AKADEMIA GÓRNICZO-HUTNICZA
IM. STANISŁAWA STASZICA W KRAKOWIE

# Climate change adaptation and flood risk transfer instruments: focus on polish case studies

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# Outline

- climate change mainstreaming in the policies in Poland
- climate change impacts on water sector – scenarios
- climate change adaptation instruments and risk transfer instruments
- stakeholders' preferences for the instruments

# Climate change mainstreaming in sectoral policies in Poland

Reaserch conducted in the RESPONSES project in Warta River Basin show there is no will to mainstream cc into sectoral policies in Poland.

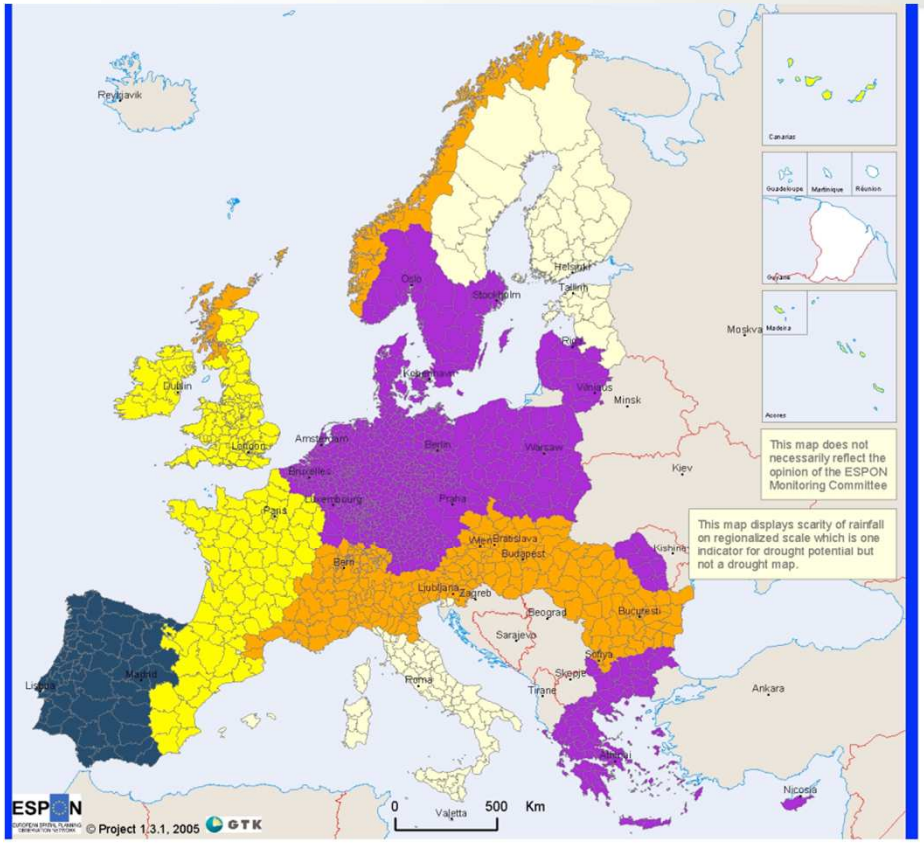
Documents: RBMPs, CAP, Regional Strategies, Programmes of Environmental Protection, etc.

