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RAINMAN

INTEGRATED HEAVY RAIN RISK MANAGEMENT

Newsletter #4
September 2018 — December 2018

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Dear readers,

on 25th May 2018 the General Data Protection Regulation (GDPR) came into force. If you would not like to receive the newsletter any longer you can unsubscribe at any time: in that case, please send an e-mail to rainman@iu-info.de. If you are still happy to hear from us, we are looking forward to providing you with news of our project!

Your RAINMAN Team

NEWSFLASH

10/09/2018

Scoping studies available for download

As a result of the first year of the RAINMAN project two scoping studies have been finished: (1) "Existing Approaches and methods for heavy rain modelling, mapping and risk assessment", (2) "Collection and development of risk reduction measures". The scoping studies are available on the RAINMAN website. Both documents give an overview about the current state of practice related to heavy rain risk management in selected countries of Central Europe.

18/09 – 20/09/2018

19th "Wasserbausymposium" in Graz, Austria

In the course of this international event RAINMAN was presented as part of the "Integrated Flood Risk Management in Styria". Additionally, information about the RAINMAN project was disseminated via proceedings of the conference.

10/10 – 11/10/2018

"Flussbautagung 2018" in Graz, Austria

The Office of the Styrian Government contributed to the Science Corner at the "Flussbautagung 2018" in Graz with a poster about RAINMAN. Around 300 international participants discussed the topic "Rivers without borders – International Flood Risk Management". The poster is available at the RAINMAN website (see news – RAINMAN @ "Flussbautagung 2018").

16/10 – 21/10/2018

16th "EUROPE-INBO 2018" in Seville, Spain

The 16th conference of the "EUROPE-INBO" group took place in Seville, Spain and gathered 237 participants coming from 42 countries. During the session "International and Regional Initiatives" IMGW (Institute of Meteorology and Water Management National Research Institute) had the opportunity to introduce the RAINMAN project.

20/03/2019

2nd Practitioner Workshop in Tiszakécske, Hungary

During the RAINMAN mid-term conference the second RAINMAN practitioner workshop will take place. During the workshop approaches for the documentation and mapping of heavy rain hazards and risks on the local level will be discussed. For this, interested municipalities and further local stakeholders are welcome to participate. Further information will be available on the RAINMAN website.

SAVE THE DATE: RAINMAN Mid-term conference!

The project's mid-term conference will take place on 20th to 21st March 2019 in Tiszakécske, Hungary. We are looking forward to present our first results and experiences and to exchange information on the various approaches and possibilities that deal with heavy rain risk in Central Europe. The event will be held in English and Hungarian. In January 2019 invitation and registration forms as well as the agenda will be available at the RAINMAN website.

Development of the RAINMAN-Toolbox

The RAINMAN-Toolbox is the main outcome of the RAINMAN project. The aim of the toolbox is to support public authorities in adapting their regional and local development to the existing risks of heavy rain induced floods and support the integrated management of heavy rain related risks. The toolbox will improve management capacities of public authorities.

Local public authorities are mainly in demand when it comes to heavy rain events, as these occur on local level and show their effects locally. Municipalities are also challenged by the need to involve their people at risk most effectively. However, a regional or national strategy is at the same time essential to set up suitable framework conditions. By considering these requirements, the RAINMAN partnership defines the target group as mainly local/regional public administrations but also policy makers and private persons.

Before developing the toolbox an online survey has jointly been developed by the project partners. It was provided and answered in 6 countries by a total of 367 mainly local and regional stakeholders. With the survey, information regarding two important inputs for the conception of the toolbox is gathered. On the one hand experiences with heavy rain in different regions are evaluated, on the other hand the stakeholders indicate their wishes and demands to improve heavy rain risk management. The results serve as a basis for the concept of the RAINMAN-Toolbox and its comprising methods and tools: Around 65 % of the respondents have already planned or implemented measures to mitigate heavy rain risks. Nevertheless, an integrated risk management planning process is only implemented or planned by less than 20 % of all respondents! This shows the need to provide guidance regarding the whole process of heavy rain risk management, from assessment and mapping of hazards and risks to the implementation and communication of measures. It became also clear, that – to support stakeholders in Central Europe – not only a catalogue of measures needs to be provided, but also guidance on how to select these measures.

