



Disaster Risk



Management



Knowledge Centre

Pooling knowledge and networks in disaster risk management

NEWSLETTER

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About this issue..... 2

Partnership

High Level Workshop on Science Advice for Climate Change Adaptation, on 16 September 20193

JRC gives science support to the Global Covenant of Mayors for Climate and Energy4

Knowledge

Expected increase in “compound flooding” in coastal areas in Europe, due to climate change5

JRC study assesses global human population living in proximity to active volcanoes in last 40 years6

JRC study on the challenges of increasingly scarce water resources for EU energy and water policies7

OECD High Level Forum on investment in resilient infrastructure, on 18-19 September 20198

New European Seismic Risk Service released by the European Facilities for Earthquake Hazard and Risk (EFEHR)9

Innovation

Towards an Action Plan on integrated techniques for seismic strengthening and energy efficiency of buildings10

Recently published JRC guidelines on selecting proper security barrier solutions against vehicle ramming11

European Commission’s new on-line newsletter on the Protection of Public Spaces12

Call for Papers - Special issue of Big Earth Data: the convergence between Big Earth Data and Artificial Intelligence13

Upcoming events and calls for submissions 14

Evidence for Policy Winter School | Disaster Risk Management: Science and Policy in Support of Decision-Making, in an Environment of Uncertainty 13-15 January 2020 | Florence, Italy

Scientists and policy-makers are invited to send their applications for the above two-day 2020 Evidence for Policy School, organized by the European Commission in collaboration with the Italian Civil Protection Department, the International Network for Government Science Advice (INGSA) and the University of Florence (UNIFI).

The deadline for application is 4 November 2019. Apply on-line: <https://lnkd.in/gzcuFib>

For any questions, please email JRC-EVIDENCE-POLICY@ec.europa.eu or visit:
<https://ec.europa.eu/jrc/en/event/training-course/evidence-policy-school-disaster-risk-management>



About this issue

As the Knowledge Centre of the European Commission that serves to support EU Member States in responding to emergencies and preventing and reducing the impact of natural and man-made disasters, the Disaster Risk Management Knowledge Centre (DRMKC) provides a networked approach to the science-policy interface in the field of DRM, across the Commission, EU Member States, and relevant bodies within and beyond the EU.

The DRMKC, which is supported and coordinated by a number of Commission Services, including the Joint Research Centre (JRC), in partnership with a key network of Member States, addresses EU policy priorities such as humanitarian aid and civil protection, climate action, sustainable development, and the European neighbourhood policy (ENP) among others.

The DRMKC Newsletter is a quarterly publication that supports the DRMKC key aims of strengthening networks and partnerships, promoting better use of available research and knowledge, and advancing technologies and capacities in DRM, by providing a regular synopsis of the latest policy-related evidence from relevant scientific activities and initiatives, carried out by the Commission and other international organisations.

Amongst the news articles featured in this, the 18th issue of the DRMKC Newsletter, are reports about a recent high level workshop organised by the Commission, on science advice for climate change adaptation, and two recent high-profile studies (both with JRC participation) on climate change risks and impacts: one on the likely increase in “compound flooding” in Europe’s coastal areas, the other on challenges posed by increased water scarcity for EU energy and water policies.

As well as climate change, this issue of the DRMKC Newsletter also features recent scientific developments related to disaster risk management and reduction of other natural and man-made hazards of major significance in Europe and globally. Examples are the reports on analysis of recent population changes close to

active volcanoes, seismic risk mapping, improving the seismic safety and energy performance of buildings, and support for the protection of public spaces from malicious attacks.

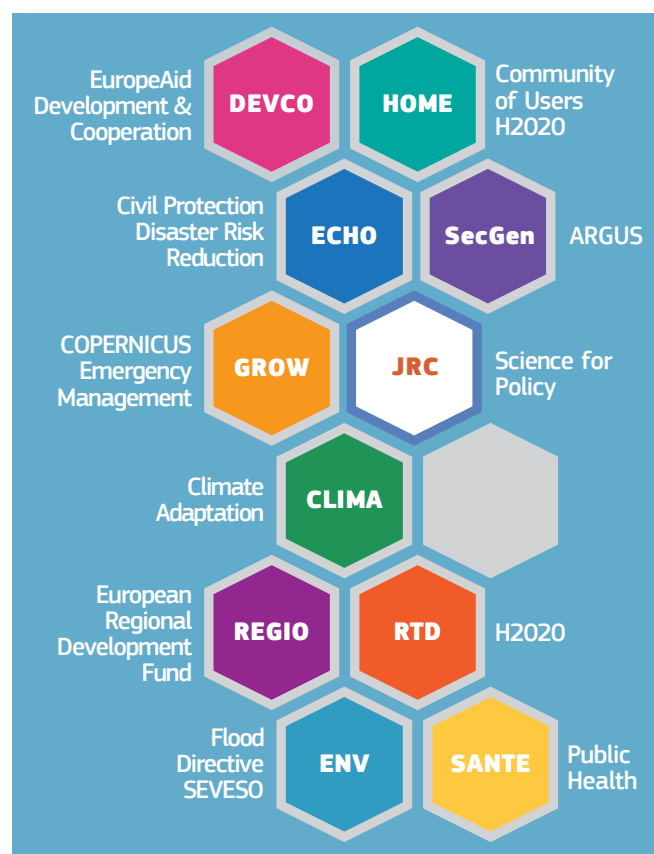
Regarding climate change - as is mentioned in the first report in this Newsletter, this is a priority for the new European Commission, as evidenced by the proposed “European Green Deal”, which aims to make Europe the first climate-neutral continent by 2050, and the fact that adaptation to climate change is one of the five mission areas of the EU’s planned €100 billion research and innovation programme for 2021-2027.

