WOJEWODA MAZOWIECKI

UNIWERSYTET WARSZAWSKI

2nd Disaster Risk Reduction Conference 2015

ABSTRACT AND PROGRAMME BOOK

Warsaw, October 15-16, 2015

Editors: Dorota Rucińska, Joanna Papis
University of Warsaw

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Krakowskie Przedmieście 26/28
00-927 Warszawa
Phone: +48 22 55 20 888, Fax: +48 22 55 22 515
e-mail: zaklad.graficzny@uw.edu.pl

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Dear Colleagues,

Professors and Students,

The International Conference on Natural Disaster Risk Reduction is a result of the cooperation between the Faculty of Geography and Regional Studies of the University of Warsaw and the Department of Safety and Crisis Management of the Masovian Province Office. The main goal of the conference is to facilitate the distribution of the observations and results of research concerning the reduction of natural disaster risks among the scientific community, government and non-government organisations, and self government organisations. It focuses at a group of scientists and practitioners willing to assist in minimising the effects of natural hazards and developing the associated social awareness.

As the society and local communities need to focus more and more on disaster risk reduction, the project will enable to develop a dialogue of researchers and practitioners and help to learn from experience of each other. We hope, that the Conference will also give an opportunity to disseminate to decision-makers information about the disaster risk reduction and help to understand their perspective on risk management. During the two-days Conference students and researchers will present their posters and discuss issues related to the new disaster risk reduction studies, and present their scientific ideas and solutions. Let's join the *International Day for Disaster Reduction*.

Welcome to Warsaw!
Scientific and Organising Committee
Disaster Risk Reduction Conference
Warsaw, 2015

Artur Magnuszewki
Dorota Rucińska

The 2nd Disaster Risk Reduction Conference in Warsaw promotes the International Day for Disaster Reduction, which has been celebrated on October 13, 2015 with the motto *Knowledge for Life*.

The International Day for Disaster Reduction (IDDR) started in 1989 with the approval by the UN General Assembly which sees IDDR as a way to promote a global culture of disaster reduction, including disaster prevention, mitigation and preparedness. The day celebrates how people and communities are reducing their risk to disasters and raising their awareness. It is also a day to encourage every citizen and government to take part in building more disaster resilient communities and nations. A sentence: *From Culture of Reaction to a Culture of Prevention* is actually challenge in the World.

The *Step Up* initiative started in 2011 and is focusing on a different group of partners every year – children and young People (2011), women and girls (2012), people living with disabilities (2013), the ageing population (2014), and traditional, indigenous and local knowledge (2015). The initiative was leaded to the World Conference for Disaster Reduction in 2015 www.unisdr.org

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The 2nd Disaster Risk Reduction Conference in Warsaw, October 15-16, 2015 (DRR 2015) is jointly organized by the Faculty of Geography and Regional Studies of the University of Warsaw and the Department of Safety and Crisis Management of the Masovian Province Office.

The DRR 2015 is under the honorary patronage of the Permanent Representative of the Republic of Poland to the United Nations Office in Geneva, Masovian Voivode and Rector Magnificus of the University of Warsaw with contribution of the Association of Polish Hydrologists, the Association of Polish Climatologists, the Association of Polish Geomorphologists, and Polish Geographical Society.

The aim of the Disaster Risk Reduction Conference is to share knowledge and experience among theoreticians and practitioners and identify the key problems of the topic with particular consideration of social aspects and uses for new analytical methods. We also intend to join the International Day for Disaster Reduction.

The conference covers the following issues: extreme phenomena in the changing environment, natural disaster risk management, social and economic aspects of natural disasters, reduction of the effects of natural disasters in local and regional solutions, and the role of the state and civic responsibility.

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Our first conference “For the Society – Disasters Risk Reduction” held on February 24, 2014, brought together 112 scientists, representatives of governmental institutions, and students. The first symposium was the largest and most important natural disasters risk reduction meeting performed ever held in Poland and generated tremendous interest. The conference aimed to facilitate the exchange of research results and expert observations between the scientific community, the government, practitioners, and non-government organizations toward efforts to minimize the impacts of natural hazards and to develop social awareness of environmental risks.

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MAZOVIA

THE ECONOMIC LEADER WITH A THOUSAND-YEAR-LONG TRADITION.

The historic buildings merged into the modern, sky-reaching Warsaw. The academic area surrounded with a huge agricultural terrain. We are inviting you to Mazoviathe region of contracts and big opportunities.

We suggest to begin our excursion from Płock, the oldest town in the region. Płock is located in the middle of Mazovia, at the borderland of Kotlina Płocka and Pojezierze Dobrzyńskie.

The burg city, established on the slope above the Vistula River, used to be the seat of bishops, Mazovian dukes and Polish lords. It is an amazing place and as such – it has been the inspiration for poets, painters and cameramen. Its magic is hidden in its unique beauty created by the history and the present.

In Pułtusk, only 60 kilometers away from Warsaw, inside the walls of the XVth c. Castle located on the brink of Puszcza Biała, at the blue Narew- there is the Polonia House (now a beautiful hotel). The city is famous for the longest (380 kilometers) cobbled square in Europe.

Żelazowa Wola is a small town located in the Mazovian plateau, on the outskirts of Sochaczew. There is a beautiful manor – the place where the world famous pianist and composer, Frederic Chopin, was born. The interior of the museum reflects the character of the epoch; however, the Chopins' manor XIXth c. equipment has not survived till today.

The precincts of Grójec are the biggest fruit growing areas in Poland. They call this place the biggest orchard in Europe, and it is said that every third apple in Poland is grown Grójec. These apples are of unusual acidity and beautiful red color – the features ensured by the unique microclimate of the area.

The Zegrze Reservoir [Jezioro Zegrzyńskie] is a place for recreation for Warsaw and neighboring citizens due to the many guest houses and water sport facilities located mainly in Zegrze, Zegrzynek, Białobrzegi and Rynia. Around the water reservoir there are cycling paths.

Near Warsaw there is the Kampinos Forest [Puszcza Kampinoska] – the Kampinos National Park [Kampinowski Park Narodowy] one of the most important forest complexes in Poland. In the forest growing on the sand dunes there live such wild animals as elks, lynxes, beavers and badgers.

The Bug Landscape Park [Nadbużański Park Narodowy], located in central-eastern part of the Mazowieckie Province, is characterized by the variety of landscape yet its most important value is the Bug valley, with many oxbow lakes and islands in the current and sandbanks and slopes. Circa 1/3 of the park's area is covered by forests – the remains of the old virgin forests. Other interesting places are the ruins of the old castles of Mazovian dukes in Ciechanów and Czersk, the stronghold in Modlin, the river basin of Narew or Konstancin Jeziorna – the beautiful health resort near Warsaw.

The Mazovian Lanscape consists of heights and plains, crossed out by the wide valleys of the queen of the Polish rivers – the Vistula, the symbolic Bug river, the historic Bzura river, and picturesque rivers: Narew, Pilica and Wkra.

There are only a few, mainly post-glacial lakes, like the one near Gostynin and the lakes in the Pojezierze Dobrzynskie. The forests cover more than 20% of the area, where the green pines and long-lasting oaks predominate the landscape.

MAZOVIA IS THE MOST OFTEN VISITED REGION OF POLAND.

It attracts circa 5 million tourists a year, which is almost 30% of the total volume of the foreign tourism in our country. The Mazowieckie Province is also the biggest in terms of the area and population, and it is thus sometimes compared to Denmark. It occupies 36 thousand square kilometers i.e. over 11% of the area of Poland. It is inhabited by at least 5.2 million people. The density of population is 145 persons per square kilometer.

Mazowieckie Province was created as a result of the administrative reform of 1999, from the former Warszawskie Province, and parts of provinces such as the radomskie, ciechanowskie, siedleckie, płockie, skierniewickie, bialskopodlaskie and łomżyńskie. It regained the shape of the Warszawskie Province before 1957. Its borders do not cover the historic Mazovian region. Its eastern part includes the Podlasie lands, the northern part covers the Kurpie, and the southern part – the radomskie land. Administration divides it into 5 townships, and 37 country districts, and 314 communes. There are 85 towns with the total 65% of population. The biggest cities here are Warsaw (over 2.8 million of inhabitants), Radom, Siedlce, Ostrołęka, Płock, Pruszków, Legionowo, Ciechanów. The smallest city in the province, as well as in Poland, in respect of the number of inhabitants is Wyśmierzyce, populated by 90 inhabitants only.

THE MAZOWIECKIE PROVINCE BELONGS TO THE MOST INTERNALLY VARIED ECONOMIC REGIONS.

Over 21% of the domestic gross product is manufactured here and it is the most in the country. Warsaw, with the “team” of the nearest towns, and Płock and Siedlce, are the leaders. Trade, telecommunication, financial and IT services, insurances, vehicle and petrochemical industry flourish in the biggest cities. At the same, the province is the biggest agglomeration of rural population (1.8 million persons) – every fourth person being employed in agriculture. Over the half of the province area is occupied by the arable lands, and therefore vegetable and fruit-growing develop best, especially near Grójec and Warka.

THE PROVINCE HAS ITS OWN RESILIENT SCIENCE AND EDUCATION BACKGROUND WITH THE BIGGEST NUMBER OF STUDENTS IN THE COUNTRY (OVER 350 THOUSAND STUDENTS).

The biggest academic center is Warsaw, but the schools are also located in Płock, Pułtusk, Radom and Siedlce. Over 18 higher schools with almost all faculties are seated there. The most famous are: the University of Warsaw (established in 1816), the Technical University of Warsaw (with tradition going back to 1826), the Warsaw School of Economics, and the Warsaw University of Life Sciences. There are also 44 non-public schools.

Finishing our Mazovia excursion, we are inviting you to the capital city. The obligatory point of this trip should be the visit at the Warsaw Old Town [Starówka]. While walking down its old streets, and visiting its stylish cafes, you shall feel its relaxing space. Razed to the ground during the II World War, the Old Town was rebuilt to match its pre-war look as closely as it was possible, and now it is listed as a point in the World

Culture and Natural Heritage List of UNESCO. There are also many precious buildings which remained after the War without significant damages, such as the Palace in Wilanów (the summer residence of the king Jan III Sobieski, who held back the invasion of the Turks in Europe in XVIIth c.), the Visitationists' Church [kościół Wizytek] and the Assumption Carmelite Church [Kościół Karmelitów pw. Wniebowzięcia] at the stylishly redecorated Krakowskie Przedmieście; and the Presidential Palace. From the Old Town, you should go for a walk along the Royal Route [Trakt Królewski] – the most representative part of the city. This route connects the Royal Castle with the palaces in Łazienki and Wilanów. It captivates with the beauty of the palaces, churches, middle-class tenement houses, and majesties of government seats. The walk along this route is the time-travel in the past centuries, letting the traveler familiarize with the history. Want more impressions? Go to the old part of Praga, with the unique climate of Warsaw where many tenements houses remember the times before the War. The foreign guest may be interested in the socialist realism remains: the Marszałkowska Dzielnica Mieszkaniowa (MDM), or the blocks near East Train Station [Dworzec Wschodni]. And if you want to watch the capital city's panorama, you should do it on the 11th level of the Palace of Culture and Science which, like the Eiffel Tower, is visible from almost every place in Warsaw. The Warsaw unique is also its contrast given by the close proximity of big city buildings, skyscrapers and monuments, and the greenery of many squares, parks and gardens. There the busy inhabitants are able to relax for a while, listen to the birds' voices and think about… nothing.

This big city agglomeration is also the asylum for many species of protected animals- butterflies, lizards and reptiles. However, the most numerous are the wild birds here. Although they have a shelter in the tree branches and bushes at the green and still natural bank of the Vistula river, the symbol of which is the couple of Peregrine Falcon which some years ago made nests at the top of the Palace of Science and Culture, in the very heart of the city.

WARSAW IS ALSO THE CENTER OF CULTURAL EVENTS.

There are numerous concerts, theatre performances, exhibitions and festivals, and the music contests such as the International Frederick Chopin Piano Competition, the International Festival of Contemporary Music "Autumn of Warsaw", Jazz Jamboree, Warsaw Summer Jazz Days, the International Stanisław Moniuszko Vocal Competition, Mozart's Festival, or the Old Music Festival – the events are well known all over the world – starting from America, to finish with Japan. There are also 30 big theatres with the most important – the National Theatre (established in 1765) and Teatr Wielki – the Polish National Opera (established in 1778) among. There are many museums and art galleries, both public and private, with the biggest ones: the Zachęta and the Centre for Contemporary Art Ujazdowski Castle. Worth seeing is the National Museum and its branches at the Royal Castle and the Wilanów Palace. Since 2004, the obligatory point of all trips has been the multimedia Warsaw Rising Museum. You must go there to find out why.

In the administrative capital city of Poland, the greatest number of the authority bodies such as the Ministries, Authorities and the Central Institutions, as well as Embassies have their seats. There are also the representations of foreign institutions, organizations and corporations. In Warsaw, the domestic communications roads cross. At the International Frederic Chopin Airport, land over 80% of passengers coming to Poland. The Warsaw City Center [Śródmieście], with the Warsaw Stock Exchange, is one of the most important business centers in the Middle Europe. – And it never sleeps…

WELCOME TO MAZOWIECKIE PROVINCE!

www.mazowieckie.pl/en

INVITED SPEAKERS

David E. Alexander is Professor of Risk and Disaster Reduction at University College London (UCL). He graduated in geography at the London School of Economics and obtained his PhD in Mediterranean geomorphology from UCL. During a Postdoctoral Research Fellowship at UCL he studied erosion processes in clay badlands. From 1982 until 2002 he taught geomorphology, physical geography, natural hazards and disaster studies at the University of Massachusetts at Amherst (USA). He has participated widely in emergency management training courses and for 2003-7 was Scientific Director of the Advanced School of Civil Protection of the regional government of Lombardy in Italy. As a Professor the University of Florence (2005-11) he was a leading member of the team that designed, launched and taught Italy's first Master of Civil Protection course. Alexander is Visiting Professor at the Universities of Bournemouth and Northumbria in the UK, Affiliated Professor at the University of Lund in Sweden and an affiliate of the Global Risk Forum in Davos, Switzerland. Alexander's published journal articles, reports and working papers include studies of seismic landslides, post-earthquake urban planning problems, logistical aspects of emergencies, the sociology of panic, the theory of disasters and earthquake injury epidemiology. His book Natural Disasters was published in London and New York in 1993 and has been reprinted on many occasions. His subsequent books on the subject include Confronting Catastrophe: New Perspectives on Natural Disasters (2000), Principles of Emergency Planning and Management (2002), and Recovery from Disaster (with Ian Davis, 2015).

David Alexander has served on public resilience forums and worked with commercial companies in insurance and telecommunications. He has worked with the Council of Europe on disaster risk reduction for people with disabilities. For the period 2008-11 he directed a major European project that brought vulnerability assessment and reduction measures to stakeholders in the public and private sectors in Europe. He has advised the governments of Italy and the United Arab Emirates on disaster mitigation measures.

David Alexander is the Editor-in-Chief of Elsevier's International Journal of Disaster Risk Reduction, and was formerly Co-Editor of Disasters journal. He is also a member of the Editorial Boards of Geomorphology, Disaster Prevention and Management, the Journal of Seismology and Earthquake Engineering, Environmental Management, Journal of Natural Resources Policy Research, PLoS Currents Disasters, ICPEM Alert and the Integrated Disaster Risk Management Journal. From 1985 until 2001 he was Editor-in-Chief of Environmental Management and for some years also of the associated book series. He was co-editor and principal author of the Encyclopaedia of Environmental Science (Springer, 1999). In 2013 he won the Distinguished Research Award of the International Society for Integrated Disaster Risk Management (IDRiM).

david.alexander@ucl.ac.uk
http://www.ucl.ac.uk/rdr/people/david-alexander
www.emergency-planning.blogspot.com
www.slideshare.net/dealexander

Adam C. Bouloukos is a US national who joined the United Nations in 1995 after several years as a researcher/instructor in criminal justice/ law. Dr. Bouloukos holds a Masters and Doctorate in Public Policy, with a specialization in criminal justice from the Rockefeller College of Public Affairs and Policy, USA and a Post Graduate Certificate in Management from Edinburgh Business School, UK.