To ensure easy access, the toolbox will be developed as an interactive website. Furthermore, the content will be available in easy language in English and will be complemented by additional content (for example summarising documents) in the national languages of the project partners (AT/GE, CZ, HR, HU, PL).

The RAINMAN Toolbox comprises of a set of transferable tools and methods to

- Assess and map heavy rain related hazards and risks

  Tool: Assessment and Mapping
  (figure: Example pluvial hazard map)

- Find, select and implement suitable risk reduction measures, as well as warning and emergency response systems

  Tool: Risk Reduction Measures
  (figure: Factsheet of a risk reduction measure)

- Improve risk communication, to raise awareness and involve stakeholders

  Tool: Risk Communication
  (figure: Games for children to raise awareness)

- Improve governance and integrate the handling of heavy rain risks into flood risk management plans

  Tool: Governance
  (figure: Recommendations for policy makers)

Current state of progress and outlook

All project partners are involved in project activities feeding directly or indirectly into the toolbox and first results are already at hand. In parallel, the partnership works out concepts for the structure, content and presentation of the above mentioned tools. These concepts form the basis for the publication of project results via the toolbox.

The toolbox structure is currently on its way to be finally agreed upon by all project partners. A navigable demo version was already established to demonstrate the structure of the website aside the 4th transnational RAINMAN partner meeting in Meißen.

Feedback from the RAINMAN Advisory Board (see info box) representing different points of views (European perspective, local/regional perspective and scientific perspective) will be considered in the revision of the toolbox structure – for a design according to the different needs of the users.

Local stakeholders of the RAINMAN pilot actions and associated partners will support the further development of the toolbox. Feedback will for example be gathered in workshops in 2019.

INFO BOX: RAINMAN ADVISORY BOARD

The RAINMAN partnership invited three external experts to discuss the project products and process of toolbox development and give advice to the consortium. The RAINMAN Advisory Board consists of:

- Markus Moser: Regional Board Stuttgart, Germany
- Clemens Neuhold: Federal Ministry for Sustainability and Tourism, Vienna, Austria; Working Group Floods
- Dr. Josef Krasa: Czech Technical University in Prague, Czech Republic

Further information:	Saxon State Office for Environment, Agriculture and Geology, Germany Florian Kerl, Dr. Sabine Scharfe rainman.lfulg@smul.sachsen.de

Definitions of heavy rain induced floods: On the road to a common understanding

The question of how to define pluvial floods (PF) and how to differentiate from fluvial floods (FF) was always part of discussions within the project partnership as it is closely related to the subject of the project. To answer the question of how PF are defined in the partner countries and whether these definitions and respective terms are legal binding or not, the project partners answered a small questionnaire. It revealed the following findings:

- Project partners mainly agree with the definition of PF provided by the European Commission's Working Group Floods (WG F), which is "direct runoff over land causing local flooding in areas not previously associated with natural or manmade water courses".
- Project partners do not necessarily limit PF to heavy rain events.
- Also local flash floods are tackled within RAINMAN and some pilot activities.

The RAINMAN partnership will further discuss and agree on coordinated definitions based upon the WG F framework.

INFO BOX: European Commission's Working Group Floods (WG F)

The WG F is one of five working groups of the Common Implementation Strategy (CIS), initiated by the European Commission, which ensures a better implementation of water legislation in the Member States. Members of this working group are Member States, Candidate and EEA Countries, stakeholders (e. g. River Commissions) and NGOs.

Further information:	Saxon State Office for Environment, Agriculture and Geology, Germany Florian Kerl, Dr. Sabine Scharfe rainman.lfulg@smul.sachsen.de

Pilot activities in Upper Austria

Content and aim of the pilot activities

Computer simulations of heavy rain events can be used for future development areas in municipalities, in order to identify potential hazards and risks. Spatial planning or technical measures can be derived from the results of those numerical simulations, such that the discharge of the precipitation water can happen without causing avoidable damage.