We wish you an informative and enjoyable read of this latest issue of the DRMKC Newsletter!

The DRMKC Newsletter Editorial Team

For more information:

<https://drmkc.jrc.ec.europa.eu/overview/Newsletter>



DRMKC Partners © European Commission

High Level Workshop on Science Advice for Climate Change Adaptation, on 16 September 2019



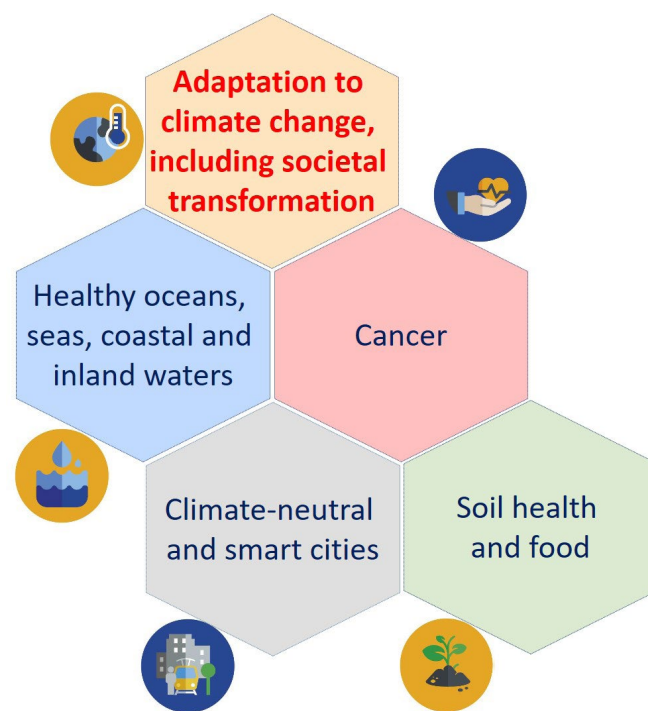
A high-level Workshop on Science Advice for Climate Change Adaptation, co-organised by the European Commission's Joint Research Centre (JRC) and Directorates-General for Climate Action (DG CLIMA) and Research and Innovation (DG RTD), was held on 16 September 2019 in Brussels.

Climate change is a top priority of the new European Commission, with President-elect Ursula von der Leyen's proposed "European Green Deal" (and a pursuant European Climate Law) - which aim to make Europe the first climate-neutral continent by 2050 - to be delivered within 100 days of the new Commission taking office on 1 November 2019. The new EU strategy on adaptation to climate change should be fully integrated in the Green Deal, while adaptation to climate change is one of five defined mission areas of Horizon Europe, the EU's planned €100 billion research and innovation programme for 2021-2027.

The Workshop was thus a timely occasion to present the latest science in climate change adaptation (CCA), understand policy developments in the field, facilitate knowledge sharing among DGs, and help prepare the next JRC work programme for CCA. The Workshop was opened by Charlina Vitcheva, Deputy Director-General (DDG) of the JRC, and Clara de la Torre, DDG of DG CLIMA. As well as JRC, DG CLIMA and DG RTD, the Workshop was attended by representatives from 12 other DGs interested in evidence and knowledge for CCA across policy domains, and from the European Environment Agency (EEA) and the European Centre for Medium-Range Weather Forecasts (ECMWF).

Presentations by JRC experts included: an overview of the state of play - and the JRC's important role - in science advice for CCA; the PESETA projects on climate impacts in Europe; an analysis of the big unknowns and uncertainties of future climate impacts; JRC's science support to the adaptation component of the Global Covenant of Mayors (GCoM) for climate and energy. Other presentations included: CCA research science and innovation, and research and practice gaps relevant for Horizon Europe (by DG RTD); Copernicus Climate Change Service (by ECMWF); Digital Europe - Extreme Earth Initiative (by DG for Communications Networks, Content and Technology / CNECT); tracking progress on adaptation, and the role of EEA assessments and the European Climate Adaptation Platform (by the EEA); requirements for monitoring progress in disaster prevention at the EU and global scales, through the Union Civil Protection Mechanism and the Sendai Framework for Disaster Risk Reduction, respectively (by DG ECHO).