His first assignment with the United Nations was as research officer in the Crime Prevention Branch in Vienna, now part of the UN Office on Drugs and Crime (UNODC) in 1995. In 2002-2004, Adam acted as Deputy Representative, UNODC-Afghanistan.

In 2004, Adam joined UNOPS and has held the following posts since then:

- Deputy Country Director, UNOPS-Afghanistan (incl mudslide/ avalanche response)
- Representative and Director/Earthquake Response Coordinator- UNOPS Pakistan
- Representative and Director, UNOPS- Sudan (emergency infrastructure)
- Director, Outreach and Partnerships (HQ)
- Representative and Director, UNOPS Geneva

In addition, in 2006-2007, Adam was the Deputy Director, Operational Support of the UN Relief and Works Agency for Palestine Refugees in the Near East (UNRWA).

Adam joined UNISDR as Director in January 2015.

Adam is married and has three sons.

2nd Disaster Risk Reduction Conference 2015

Conference day 01: October 15, 2015

LOCATION: National Stadium in Warsaw

conference room "LONDON"

8:00 am to 12:00 am	REGISTRATION & CHECK-IN PROCEDURE EXHIBIT TABLES INSTALATION

WELCOME REMARKS & OPENING LECTURE

Co-Chairpersons: Krzysztof Dąbrowski and Artur Magnuszewski

9:00 am to 9:10 am	**Opening Ceremonies** Jacek Kozłowski *Mazovia Province Governor*
9:10 am to 9:15 am	Andrzej Lisowski *Dean of Faculty of Geography and Regional Studies, University of Warsaw*
9:15 am to 9:20 am	*Permanent Representative of Republic of Poland to UN Office at Geneva*
9:20 am to 9:25 am	Krzysztof Malesa *Representative Government Centre for Security, Poland*
9:25 am to 9:40 am	Adam C. Bouloukos *Director of UN International Strategy for Disaster Reduction* **The Sendai Framework for Disaster Risk Reduction 2015-2030: Next Steps in Implementation**
9:40 am to 10:20 am	David E. Alexander *Professor of Institute for Risk and Disaster Reduction, University College London, UK* **Opening Lecture: Current trends and new challenges in disaster risk reduction**
10:20 am to 10:35 am	DISCUSSION
10:35 am to 10:45 am	COFFEE BREAK

Session 01:
ROLE OF STATE AND CITIZENS RESPONSIBILITY – PERSPECTIVE OF POLAND
Co-Chairpersons: Kazimierz Banasik, Krzysztof Dąbrowski and Marta Różak

10:45 am to 11:00 am	Zbigniew Śwircz *Ministry of Administration and Digitalization, Poland* *Disaster Prevention and Recovery and Crisis Management,* **The role of the state in disasters recovery focus on assistance to individual persons**
11:00 am to 11:15 am	Ireneusz Zygmunt *Armed Forces Operational Command (AFOC), Colonel (Col.)* **The role of the Polish Armed Forces in support of public administration authorities in crisis situations**
11:15 am to 11:30 am	Janusz Szylar *Mazovian Headquarters of State Fire Service* **The rapid reaction forces, operational preparation of the area for future action in the event of natural disasters**
11:30 am to 11:45 am	Rafał Mańkowski *Polish Insurance Association*
11:45 am to 12:00 pm	DISCUSSION
12:00 pm to 12:30 pm	**EXHIBIT HALL** **& STOPDISASTERS Game (UNISDR)** Presentation by Students of *Faculty of Geography and Regional Studies, University of Warsaw*

Session 02:
RISK MANAGEMENT OF NATURAL DISASTERS
Co-Chairpersons: David Alexander and Artur Magnuszewski

12:30 pm to 12:45 pm	Maria Niedzielko Crisis Information Centre at Space Research Centre, Polish Academy of Sciences, *Warsaw* **Effective decision-making in crisis management using geoinformation technologies**
12:45 pm to 1:00 pm	Bogdan Ozga-Zieliński *Association of Polish Hydrologist* **Risk, Reliability and Safety of Hydrological Systems**
1:00 pm to 1:15 pm	Grzegorz Dumieński *Institute of Meteorology and Water Management – National Research Institute in Wroclaw, Centre of Research* **Development of sensitivity of a flood-endangered system in flood risk management**

1:15 pm to 1:30 pm	Joanna Doroszkiewicz, Renata Romanowicz *Institute of Geophysics, Polish Academy of Sciences, Warsaw* **Flood risk management measures for land use planning**
1:30 pm to 1:45 pm	Hannelore Mees *University of Antwerp, Antwerp, Belgium* **Citizens, local governments and flood resilience: experiences from 5 EU member states**
1:45 pm to 2:00 pm	Dorota Leduchowska *Emergency Planning and Critical Infrastructure Protection Office, Government Centre for Security, Poland* **Risk Management – New challenge arising from the EU Civil Protection Mechanism**
2:00 pm to 2:15 pm	Magdalena Kwiecień *Institute of Meteorology and Water Management – National Research Institute, Division of Water Management, Kraków* **Warning systems for specific hazards in the IT System of the Country's Protection against extreme hazards**
2:15 pm to 2:30 pm	DISCUSSION
2:30 pm to 3:30 pm	LUNCH BREAK

Workshop: STARFLOOD
Chairperson: Zbigniew W. Kundzewicz

3:30 pm to 6:30 pm	**INTERNATIONAL WORKSHOP „FLOOD RISK MANAGEMENT IN EUROPE". PROJECT STARFLOOD** ***Research Team*** *of Institute for Agricultural and Forest Environment (IAFE) of Polish Academy of Sciences in Poznań:* Adam Choryński, Zbigniew W. Kundzewicz, Jakub Lewandowski, Piotr Matczak, Małgorzata Szwed ***International Team***: Mary-Jeanne Adler *National Institute of Hydrology and Water Management, Ministry of Environment and Climate Change-Department for Waters, Forests and Fisheries, Bucharest, Romania* Snejana Dakova *Private consultant, Sofia, Bulgaria* Daniel Kindernay *Slovak Water Management Enterprise, Banská Štiavnica, Slovakia* Jan Kubát *Hydrometeorological Institute, Prague, Czech Repubic* Márton Pesel *General Directorate of Water Management, Budapest, Hungary*
6:30 pm	CLOSING SESSION
6:45 pm	Visiting National Stadium (for those interested in the visiting)

2nd Disaster Risk Reduction Conference 2015

Conference day 02: October 16, 2015

LOCATION: National Stadium in Warsaw

conference room "LONDON"

8:00 am Opening

Session 03:
EXTREME NATURAL EVENTS AND THEIR ASPECTS
Co-Chairpersons: Renata Romanowicz and Ewa Smolska

8:00 am to 8:15 am
Urszula Somorowska
University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology
Extreme stages of the soil wetness conditions over Poland: dynamics and risks

8:15 am to 8:30 am
Halina Kowalewska-Kalkowska
University of Szczecin, Faculty of Geoscience, Institute of Marine Coastal Sciences
The flood threat from severe high water events in the urban area of the lower Odra River

8:30 am to 8:45 am
Tomasz Kalicki, Paweł Przepióra
Jan Kochanowski University in Kielce, Institute of Geography, Department of Geomorphology, Geoarcheology and Environmental Management
Sediments and morphology of flash flood near Kromołów (southern Poland) after 18 years

8:45 am to 9:00 am
Łabędzki Leszek
Institute of Technology and Life Sciences, Research Centre of Kujawsko-Pomorskie
Vulnerability of Polish agriculture to meteorological drought

9:00 am to 9:15 am
Mateusz Strzelecki
University of Wrocław, Institute of Geography and Regional Development, Faculty of Earth Science and Environmental Management, Department of Geomorphology
Assessment of impact of coastal hazards on scientific and community infrastructure in Svalbard, High Arctic

9:15 am to 9:30 am DISCUSSION

Session 04:
MITIGATION EFFECTS OF NATURAL DISASTERS IN LOCAL LEVEL – EXAMPLE OF MAZOVIAN VOIVODESHIP
Co-Chairpersons: Krzysztof Dąbrowski and Ewa Smolska

9:30 am to 9:45 am	Andrzej Rybus-Tołłoczko *Federation of NGO's "POMOCNI MAZOWSZU"* **Assistance for people affected by natural disasters, experience Mazovian Region**
9:45 am to 10:00 am	Jan Żelazo *Professor emeritus – Specialist of Hydrology*
10:00 am to 10:15 am	Zbigniew Frankowski, Edyta Majer, Grzegorz Różyński *Polish Geological Institute – National Research Institute* **Interventions of the Polish Geological Service on Mazovian Voivodeship**
10:15 am to 10:30 am	Stanisław Kubeł *Local Official of Ostrołęka District*
10:30 am to 10:45 am	Małgorzata Bogucka-Szymalska *Ministry of Environmental, Department of Water Management*
10:45 am to 11:00 am	Representative *Institute of Meteorology and Water Management*
11:00 am to 11:15 am	Iwona Gawłowska *Regional Water Management Authority in Warsaw* **Reservoirs activity as a flood risk reduction tool in Mazovia**
11:15 am to 11:30 am	Robert Kęsy *Provincial Board of Amelioration and Water* **Flood protection investments in Mazovia Province realized by the PBAW in Warsaw**
11:30 am to 11:45 am	DISCUSSION
11:45 am to 12:00 pm	**EXHIBIT HALL & STOPDISASTERS Game &** COFFEE BREAK

Session 05:
MITIGATION EFFECTS OF NATURAL DISASTERS – FACTORS
Co-Chairpersons: Renata Romanowicz and Ewa Smolska

12:00 pm to 12:15 pm	Anita Bokwa *Jagiellonian University in Kraków, Institute of Geography and Spatial Management, Department of Climatology* **Impact of global climate change on the number of hot days in urban areas of Central Europe**

12:15 pm to 12:30 pm

Bishawjit Mallick[1], Thorsten Heimann[2]
[1]Institute of Regional Science (IfR) at Karlsruhe Institute of Technology, Germany, [2]Leibniz Institute for Regional Development and Structural Planning (IRS) / FU Berlin
Cultural Differences in Handling Flood Risks – Towards a global comparison between technologically rich and poor countries

12:30 pm to 12:45 pm

Jarosław Działek
Jagiellonian University in Kraków, Institute of Geography and Spatial Management, Department of Regional Development
Social and economic factors influencing vulnerability to floods in Southern Poland

12:45 pm to 1:00 pm

Paweł Franczak
Jagiellonian University in Kraków, Institute of Geography and Spatial Management, Department of Hydrology
Spatial planning in floodplains in mountain catchments of different row, in the basin of the Upper Vistula and the Upper and Central Odra

1:00 pm to 1:15 pm

Karolina Listwan
Jagiellonian University in Kraków, Institute of Geography and Spatial Management, Department of Regional Development
Opportunities and barriers to the use of natural disaster insurance as non-technical means of protection against floods in Poland

1:15 pm to 1:30 pm

DISCUSSION

Session 06:
MITIGATION EFFECTS OF NATURAL DISASTERS – TOOLS AND METHODS
Co-Chairpersons: Zbigniew W. Kundzewicz and Stanisław Lewiński

1:30 pm to 1:45 pm

Nicole Mahlkow
Research Associate Freie Universität, Berlin, Germany
Prepared for the future? Urban development governance against heat risks in mid-latitude cities

1:45 pm to 2:00 pm

Konrad Kępski
Regional Water Management Authority in Kraków
Reservoirs activity as the tool reducing floods' hazard based on the flood in 2014

2:00 pm to 2:15 pm

Yuriy Kostyuchenko
Scientific Centre for Aerospace Research of Earth, National Academy of Sciences of Ukraine
Quantitative assessment and mapping of hydrological risk using Landsat data

2:15 pm to 2:30 pm	Paulina Pokojska *University of Warsaw, Faculty of Geography and Regional Studies, Laboratory of Spatial Information Systems* **Forest fire risk in Poland – classification with application of GIS techniques**
2:30 pm to 2:45 pm	Edyta Woźniak *Earth Observation Group, Space Research Centre, Polish Academy of Sciences, Warsaw* **Automatic extraction of burnt areas from Landsat images time series for fire risk management**
2:45 pm to 3:00 pm	DISCUSSION
3:00 pm to 4:00 pm	LUNCH BREAK

Session 07: POLCITCLIM PROJECT
ADAPTATION AND MITIGATION TO CLIMATE CHANGE – LOCAL SOLUTION
Chairperson: Paweł Swianiewicz

4:00 pm to 4:15 pm	Adam Gendźwił *University of Warsaw, Faculty of Geography and Regional Studies, Department of Local Development and Policy* **Awareness of climate change and significance of climate change policies at the local agendas – a comparison of Norwegian and Polish municipalities**
4:15 pm to 4:30 pm	Jørn Holm-Hansen *University of Oslo, Norwegian Institute for Urban and Regional Research* **Adaptation to climate change in Russian cities – the case of Arkhangelsk and St Petersburg**
4:30 pm to 4:45 pm	Paweł Swianiewicz *University of Warsaw, Faculty of Geography and Regional Studies, Department of Local Development and Policy* **Modes of Governance in Local Adaptation to Climate Change: Networks Bound by Hierarchy and Market Motivation?**
4:45 pm to 5:00 pm	Katarzyna Szmigiel-Rawska *University of Warsaw, Faculty of Geography and Regional Studies, Department of Local Development and Policy* **The assignment of responsibility and manifestations of climate change policy**
5:00 pm to 5:15 pm	DISCUSSION

SUMMARY CONFERENCE
CONCLUSIONS & RECOMMENDATIONS
RESULTS OF COMPETITION FOR THE BEST SCIENTIFIC POSTER

5:15 pm to 5:30 pm	Jacek Kozłowski *Mazovia Province Governor* Artur Magnuszewski *Vice-Dean of Faculty of Geography and Regional Studies, University of Warsaw* Krzysztof Dąbrowski, *Director of Department of Safety and Crisis Management of Mazovia Province Office*
5:30 pm to 6:00 pm	COFFEE BREAK – BEHIND SCENES AT DRR CONFERENCE 2015 TALKS

2nd Disaster Risk Reduction Conference 2015

POSTER HALL

LOCATION: National Stadium in Warsaw

POSTER conference room
October 15: 12:00 pm to 12:30 pm
October 16: 11:45 am to 12:00 pm

Mary-Jeanne Adler
National Institute of Hydrology and Water Management (INHGA), Bucharest, Romania
e-LAC Project: Pro-active operation of cascade reservoirs in extreme conditions (floods and droughts) using a Comprehensive Decision Support Systems (CDSS). Case study: Jijia catchment

Paweł Franczak
Jagiellonian University in Kraków, Institute of Geography and Spatial Management, Department of Hydrology
Flash Flood in the upper part of drainage basin of Skawa in 2001

Katarzyna Grabowska
University of Warsaw, Faculty of Geography and Regional Studies, Department of Climatology
Synoptic conditions during the occurrence of longest thunderstorms in Central and Southern Europe

Marek Jaskólski, Łukasz Pawłowski
University of Wrocław, Institute of Geography and Regional Planning, Department of Geomorphology
Arctic town at risk – evaluation of potential geohazards associated with climatechange and human impact in Longyearbyen, Svalbard

Mirosław Kamiński
Polish Geological Institute – National Research Institute, Warsaw
Application of LiDAR date to assess the landslide susceptibility map using weights of evidence method – an example from Podhale region (Southern Poland)

Marta K. Kaniowska
University of Warsaw, Faculty of Geography and Regional Studies
The effects of Nepal earthquake in April 2015 and proposals seismic engineering to limiting the seismic risk for the future earthquakes