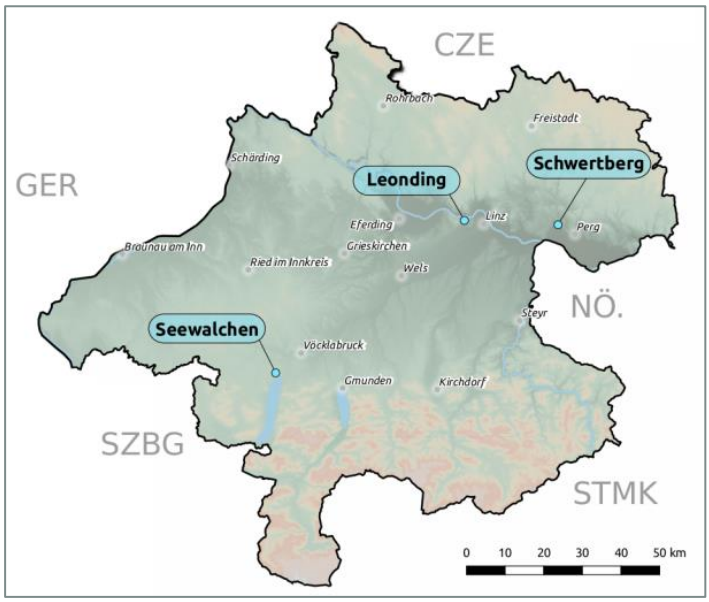
A reasonable planning of measures requires reliable numerical simulation results within a predefined quality. Additionally, the definition of specifications can help to make results of different numerical simulations comparable with respect to their significance.

Therefore, different computer software packages will be applied in three pilot areas in Upper Austria, in order to compare the obtained results and to assess their applicability to heavy rain simulations in different geographical conditions. Furthermore, sensitivity analyses will be conducted with the aim to quantify the investigated effects, such as the precision of the modelled terrain, the adopted precipitation intensity and duration, the soil moisture and infiltration characteristics.

It is the aim of the pilot activities to better understand the heavy rain discharge behaviour on the surface, the suitability and differences of available software packages, and to identify the relevant modelling parameters for the numerical simulations. The achieved outcomes will be summarized in a guidance, which will support planners for executing a simulation of heavy rain events.

Location

The province of Upper Austria with its capital Linz is located in the North-Western part of Austria. For our pilot activities we selected three rural pilot areas. All three study areas have been affected by heavy rainfall events in recent years and are particularly vulnerable to surface water flooding.



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Field Experiments — Summer 2018

Irrigation experiments were carried out in the pilot areas Leonding and Seewalchen in summer 2018. The irrigation experiments are conducted to gain a better understanding of the response of different study plots to very intense precipitation. In the RAINMAN pilot areas different 80 m² plots were irrigated with a rainfall intensity of 100 mm/h (see figure). The generated surface runoff has been collected in channels and measured and water samples were taken to estimate the suspended sediment load. The field experiments provide an important input to improve infiltration and runoff processes under extreme conditions of the hydrological simulations.

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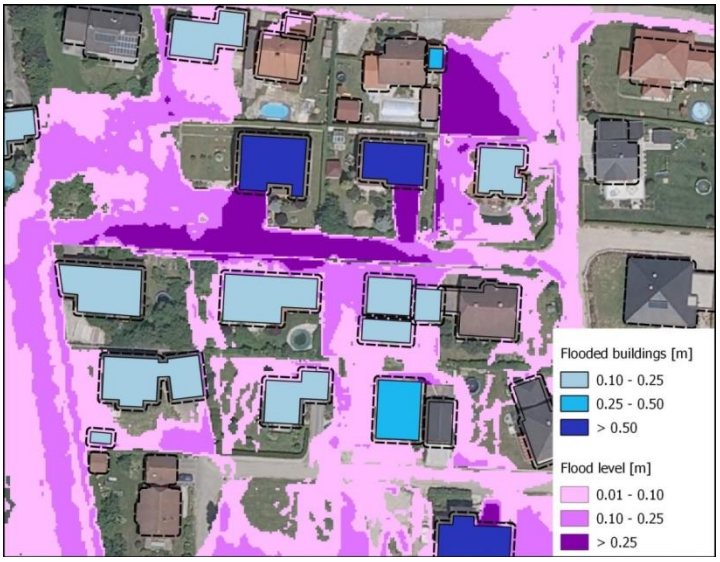
Hazard and risk assessment

In order to effectively manage the risks originating from heavy rainfall, it is crucial to identify locations which are especially prone to pluvial flooding. In our pilot activities different approaches towards the development of hazard and risk maps are investigated (see figure for an example).