Reasons: future climate change is uncertain; incl. the impacts

# climate change impacts on water sector

# Source: ESPON

## Drought potential



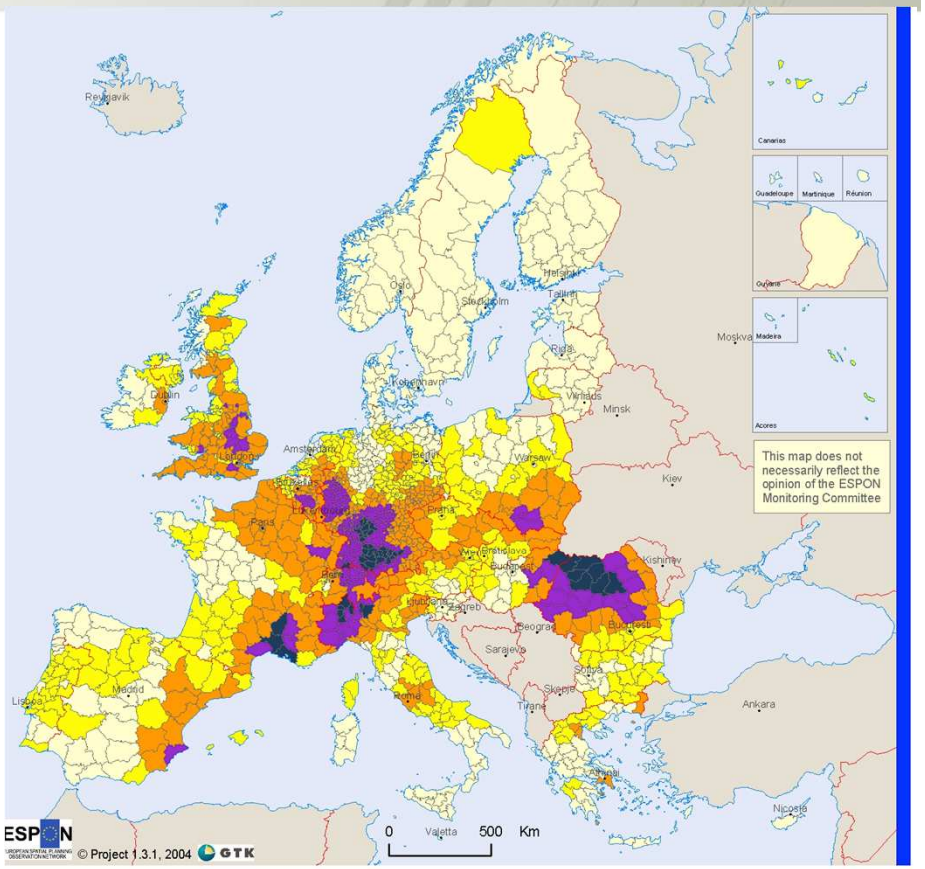

**Precipitation deficit as potential drought indication**

- No data
- Very low
- Low
- Moderate
- High
- Very high
- Non ESPON space

Origin of the data: © EuroGeographics Association for the administrative boundaries
ARIDE final report (2001)
Source: ESPON Data Base

The precipitation deficit in regional basins as potential drought indication is based on the scarcity of rainfall in regionalised European basins 1904-1995. Derived from Alvarez & Estrela 2001 (ARIDE final report) p. 88-91.