Witold F. Krajewski
University of Iowa, Iowa City, Iowa, United States
Real-Time Flood Forecasting System for the State of Iowa in the United States (using the Internet)

Monika Lisowska
University of Warsaw, Faculty of Geography and Regional Studies, Department of Climatology
The wind gusts in Ciężkowice Piedmont

Artur Magnuszewski
University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology
Flood potential index and the relative exposure to the risk of flooding hazard in counties, Poland

Paweł Mikuś
Institute of Nature Conservation, Polish Academy of Sciences, Cracow
Low-impact method of flood damage prevention in a dynamic mountain river – case study from the Czarny Dunajec River

Marta Milczarek
Crisis Information Centre at Space Research Centre, Polish Academy of Sciences, Warsaw
Anti-flood early warning and prevention system in Georgia

Mariusz Porczek
University of Warsaw, Faculty of Geography and Regional Studies, SIS Laboratory,
Estimation of CODGIK's data in identifying landslides by clusters analysis in selected counties of Lesser Poland

Dorota Rucińska
University of Warsaw, Faculty of Geography and Regional Studies, Department of World Regional Geography
Overview of strong winds and social perception of natural hazards: the case study of Tuchola Forest, Poland

William Solecki
City University of New York – Hunter College, New York, USA
Climate Extremes, Risk, and Resiliency in New York City

Mateusz Ślązek
University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology
Heat waves and evapotranspiration in the lowland catchment of the Liwiec River, eastern Poland

Tamara Tokarczyk
Institute of Meteorology and Water Management – National Research Institute, Wrocław Branch
Extreme historical drought events in Poland – analysis based on the selected indices

Maria Wąsowska
University of Warsaw, Faculty of Geography and Regional Studies, Department of World Regional Geography
Volcanic hazards and Vanuatu population

Abstracts of Presentations

Effective decision-making in crisis management using geoinformation technologies

Anna Foks-Ryznar, Alicja Głazek, Karolina Kuskowska, Marta Milczarek, Maria Niedzielko, Marcin Rudnicki, Jakub Ryzenko, Joanna Tymińska, Emil Wrzosek

Crisis Information Centre at Space Research Centre, Polish Academy of Sciences, Warsaw
cik@cbk.waw.pl

Natural disasters are expected to become more frequent and devastating in the near future due to climate change, human activity or excessive settlement in hazard-prone areas. Because of growing world population and uncontrolled urbanization, each natural crisis may cause expensive infrastructure destruction, economic decrease and poverty increase. To minimize tragic effects of natural disasters, it is critical to undertake effective decision-making process in crisis management.

Disaster risk reduction is a complex and long-term process including four main stages: early warning system, preparedness, mitigation and prevention. In every stage, it is fundamental to process and deliver reliable information which in majority refer to spatial data. For that reason, crisis management is supported by geoinformation technologies which are nowadays irreplaceable in decision-making process.

Crisis Information Centre at the Space Research Centre of Polish Academy of Sciences (CIK) uses geoinformation technologies and remote sensing techniques to support institutions responsible for crisis management and emergency services in Poland (e.g. State Fire Service). Using different sources of data and merging various technical solutions, including new, pre-operational solutions, CIK processes and delivers up-to date, accurate and reliable information, which support the situational awareness during the crisis situation.

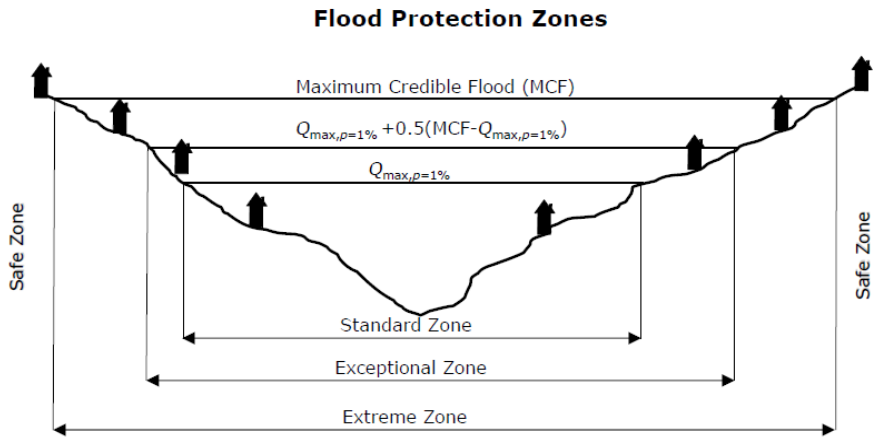
This presentation refers to the CIK projects and activations which are focused on supporting decision-making process in crisis management: Flood in Poland 2010, Flood in South Sudan 2013, Anti-flood early warning and prevention system in Georgia and GECCO: space-derived GEoinformation for Crisis management and COordination. All these activities are examples of using geoinformation and satellite technologies in disaster risk reduction. In this context a saying: “You can see more from above” becomes extraordinarily meaningful.

Risk, Reliability and Safety of Hydrological Systems

Bogdan Ozga-Zieliński

Association of Polish Hydrologists
http://shp.org.pl
b.ozgazielinski@upcpoczta.pl

In the paper application of reliability theory, its practical aspect, i.e. reliability egineering is presented for description of reliable structure of quasinatural system – hydrologic system, its safety as well as flood hazards appearing in river basin caused by extreme hydrological and meteorological events. Suggested methods of assessment hazard, risk and losses connected with occurrence of natural extreme events are aimed to enhance capabilities of protection against these events and improve management of flood risk in accordance with Flood Directive. In river basin various hazards appear as a result of mutual relations between forces of Nature, Human, Technology (Engineering) and natural Environment, constituting system of connection N-H-T-E, having direct influence for safety of people and economy. Extreme hydrological events in form of huge floods causing flooding were treated as undesired events from the view point of safety life and health and property of human being as well as a sign of failure of hydrologic system to efficient (reliable) functioning. For such statement, first of all it is necessary to identify mechanism of arising extreme hydrological hazards as well as technical and nontechnical activities for protection against these hazards. Then, it is necessary to define reliable structure of hydrologic system and describe it by mathematical model for that fault tree is proposed, which enables probabilistic description of undesired events appearing in hydrologic system. Once the reliable model of hydrologic system is known, the hazard and risk of extreme hydrological events can be assessed by method of event tree. Proposed reliability, hazard and risk measures can be used for quantitative assessment of risk and losses resulting from undesired events appearance.When risk of extreme hydrological events is identified, it can be managed to ensure safety of people and hydrologic system itself.



The process of risk management is a selection of effective means ensuring safety and protection against identified hazards, i.e. capability of prevention of losses, so called safety potential. Safety potential has to balance capabilities of hydrologic system to losses causing, so called hazard potential. So, risk management, according to ALARP principle, should keep balance of both potentials in zone of tolerated risk. Presented in the paper example employs only fragment possibilities of reliability engineering, hazard analysis and associated with them risk and safety of hydrologic systems.

Development of sensitivity of a flood-endangered system in flood risk management

Grzegorz Dumieński[1], Andrzej Tiukało[2]

[1]*Research Centre, IMGW-PIB, Branch of Wroclaw*
grzegorz.dumienski@imgw.pl
[2]*National Flood and Drought Modelling Center, IMGW-PIB, Warsaw*
andrzej.tiukalo@imgw.pl

The main objective of Flood Risk Management Plans (Polish PZRP – Plany Zarządzania Ryzykiem Powodziowym) is to develop a strategy that minimises flood risk and reduces its negative effects on human life and health, natural environment, cultural heritage and business.

Based on the resilience theory, an effective tool to describe system's or its particles' capacity to reduce the consequences of such events, as well as to reconstruct or adapt this system to the new conditions, the authors analysed sensitivity of the flood-endangered system as a factor influencing its vulnerability, which supports management of flood risk. A conception has been proposed to highlight the basic components which impact the (flood) risk level of a system exposed to natural threats (especially floods). On one hand it organises terminology used in studies aiming at resilience of social and ecological systems exposed to floods, and on the other hand it carefully analyses currently used simplifications in the process of preparation of flood threat and flood risk maps, which constitutes the foundation for preparation of flood risk management plans in Poland. Possible solutions have been indicated for more complex characteristics of systems endangered by flood – requiring interventions in order to reduce the identified flood risk.

The presented studies constitute the authors' contribution to discussions on the assessment of the "ability to cope" by local government bodies in Poland endangered by floods, with particular reference to measures possible to implement for development (reduction) of their sensitivity to this threat.

Flood risk management measures for land use planning

Joanna Doroszkiewicz[1], Renata Romanowicz[1], Hege Hisdal[2]

[1]*Institute of Geophisics, Polish Academy of Sciences, Warsaw*
joador@igf.edu.pl, romanowicz@igf.edu.pl;
[3]*Hydrological Modelling Section, Norwegian Water Resources and Energy Directorate, Oslo, Norway,*
hhi@nve.no

The objective of flood management measures is to reduce flood risk. The flood risk is an effect of a combined flood hazard and contemporary or future land use in the river valley.

The aim of this presentation is an overview of flood management measures and their classification according to the domain, category and type of actions in the process of reducing flood risk. In our classification flood management measures were primary divided into physical measures and policy instruments. These in turn were divided into the categories of actions. In particular, policy instruments were divided into regulation, communication and compensation instruments, whilst physical measures were divided into control and adaptation measures. Further classification followed the type of action criterion. For example, the adaptation measures were divided into land use planning and river corridor management. The objective of this classification is to help explaining complex relationships between needs and resources and therefore it plays an important part in an efficient flood risk management.

Evaluation of flood risk management implementation helps to strengthen adaptation to future climate by managing flood hazards and it helps communities living in flood prone areas to deal with the uncertainty.

Citizens, local governments and flood resilience: experiences from 5 EU member states

Hannelore Mees, Ann Crabbé

University of Antwerp, Antwerp, Belgium,
hannelore.mees@uantwerpen.be;ann.crabbe@uantwerpen.be

In order to strengthen their resilience against current and future flood risks caused by climate and land use change, the European Flood Directive (2007) demands its member states to consider strategies of prevention, protection as well as preparedness in their flood risk management. In several European countries, a debate is initiated on who has to take responsibility in the implementation of these strategies. Besides the involvement of a wide range of governmental actors, we witness a trend towards sharing or even shifting responsibilities towards the citizens and households.

Based on analyses in the Netherlands, Belgium, France, England and Poland, we can state that countries differ significantly with regard to the extent in which citizens are involved in flood risk governance. In some countries, they are actively engaged in the development of community flood action plans, e.g. the UK, or in local crisis response structures, e.g. Poland or France. In other countries, citizen engagement in flood risk governance remains ad hoc or does not occur at all, e.g. Belgium and the Netherlands. Our presentation will describe how citizen involvement in flood risk governance has evolved in these countries and how the differences in this evolution can be explained. Further, the presentation will present good practices at local government level and how local authorities can embed and foster citizen involvement in their flood risk governance.

The findings are based on document analysis and semi-structured interviews, conducted in the framework of the STAR-FLOOD project. STAR-FLOOD is a European research project comparing flood risk practices in 6 European member states at national and local scale (more information on www.starflood.eu).

Warning systems for specific hazards in the IT System of the Country's Protection against extreme hazards

Tomasz Walczykiewicz, Magdalena Kwiecień, Łukasz Woźniak

Institute of Meteorology and Water Management – National Research Institute,
Division of Water Management, Kraków
tomasz.walczykiewicz@imgw.pl;
magdalena.kwiecien@imgw.pl
lukasz.wozniakz@imgw.pl

Registration and statistics of emergencies lead to the conclusion, that the number of incidents and hazards to human health and the environment is huge and the trend in terms of property damage is strongly increasing. The Institute of Meteorology and Water Management National Research Institute is actively involved in supporting the work focused on reducing the risk of natural and technological hazards. One of the main directions of this work includes the implementation of research and development projects. An example of such a project is the project IT System of the Country's Protection against extreme hazards (polish acronym ISOK). Construction of the system will help to increase the safety of citizens and reduce the losses caused by the occurrence of natural, technological and synergistic hazards. Primary purpose of the system is therefore supporting protection of the society, the economy and the environment from the extraordinary risks, as well as decision support in the event of serious incidents. One of the components of the project is Other Hazard Maps Component. Within it, five maps have been developed which are separate warning systems:

- maps of air contamination connected with meteorological threats,
- map of threat to health and life of population connected with meteorological threats and social vulnerability,
- risk map of disruption in Polish power system connected with meteorological threats,
- risk maps of major accidents in chemical industry connected with meteorological threats,
- maps of surface water and groundwater intakes for areas threatened with flooding,

The primary function of maps is their predictive function which takes into account the impact of weather conditions on the analyzed phenomena. Other hazard maps developed by the project ISOK are closely linked to the implementation of the basic assumptions of strategic documents relating to economic and social development and computerization adopted in Poland.

Developed within the framework of the project ISOK, system with maps will be used to ensure better coordination and efficiency of the services responsible for crisis management in Poland, thus contributing to the improvement of the safety of people and their property.

Extreme stages of the soil wetness conditions over Poland: dynamics and risks

Urszula Somorowska

University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology
usomorow@uw.edu.pl

In recent decades severity of droughts and risk of floods are reported to be emerging issues across the world, including Poland. Prolonged dry periods in summer lead to, among others, vegetation water stress, sometimes of a flash nature. Availability of soil water is then limited and risk of water shortages for plants appears. Equally dangerous natural hazards are floods during which excess of water can cause not only environmental, but also societal and economic damages. Except for wetlands, such a flooding can cause disease, death, or other problems to plants, upon exposure. A range of different single or combined indicators is already in use to detect and monitor soil water availability. However, further research is still needed to account for soil wetness variability and its spatial heterogeneity across different scales.

In this study, the focus is on the soil wetness conditions in Poland in years 2000-2014, to analyze its spatial and temporal variability. Soil moisture data of medium resolution were acquired from reanalysis data, on a monthly time scale and based on that – soil water storage in the surface soil layer was estimated. Mean monthly spatial patterns were generated over Poland and frequency histograms were analyzed. Anomalies were estimated. Risk of appearance of extreme stages was evaluated.

Results indicate that the widening of the water deficit in recent years is particularly felt in the central lowlands waist of Poland. Recharge of the soil water usually appears in months from October till March, whereas from April till August depletion of soil water storage takes place. In particular years this seasonality is disturbed by meteorological conditions. In the examined period, the severe soil droughts were detected in 2003, 2006 and 2014. Especially wet conditions were detected in 2010.

The flood threat from severe high water events in the urban area of the lower Odra River

Halina Kowalewska-Kalkowska

Department of Geoscience, University of Szczecin, Szczecin
halkalk@univ.szczecin.pl.

The flood threat in the lower Odra River (the southern Baltic Sea) is posed by storm surges, snow-melt and rainfall events as well as ice jamming. The study analyses the causes leading to extreme high water events in the downstream Odra reach and the flood threat for towns along it on the basis of water level data from 1993-2014.

The case study revealed that long-lasting very high extensive storm surges at the Pomeranian Bay coast resulted in a few dozen centimeters' increase in water level, taking place first in the Szczecin Lagoon and then in the lower Odra channels (Fig. 1). The extent of those surges reached as high up the Odra River as to Bielinek. Although snow-melt mediated Odra floods were more frequent in the downstream Odra reach, the two highest Odra floods in 1997 and 2010 were caused by an increased river discharge due to heavy rains in the upper Odra basin. During thaw periods severe high water events in the lower Odra channels were also caused by ice jamming.

The results of analyses carried out during investigations allow to conclude that extreme high water events in the downstream Odra reach are caused by the superposition of a few factors. In 1993-2014 they were registered under the condition of the increased water volume in the Baltic Sea (e.g., winters 2007, 2012). Then they were detected when storm surges limited the outflow of the Odra River during snow-melt (e.g., spring 2002) or rainfall events (e.g., spring 2010). Next, they were recorded while the increased Odra outflow was slowed down by ice jams. Many days' maintenance of high water levels, often in the range of alarm states, posed a flood threat for low-lying areas around the Szczecin Lagoon, the Dąbie Lake and areas adjacent to the lower Odra channels (e.g., in October 2009).

