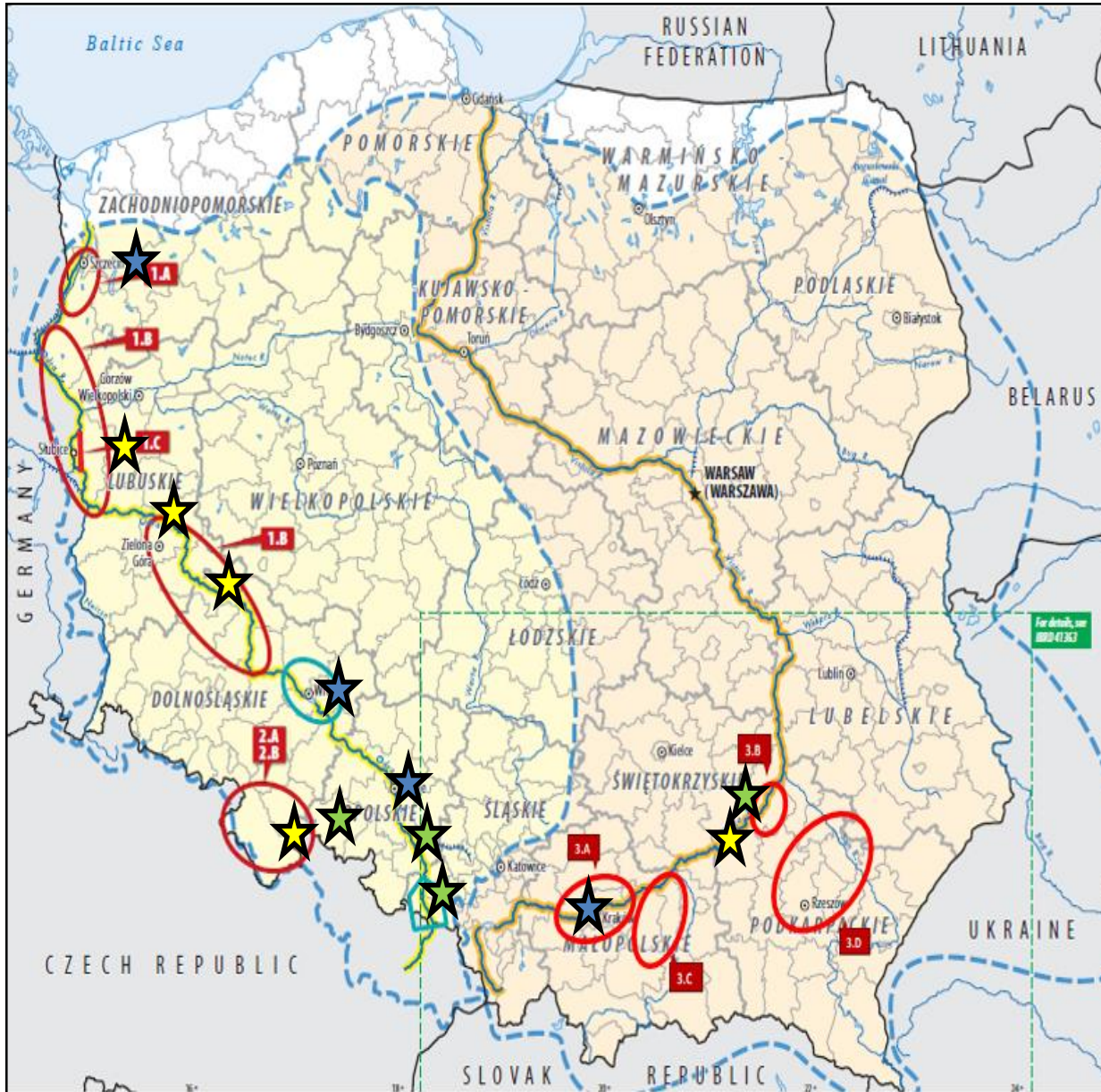


Dogęszczanie korpusu istniejącego wału

2012-07-22

Biuro Koordynacji Projektu Ochrony Przeciwpowodziowej  
Dorzecza Odry i Wisły

# Summary: Odra & Vistula basins Flood Management Projects



Kraków  
Wrocław  
Szczecin  
Opole



Kędzierzyn-  
Koźle  
Racibórz  
Tarnobrzeg  
Nysa



Nowa Sól  
Kłodzko  
Sandomierz  
Słubice  
Krosno  
Odrzańskie

Source: International Bank for Reconstruction and Development Project Appraisal Document on a proposed loan in the amount of euro 460 million (us\$504 million equivalent) to the Republic of Poland for a Odra-Vistula Flood Management Project, Report No: PAD1203, July 1, 2015