## Flood hazard recurrance



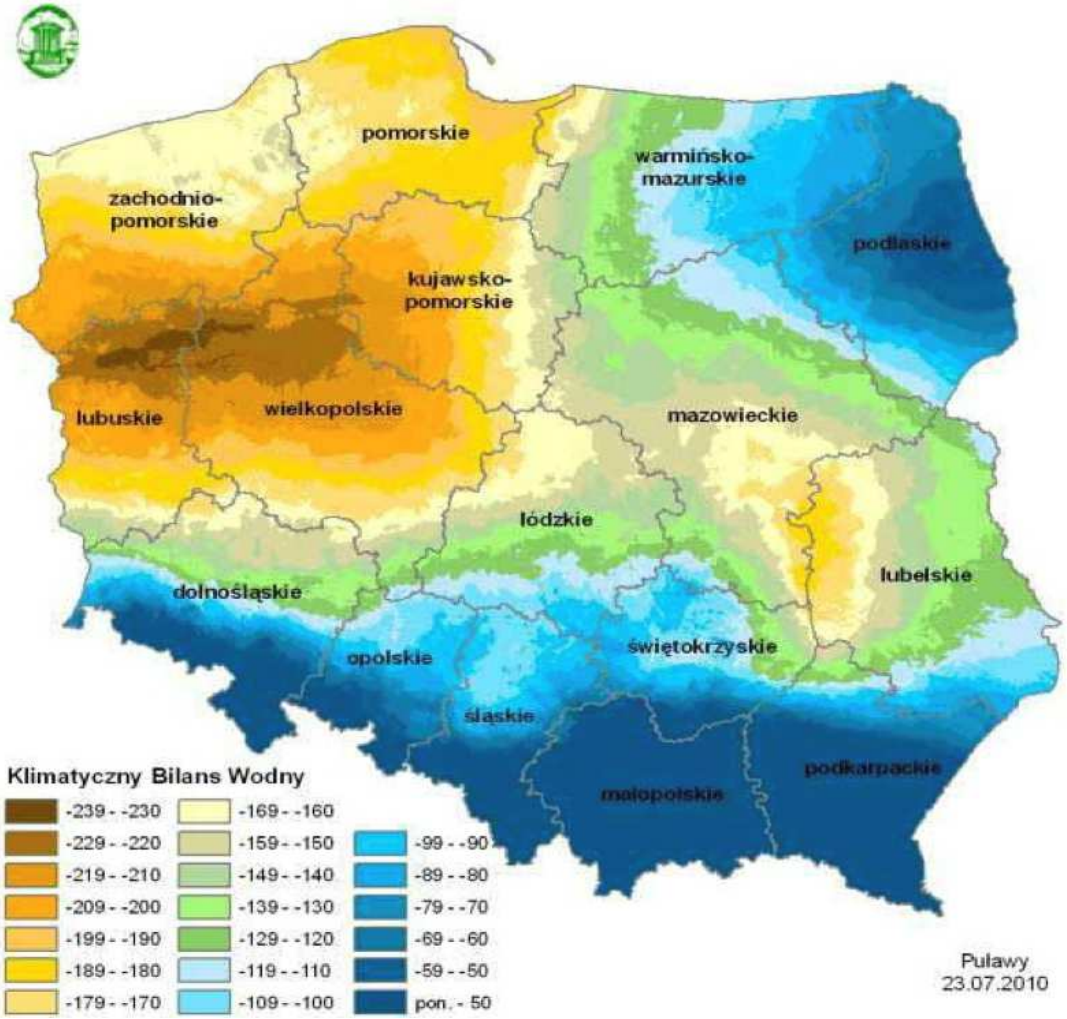

**Flood recurrence**

- Very low
- Low
- Moderate
- High
- Very high
- Non ESPON space

Origin of the data: © EuroGeographics Association for the administrative boundaries
Large flood areas © Dartmouth Flood Observatory
Flood areas © ESA - Earth observation - Earth online
Rhine Atlas 2001 IKRS-CIPR-ICBR
Source: ESPON Data Base

This map displays the hazard recurrence based on average number of large flood events on NUTS3 regions 1987-2002. The first class "Very low hazard intensity" includes the regions without large flood events.

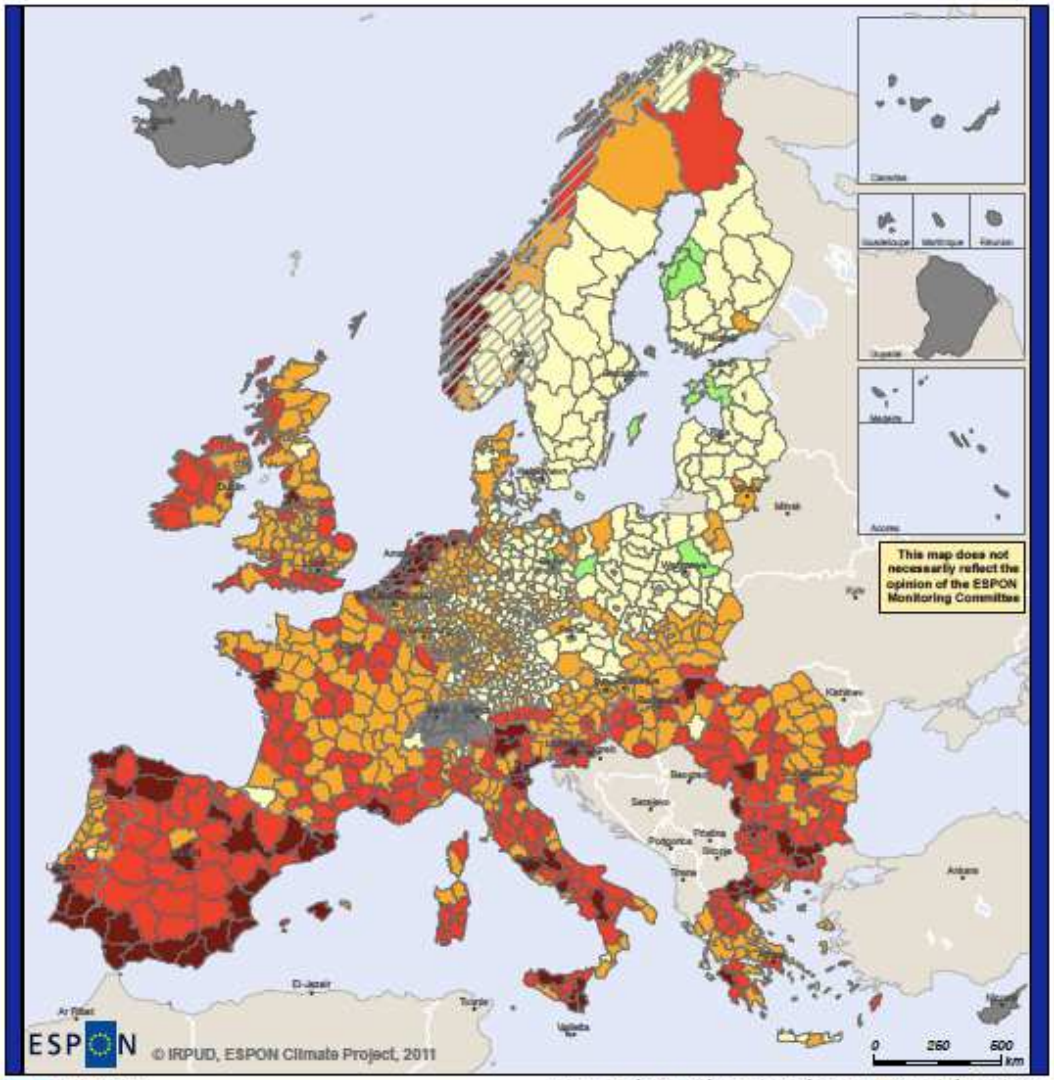
# Climate-Water Balance




Source: IUNG (2010) Puławy, Poland.