Sediments and morphology of flash flood near Kromołów (southern Poland) after 18 years

Tomasz Kalicki, Artur Zieliński, Paweł Przepióra, Łukasz Podrzycki,
Sławomir Chwałek, Marcin Frączek

Institute of Geography, Jan Kochanowski University in Kielce
tomaszkalicki@ymail.com; artur.zielinski@ujk.edu.pl; Pawelprzepiora1988@gmail.com
harcerzpodrzyk@op.pl; Chwostek@poczta.fm; marcinfraczek1987@gmail.com

The examined area is located in southern Poland. Kromołów is a part of Zawiercie city in northern Upper Silesia region near spring of Warta river, tributary of Oder river. According to geomorphological regionalization, it is most southern part of Valley of upper Warta and Prosna between two questas – Upper Jurasic in the east and Upper Triasic in the west. Some dry, fluvio-denudational valley (dellen) formed drainage pattern of this territory. Some of those forms are also shaped when applied last flash flood in 1996. Today most of this forms become changed by human but still in the field we can see signs of that flood from 1996. Flash flood became in two waves and it formed very fast by huge rainfalls.

Near center of the Kromołów, is located small dry valley with long erosional cut having a depth of 3-4 meters and a length of almost 800 meters. According to data from Archaeological Map of Poland (AZP) and radiocarbon dating from the buried soil (2570±80 BP, cal. 847-428 BC; MKL-2252) from valley floor, flash floods occurred and formed this valley many times in prehistory when the drainage basin was settled. Also 18 year ago in this place, water was concentrate and flow to the center of nearby city. Few profiles located in this form, gives us many information about this last flash flood. In alluvium located in lower part of that form we can see material applied in two visible waves. Between them are small layers with many plastic garbage and lower build with coal mixed with sand and detritus. The flood was very fast and took with her many material accumulate in this place. Also most of this material was accumulate in the roads of Kromołów crowning a catastrophic event by broken roads and flooded buildings. Interesting fact is that in coated material in this form can be found also parts of ceramics with XVII-XVIII age because in this drainage basin are located archaeological sites from last centuries.

Kromołów still got marks on buildings showing size of last flood in this place. From last flash flood there was saved many photo and video materials giving us chance to see and understand power of this catastrophic event.

Vulnerability of Polish agriculture to meteorological drought

Leszek Łabędzki, Bogdan Bąk

Institute of Technology and Life Sciences, Kujawsko-Pomorski Research Centre
l.labedzki@itp.edu.pl

Drought risk is a combined effect of drought hazard (likelihood) and drought consequence (exposure and vulnerability). Drought hazard is determined by frequency and severity of droughts Vulnerability of agriculture to drought is generally referred to as the degree to which agricultural systems (crops) are likely to experience harm due to drought stress. The identification of key vulnerability factors are usually based on their significance for agricultural sector. Analysis of drought literature suggests that climate, soils and cultivated crop types are the most significant factors of agricultural drought risk that should be taken into account.

In the study two factors are taken: a climatic factor (hazard factor) defined as meteorological drought and measured by the standardized precipitation index SPI; a vulnerability factor defined as potential crop yield reduction due to meteorological drought. These two factors are combined in the form of the relationship showing the effect of meteorological drought expressed in terms of SPI on crop yield reduction in different agro-climatic regions of Poland. Crop yield losses is predicted on the basis of the reduction in evapotranspiration CDI (a linear crop-water production function). The effect of meteorological drought on evapotranspiration reduction is quantified using the relationships between CDI and SPI which have been derived for 40 meteorological stations in Poland, using the meteorological data from 1970-2004. The prediction of reduction in crop yield was calculated for the threshold values of SPI equal to -1.0 (moderate meteorological drought), -1.5 (severe meteorological drought) and -2.0 (extreme meteorological drought), for field crops (late potato, sugar beet, winter wheat, winter rape, maize) on two mineral soils (light and heavy soil) with different available soil water and for permanent grasslands (meadows) on two mineral-organic soils.

A spatial differentiation of crop yield reduction depending on meteorological drought category and soils are determined. Agriculture in central, central-east and central-west part of Poland is most vulnerable to meteorological drought. The less reduction is observed on the soil with greater total available soil water for all analyzed crops. Late potato is the most vulnerable crop to be damaged by drought. Its potential yield reduction can be more than 50% on light soils on most area of Poland during extreme meteorological drought. Least yield reduction is for winter wheat and winter rape. In most regions there is no negative effect of meteorological drought on yield of these crops.

Assessment of impact of coastal hazards on scientific and community infrastructure in Svalbard, High Arctic

Mateusz Czesław Strzelecki[1], Marek Jaskólski[1], Łukasz Pawłowski[1], Piotr Zagórski[2], Michael Lim[3], Antony Long[4]

[1]*University of Wroclaw, Institute of Geography and Regional Planning, Wroclaw*
mat.strzelecki@gmail.com
[2]*Marie-Curie Sklodowska University in Lublin, Department of Geomorphology, Lublin*
[3]*Northumbria University, Engineering & Environment, Newcastle upon Tyne, UK*
[4]*Durham University, Department of Geography, Durham, UK*

A recent report on the state of the Arctic coast emphasizes the role of the coastal zone as the interface where severe environmental changes impact directly on Arctic communities (Forbes et al. 2011). Arctic warming, which is occurring at twice the rate as the rest of planet (IPCC 2007), has accelerated geomorphic processes that directly affect the functioning of the coastal zone.

In this paper we report the results of research project *'Assessment of impact of coastal hazards on scientific and community infrastructure in polar regions using remote sensing, geoinformation and new geomorphological mapping methods* undertaken in HOMING PLUS Program funded by the Foundation for Polish Science. The scientific aim of the project was to apply state-of-the-art geoinformation and remote sensing techniques together with new field-based geomorphological mapping methods to examine the impact of coastal hazards on scientific and community infrastructure along the coasts of Svalbard Archipelago, High Arctic.

Svalbard is located at a key boundary between oceanic and climatic fronts in the European part of the Arctic and is ideally placed to study sensitivity of the Arctic coastal zone to climate changes. On the contrary to uninhabited parts of the Arctic region, Svalbard is an area of intensive human activity that led to the development of scientific, industrial, touristic and community infrastructure, mostly within its coastal zone.

Recent reports from Hornsund (Zagórski et al. 2012) and Sassenfjorden (Sessford 2013) documented the rapid erosion of Svalbard coasts during the last decades of the 20th century which led to the destruction of scientific infrastructure at Polish National Polar Station (PPS) in Isbjornhamna and national heritage sites at Fredheim. The abandonment of Piramiden town (Billefjorden) by Russian community at the end of the 20th century exposed huge amounts of insecure litter and port infrastructure to the operation of coastal processes what in consequence polluted surrounding beaches and threatened the state of fjord ecosystem. In Longyearbyen, the largest settlement and the administrative center of Svalbard, several housing and warehouse facility are built on the coast and threated by storm action. Our research documented significant changes in coastal zone in the surroundings of majority of research stations and towns in Svalbard, associated with increased coastal erosion, paraglacial transformation of coastal landscape and increasing duration of ice-free period.

To our knowledge, we prepared the first application of CVI (coastal vulnerability index) and Leopold matrix to assess the potential effects of geomorphic processes on coastal zone and coastal infrastructure in High Arctic setting.

Our work highlights the need for a greater understanding of the controls on Artic coastal hazards, especially given the potential for accelerated warming and sea-level rise in the coming decades and centuries.

Acknowledgements: Paper is a contribution to Project: 'Assessment of impact of coastal hazards on scientific and community infrastructure in polar regions using remote sensing, geoinformation and new geomorphological mapping methods' funded by the Foundation for Polish Science in HOMING PLUS Program (grant no. 2013-8/12).

Impact of global climate change on the number of hot days in urban areas of Central Europe

Anita Bokwa[1], Petr Dobrovolný[2], Tamás Gál[3], Ján Geletič[2], Ágnes Gulyás[3], Monika Hajto[4], Brigitte Hollosi[5], Rafał Kielar[4], Michal Lehnert[6], Nóra Skarbit[3], Pavel Šťastný[7], Marek Švec[7], Janos Unger[3], Miroslav Vysoudil[6], Jakub Walawender[4, 1], Maja Zuvela-Aloise[5]

[1]Jagiellonian University, Kraków
anita.bokwa@uj.edu.pl
[2]Global Change Research Centre AS CR, Brno, Czech Republic
dobro@sci.muni.cz, geletic.jan@gmail.com
[3]University of Szeged, Szeged, Hungary
tgal@geo.u-szeged.hu, agulyas@geo.u-szeged.hu, skarbitnora@gmail.com, unger@geo.u-szeged.hu
[4]Institute of Meteorology and Water Management – National Research Institute, Warsaw
Monika.Hajto@imgw.pl, Rafal.Kielar@imgw.pl, Jakub.Walawender@imgw.pl
[5]Central Institute for Meteorology and Geodynamics, Vienna, Austria
brigitta.hollosi@zamg.ac.at, maja.zuvela-aloise@zamg.ac.at
[6]Palacky University Olomouc, Olomouc, Czech Republic
michal.lehnert@gmail.com, vysoudil@prfnw.upol.cz
[7]Slovak Hydrometeorological Institute, Bratislava, Slovakia
pavel.stastny@shmu.sk, marek.svec@shmu.sk

Urban areas modify local climate and the best known feature is urban heat island (UHI). In summertime, UHI effect enhances the negative impact of high air temperature, especially during heat waves. As the number of days with extreme air temperatures is expected to increase, due to global climate changes, effective mitigation actions have to be planned for particular cities. The actions should be based on the recognition of the possible range of heat load increase, in terms of both its value and spatial extent. In four Central European cities (Kraków, Poland, Bratislava, Slovakia, Brno, Czech Republic and Szeged, Hungary) the spatial structure is typical for post-communistic urban areas and additionally Kraków, Bratislava and Brno are located in large river valleys, in concave land forms, while Szeged is located in a flat area. The non-hydrostatic MUKLIMO_3 model, developed by DWD (*Deutscher Wetterdienst*) for micro-scale urban climate and planning applications (Sievers 2012, 2014), allows to study the impact of both land use and land form on the changes in the number of hot days (i.e. with maximum air temperature exceeding 25 centigrade), due to global climate changes. The model was used for the four cities to study spatial patterns of the changes predicted and to evaluate the maximum range of the changes.

The project "Urban climate in Central European cities and global climate change" has been realized within the framework of the International Visegrad Fund's Standard Grant No. 21410222 in the years 2014-2015.

Cultural Differences in Handling Flood Risks – Towards a global comparison between technologically rich and poor countries

Bishawjit Mallick[1], Thorsten Heimann[2]

[1]*Bishawjit Mallick, Institute of Regional Science (IfR) at Karlsruhe Institute of Technology (KIT) and Post-Doctoral Fellow at Vanderbilt University, USA*
bishawjit.mallick@kit.edu
[2]*Thorsten Heimann, Leibniz Institute for Regional Development and Structural Planning (IRS) / FU Berlin*
heimann@irs-net.de

Ways of dealing with flood risks differ worldwide. Differences have been observed for the perceptions of possible threats as well as for appraisals of adequate coping strategies. Even similar flood scenarios are treated differently. Thus to identify suitable local coping strategies, knowledge and culture of the inhabitants and decision-makers need to be taken into account. Consequently we have to ask: which role do the differences in knowledge and culture play in handling flood risks? Who are the local agents carrying out pre-and post-flood risk reduction activities and how do such agents support the resilience building?

We use our survey data of coastal areas (each rural and city areas with more than 5.000 inhabitants) concerning different stages of development: Two are from technologically rich areas of Europe in different transformational states (old EU: Germany, new EU: Poland); third one is from a technologically poor country (Bangladesh). Our surveys focused on: perceptions on flood-related risks, adopted measures, the type of supports driven by local, national or international agents, and particularly, how their approvals were interconnected with cultural knowledge like shared worldviews, values and socio-spatial identities. First, we have conducted in-depth interviews. In addition to these, we use survey data which is based on more than 2000 interviews in Bangladesh, Germany and Poland.

Our analysis shows that attributed stressors of vulnerability are varied and dependent on the cultural communication and knowledge based of the respective coastal communities. Therefore, the adaptation and policy planner should take the local cultural and indigenous practices into consideration for the future risk reduction management.

Social and economic factors influencing vulnerability to floods in Southern Poland

Jarosław Działek[1], Wojciech Biernacki[2], Roman Konieczny[3]

[1]*Institute of Geography and Spatial Management, Jagiellonian University, Kraków*
jarek.dzialek@uj.edu.pl
[2]*University School of Physical Education in Kraków*
[3]*Institute of Meteorology and Water Management, Kraków*

Vulnerability to natural hazards refers to capacities of individuals, households or communities to forecast, prepare, cope, resist and recover from a disaster such as flood. In literature there are number of factors discussed that are to increase or decrease the level of vulnerability. They include such human characteristics as wealth/poverty, gender, age and racial or ethnic status. Additional factors related to family and household composition or resources of human and social capital are often analyzed in vulnerability assessments.

The aim of our paper is to test what social and economic factors explain the level of vulnerability in several communities in Southern Poland. Eight research areas affected by floods during last 15 years were chosen. They represent different types and sizes of communities (rural areas, small and medium-size towns), located in different historic regions of Poland and affected by different types of floods (flash or slow).

As a proxy of vulnerability we chose the amount of protective actions undertaken by households, alone or together with neighbors. We claim that vulnerability is reflected in the mitigation behavior, that indicates how the household is ready to cope with a possible disaster. We test then different factors that could explain different level of preparedness among households: age and gender structure, family and household type, human and social capital and economic factors. The aim of our analysis is to find out what factors are the most important in explaining observed differences in vulnerability. We test also whether other factors such as risk perception or general characteristics of researched communities has more influence on preparedness than above mentioned vulnerability factors.

Our paper presents findings from research carried out within the framework of a research project on 'Socio-economic factors of social vulnerability to floods with a special focus on the role of communication' financed with a grant awarded by the National Science Centre, Poland, decision no. DEC-2012/05/D/HS4/01328.

Spatial planning in floodplains in mountain catchments of different order, in the basin of the Upper Vistula and the Upper and Central Odra

Paweł Franczak[1,], Karolina Listwan[1,], Jarosław Działek[1,] Wojciech Biernacki[2]

[1]*Institute of Geography and Spatial Management, Jagiellonian University, Kraków*
p.franczak@uj.edu.pl; karolina.listwan@doctoral.uj.edu.pl; jarek.dzialek@uj.edu.pl
[2]*Department of Natural Environment Sciences, University of Physical Education in Kraków*
wojciech.biernacki@awf.krakow.pl

Floods are among natural disasters causing most of the damage. They contribute to high losses in public infrastructure and private property. The impact of floods is well illustrated by the data from 2010 floodings in Poland, when in 811 municipalities there wererecorded losses amounting to approximately PLN 12.5 billion (EUR 2.9 billion). These losses are largely related to improper floodplains management and inadequate spatial planning in these areas. In many cases, it is the result of no spatial planning whatsoever – at only about 40% of the areas at risk of flooding in Poland there has been established local spatial plans showing probablelimits of flood waters.

Establishing limits of possibly flooded areas in planning documents depends a lot on the size of the river catchment. Therefore, the aim of this study is to identify difficulties in floodplain zoning in the catchment areas of different scale. An attempt was made to assess conformity of floodplains limits established in official documents with real extent of floodwaters observed during recent flood events of different types (flash mountain floods or slow lowlands floods) It was analysed as well what use is proposed in spatial planning documents for these earlier flooded areas and whether there are any restrictions imposed upon them.