# GENERAL CONCLUSIONS: Economic benefits of flood management system investments are broad...

Saving lives

01

Reduction of  
loss to assets,  
production  
capacity and  
distress

02

Creating  
conditions  
catalysing  
economic growth

03

Jobs creation

04

Unlocking land  
and property  
potential, support  
waterfront  
creation

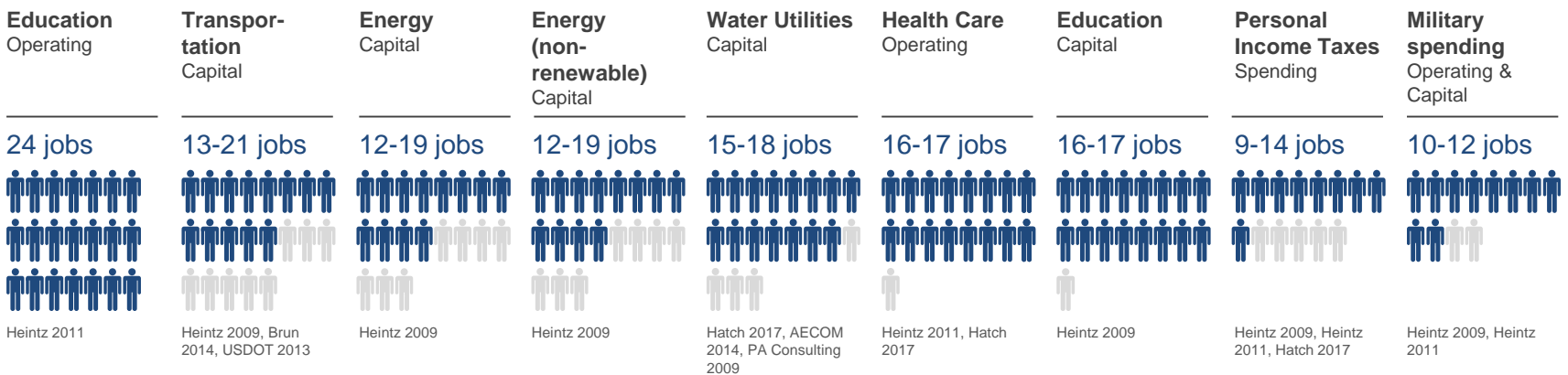
05

Reducing  
incidence  
of poverty

06

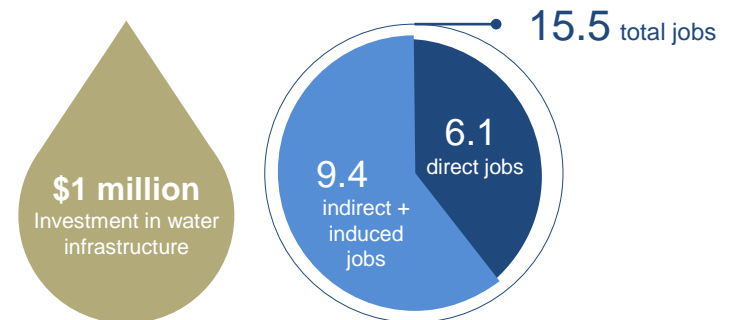
# Investments in infrastructure resilience support job creation and economic growth

## Jobs per USD 1 million by sector by expenditure type



## Economic benefits of water and wastewater service reliability

Impacts to Business	Savings per day of avoided service disruption	
	Aggregate National	Per employee
Sales saved	USD 43.5bn per day	USD 230 per day
GDP saved	USD 22.5bn per day	USD 120 per day
Days to 1% GDP savings	8 days: 1.9m jobs protected	



Note: Values expressed in 2016 dollars. Source: IMPLAN 2015, FEMA 2011, Aubuchon 2012, Chang 2002

Source: The Economic Benefits of Investing in Water Infrastructure, Value of Water Campaign, 2017

# CONCLUSIONS related to WROCLAW:

Wroclaw flourished over last 20 years becoming one of the key business, cultural and social centers in Central Europe

The best Mid-sized European City  
Of The Future 2016/2017  
- FDI Strategy -

International EXPO  
Exhibition 2012

European Football  
Championship UEFA EURO  
2012

3<sup>rd</sup> best Mid-sized European City Of  
The Future 2016/2017  
- Business Friendliness -