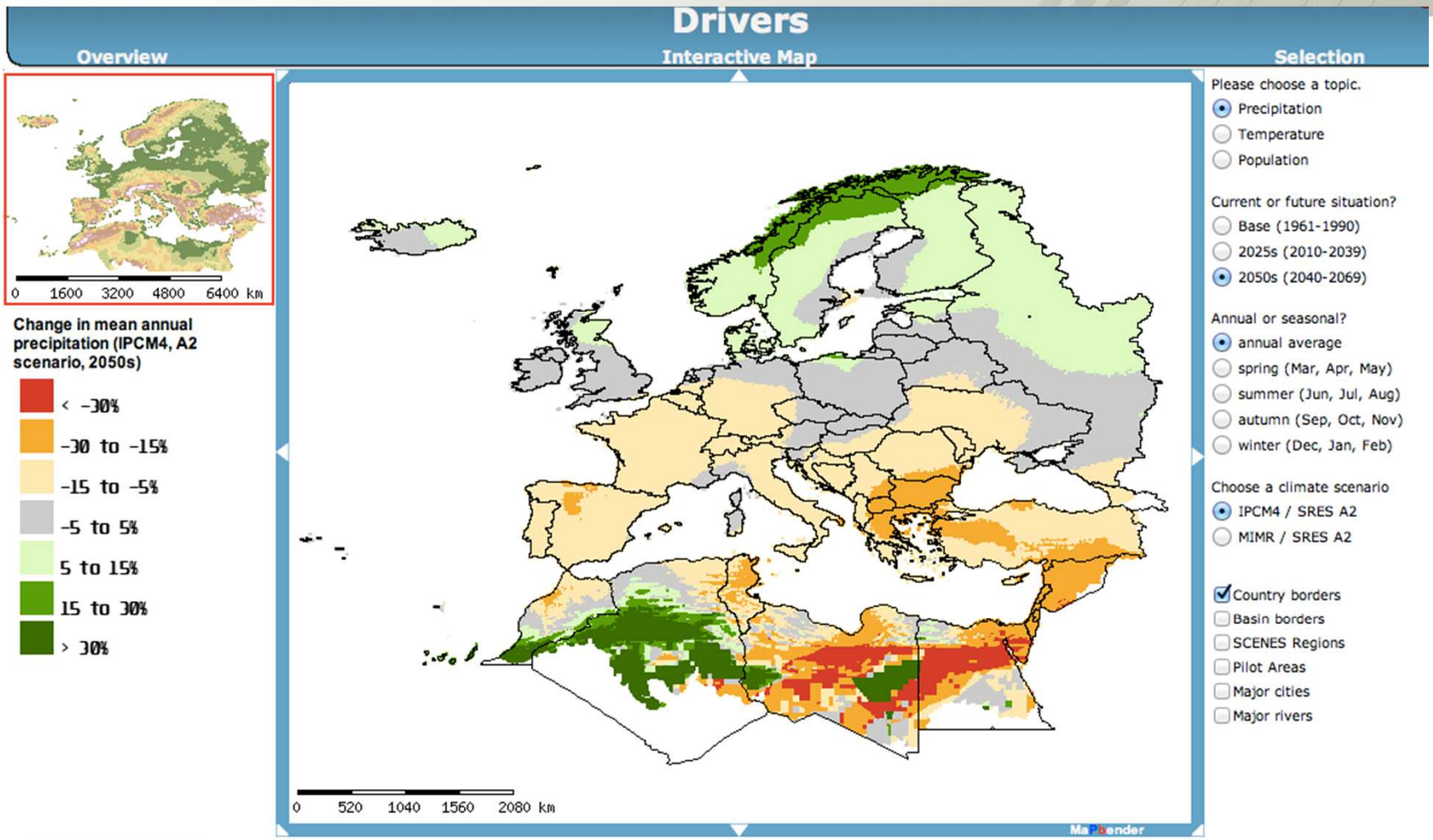
# Source: ESPON

## Climate change impact



# SCENES FP 6. project

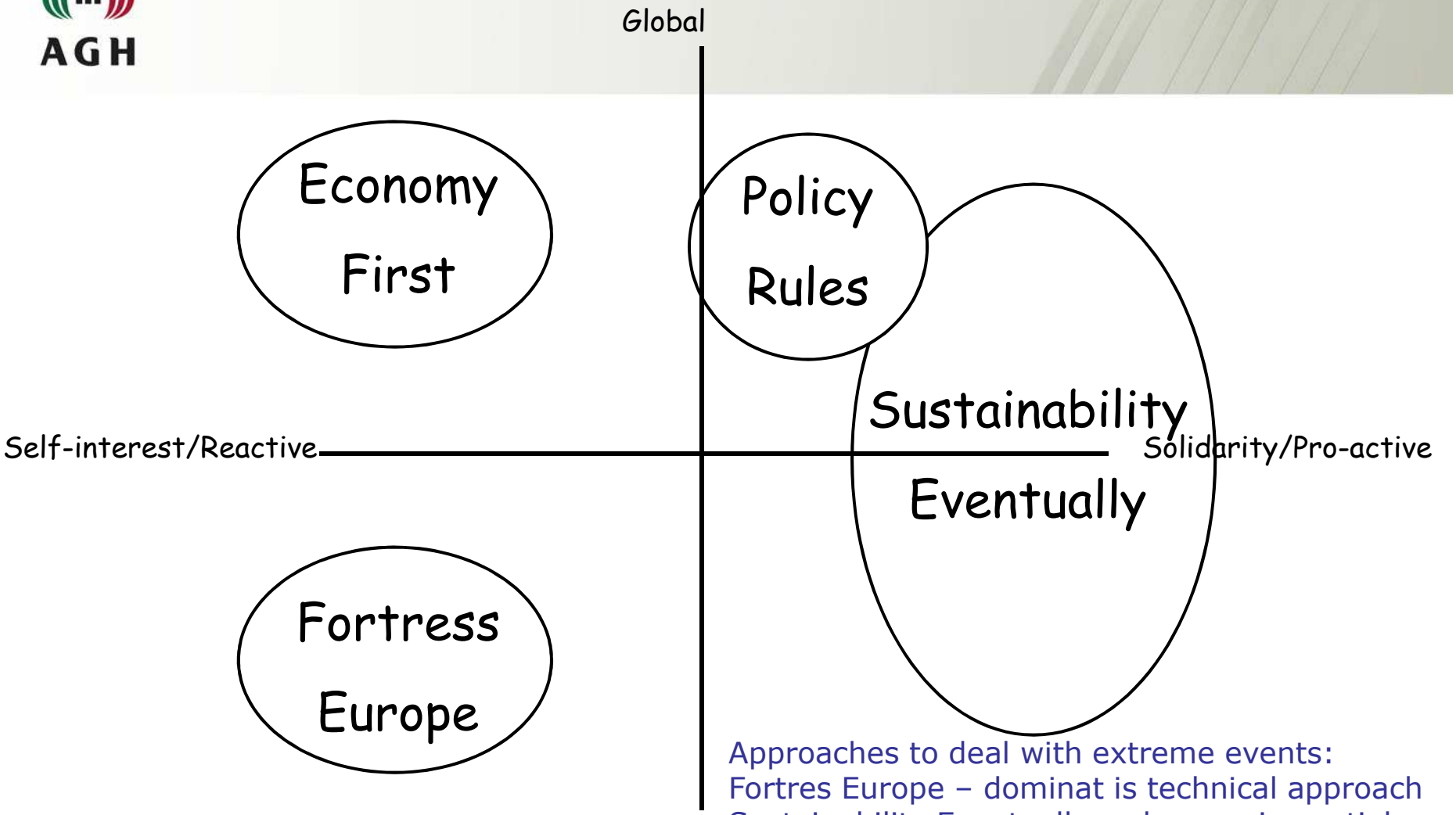
## Water Scenarios for Europe and Neighbouring States




http://www.1stcellmedia.de/customer/uni/cms/index.php?option=com_frontpage&Itemid=1

# SCENES FP 6. project

## Water Scenarios for Europe and Neighbouring States




Approaches to deal with extreme events:
Fortres Europe – dominat is technical approach
Sustainability Eventually – changes in spatial planning approaches, implemented are climate change mitigation and adaptation instruments, especially at local levels.