The study was conducted in ten villages and towns located in river catchments representing different sizes from the basin of the Upper Vistula and the Upper and Central Odra. Catchments areas were selected also according the degree of their urbanization and the type of flood occurring there. The study areas with streams and rivers given in the brackets were: Makow Podhalanski (Księży Potok), Zawoja (Rybny Potok), Bogatynia (Miedzianka), Kasinka Mała (Kasinianka) Ołdrzychowice Kłodzkie (Biała Lądecka), Budzów (Paleczka), Tuchów (Biała Dunajcowa), Krosnowice (Nysa Kłodzka), Tarnobrzeg (Wisła) i Zabrnie (Wisła).

The study was conducted as part of a project funded by the National Center for Science awarded on the basis of the number of decisions DEC-2012/05/D/HS4/01328.

Opportunities and barriers to the use of natural disaster insurance as non-technical means of protection against floods in Poland

Karolina Listwan[1], Jarosław Działek[1], Wojciech Biernacki[2]

[1]*Institute of Geography and Spatial Management, Jagiellonian University, Kraków*
karolina.listwan@doctoral.uj.edu.pl; jarek.dzialek@uj.edu.pl
[2]*Department of Natural Environment Sciences, University of Physical Education in Kraków*
wojciech.biernacki@awf.krakow.pl

Our paper raises the subject of reducing the scale of the negative effects of floods through natural disaster insurance. Motivation for our research were floods, that in 2001-2010 affected southern and western Poland, causing major damages. These events have brought up public debate about possibilities and limitations of natural disaster insurability in Poland, that could help to compensate for property damage when catastrophe risk fulfills.

The aim of this paper is to answer the question: Whether and how catastrophic insurance may be an effective means of protection against flood damage? In this context, the authors pay particular attention to the opportunities and barriers to the availability of non-technical means of protection for people living in flood risk areas, focusing especially on the problem of low levels of insurance purchase.

Eight areas in southern Poland were selected as case studies: 1. Bieruń; 2. Bogatynia; 3. Tarnobrzeg; 4. Budzów and Zembrzyce communes; 5. Lądek Zdrój and Kłodzko commune; 6. Wadowice Górne and Szczucin commune; 7. Tuchów commune; 8. Brzostek and Pilzno communmes. The selection of sites was based on several criteria, among which frequence of floods was decisive. They were also chosen in terms of the types of floods affecting them (flash or slow floods), size of the communities (rural areas, small or medium-size towns), and location within historical regions in Poland.

Our findings were obtained through a set of research tools, which included; an overview of European and national law on natural disaster insurance systems; analysis of legal, economic and social conditions of Polish insurance market, identification of practices of insurance companies in Poland and finally a questionnaire survey carried out in 2014 among the residents of above mentioned localities affected by floods. Type of Study: personal in-home surveys. The study involved 808 households. The investigation covered vulnerability and resilience of households to floods.

The study was conducted as part of a project funded by the National Center for Science awarded on the basis of the number of decisions DEC-2012/05/D/HS4/01328.

Prepared for the future? Urban development governance against heat risks in mid-latitude cities

Nicole Mahlkow

Research Associate Freie Universität, Berlin, Germany
nicole.mahlkow@fu-berlin.de

Heat waves have proved to be serious disasters causing high mortality and morbidity rates. Especially in mid-latitude cities, the challenges that lie ahead of local policy makers and planners have become aware after the disastrous heat wave of 2003. In urban agglomerations, prolonged periods of extreme temperatures can be aggravated by the urban heat island(s) (UHI) effect and may become more likely due to global climate change. Vulnerabilities to urban heat are driven by a range of interrelated factors, e.g. demographic and social dynamics. These factors have to be taken into account when appraising the risk and respective strategies.

As part of the research group "Urban Climate and Heat Stress in mid-latitude cities in view of climate change" (UCaHS) we study the current integration of heat risks into the urban governance of our test bed Berlin. We would like to present the results of our qualitative study which looks at the obstacles and potentials for disaster risk reduction. Our analysis focuses on the roles of regulatory approaches, policy and planning instruments and processes, and the legal environment related to urban development in Berlin. We identified involved actors and institutions, their networks at different levels, as well as the interrelations with technical and natural assets and analysed them with regards to heat risk reduction. To do so, we used the recently developed approach of the Constellation Analysis (CA), an instrument which allows for an integrative, interdisciplinary perspective on sustainability and environmental problems.

Our results show the complexity that urban planning and governance have to consider, when trying to reduce risk factors. To achieve heat risk reduction by means of urban development, planning instruments need to be empowered and harmonized. Political backup, targeted discourses, a well-coordinated multi-scale cooperation of actors, leadership as well as knowledge integration and guiding principles on implementation are crucial factors to achieve this. Our presentation elaborates on these essential factors with regards to good governance approaches for disaster risk prevention. We consider the identification of the complex urban planning constellations and how they affect heat risk mitigation an important prerequisite to deliberate place-specific development paths with different stakeholders.

Reservoirs activity as the tool reducing floods' hazard based on the flood in 2014

Konrad Kępski, Aleksander Kruszewski

Regional Water Management Authority in Kraków, Operations Center, Kraków
kkepski@krakow.rzgw.gov.pl

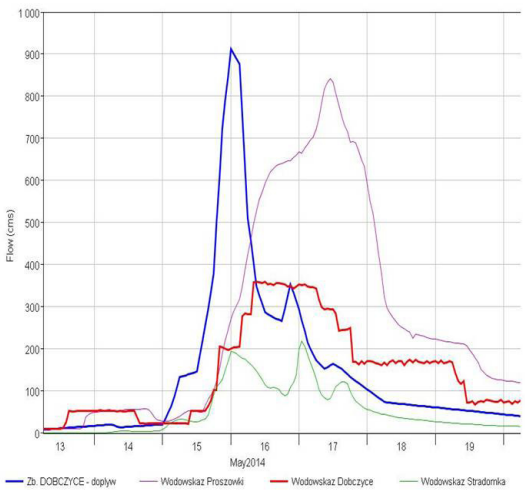
The main purpose of the presentation is the describe reservoirs activity in time of 2014 flood: Besko, Chańcza, Dobczyce, Klimkówka, Czorsztyn-Niedzica, Rożnów, Solina, Świnna Poręba.

The presentation will consist witch diagrams for each reservoir including:

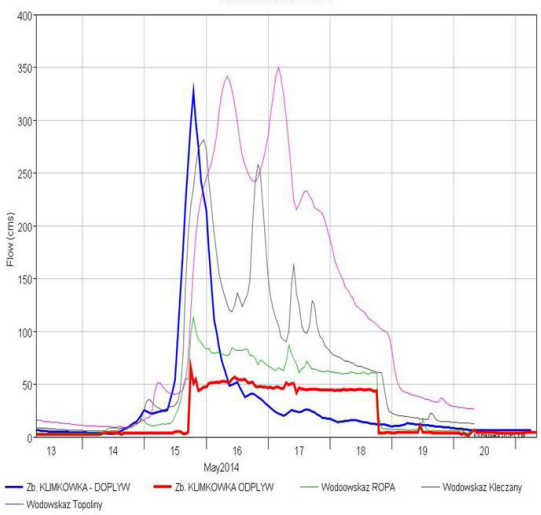
1. inflow, outflow, flood capacity parameters
2. actual and hypothetic water flow below the dam

Based on the inflow and outflow difference in mentioned reservoirs the Authors will show the reduction of the flood wave, and thus the reduction of the flood hazard. The Authors will show the role of the reservoir for the region below the dam and the importance of the flood wave reduction, with special focus on the reduction of its significance along course of the river. The Author will show the possible consequences for the region below the dam as if dam doesn't exist.

The existing of the dam is not the only factor influencing the flood protection, the remaining and essential factors are elaborating of correct work instruction for each dam, inflow forecasts, state of reservoir's before flood. These factors are crucial for the proper reservoirs' work and thereby reducing the flood consequences for the community.



Comparison of the Dobczyce water reservoir operation with the flows in the water gauges cross – sections, located on the Raba river downstream the dam



Comparison of the Klimkówka water reservoir operation with the flows in the water gauges cross – sections, located on the Ropa river downstream the dam

Quantitative assessment and mapping of hydrological risk using Landsat data

Yuriy V. Kostyuchenko[1,2,*], Dmytro Movchan[1], Ivan Kopachevsky[1], Yulia Bilous[1], Stanislav Dougin[1], Maxim Yuschenko[1], Igor Artemenko[1]

[1]*Scientific Centre for Aerospace Research of the Earth, National Academy of Sciences of Ukraine, Kiev Ukraine*
[2]*Department of Earth Sciences and Geomorphology, Faculty of Geography, Shevchenko National University of Kiev, Kiev, Ukraine*

Quantitative assessment of hydrological risk is discussed in this paper. Method of quantitative assessment of flood risk using satellite derived spectral indexes is described. Method is based on using of Bayes's rule. On the example of separate river basin it is demonstrated that the method might be used for calculation of spatially distributed quantitative parameters of risk with controlled reliability.

Method is adopted for Landsat TM, ETM and OLI data. Empirical parameters required for Bayes's probabilities distributions determination on the study area are proposed. For determination of Bayes's probabilities distributions a calibration of satellite observations on the in-field measurement is executed. In-field specters were measured on the study area during 2009-2014 with FieldSpec3FR spectroradiometer. More than 3000 spectral patterns have been obtained on 240 test sites.

An algorithm of spatial and spectral regularization of data has been proposed. Regularization aimed to optimization of procedure of inter-calibration of satellite and in-field data. Proposed regularization algorithm uses Kernel-based Principal Component Analysis (KPCA). Resulting regressions, which may be interpreted as equations for calibration of satellite-derived spectral indexes (NDVI, NDWI) with local ground spectrometric measurements, was calculated.

Besides, empirical regression coefficients for evaluation of some plant pigments concentrations for separate spectral indexes (NDVI, EVI, ARVI) derived from TM, ETM and OLI sensors, have been calculated using lab data. In this study the Landsat 2-8 data received in period 1975-2014 (25 scenes) were utilized. Study is focused on wetlands in Prypyat river basin (Western-North part of Ukraine, trans-boundary region with Southern-East Poland and Southern-West Belarus).

It is shown how the Landsat data may be calibrated for the study region in the framework of task about quantitative assessment of local and regional hydrological risks. Calibration coefficients for separate spectral indexes are calculated. Empiric equation and corresponding coefficients for evaluation of plant pigments concentration using Landsat data are calculated. Form of Bayes's probabilities distributions and its coefficients for task of flood mapping are proposed and calculated.

Therefore shown, that OLI data demonstrates similar statistical properties as TM and ETM data. Using LDCM data we able to construct multi-term time series, and so increase reliability of risk assessments. Quantitative risk distribution – the map of flood risk in study area is calculated.

Forest fire risk in Poland – classification with application of GIS techniques

Paulina Pokojska

University of Warsaw, Faculty of Geography and Regional Studies, Laboratory of Spatial Information Systems
ppokojska@uw.edu.pl

Forest fire risk assessment is a very important issue for planning fire protection, preparing forests for the eventuality of fire and distribution of funds for forest fire protection.

The aim of the study was to classify forests in Poland in respect of fire risk. A classification was carried out using the method developed in the Forest Research Institute, introducing the modifications. Four factors that increase the risk of fire in the forests have been taken into account: climatic (formula which takes into account relative humidity and share of days on which the litter humidity was lower than the threshold value), anthropogenic (density of population), historical (observed occurrence of fires) and types of forests. For individual criteria maximum number of points was determined. The classification of forest area into fire risk category is based on the sum of points. Forests have been classified into three categories of fire risk (I-high, II-medium III-low) at 250 m resolution.

At the final stage of the research, classification of forest fire risk was made for counties. Classification results were compared with the classification carried out in the Forest Research Institute. Spatial distribution of forest fire risk in relation to the counties obtained in this work and in the Forest Research Institute are similar but in this study a smaller number of counties has been included in the I and III category of risk.

GIS techniques have been applied at all stages of work – acquisition, analysis and visualization of the data. QGIS, SAGA and Surfer software were used.

Research done in the frame of the project: ‘Spatial Differentiation of Information Society Vulnerability to Defined Environmental Hazards in Poland’ granted by Polish National Science Centre. (DEC-2011/03/B/HS4/04933).

Automatic extraction of burnt areas from Landsat images time series for fire risk management

Edyta Woźniak, Sebastian Aleksandrowicz

Space Research Centre, Polish Academy of Sciences, Warsaw
ewozniak@cbk.waw.pl, saleksandrowicz@cbk.waw.pl

Fire history can be used as an indicator of forest fire risk. The analysis of spatial distribution and temporal frequency of burnt areas gives the information about fire ignition zones, vulnerability of the vegetation and fire load. The archive of Landsat images is a very good source of data because of its historical and spatial accessibility, as well as, the temporal, spectral and spatial resolution of images. However the extraction of the information about burnt areas is laborious, especially for long time series and for large areas. Hence, automation of the burnt areas extraction process is an important issue. Proposed algorithm for the automatic mapping of burnt areas is based on the atmospherically corrected pairs of Landsat images. It is developed using object-oriented classification approach. It uses Normalized Burnt Ratio (NBR) index and differences in infrared spectral bands to discriminate the burnt zones. The algorithm utilizes the relative value of change instead of the fixed threshold so it reduces the influence of the radiometric characteristics of images on the final classification result. The algorithm was tested for the Mediterranean conditions: Spain, Greece and Israel and highly accurate results (up to 86%). The obtained maps of burnt areas permitted to reconstruct the fire history of the tested zones and point out the most susceptible areas.

Awareness of climate change and significance of climate change policies at the local agendas – a comparison of Norwegian and Polish municipalities

Adam Gendźwiłł

Department of Local Development and Policy, Faculty of Geography and Regional Studies, University of Warsaw

In many countries, climate change has entered the local political agenda. Policies implemented by local governments to curb greenhouse gas emissions and to adapt to changing climate conditions are regarded as important elements of the response to the problem of global warming. A first and necessary step toward developing climate change policies is to raise awareness of the challenge that climate change poses. In this paper, we compare the awareness of climate change among local leaders and local administration in two European countries – Norway and Poland – which differ in terms of popular perception of climate change, incentives towards mitigation and adaptation measures, local government capacities, and administrative cultures. Based on the results of surveys conducted in 2014, we investigate both the differences between countries and the municipalities within each country.

Adaptation to climate change in Russian cities – the case of Arkhangelsk and St Petersburg

Jørn Holm-Hansen

Norwegian Institute for Urban and Regional Research (NIBR)

This paper article takes a look at the politics of climate change adaption in the two Russian cities of Arkhangelsk and St. Petersburg. Adaptation to climate change has been classified as one of the public policy issues that are so complex, that new – and less hierarchical – ways of making policies push their way forward.

Climate change poses significant risk to cities, and adaptation is 'place-bound' by its nature. Therefore, many of the decisions to be taken and practical work to be carried out in the field of adaptation fall within the competencies of local government, among them land use planning and water issues. Programmes and measures to deal with, and prevent, negative impacts of climate change tend to involve actors across the public-private divide as well as the state-society divide. They also involve various levels of government.

In this article we apply the concept of 'network governance' to analyse the climate adaptation polices made in Arkhangelsk and St. Petersburg. The way network governance is applied in this article, however, is to bring to the fore the interaction between authorities, business and civil society. This interaction is not necessarily purely top-down, even in Russia, and network governance may be a tool to get sight of new aspects of Russian decision-making and policy implementation in the field of climate adaptation.

Modes of Governance in Local Adaptation to Climate Change: Networks Bound by Hierarchy and Market Motivation?

Swianiewicz Paweł

Department of Local Development and Policy, Faculty of Geography and Regional Studies, University of Warsaw

Numerous Polish cities increasingly realize that climate change have an impact on the conduct of local government functions, such as spatial planning, water and sewage networks and several others. Adaptation to changing environment requires also organizational change in local administration and local government subsidiary institutions. The paper asks the question what is the impact of that adaptation on modes of governance? The paper refers to three basic modes: hierarchy, market and network and analysis changes in their relative roles.