European Capital  
of Culture 2016

European Green Capital



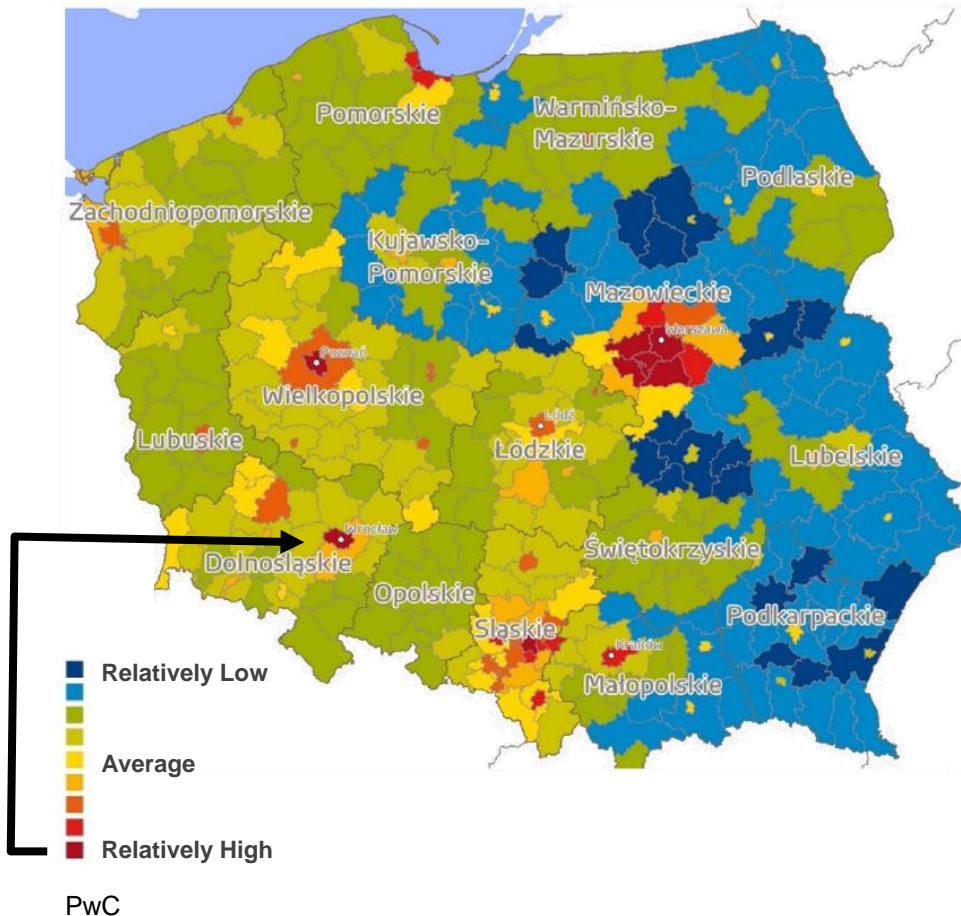
European Best  
Destination 2018

The World Games  
2017

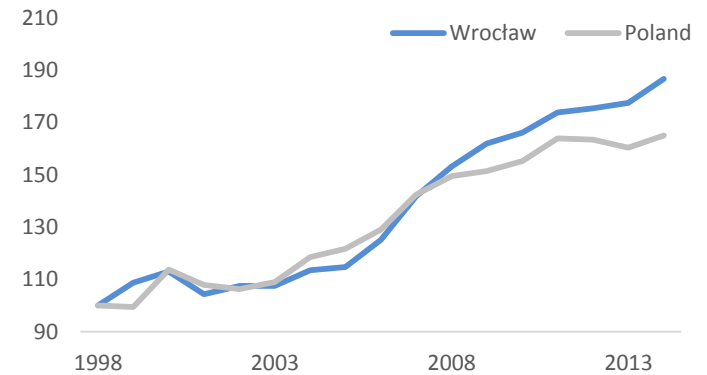
2<sup>nd</sup> best developed  
city in Poland over past 10  
years

# Wroclaw managed to almost double GDP per capita and decrease unemployment to around 2% becoming one of the most prosperous regions in the country

Citizens' purchasing power (2016)

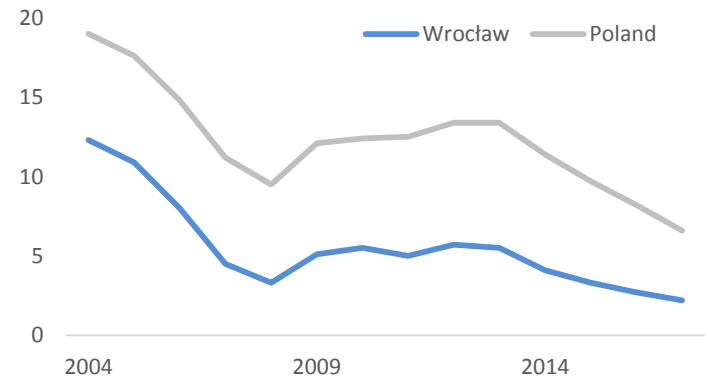


GDP per capita (real growth rate: 1997: 100)