# KLIMAT project

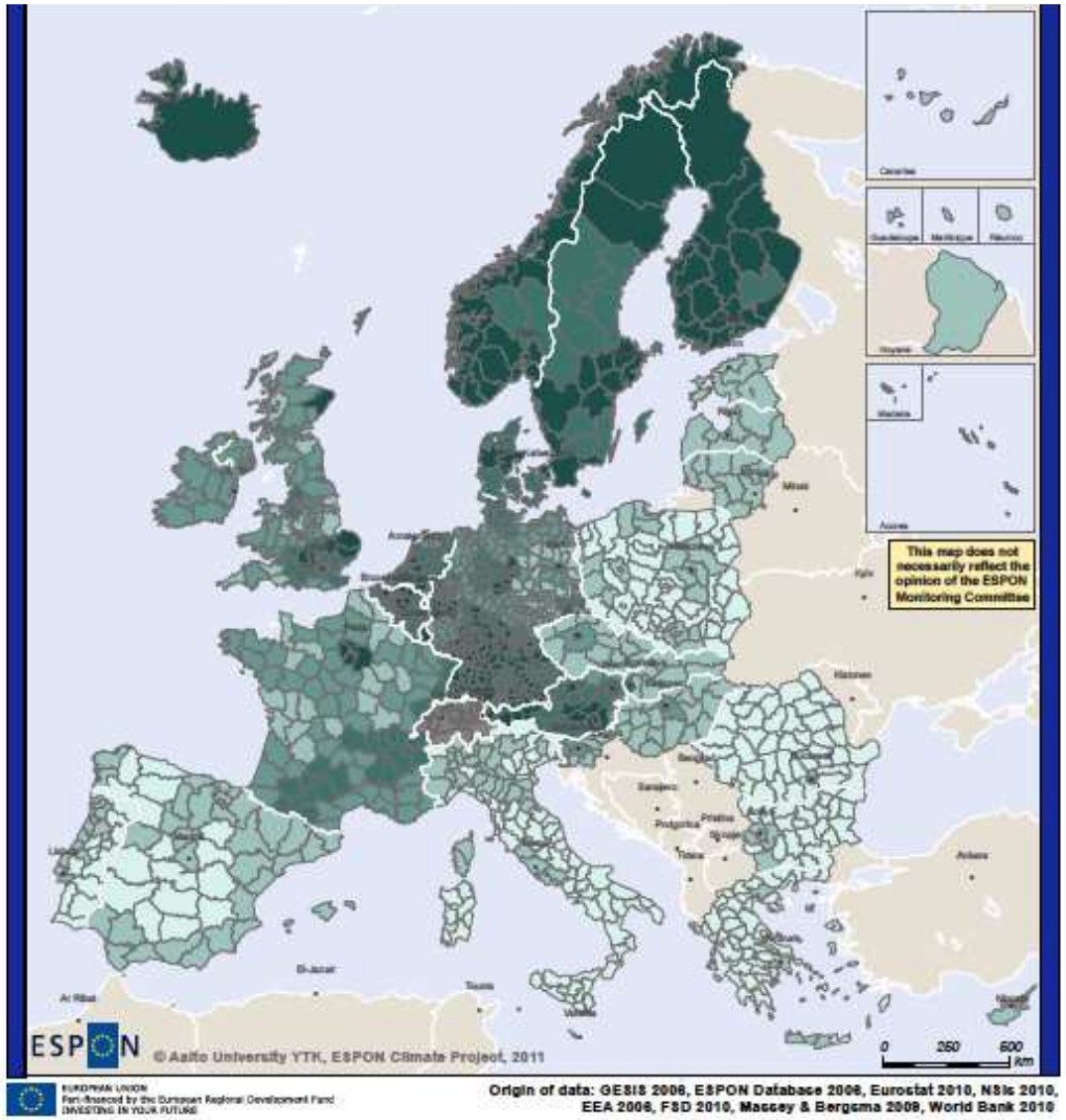
**Average percentage change in unit outflow in 2011-2030 in referenece to 1971-1990 (monthly simulations)**
Source: IMGW, Projekt KLIMAT
http://klimat.imgw.pl/

Water withdrawals (% change 2030/2007):
A2 (regional) 75-90
B1 (sustainable) 40-75
A1B (market) 60-110
Source: *Walczykiewicz T., Rataj C., Barszczyńska M. (2012*) Scenariusze wpływu zmian klimatu na zasoby i pobory wody w Polsce, instrumenty adaptacji. *Zakład Gospodarki Wodnej i Systemów Wodnogospodarczych, IMGW-PIB, Oddział Kraków*
http://www.zarz.agh.edu.pl/adubel/wp-content/uploads/2013/02/AGH_CR_05_03.pdf

Approaches to deal with extreme events: in all scenarios management of natural disasters is an important task of water management. Changes in risk management and burden sharing are slow in all scenarios, especialy in the regional one.

# Assessing **adaptive capacity to climate change**

Adaptive capacity (source: ESPON)



# Assessing adaptive capacity to climate change

**KLIMAT project**: analyisis of adaptation potential based on indicators (for local communities – „gmina"); 11 indicators charcterizing:

- **socio-cultural adaptation potential**: demography, family, education, social capital
- **economic adaptation potential:** income, stability of income, employment rate, income of local comunities
- **infrastructural adaptation potential:** access to water resources, access to education and health services, transport

Source: *Zakład Gospodarki Wodnej i Systemów Wodnogospodarczych, IMGW-PIB, Oddział Kraków (2011*) Scenariusze wpływu zmian klimatu na zasoby i pobory wody w Polsce.