Empirical base of the study is qualitative study of four cases of Polish cities: Bydgoszcz, Słupsk, Sopot and Sandomierz, with comparative reference to similar Norwegian studies of Bergen, Stavanger and Moss.

The study is a part of the POLCITCLIM project funded from Norway Grants in the Polish-Norwegian Research Programme operated by the National Centre for Research and Development.

The assignment of responsibility and manifestations of climate change policy

Jan Erling Klausen[1]
Katarzyna Szmigiel-Rawska[2]

[1]*Norwegian Institute for Urban and Regional Research (NIBR), Oslo, Norway*
[2]*Department of Local Development and Policy, Faculty of Geography and Regional Studies, University of Warsaw*

Municipal governments are increasingly seen as occupying a pivotal role in terms of achieving effective societal adaptation to climate change. The complex and contingent nature of climate change impacts suggests that local governments will be in a favorable position for identifying potential impacts, given their detailed local knowledge. Moreover, local governments are commonly in charge of several tasks and responsibilities of particular relevance to adaptation, including planning and zoning authority, water and sewage and other basic services. This however gives rise to questions about how the relevant tasks and responsibilities are organized and coordinated in the municipal organization. The recurring problems of fragmented and "siloized" governments often associated with New public management-inspired reforms, could be detrimental to the overarching coordination needs that complex adaptation problems would seem to entail. The current move towards "New public governance" could provide a promising approach to countering such problems.

The paper investigates how climate change adaptation measures are organized in Polish and Norwegian local governments. Taking departure in a comparative analysis of the tasks and responsibilities of the two countries' local government systems, the paper seeks to investigate if and how coordinative mechanisms associated with New public governance are being put to use. Based on survey data as well as interviews, the research question is if urban commitment to addressing climate change struggles contemporary local government systems or if it is carried out in stable and tested procedures as well as decision-making processes.

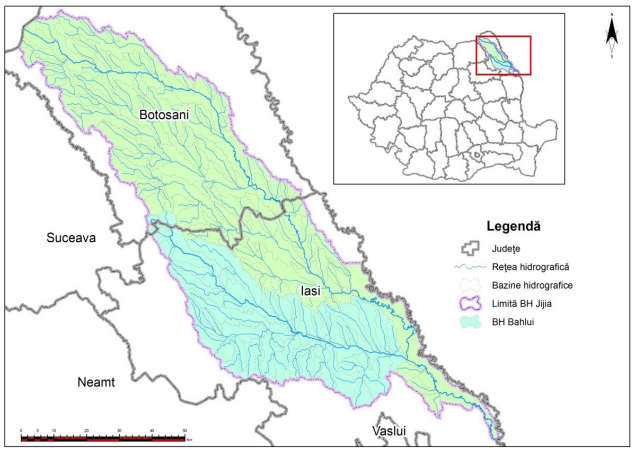
Abstracts of Posters

e-LAC Project: Pro-active operation of cascade reservoirs in extreme conditions (floods and droughts) using a Comprehensive Decision Support Systems (CDSS). Case study: Jijia catchment

Paul Serban Agachi[1], Alexandra Csavdari[1], Radu Drobot[2], Mary-Jeanne Adler[3], Marius Matreata[3], Ciprian Corbus[3], Marius Rata[4], Ioana Stoian[5], Tudor Blidaru[6]

[1]Polytechnic University of Cluj, Romania
[2]Technical University of Civil Engineering, Bucharest, Romania
[3]National Institute of Hydrology and Water Management (INHGA), Bucharest, Romania
e-mail: mj.adler@hidro.ro,
[4]Duck-Tech
[5]Institute for Design and Production of Authorization Equipment, Cluj, Romania
[6]Prut Basin Directorate, Iasi, Romania

Flood Risk Management Plan cames with an important program of river basins development, continuing the structural measures (dams and dykes) addopted under the Romanian Flood Management Strategy (but only a part, round 50% of the necessary structural measures are put into operation). The structural measures in operation cannot solve alone the problems related to floods management. Non-structural measures, among which we can mention mainly flood modeling, hazard estimation and mapping, forecasting and warning floods and droughts are important for flood prevention and environment protection in case of disasters. Still, although material damage is quite important, due to the alert systems, at the level of the country the average human casualties are quite reduced: 15 human lives lost per year. In order to diminish the economic losses, the authorities have two major options: a) risk mapping followed by a better spatial planning (reducing thus the vulnerability), and b) improved operation rules of the existing structural measures (dams and polders), in order to modify the flood magnitude. To apply such optimization rules in real time, a good hydrological informational system was implemented upstream the dams (WATMAN Project) and now, teams of reserchers work getting incertitude of the forecasting models to be acceptable law. A detailed description of the modeling platform, incluidng DESWAT forecasting models and Vidra Model was provided for Jijia Basin, the pilot application under e-LAC Project implementation. Considering the above mentioned aspects, the e-LAC Project based on the forecasting platform and rules for reservoirs exploitation, developed a Comprehensive Decision Support System (CDSS) including of an Expert System (ES), together with an Advanced Control Technology (ACT) system assisting the authorities to prevent the disasters in both cases (flood and drought).



Flash Flood in the upper part of drainage basin of Skawa in 2001

Paweł Franczak[1], Jarosław Cebulski[2]

[1]*Institute of Geography and Spatial Management, Jagiellonian University, Kraków*
p.franczak@uj.edu.pl;
[2]*Institute of Geography and Spatial Organization, Polish Academy of Sciences, Kraków*
jarekcebulskil@op.pl.

In recent years, the upper Vistula basin experienced several major floods. The largest of these took place in the years 1997, 2001 and 2010. The flood of July 1997 referred to is called. „Millennium Flood". The drainage basin of Skawa the greates lood did not occur in 1997, but in 2001, ust as occurred in the neighboring drainage basins.

In July 2001, in the Carpathian basin of the Vistula there were a lot of pourable rainfalls and storms. Meteorological situation was similar to rainfall of 1934, when the great flood has occurred. The 25 of July, in the upper part of drainage basin of Skawa a violent storm occured, its centre was located right over Makowska Mountain. Daily precipitation in Maków Podhalańskie, was 190.8 mm that day. Most of the precipitation occurred during the storm. Although the precipitation was much lower in the other stations located in the drainage basin. The flow of Skawa in Sucha Beskidzka was 660 m^3/s, while the constructed dam in Świnna-Poręba – 1019 m^3/s.

Precipitation was so abundant that the floodplains terraces of Skawa have been inundated, and made the streams flowing down the Makowska Mountain spilled out of the trough. The center of Maków Podhalański and neighboring streets were destroyed. The main current of water flowed through the streets: Źródlana, Krótka, Kościelna, Rynek and Wolności. The biggest losses were caused by Księży Potok and several smaller streams (Rzyczki, Grabce and Czarny Potok) that poured out of the trough and flowed through. Big loss has been incurred in the municipalities Budzów and Zembrzyce located on the other side of the mountain. The loss were caused by small Paleczka stream.

As a result of flooding in the county of Sucha Beskidzka flood losses amounted to 90 million zlotys. The biggest cause estimated at as many as 60 million zlotys occurred in the municipality of Budzów. In the municipality of Maków Podhalański offs amounted to 20 million zlotys. In other municipalities, losses amounted to 10 million zlotys. Destruction or substantial damage has been 17 bridges. Significant damage arose in the 28 district roads (85% of the roads). During the floods in the municipality of Budzów killed one person.

Synoptic conditions during the occurrence of longest thunderstorms in Central and Southern Europe

Katarzyna Grabowska, Joanna Popławska

Faculty of Geography and Regional Studies, University of Warsaw, Warsaw
kasiagra@uw.edu.pl; joanna.poplawska@uw.edu.pl;

Thunderstorms accompanied by severe weather phenomena, including lightning, hail, heavy rains, strong winds, landspouts and tornadoes, posing threat to human life and activities.

The aim of the study is to present the synoptic conditions that caused the longest thunderstorms in selected cities of Central and Southern Europe during the years 2005-2014.

These cities are located in the area of moderate warm climate and subtropical climate. Brest (France) and Porto (Portugal) represent maritime climate, Warsaw (Poland) and Naples (Italy) – transition, while Orenburg (Russia) and Thessaloniki (Greece) – continental.

The data used in the work relate to the number of storm days in the years 2005-2014 and analysis of synoptic situation which includes synoptic maps of daily meteorological bulletin IMGW, visible and infrared satellite images as well as vertical aerological sounding.

In the period under study the longest thunderstorm (lasting several hours) for each city was chosen and then examined to see what weather conditions generated the thunderstorm. The changes in temperature, air humidity, wind direction and atmospheric pressure before, during and after the thunderstorm were analysed.

In all cities under study short thunderstorms, lasting less than 30 minutes, occur most often. Long thunderstorms are rare. The longest thunderstorm lasted 10 hours and occurred in Naples, then 9 hours – in Warsaw. In maritime climate the longest thunderstorms last for a shorter time, about 4 hours (Brest and Porto).

In the zone marked by marine climate the majority of thunderstorms were observed at 1.30 p.m., in the transitional climate zone – at 5.00 p.m., and in the continental climate zone – at 6.00 p.m.

Thunderstorms occur during the entire diurnal cycle in all cities under study.

Arctic town at risk – evaluation of potential geohazards associated with climate change and human impact in Longyearbyen, Svalbard

Marek Jaskólski[1], Łukasz Pawłowski[1], Mateusz Czesław Strzelecki[1], Piotr Zagórski[2], Michael Lim[3]

[1]*University of Wroclaw, Institute of Geography and Regional Planning, Wroclaw*
mat.strzelecki@gmail.com
[2]*Marie-Curie Sklodowska University in Lublin, Department of Geomorphology, Lublin*
[3]*Northumbria University, Engineering & Environment, Newcastle upon Tyne, UK*

Present-day Arctic coastal landscapes are modified by increased degradation of permafrost (Wobus et al. 2011), accelerated sediment supply from deglaciated catchments (Mercier & Laffly 2005), and prolonged periods of open-water conditions and wave activity (Lantuit et al. 2012). Since the second half of 20th century there is also an observed increase in the number and intensity of storms entering the Arctic (Zhang et al. 2004), particularly in summer months when coastlines are free of protective ice cover. Many of those changes directly affect the functioning of Arctic towns. Changes in sea-ice conditions, precipitation and degradation of permafrost are of particular importance for the operation of Arctic ports, airports and roads as well as sustainable town management.

In this paper we present the results of research project *'Assessment of impact of coastal hazards on scientific and community infrastructure in polar regions using remote sensing, geoinformation and new geomorphological mapping methods'* funded by the Foundation for Polish Science focusing on geohazards affecting the functioning of Longyearbyen. Longyearbyen is the largest settlement and the administrative center of Svalbard and plays important role as a hub for Arctic science and tourism.

In our project we applied combination of methods including aerial imaginary analyses, GIS and geomorphological mapping to examine the impact of coastal and other geo-hazards on Longyearbyen community infrastructure. Among observed changes the key problems in Longyearbyen, are those associated with coastal erosion affecting warehouse facilities and debris flows often blocking main road between town and airport.

Our work highlights the need for the establishment of coastal change monitoring in Longyearbyen and preparation of plans of shoreline protection as well as relocation of severel housing and warehouse facilities further inland.

Acknowledgements: Paper is a contribution to Project: 'Assessment of impact of coastal hazards on scientific and community infrastructure in polar regions using remote sensing, geoinformation and new geomorphological mapping methods' funded by the Foundation for Polish Science in HOMING PLUS Program (grant no. 2013-8/12).

Application of LiDAR date to assess the landslide susceptibility map using weights of evidence method – an example from Podhale region (Southern Poland)

Mirosław Kamiński

Polish Geological Institute – National Research Institute, Warsaw
miroslaw.kaminski@pgi.gov.pl

Podhale is a region in the Polish internal Carpathian where landslides are a big threat to the local infrastructure. The character of the relief (deep river valleys, slope gradients) and geological settings in terms of both lithology (flysch complexes) and tectonics (rock formations, dislocation lines, faults and joins) especially favours landslides in this area. Although the Polish Carpathians amount to only 6% of the country area, over 90% of all forms of mass movements recorded in Poland concentrate on mountain slopes and river valley sides of this region (Rączkowski et. al. 2002). The susceptibility assessment has been based on an indirect bivariate statistical analysis Weights of Evidence method performed in order to predict the occurrence of an event (landslide) where well-known evidences (predictor variables) are available. Assessment of landslide susceptibility is being considered in a number of publications in the world literature e.g.: Bonham-Carter et. al. 1989, Lee et. al. 2002, Kamiński, 2012. The weights-of-evidence modelling (based on multi-class maps) was applied within a geographical information system (GIS) to prepare a landslide susceptibility map. The spatial database for factors (evidences) that influence landslide occurrence were prepared from different sources including topographical maps, geological maps, satellite data, hydrological data, soil data and field data. Seven prepared thematic maps of evidence were: slope gradient, slope aspect, elevation, drainage density, road density, faults density and lithology. All maps were subdivided into different classes by its value or feature and then were converted to raster format in the ArcGIS 10.0, each representing an independent layer of causative factor in the constructed spatial database. The conditional independence test was carried out to determine factors that are conditionally independent of each other with landslides. The results of the Chi square analysis figured out ten possible models, including combinations of different independent factors, which were used in preparing ten landslide susceptibility indexes. Were used for further analysis of five factors: slope gradient, slope aspect, elevation, drainage density and lithology. Has also been made landslide mapping. Was based on fieldwork and analysis of GIS Light detection and ranging (LIDAR). The final prediction results, it is concluded that the susceptibility map gives useful information both on present instability of the area and its possible future evolution in agreement with the morphological evolution of the area.

The effects of Nepal earthquake in April 2015 and proposals seismic engineering to limiting the seismic risk for the future earthquakes

Marta Krystyna Kaniowska

Faculty of Geography and Regional Studies, University of Warsaw
marta.kaniowska@student.uw.edu.pl

On 25 April 2015 occurred a earthquake in Nepal reported as 7.5 M (seismonepal, 2015), wich was caused by the two tectonic plates that collided to build the Himalayas (USGS1, 2015). The epicenter was identified at a distance of 80 km (mostly region Kathmandu, Dolakha, Gorkha). The area was about 100x50 km in size (USGS1,2015). The shocks have been felt in China, India and Bangladesh.

Although scientists have warned about the earthquake, government ignored the problem (Rajendran C.P, 2015, Medieval pulse of great earthquakes in the central Himalaya) and consequences of the earthquake and the government's actions are deplorable today. The earthquake have knock-on effects on many aspects: killed 8712 people in Nepal and caused avalanches on Mount Everest (19 people died) or landslides in the Langtang Valley in Nepal. Thousands of houses were destroyed (the most damaged was area near epicenter). The most affected were the poor communities who lost their homes. Many of UNESCO objects in Nepal were destroyed for example Dharahara tower. The economic cost of the earthquake estimates at between $5 billion to $10 billion (USGS2).

In the case of next earthquakes, we can use measures conducive to reduce risk seismic vibration control which restrict penetration of potentially damaging seismic waves into a building structure or use dry-stone walls control. Also should be modernized buildings like hospitals, schools and other. The biggest problem is lack of money. There is a lack of unified system of information dissemination and the modern communication technologies (UNDP, 2008). Flood management in the Koshi river basin is important too. Very important is education. Before the earthquake scientists made test to check the knowledge people of disaster risk reduction (Tuladhar G., 2015, Disaster risk reduction knowledge of local people in Nepal). The analysis of the obtained results has shown that the local people lack accurate knowledge of disasters. There is no law in existence concerning how to share information about disasters and hazards between Nepal and other states. Nepal should look into more possibilities of bilateral information sharing and regional arrangements.