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A topic of special interest is to what extent existing and future technical protection measures (e. g. retention basins, local protection measures at object level) and hydraulically relevant structures (sidewalks, culverts, walls and fences) can and should be considered in the hazard mapping process. In the course of the planned pilot actions the capabilities of two different hydraulic modelling software packages to consider technical protection measures and hydraulically relevant structures are investigated.

The collected data and study results of the RAINMAN pilot actions will help to formulate recommendations for the preparation of hazard and risk maps, which will be summarized in a guideline.

Further information:	Environment Agency Austria Dr. Yvonne Spira yvonne.spira@umweltbundesamt.at

Pilot actions in the Middle Tisza District

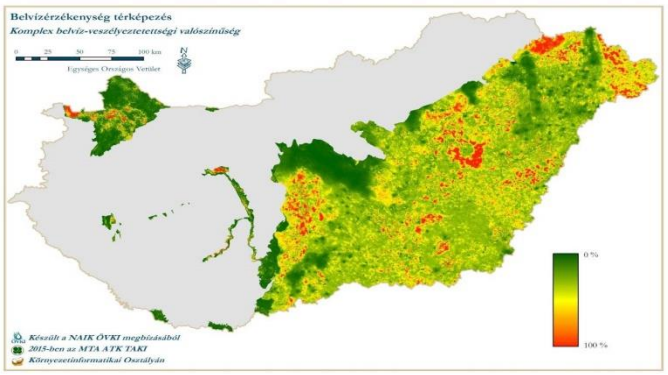
The Middle Tisza District is placed in the Eastern part of Hungary in the Great Plains. The whole area has lowland characteristics, with a large percentage of arable lands. Most of the territory is threatened by floods and inland excess water (pluvial floods). Because of the topographic conditions the runoff is slow and high precipitation can cause frequent inundations both on rural and urban areas. Two RAINMAN pilot areas "Tiszakécske" and "Kunhegyes" are located in the Middle Tisza District. Both were chosen as RAINMAN pilot activities due to their typical low land characteristics.

In the area of Tiszakécske both pluvial and fluvial floods occurred. Pluvial floods in this area occurred almost every year and caused damages on settlements and on arable land because water from the lowland areas does not run off (sometimes for more than 30 days). Pluvial floods occurred most often at the end of the winter and in early spring. Usually at the same time the Tisza River is flooded, too (fluvial floods). Inundations in the areas are therefore caused not only by heavy rain but additionally by fluvial floods, because of a saturated frozen ground or fast snow melting. The possibility of storing inland excess water in the oxbows will be examined.

Also the area of Kunhegyes is characterised by low land and similar occurrences of heavy rain events but also similar problems as in the area of Tiszakécske arise due to heavy rain events. Moreover, the rainwater drainage network of Kunhegyes was designed to cope with a two years return time and 50 percent probability of occurrence rainfall – which is in line with Hungarian standards. The standard rainfall can fully fill up or overrun the pipes and ditch network which impacts the Villogo-channel and the Kakat-channel.