# Climate change adaptation instruments

| | Public Off-Farm Measures | | Private On-Farm Measures |
|---|---|---|---|
| **Water Retention through catchment storage schemes** | Upland water retention<br>- Ditches, wetlands, ponds (on-farm and off)<br>- Afforestation to increase interception and infiltration to groundwater<br>Water storage areas (floodplain/river)<br>- Reservoirs, polders, washlands<br>- Dams | **Water Retention by managing runoff and increasing infiltration** | Arable land use practices<br>- Optimize crop season(in Poland shift from Winter to Spring)<br>- Water harvesting, supplemental irrigation, soil cover/mulches<br>- Extensification, set-aside areas, convert arable land to grassland<br>Livestock land practices<br>- Lower stocking rates, restrict grazing season, maintain pastures<br>Tillage Practices and erosion control<br>- Conservation tillage, no tillage, contour farming, furrow cropping,<br>Deep cultivations to reduce impermeability<br>On-Farm Water Storage<br>- Ponds, Bunds, Tanks<br>Buffer Strips and buffering zones<br>- Contour grass strips, hedges, shelter belts, bunds, riparian buffer strips<br>Machinery Management<br>- low ground pressures, avoiding wet conditions |
| **Managing River Water Conveyance** | Containing water volume in the active river channel<br>- Levees, embankments, retaining walls, channelization<br>Conveying water to increase farm access<br>-Pumping stations, aquaducts, weirs, diversions, canals | | |
| **Managing Water Demand/Supply** | Increase efficiency of available water use<br>-Water recycling, De-salinization, regulation, education campaigns, investment in technology.<br>Increase water governance capacity<br>-Education and Institutions.<br>Decrease Demand<br>- water pricing | **Managing Farmland Water Conveyance** | Management of hill slope connectivity<br>- blockage/opening of farm ditches<br>Channel maintenance and/or realignment<br>-reduced maintenance of farm ditches, dredging<br>Managing Water distribution<br>- Irrigation infrastructure |
| **Managing Distribution of Flooding Impacts** | Spatial planning to restrict construction on flood-prone areas<br>- Zoning, flood-proofing buildings<br>Enhancing capacity to cope with extreme events<br>- Public Insurance (subsidized), Government funding for relief and reconstruction, early warning systems, emergency planning, infrastructure, education<br>Post-disaster compensation<br>- Public or subsidized insurance, Government funding for relief and reconstruction | **Reducing exposure and vulnerability** | Spatial planning to restrict construction in flood-prone areas<br>Reinforcement of critical equipment and infrastructure<br>- Flood-proofing buildings, Securing equipment<br>Enhancing capacity to cope with extreme events<br>- Private Insurance (crop and flood), drainage, disaster preparedness plans |

Bayer J., Dubel A., et al. 2012. *Impact analysis of climate change on drought/flood risk, and relevant non-climate policies and their implementation, and consequences for agriculture and ecosystems*. Deliverable D4.2 of the Responses project, IIASA, Laxenburg

## Stakeholders' preferences for the instruments

**Projects:**

- **Respones (FP.7)**
- **InTRaP (National Science Foundation in PL)**

# Adaptation measures (RESPONSES project)

MACRO SCALE **3/0**

- **Big reservoirs**
  (area bigger than 100ha and volume min. 50mln $m^3$ e.g. Jeziorsko, Wielowieś Klasztorna reservoirs)
- **(big) polders** **0/12**
  (e.g. Golina polder)

MEZO SCALE

- **amelioration systems** **14/0**
- **middle size reservoirs** **9/4**
  (area between 30ha and 100ha and volume 0,5 – 5 mln $m^3$ e.g. Jeżewo, Radzyny reservoirs)

MICRO SCALE

- **small reservoirs, ponds** **10/7**
  (area of about a few ha and volume till 0,5 mln $m^3$)
- **shelter belts** **11/7**
- **aforestation** **2/10**
- **no-tillage** **0/12**

Instruments ranking (Turew 30.05.2012)

**Most frequently** used in the Warta river basin

**Least frequnetly** used in the Warta river basin (**recommended**)

# Flood Risk Transfer Instruments (InTRaP project)

September 2012 – August 2015 (36 months)

The aim of the project is **systematic and scientific analysis and discription of flood risk transfer instruments available in Poland**.

Implementation by analysing:

- Flood risk characteristics,
- Instruments available on polish market,
- Stakeholders' preferences,
- Reasons for low market penetration of the FRTI.

# Risk transfer

Risk transfer means **moving risk form own to someone elese's portfolio**.

Reasons for risk transfer:

- Risk aversion
- Requirement

Reasons for lack of risk transfer:

- Low risk awerness
- Lack of knowledge about risk transfer posibilites
- Percieved inefficiency of risk transfer
- Low income
- Too high income

# Flood risk transfer instruments

| | Who takes the risk (liability): |
|---|---|
| • Insurance and reinsurance, | • Insurer, reinsurer (voluntarily, against payment), |
| • Catastrophic/relief/reserve/solidarity funds, | • Fund raiser (voluntarily), |
| • Catastorphe bonds, | • Option bayers (voluntarily), |
| • Catastrophe taxes, | • All (unvoluntairly) |
| • Central budget relief/reconstruction payments | • Central budget, indirectly all (unvoluntairly). |

# Flood Risk Management


Dimentions:
high/low risk
pre- and post-disatster financing
public assests, private assests (households, businesses, farmers)

# Flood insurance in Poland



1997

- Property insurance from fire and other extreme events
- Crop insurance

2010

- Mandatory insurance of farm buildings from fire and other extreme events

Market penetration about 7%.