Casualties of the earthquake in Nepal by country

L.p	Country	Deaths	Injuries
1.	Nepal	8712	22219
2.	India	170	560
3.	China	27	383
4.	Bangladesh	4	200
Total		**8913**	**23637**

Own elaboration based on USGS http://earthquake.usgs.gov,
https://data.hdx.rwlabs.org/dataset/official-figures-for-casualties-and-damage,
http://news.xinhuanet.com/english/2015-04/28/c_134193125.htm,
http://zeenews.india.com/news/india/quake-toll-in-india-now-78_1587267.html,

Real-Time Flood Forecasting System for the State of Iowa in the United States

Witold F. Krajewski[1]

[1]*University of Iowa, Iowa City, Iowa, United States*
witold-krajewski@uowa.edu

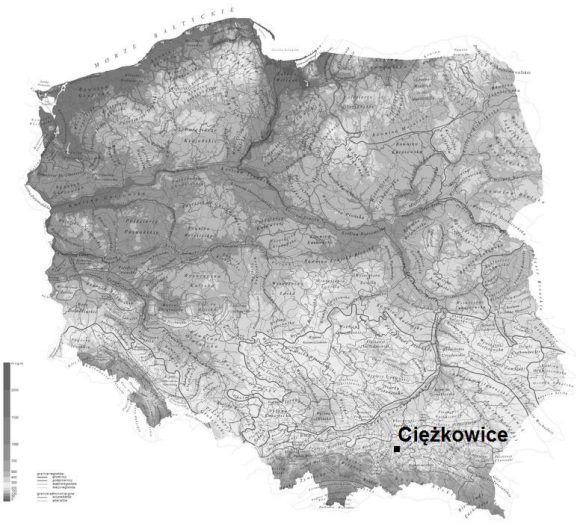
The Iowa Flood Center (IFC) established in 2009 following the record floods of 2008 has developed a real-time flood forecasting system for the people of Iowa. The system complements the operational forecasting routinely issued by the U.S. National Weather Service through the River Forecast Centers and the local offices. The system is based on sound scientific principles of flood genesis and spatial organization and includes many technological advances. The core of the system is a continuous rainfall-runoff model that is based on landscape decomposition into hillslopes and channel links. The decomposition follows the high-resolution airborne lidar-based Digital Elevation Model terrain analysis resulting in spatial resolution on the order of 0.01 km^2. Rainfall conversion of runoff is modeled as a continuous representation of empirical data better known in its integral version as Curve Number method. Channel routing is based on a non-linear representation of water velocity that accounts for the discharge amount as well as the upstream drainage area. Mathematically, the model represents a large system of ordinary differential equations organized following river network topology. The IFC has developed a highly efficient numerical solver of the system suitable for High Performance Computing architecture. The solver allows the IFC to update its forecasts every 15 minutes for over 2000 forecast points that include over 1000 communities in Iowa. The input to the system comes from an in-house developed radar-rainfall algorithm that maps rainfall every five minutes with spatial resolution of about 0.25 km^2. The algorithm uses Level II radar reflectivity and other polarimetric data from the WSR-88DP radar network operated by the federal agencies. A unique feature of the algorithm is its advection correction method that improves accuracy of rainfall accumulations. The system is complemented by a large number of flood inundation maps and real-time river stage data from over 200 IFC "bridge sensors." All information that the system generates is communicated to the general public through the Iowa Flood Information System, a browser based comprehensive and interactive platform.

The wind gusts in Ciężkowice Piedmont

Monika Lisowska

University of Warsaw, Faculty of Geography and Regional Studies
mlisowska@uw.edu.pl

The wind gusts are a dangerous meteorological phenomenon which may cause material damage and risk to human life. In recent years they have been observed more frequently. The purpose of this analysis is to examine synoptic situations favoring the occurrence of wind gust in Ciężkowice Piedmont and to characterize their seasonal, monthly and diurnal variations. According to Polish *Meteorological Dictionary* (2003), wind gust is brief and sudden increase in speed of the wind, which exceed minimum by 5 $m \cdot s^{-1}$ 2-minutes mean wind speed.



The study uses data on wind speed from the wind data collection tower at Ciężkowice from the period between June 2008 and May 2010. Mean and maximum wind speed were measured at two heights – 10 and 40 m above ground level. The location selected for this analysis represents upland landscape, typical for this part of Poland.

Wind gusts at Ciężkowice are observed throughout the year. They are more frequent at height 10 m than 40 m above ground level. The maximum of their occurrence is in March and November (40 m above ground level), November and December (10 m above ground level), while the minimum in August and September (40 m above ground level), June and September (10 m above ground level). During the day they most often occur in the afternoon hours.

Flood potential index and the relative exposure to risk of flooding hazard in counties, Poland

Artur Magnuszewski[1], Mariusz Porczek[2], Piotr Werner[2]

[1]*University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology*
[2]*SIS Laboratory, Geography and Regional Studies Faculty, University of Warsaw*

Flood potential index of the major rivers in Poland has been calculated by J. Françou method. Flood potential index shows relation between maximum discharge HQ and catchment area A. It has a form of

$$k = 10 \cdot (1 - \frac{\log HQ - 6}{\log A - 8})$$

Data used represent 624 catchment from different geographical regions of Poland covering period 1951-1990. In the Vistula catchment the highest flood potential index k have Dunajec, Soła Skawa, Raba rivers. High flood potential index continues down the upper Vistula River until the Zawichost gauge. Generally Polish rivers have lower flood potential than the most of the rivers of the world. In the context of flood potential index it has been shown exposition to the flood calculated as a percentage of settlement located in the flood range to the total area of municipalities (gmina). Analysis of the map shows that the highest exposition to the flood danger is characteristic for the upper parts of the river valleys, it continues down the transit reaches of the major rivers, and occurs also in the delta of the Vistula River. Proposed metrics of the flood potential and relative exposition of the municipalities to a flood danger can be used for creation of more complex indices, they can be also integrated in a bigger spatial units and used in a plans of the flood risk reduction.

Low-impact method of flood damage prevention in a dynamic mountain river – case study from the Czarny Dunajec River

Paweł Mikuś[1], Bartłomiej Wyżga[1], Artur Radecki-Pawlik[2], Joanna Zawiejska[3], Antoni Amirowicz[1], Paweł Oglęcki[4]

[1]*Institute of Nature Conservation, Polish Academy of Sciences, Kraków*
mikus@iop.krakow.pl
[2]*Department of Hydraulic Engineering and Geotechnique, University of Agriculture, Kraków*
rmradeck@cyf-kr.edu.pl
[3]*Institute of Geography, Pedagogical University, Kraków*
jzawiejska@gmail.com
[4]*Department of Environmental Engineering, Warsaw University of Life Sciences, Warszawa*
pawel_oglecki@sggw.pl

Migration of a mountain river channel may cause erosional threat to infrastructure or settlements on the valley floor. Following a flood of 2010, a cutbank in one of the bends of the main channel of the Czarny Dunajec, Polish Carpathians, approached to the local road by 50 m. To arrest erosion of the laterally migrating channel, water authorities planned construction of a ditch cutting the forested neck of the bend, reinforcement of the ditch banks and damming the main channel with a boulder groyne. In order to avoid channelization of the highly valued, multi-thread river reach that would deteriorate its ecological status and cause increased flood risk to downstream reaches, an alternative approach to prevent bank erosion was proposed. The new scheme, applied in 2011, included opening of the inlets to inactive side braids located by the neck of the bend of the main channel. This re-established the flow in the steeper low-flow channels, leading to a cut-off and abandonment of the main channel. Gravelly deflectors were constructed directly below the inlets to the re-activated side channels to divert the flow into the channels and prevent the water from entering the main channel. Hydraulic measurements performed before and after the implementation of the scheme confirmed that it enabled shifting the main water current, with the highest average velocity and bed shear stress, from the braid closest to the road to the most distant one. Similar surveys of fish and benthic macroinvertebrate communities indicated that re-activation of the flow in the side channels was beneficial for these groups of river biota, increasing their diversity in the reach. Not only was the implemented solution significantly less expensive, but it also enhanced ecological functions of the multi-thread channel and the variability of physical habitat conditions and maintained the role of the reach as wood debris trap. However, avulsion of the main channel in the immediately upstream river bend during the flood in May 2014 again caused erosional threat to the road, although in different location. This indicates that with the highly unstable, multi-thread channel pattern of the Czarny Dunajec, the best practice of river maintenance in relatively unmanaged valley reach would be allowing free channel migration within the floodplain area and reinforcing, where necessary, the boundary between the erodible river corridor and the managed terrace.

Anti-flood early warning and prevention system in Georgia

Marta Milczarek

Crisis Information Centre at Space Research Centre, Polish Academy of Sciences, Warsaw
mmilczarek@cbk.waw.pl

Flash-floods are one of the most severe natural disasters in Georgia. They cause a serious problem for inhabitants and local governments.

The anti-flood early warning system was created under the project of Polish Center for International Aid and financed by the Polish cooperation programme of the Ministry of Foreign Affairs of the Republic of Poland.

The main aim of the project was to increase the level of crisis management efficiency of local governments in the respond to flash-floods on selected rivers in Kachetia region of Georgia. For this purpose there has been created a pilot alert system for a possible flood threat warning. The purpose of the project was also to improve planning process in crisis management through introducing GIS, EO data and simulation tools.

Hydrologic and hydraulic modelling of selected rivers was carried out. Measurements of cross-sections on rivers were made and there were prepared input spatial data. As a result of modelling, conducted by hydrologists from Regional Water Management Board in Cracow, flood zones were created and shown on the flood hazard maps. At the same time, local response plans were modified and improved by Polish experts. There has been developed a conception of water gauges network. Water gauges have been installed. As an element of the warning system, there was created a website visualizing the measurements of water level, precipitation and air temperature, which is accessible to Georgian specialists from National Environmental Agency, Ministry of Internal Affairs and to administrators from local governments. Moreover, sirens were installed and can be used to alarm inhabitants in case of flood (or other dangerous situations).

In the scope of the project, workshops were held in two towns in Georgia threatened by mountain rivers. The exercises were prepared for the members of municipalities responsible for management in the case of crisis situation.

All these efforts were undertaken to reduce risk and effects of unexpected flood to the inhabitants and their local government, which is responsible for preparedness and mitigation in the event of flash-floods. The early warning system enables to get prepared beforehand.

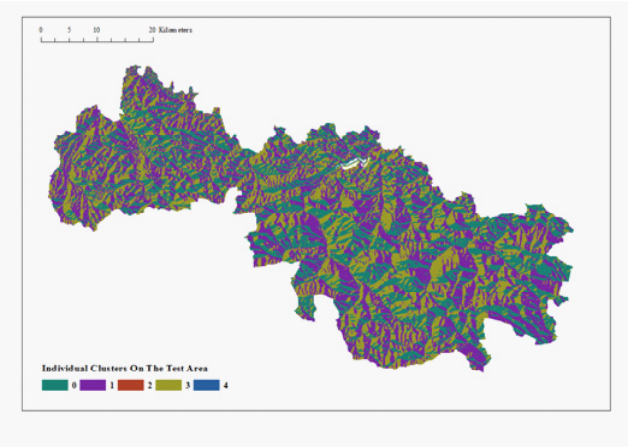
Estimation of CODGIK's data in identifying landslides by cluster analysis in selected counties of Lesser Poland

Mariusz Porczek

SIS Laboratory, Faculty of Geography and Regional Studies, University of Warsaw
mt.porczek@uw.edu.pl

Landslides are natural hazards, which are the subject of many research projects using GIS analytical tools. There are several research methods of identification of potential areas of landslides using aerial and satellite images. Well-known morphometric method, k-mean procedure may be used to analyze simultaneously several geomorphometric parameters. The research study is an attempt to reveal landslide hazards in Polish counties of Lesser Poland (Limanowa, Myślenice, Wadowice). Digital Terrain Model (DTM), from Polish Geodetic and Cartographic Documentation Center (sharing for free) is used for this purpose as the input layer.

The study involves the comparison of the multidimensional morphometric classification with the statistical, empirical data concerning the occurrence and density of landslides. Authors have assumed that multidimensional morphometric classification based solely on DTM can give as output the classification of morphometrical relief forms (clusters of the classified geomorphometric parameters). They were based on clusters using the map layers, which have been derived from DTM: slope, aspect, horizontal curvature, vertical curvature and relative elevation (Map clusters below).



The empirical data of landslides observed in the communes (the share of landslides as the percentage of area of communes) have been used for comparison with established clusters. Finally spatial correlation coefficients of clusters and data of landslides have been verified to prove the relevance of the applied method.

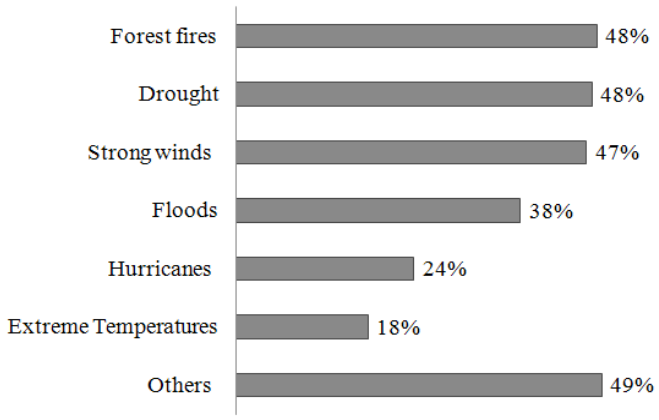
Acknowledgement: Study realized within the framework of the research project 2011/03/B/HS4/04933 granted from National Science Centre (Spatial Differentiation of Information Society Vulnerability to Defined Environmental Hazards in Poland 2012-215).

Overview of Strong Winds and Social Perception of Natural Hazards: the case study of Tuchola Forest, Poland

Rodrigo Rudge Ramos Ribeiro[1], Dorota Rucińska[2]

[1]*University of Alicante, Alicante, Spain*
rrr35@alu.ua.es
[2]*University of Warsaw, Department of World Regional Geography, Warsaw*
dmrucins@uw.edu.pl

This article analyses some aspects of strong winds and social perception in Poland. It is assumed of the speed of 17 m/s as a strong wind. To achieve this goal, the methodology combined qualitative research tools, with a literature review, field work with questionnaire survey and result analysis. Surveys were developed and applied in northern Poland, on the region of the Tuchola Forest. The literature review of the occurrence of natural disasters in Poland during 1985-2014 indicates that the main hazards are: extreme temperature, flood, storm and wildfire. The winds in Poland are typically weak to moderate (with their speed ranging from 2 to 10 m/s) and are a kind of costly hazards in Poland that usually happens during the winter. By the field work conducted during 2014, it was obtained a questionnaire with a sample size of 143 interviews considered valid to analysis. The respondents were people found on the area of the Biosphere Reserve Tuchola Forest, most of them from the city of Chojnice (49% of the respondents) and from Brusy (17% of the respondents). The perception of main natural hazards that most worries the case study are: forest fires, drought and strong winds. The result indicates some influence aspects of previous experiences characteristics that change the perception in the study carried. After analyze the historical data of speed of winds, it can be concluded that Poland is not a country very affected by strong winds, the authors highlight the value to understand the social perception of natural hazards and damage.