Status of the methodology development in the Middle Tisza District

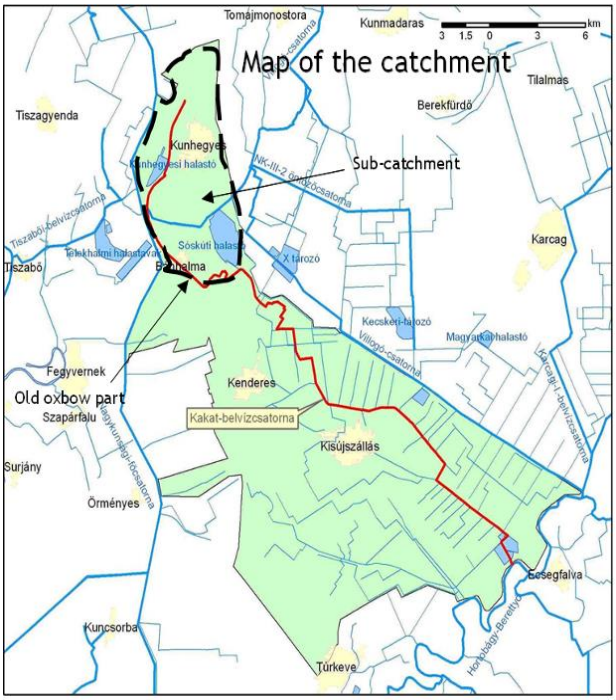
It is planned to develop an assessment methodology and risk analysis for inland excess water threats. A mapping method was already developed to integrate the threats into the Flood Risk Management Plan 2015. Furthermore, a complex Inland Excess Water Threat Index was generated. This methodology will be developed further within the RAINMAN project especially with regard to the level of detail and preciseness. In this context, a risk analysis and risk map will be generated for the two pilot areas of this pilot activity.



Inland excess water threats according to Complex Inland Excess Water Threat Index (low-to high threats from green to red)

Optimised rain water storage at Kakat reservoir in Tisza Region

The catchment of the Kakat Canal is located in the eastern part of the Directorate with a size of 406 km^2. Furthermore, there is an upper sub-catchment with a size of 99 km^2 to the south of Kunhegyes. The optimisation of this upper sub-catchment is important to reduce the risk of pluvial flooding in the pilot region. The implementation of this measure aims at a controlled water storage and run-off. The challenge is to design a retention area and its control mechanisms for a very short warning time in case of heavy rain events. Other tools, as for example assessment and mapping of heavy rain risks, are used to analyse the risks and plan the mitigation measure.



Map of the Kakat catchment

The practice-test focuses on the management of territorial inundations and retaining rainwater during heavy rain events. The Middle Tisza District Water Directorate will develop a storage volume on the Kakat Canal of 12,000 m^3 and reconstruct an old sluice. By optimisation of the Operation Manual the retention volume shall be managed responding on effects of heavy rain events. For creating the reservoir the Kakat Canal has to be dredged for 1 km between sections 32+610 km and 33+610 km to optimise the reservoir.

After completion of the optimisation, the reservoir is ready to support the management of heavy rain events and to be tested as low-impact risk reduction measure, fulfilling also ecologic requirements. The population and municipality of Kunhegyes as well as the county Jász-Nagykun-Szolnok benefit due to increased safety and storage capacities. The maintenance of the reservoir and the works realised during the investment will be implemented into the maintenance plan for ensuring the conditions of a long-term operation.

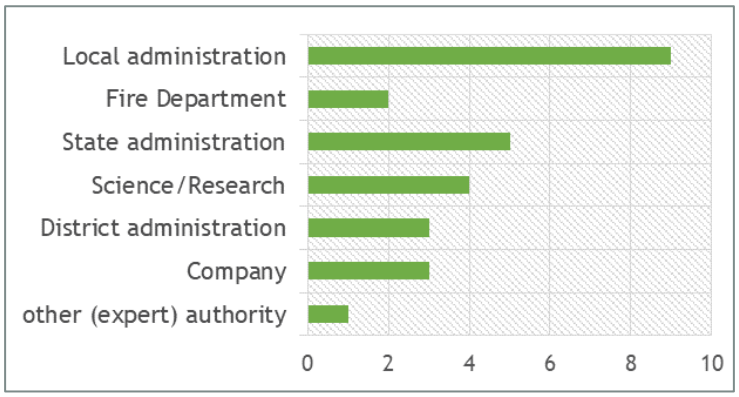
The realisation will serve as a test case for implementing one of the risk reduction measures for the RAINMAN project. Implementation experiences on the actual technical implementation (technical effects, building and contracting process, acceptance issues etc.) will be included in the RAINMAN-Toolbox.