Source: own calculations based on GUS

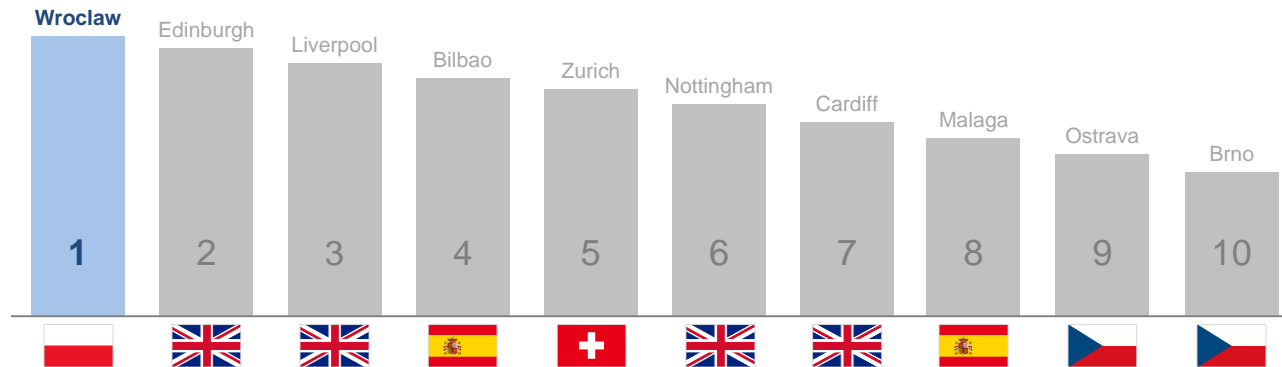
Unemployment rate (%)



Source: GUS

# It was mainly an effect of creating enabling environment for businesses to grow, which was noticed by investors

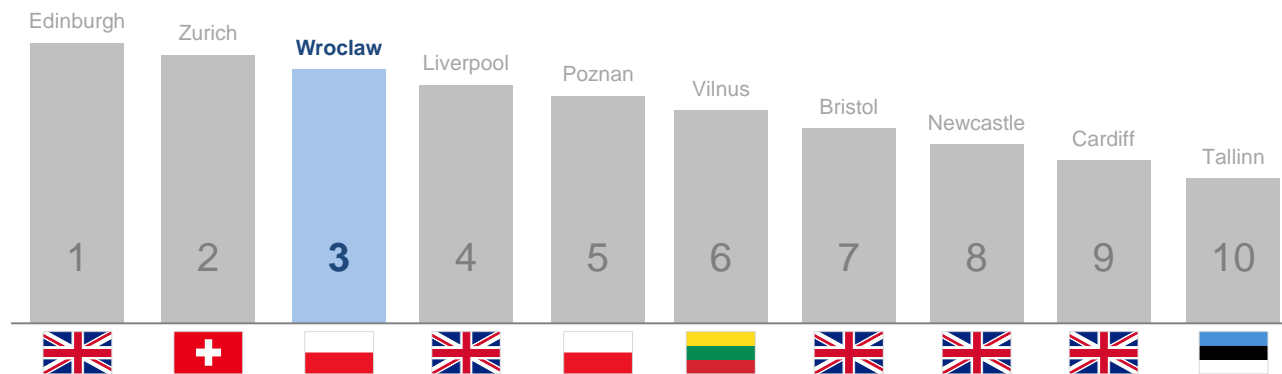
Top 10 Mid-sized European Cites Of The Future 2016/2017 – FDI Strategy



#1 in Investment Attracting Ranking



Top 10 Mid-sized European Cites Of The Future 2016/2017 – Business Friendliness



#3 in the “Business friendliness” category





# Conclusions related to IFI involvement:

- Ability to leverage resources from other financiers (e.g. CEB, EU, EIB) and acts on behalf of the other financiers
- WB supports project implementation (constant interactions, international technical expertise, WFD compliance, etc.)
- Technical innovation and comprehensive and holistic approaches (e.g. urban development)
- Helps to increase institutional capacity to manage large value and complex investments
- Stability of the project implementation across political changes due to IFI supervision and advise
- Faster progress in flood protection in Odra River basin due to IFI presence versus slower progress in flood protection Vistula River basin



**Thank you for your attention**

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