Social perception of natural hazards that most worries the case study (source: fieldwork in 2014)

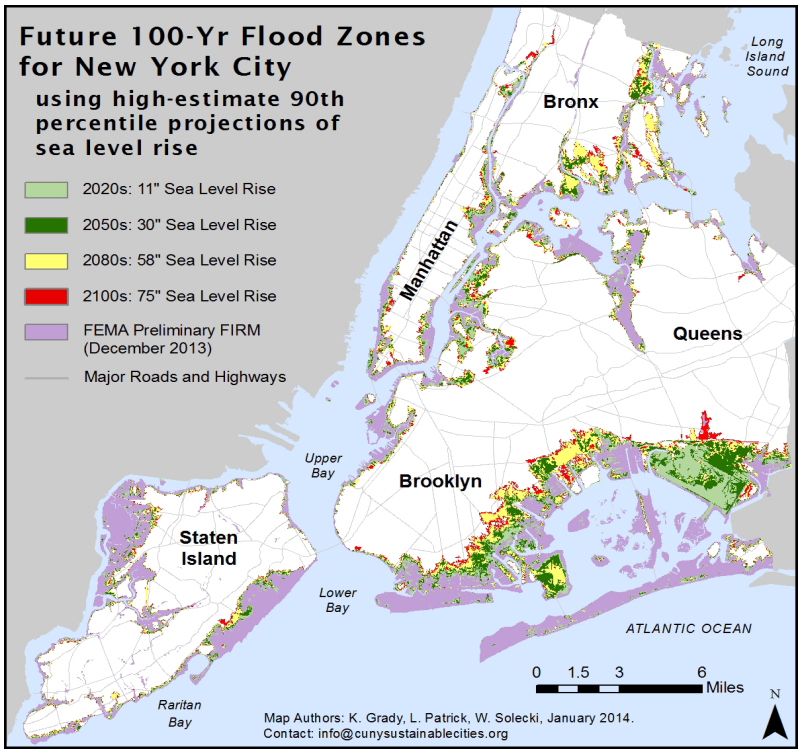
Climate Extremes, Risk, and Resiliency in New York City

William Solecki

City University of New York – Hunter College, New York, USA
wsolecki@hunter.cuny.edu

Climate change presents cities with significant challenges such as adaptation to dynamic climate risks and protection of critical infrastructure systems and residents' livelihoods. City governments and inhabitants must continually respond to a variety of urban environmental risks. Understanding how cities have begun to extend these experiences to the context of climate change adaptation as well as mitigation is crucial for the development and identification of climate action best practices.

The focus of this paper will be to document and explore how the city of New York has begun to define and implement a set of climate actions over the past decade. These actions are presented within a discussion of past and future climate risks and vulnerabilities, and of climate resiliency and sustainability programs that the city government has developed recently. Even as a mature, mega-city in a high-income country, lessons from the New York City experience can be transferred to a variety of other urban contexts.



Heat waves and evapotranspiration in the lowland catchment of the Liwiec River, eastern Poland

Mateusz Ślązek

University of Warsaw, Faculty of Geography and Regional Studies, Department of Hydrology
mslazek@uw.edu.pl

Evapotranspiration is one of the main hydrological processes of the river catchment. An understanding of its quantities and dynamics is required for the environmentally oriented water management helping to protect the environment against drying. Important reason for undertaking this study was to evaluate evapotranspiration impact on the water cycle. Evapotranspiration estimates from the MODIS Global Evapotranspiration Project, mean daily air temperature and daily sum of precipitation from Institute of Meteorology and Water Management were acquired and analyzed in the lowland agricultural catchment of the Liwiec River, which is located in the eastern part of Poland. During analyzed period (2000-2014) fourteen heat waves occurred. Basing on the longest heat wave periods, summer half-years of 2006 and 2010 were chosen for further analysis. There were eight-day and four-day long heat waves in July 2006 and three four-day periods in 2010, two in July and one in August. Development of evapotranspiration and precipitation during these events was analyzed. In July 2006 high temperature and very low sum of precipitation resulted the lowest sum of evapotranspiration from all Julies in years 2000-2014. Situation in July 2010 is more complicated, because of hydrologic situation in previous months.

Extreme historical drought events in Poland – analysis based on the selected indices

Tamara Tokarczyk, Irena Otop, Wiwiana Szalińska, Piotr Djaków

Institute of Meteorology and Water Management – National Research Institute, Wrocław Branch
Tamara.Tokarczyk@imgw.pl

Drought is a natural phenomenon that can negatively affect various sectors, like natural environment, economy and social life. Lack of precipitation or their shortage, along with high air temperature and insolation, are the main reason of drought occurrence. Drought is more and more often considered and analysed as a process, starting from the first stage of atmospheric drought, through the stage of soil drought and finally to hydrological drought. Economic droughts are also considered and they can occur during each of the stages. However, the most noticeable effects (i.e. losses) occur after whole drought process is completed.

Currently a great attention is paid not only to drought monitoring but also to evaluation and forecasts systems. Indices based on meteorological and hydrological data are nowadays widely developed methods. The analysis of the indices, presented usually with the use of classes and thresholds, can be easily interpreted. The use of the indices enable not only evaluation of a current drought event but also gives a possibility to assess drought events that already occurred in the past.

In this article drought events in Poland from 1966 to August 2015 were analysed with the use of SPI (Standardized Precipitation Index) and SPEI (Standardized Precipitation Evapotranspiration Index) drought indicators. The use of standardization enables detached, comparable evaluation that considers various climatological conditions and a different time scale (month, season, year). Furthermore, the process of drought development in selected catchment of Odra River basin was analysed with the use of hydrological data.

SPI is widely used index focused on drought monitoring and evaluation of drought intensity on the basis of precipitation data only. Considered time scale reflects the influence of drought on water availability (soil moisture, river discharges, ground waters). Precipitation anomalies in a relatively short time (1-3 months) affect soil moisture, while river discharges, ground waters and reservoirs feeding react to long-term anomalies (12-24 months). The SPEI was also used which is based on meteorological variables affecting evapotranspiration process.

SPI and SPEI indices were analysed for 3, 6 and 12-month periods. Identified drought events were evaluated in terms of their duration and intensity. GIS tools were used in order to assess spatial ranges of droughts characterized by the highest intensity (strong and extreme droughts).

Volcanic hazards and Vanuatu population

Maria Wąsowska

Faculty of Geography and Regional Studies, University of Warsaw
m.wasowska17@gmail.com

In the volcanic regions, cooperation between scientists and population inhabiting threatened areas is essential. It is vital to prepare suitable forecasting, planning and managing procedures what is particularly important for the islands in case of occurrence of the crisis situation.

The aim of this article is to answer the question in what way Vanuatu population is prepared for volcanic eruption phenomenon and how the people living on the islands are informed about and prepared for danger of increased volcanic activity.

Vanuatu is the island state located in New Hebrides archipelago formerly being British-French condominium which gained independence in 1980.

At present the system of monitoring of volcanic seismic and meteorological phenomena is organized and supervised by Vanuatu Geohazards Observatory. Efficient and well prepared preventive actions are very important for communities living in this island state.

NOTES

2nd DRR in Warsaw, 2015 Participants

Adler Mary-Jeanne National Institute of Hydrology and Water Management, Ministry of Environment and Climate Change-Department for Waters, Forests and Fisheries, Bucharest
Alexander David E. Institute for Risk and Disaster Reduction, the University College London
Balcerowicz Mateusz Ministry of Environment
Banasik Kazimierz Warsaw University of Life Sciences – SGGW, Faculty of Civil and Environmental Engineering Poland
Biały Ivetta Mazovia Province Office in Warsaw
Blażejak Agnieszka Mazovia Province Office in Warsaw
Bokwa Anita Jagiellonian University in Kraków, Institute of Geography and Spatial Management
Bouloukos Adam C. Director of UN International Strategy for Disaster Reduction
Choryński Adam Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Dakova Snejana Private consultant, Sofia
Daniluk Andrzej Regional Fund for Environmental Protection in Warsaw
Dąbrowski Artur Regional Fund for Environmental Protection in Warsaw
Dąbrowski Krzysztof Mazovia Province Office in Warsaw
Domaradzki Michał Warsaw Police Headquarters
Doroszkiewicz Joanna Institute of Geophysics, Polish Academy of Sciences
Dumieński Grzegorz Institute of Meteorology and Water Management – National Research Institute in Wroclaw
Dziadak Ryszard Regional Fund for Environmental Protection in Warsaw
Działek Jarosław Jagiellonian University, Institute of Geography and Spatial Management
Dzik Jakub Podkarpackie Voivodeship Office in Rzeszów
Franczak Paweł Jagiellonian University, Institute of Geography and Spatial Management
Frankowski Zbigniew Polish Geological Institute – National Research Institute, Warsaw
Gabinowski Piotr West Pomeranian Province Governor's Office in Szczecin
Gawłowska Iwona Regional Water Management Authority in Warsaw
Gawor Ewa Warsaw City Hall
Gendźwiłł Adam University of Warsaw, Faculty of Geography and Regional Studies
Grabowska Katarzyna University of Warsaw, Faculty of Geography and Regional Studies
Grabowski Jaromir Regional Inspectorate of Building Construction
Grabowski Maciej H. Ministry of the Environment
Gutry-Korycka Małgorzata University of Warsaw, Faculty of Geography and Regional Studies
Haleniuk Jarosław Lubelskie Province Governor's Office in Lublin
Halicki Andrzej Ministry of Administration and Digitalization of Poland
Heimann Thorsten Leibnitz Institute for Regional Development and Regional Planning, Berlin
Holm-Hansen Jørn University of Oslo, Norwegian Institute for Urban and Regional Research
Janowczyk Beata Government Centre for Security
Jaskólski Marek University of Wrocław, Institute of Geography and Regional Planning
Kaak Waldemar Lubuskie Province Office in Gorzów Wielkopolski
Kalicki Tomasz Jan Kochanowski University in Kielce, Institute of Geography
Kaliński Grzegorz University of Warsaw, Faculty of Geography and Regional Studies
Kamiński Mirosław Polish Geological Institut – National Research Institut, Warsaw
Kaniowska Marta University of Warsaw, Faculty of Geography and Regional Studies
Kantowicz Ewelina University of Warsaw
Karpińska-Banaszek Joanna Mazovia Province Office in Warsaw
Kępski Konrad Regional Water Management Authority in Kraków
Kęsy Robert Provincial Board of Amelioration and Water, Warsaw
Kiewisz Wojciech GRONTMIJ Corporation
Kindernay Daniel Slovak Water Management Enterprise, Banská Štiavnica, Slovakia, State Enterprise
Korczak Rafał Provincial Police Headquarters in Radom

Korzeniowski Robert Lower Silesian Governor's Office in Wrocław
Kostyuchenko Yuriy Scientific Centre for Aerospace Research of the Earth, National Academy of Sciences of Ukraine
Kowalewska-Kalkowska Halina Faculty of Geoscience, University of Szczecin
Kozłowski Jacek Mazowieckie Province Governor
Krajewski Witold University of Iowa, USA
Kubát Jan Hydrometeorological Institute, Prague
Kubeł Stanisław District Office in Ostroleka
Kuliński Michał Regional Fund for Environmental Protection in Warsaw
Kundzewicz Zbigniew W. Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Kuriata Krzysztof Warmińsko-Mazurskie Voivodeship Office in Olsztyn
Kwiecień Magdalena Institute of Meteorology and Water Management – National Research Institute in Krakow
Leduchowska Dorota Government Centre for Security, Poland
Leńczyk Paulina University of Warsaw, Faculty of Geography and Regional Studies
Leonowicz Michał Government Centre for Security, Poland
Lewandowski Jakub Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Lewiński Stanisław Space Research Centre, Polish Academy of Sciences
Lisowska Monika University of Warsaw, Faculty of Geography and Regional Studies
Lisowski Andrzej University of Warsaw, Faculty of Geography and Regional Studies
Listwan Karolina Jagiellonian University, Institute of Geography and Spatial Management
Łabędzki Leszek Institute of Technology and Life Sciences, Kujawsko-Pomorski Research Centre
Magnuszewski Artur University of Warsaw, Faculty of Geography and Regional Studies
Mahlkow Nicole Freie Universität Berlin, Department of Political and Social Sciences
Majer Edyta Polish Geological Institute – National Research Institute, Warsaw
Malesa Krzysztof Government Centre for Security
Mallick Bishawjit Institute of Regional Science (IfR) at Karlsruhe Institute of Technology (KIT)
Mańkowski Rafał Polish Insurance Association
Marciniak Rafał Mazovia Province Office in Warsaw
Martoś Andrzej Świętokrzyskie Voivodeship Office in Kielce
Matczak Piotr Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Matuszewski Tomasz District Office in Gostynin
Mees Hannelore University of Antwerp, Antwerp, Belgium
Mikuś Paweł Institute of Nature Conservation, Polish Academy of Sciences
Milczarek Marta Crisis Information Centre at Space Research Centre, Polish Academy of Sciences
Niedzielko Maria Crisis Information Centre at Space Research Centre, Polish Academy of Sciences
Ozga-Zieliński Bogdan Association of Polish Hydrologists
Papaj Leszek Świętokrzyskie Voivodeship Office in Kielce
Papis Joanna University of Warsaw, Faculty of Geography and Regional Studies
Pawłowski Łukasz University of Wrocław, Institute of Geography and Regional Planning
Perz Adam GRONTMIJ Corporation
Pesel Márton General Directorate of Water Management of Hungary
Piątek Dariusz Mazovia Province Office in Warsaw
Pokojska Paulina University of Warsaw, Faculty of Geography and Regional Studies
Porczek Mariusz University of Warsaw, Faculty of Geography and Regional Studies
Przepióra Paweł Jan Kochanowski University in Kielce, Institute of Geography
Przybycin Andrzej Polish Geological Institute – National Research Institute, Warsaw
Raczyński Jacek Lodz Province Office
Romanowicz Renata Institute of Geophysics, Polish Academy of Sciences
Różak Marta Mazovia Province Office in Warsaw
Różycki Łukasz Permanent Mission of the Republic of Poland to the UN Office at Geneva

Różyński Grzegorz Polish Geological Institute – National Research Institute, Warsaw
Rucińska Dorota University of Warsaw, Faculty of Geography and Regional Studies
Rybus Tołłoczko Andrzej Federation of NGO's 'Pomocni Mazowszu'
Siemek Stanisław Małopolska Provincial Office in Krakow
Siemoniak Tomasz Ministry of National Defence of Republic of Poland
Sierantowicz Krzysztof Municipal Office in Gieraltowice
Skworzec Piotr Podkarpackie Voivodeship Office in Rzeszów
Smolska Ewa Association of Polish Geomorphologists
Sobolewski Mirosław Government Centre for Security
Solecki William City University of New York – Hunter College, NYC
Somorowska Urszula University of Warsaw, Faculty of Geography and Regional Studies
Stachowicz Teresa Mazovia Province Office in Warsaw
Stachura-Olejniczak Halina Mazovia Province Office in Warsaw
Strzelecki Mateusz University of Wrocław, Institute of Geography and Regional Development
Stypiński Andrzej Mazovia Province Office in Warsaw
Sulęta Władysław Pomeranian Voivodeship Office in Gdansk
Swianiewicz Paweł University of Warsaw, Faculty of Geography and Regional Studies
Szczepanek Andrzej Silesian Voivodeship Office in Katowice
Szmajdziński Andrzej Government Centre for Security
Szmigiel-Rawska Katarzyna University of Warsaw, Faculty of Geography and Regional Studies
Szwed Małgorzata Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Szylar Janusz Mazovian Headquarters of State Fire Service
Ślązek Mateusz Institute for Agricultural and Forest Environment, Polish Academy of Sciences in Poznań
Ślęzak-Jarczyńska Ewa Wielkopolska Voivodeship Office in Poznań
Świetlik Marek Opole Voivodeship Office
Śwircz Zbigniew Ministry of Administration and Digitalization of Poland
Thapa Hari Bahadur Save the Environment Foundation, Nepal
Tokarczyk Tamara Institute of Meteorology and Water Management – National Research Institute, Wrocław Branch
Ustrnul Zbigniew Jagiellonian University, Institute of Geography and Spatial Management
Walewski Andrzej University of Warsaw, Faculty of Geography and Regional Studies
Wąsowska Maria University of Warsaw, Faculty of Geography and Regional Studies
Welc Ewa Podlasie Province Office in Białystok
Wesołowski Lech Kujawsko-Pomorski Voivodeship Office in Bydgoszcz
Woźniak Edyta Space Research Centre, Polish Academy of Sciences, Warsaw
Zygmunt Ireneusz Armed Forces Operational Command
Żelazo Jan Specialist of Hydrology
Żmudzka Elwira Association of Polish Climatologists