Further information:	Middle Tisza District Water Directorate, Hungary Attila Lovas, Gábor Harsányi, Péter Gergő Katona, Melinda Váci tiszaoffice@kotivizig.hu

1st RAINMAN Practitioner Workshop: Approaches of documentation and mapping of hazards

Throughout the RAINMAN project, four workshops to practitioners will be held in several partner countries. The aim of this direct cooperation is to involve the responsible parties from the pilot areas, interested representatives from municipalities and other stakeholders early in the development process of an analytical framework and of methods / tools for heavy rain risk assessment and mapping and thus meet the requirements of the users.

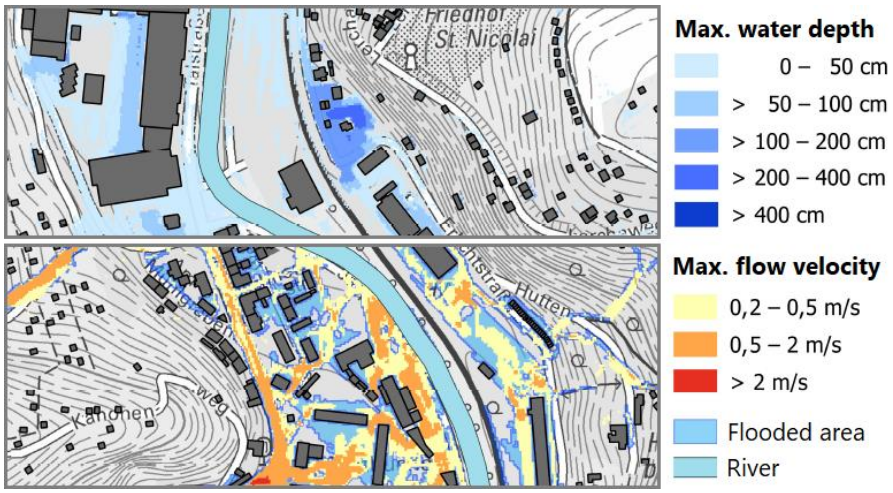
The first RAINMAN practitioner workshop was held as part of the 2nd STRIMA II Flood Risk Management Forum in Dresden on September 11th, 2018. Suitable methods for the documentation of heavy rain events and creation of hazard and risk maps were discussed with potential users and valuable feedback was collected for the further development. Among the participants were representatives of several administrative authorities, many of them from local administrations, who were the primary target group of this workshop (see figure).



A database-driven documentation tool was introduced which can be used to document past heavy rainfall events and organize data sets consisting of images, videos, and an inventory of water marks (i. e. all evidence of surface runoff following a rainfall event). A thorough event documentation can be used to detect recurrent flow patterns and to give an initial assessment of particularly endangered areas. Water marks derived from pictures taken during or after a rainfall event offer important information for the evaluation of hydrodynamic models.

The participants showed great interest in the user-friendly tool for the uniform recording of heavy rainfall events and the resulting damage. In order to avoid multiple acquisitions of similar data for related tasks (e. g. damage assessment, follow-up care) and to enable nationwide uniform coverage, they proposed that the mandatory requirements for the collected data should be specified centrally. For the consistent collection of water marks a guideline is needed that identifies the various types of water marks and the information derived from them (e. g. lines of floating material or moisture on structures to determine maximum water depth, erosion and sedimentation patterns, oriented vegetation, debris and structural damage to buildings and infrastructure as indicators of flow direction and velocity) and that provides guidance for the data collection and interpretation.

In addition to the documentation tool, different map layouts for hazard maps were presented (see the figure below for an example). Discussions in small groups showed that the requirements for the content and level of detail of hazard and risk maps differ depending on the purpose of use. In order to do justice to this, layout specifications for different fields of application (e. g. hazard/risk identification, planning of risk reduction measures, operational planning) should be developed. It was proposed to add an explanatory sheet to make the hazard maps more comprehensible to non-experts. The sheet should contain information about effects resulting from certain water depths or flow velocities (e. g. water entering through open Ground-level basement windows at shallow water depths; failure of door and window seals due to increased pressure at high flow rates). Also, a direct visualization of these effects has been suggested (e. g. marking of buildings that could be affected by ingress of water; marking of impassable traffic routes), as the information could be conveyed more quickly. The development of an early-warning system for heavy precipitation events and near-real-time hazard maps was encouraged by several participants in order to improve the emergency response time.