# Discourses on insurance schemes for Poland

„Common but non-mandatory insurance would help relief and recovery. Insured should be only assets at risk.” (MSWiA)

„There should be a common catastrophe insurance system**. Mandatory insurance = common insurance**. That leads to lower premiums. The government should have a control over the system.” (PIU)

„Instead of mandatory insurance promotion of insurance in high risk regions, **finacial incentives and premium subsidies for those who can not afford it**.” (law firms)

„Catastrophe insurance system within the flood risk zones. **Mandatory insurance with state subsidies**. Incentives e.g. tax decrease, subsidies.” (Spokesmen of insured)

# Current project of catastrophe insurance scheme

- Insurance of: public, private buildings without chattel
- Risks: flood, storm, fire, landslide
- Multi-hazard/peril
- Premiums are decided by insurers (no unified premiums)
- Setting max limit on the premium by e.g.:
  - Subsidies (expensive, easy to implement and apprise)
  - Contribution of state to the relief payments in case of a catastrophic event (decrease of insurers' risk)
- Possible solutions:
  - Unified insurance scope
  - Defining the minimum scope for insurance protection

Based on: Lewiński P. (PIU) „Koncepcja ubezpieczenia budynków mieszkalnych od ryzyk katastroficznych z punktu widzenia zakładu ubezpieczeń"

# Case study areas

Lower Warta sub-basin

Przemsza basin, Soła basin


Upper Narew sub-basin

Differences:

- economic conditions
- natural conditions
- risk exposure

# Flood risk transfer instruments (FRTI): research

**Working hypotheses about stakeholders not using FRTI:**

H1: Low level of stakeholders' risk aversity.

H2: Households, businesses, farmers and public sector can not afford risk transfer due to its high prices and own budget constriants.

H3: Stakeholders think that they are not at risk.

H4: Stakeholders are used to central budget relief payments, they are passive in prevention and risk transfer (because no risk transfer instrument is perceived as good).

# Results from pilot research

24 people
Przemsza basin

# Results from pilot research

Why are you transfering the risk?

- Bank loan requirement 2, losses 2, security 2, compensation 1

Why are you not transfering risk?

- No losses / low risk 9
- Too expensive premiums 1
- Lack of information (offers) 1

What could change your approach?

- Better knowledge about risk 15
- Gained trust in public institutions and legal regualtions 14
- Better own experinces 6
- Good examples e.g. of the neighbours 5

How do you assess you risk aversity level?

- High (I like to transfer risk) 7
- Middle 15
- Low (I like risk) 2

# Results from pilot research

Are insurance against natural disasters too expensive?

YES 8

NO 3

I DON'T KNOW 13

Do your budget limitations prevent you from purchasing insurance?

YES 9

NO 15

How much do you think should risk transfer cost (yearly, as a percent of assets value), so that you decide to take it?

5/0,2/0,5/0,2/1/20/1/3/1/10/1/0,1/7/0,5/1/2/0,2/0,1/0,5/1/1/3/1/0,05

How much should risk transfer cost as a precent of your income to be accepted by you?

0,1/0,2/5/2/0,5/20/1/0,5/5/3/2/0,2/0,1/1/2/2/0,2/0,1/1/0,5/1/1/1/5

# Results from pilot research

Which of the risk transfer instruments do you consider the best?

- Insurance and reinsurance 18
- Central budget subsidies (loss financing) 7
- Catastrophe taxes 1
- Catastrophe/reserve fund 1

# Conclusions from scientific discussion on Instruments for Natural Disasters Risk Management

**05.March 2013**

**Faculty of Management AGH Kraków, Poland**

- Spatialy diverse increase in risk of natural hazards in the future is very probable, due to differences in precipitation.
- Scenarios and modelling outcomes give highly disperse outcomes.
- Basis for design of FRM instruments is knowledge about risk. FHM, FRM, FRMP are being prepared.
- Interesting examples of FRTI from US, France, Spain or paramteric insurance need further reseach on its possible implementation in Poland.
- FRTI should give incentives for flood prevention.
- Different solutions for high/low probability events.
- Economic efficiency of various FRTI schemes should be assessed to inform policy making.
- If security is a public good, who should finance FRM.

# Final conclusions

- Although future cc impacts (and their severeness) are uncertain, better instruments for current adaptation are needed. They could serve for the future.
- Information about risk is necessary to increase awareness and adoption of FRTI.
- Design of better FRTI to serve effective FRM is needed in Poland. Economic analysis and public participation can lead to acceptable and (also therefore) an effective and efficient solution.

# Thank you for your attnetion!

# Grazie ;-)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