Data source: GeoBasis-DE © BKG 2017, DGM2 © GeoSN 2018, ADV-WMS-DE-SN-DTK-Produkt-Graustufen © GeoSN 2018

In conclusion, it can be stated that the great interest in the issue of heavy rain risk assessment and mapping has been reflected clearly in the lively discussion rounds. The direct exchange between the stakeholders and the RAINMAN project and transfer of knowledge – in both directions – was evaluated very positively by the participants and provided important impulses for the further method development.

The 2nd RAINMAN Practitioner Workshop will take place during next year's RAINMAN Mid Term Conference in Tiszakécske, Hungary, and focus on the methodical approaches developed in the Hungarian and Saxon pilot activities and their applicability under different context conditions. Especially, the lowland situation in the Hungarian pilot areas will be considered in greater detail. More information will be available on the RAINMAN website.

Further information:	Leibniz Institute of Ecological Urban and Regional Development, Germany Lisa Körte, Axel Sauer, Regine Ortlepp rainman@ioer.de

4th transnational RAINMAN partner meeting in Meißen

Sixteen months after the project launch the consortium of the RAINMAN project came together for the forth partner meeting in Meißen (Germany) on 12th and 13th November.

The group of more than 50 participants was welcomed by the Mayor of the city of Meißen, Mr Olaf Raschke. In a vivid speech he expressed the reasons why the city of Meißen is engaging in the RAINMAN project. Just recently the city was affected by flooding and heavy rain events. The experiences which the city gathered in this context will be considered in the project. An excursion gave the partnership the opportunity to visit measures which have already been implemented to reduce heavy rain risks. During two interesting days, the participants of the partner meeting discussed about how to improve heavy rain risk management on local and regional level and about the development of the RAINMAN-Toolbox.

In the morning of the first day the presentations and discussions revolved around mapping of heavy rain risks. The responsible partners from Poland, Austria, Hungary and Germany presented the current state of their work in Lower Silesia, the city of Graz, Upper Austria and at the Middle Tisza District.

In the second part of the first day the focus was on the structure and the composition of a catalogue of measures in order to reduce the impact of heavy rain events. Additionally the opportunities of the consideration of heavy rain risks in spatial planning were discussed.

Finally, the main focus of the second day lay on the intensive discussions with the RAINMAN Advisory Board (see info box on page 5). The experts highlighted the relevance and potentials of the project. At the same time they underlined the challenging task to find a balance between addressing the target group on a local level and meeting the objective of the project to develop transnational applicable tools for heavy rain risk management.

The external experts gave useful tips for the further development of the RAINMAN-Toolbox. For instance they suggested preparing recommendations on risk communication, because in their opinion there seems to be a strong need for action. The external experts encouraged to use a simple language for the toolbox and to support the texts visually in order of making the toolbox more attractive. The catalogue of measures should include recommendations for the implementation as well as examples to support a professional implementation. These and other recommendations of the external experts will provide a good basis for the further development of the toolbox and the project's contents.

As an outcome of the meeting the project partners defined the next steps for the development of tools of the RAINMAN-Toolbox. In the coming months the structural basics of the RAINMAN-Toolbox will be further developed and connected to the pilot project areas. Within the midterm conference in March in Tiszakécske (→ see announcement on page 3) the results will be presented.

Further information:	Saxon State Office for Environment, Agriculture and Geology, Germany Dr. Sabine Scharfe, Florian Kerl rainman.lfulg@smul.sachsen.de

RAINMAN Key Facts

Project duration:	07.2017 – 06.2020
Project budget:	3,045,287 €
ERDF funding:	2,488,510 €
RAINMAN website & newsletter registration:	**www.interreg-central.eu/rainman**

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Leibniz Institute of Ecological Urban and Regional Development

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