From the discussions, possible priorities for future work emerged. DG CLIMA expressed a clear **short-term need for knowledge to support the forthcoming climate adaptation strategy**. PESETA 4 will be the JRC's timely contribution, but more can and must be done. DG RTD called for better exploitation of past and future research, especially given the upcoming mission area on CCA in Horizon Europe. There is a need for **improving data on policy effective-**



Climate change adaptation is one of the five defined "mission areas" of Horizon Europe, the next EU research and innovation programme (2021-2027). Graphic © European Commission

ness. There is a lack of quality data for tracking adaptation outcomes and policy effectiveness. Other approaches to data collection should be developed, also better utilising Copernicus services. Science must cover **new and challenging areas**. Various DGs called for additional research areas, largely confirming and complementing needs already anticipated by JRC, including: cascading and spill-over impacts, non-economic impacts, impacts of extremes beyond general equilibrium, stress testing of government budgets, and more sector-relevant information (e.g. DGs AGRI, MARE).

Also highlighted were sustainable finance ("guidelines on adaptation finance can leverage huge amounts of private funding"), agriculture ("the averages of PESETA hide important regional differences on livelihoods as well as possible scenarios for food insecurity"), migration ("strong interest in better understanding cascading effects"), resilience and vulnerability ("JRC's work on resilience scoreboard may be useful to monitor progress in adaptation").

Paulo Barbosa and Niall McCormick
European Commission, Joint Research Centre (JRC)

For more information:
https://ec.europa.eu/clima/policies/adaptation_en
<https://ec.europa.eu/jrc/en/research-topic/climate-change>



JRC gives science support to the Global Covenant of Mayors for Climate and Energy

A training workshop on mitigation and adaptation to climate change, which was organised by the European Commission's Joint Research Centre (JRC) in the framework of the Global Covenant of Mayors (GCoM), was held in August 2019 in Corrientes, Argentina.

The GCoM - or to use its full title, the Global Covenant of Mayors for Climate and Energy - is the largest global alliance of cities and local governments with a shared long-term vision of taking measurable action to combat climate change and transition to low-emission and more resilient societies.

Currently, the European Commission supports secretariats covering the EU, eastern and southern neighbouring countries of the EU, Sub-Saharan Africa, North America, Latin America and the Caribbean, China and South-East Asia, India and Japan, Australia. In Europe, the EU Covenant of Mayors is firmly embedded in the EU's climate and energy policies, and signatory cities will contribute significantly to the implementation of the EU's 2030 climate and energy package and of the EU Strategy on adaptation to climate change.

The GCoM helps local authorities worldwide to translate their commitments into action, through the implementation of Sustainable Energy and Climate Action Plans (SECAPs), while taking into account their diverse needs. The European Commission, through the JRC, provides scientific and technical support to the GCoM, and is in charge of ensuring the scientific quality of the initiative by:

→ Developing methodologies regionally adapted for the SECAPs implementation.

→ Evaluating the SECAPs and providing a complete feedback to the participating cities, highlighting the strengths and weaknesses of their plans.

→ Supporting local authorities in designing and implementing their plans by providing training to local actors and stakeholders through Technical Workshops.

→ Assessing the overall impact of the initiative worldwide.

The guidance material, prepared by the European Commission with the support and input of many experts from municipalities, regional authorities and other agencies or private companies, offers a set of methodological principles and a harmonised data compilation and reporting framework, under the GCoM's "Common Reporting Framework".

The JRC prepares guidebooks for the different regions of the world, taking into consideration their differences under a single harmonisation umbrella, and with the aim of helping local authorities prepare action plans to reach committed targets.

The JRC is responsible for training experts, local actors and stakeholders involved in the initiative. During the workshops, the JRC provides cities' delegates with materials, tools and hands-on exercises focusing on the initiative's three interconnected challenges:

- Climate change mitigation (through decarbonisation).
- Climate change adaptation.
- Access to secure, sustainable and affordable energy.

As well as the training workshop in Argentina, the JRC conducted an experts' consultation on the first Global Covenant guidebook for Latin America, on 25-27 September 2019 in Cartagena de Indias, Colombia.

This news item is based on an article published in the JRC Newsletter on 23 August 2019 (see web-link below).

Paulo Barbosa

European Commission, Joint Research Centre (JRC)

For more information:

<https://ec.europa.eu/jrc/en/news/jrc-gives-science-support-global-covenant-mayors-climate-and-energy>
www.globalcovenantofmayors.org/



A scene from the training workshop on mitigation and adaptation to climate change, organised by the JRC in August 2019 in Corrientes, Argentina

© European Commission

Expected increase in “compound flooding” in coastal areas in Europe, due to climate change



A new study on the present and projected future risk of so-called “compound flooding” – which is caused by the co-occurrence and interaction of high sea-levels (i.e. storm surges or storm tides) and heavy precipitation (resulting in large runoff) – in low-lying coastal areas of Europe, has been published in the journal *Science Advances*, and has been featured on several international news media outlets (including the BBC News web-site on 18 September 2019 – see below).

Estimating coastal flood risk is essential for engineering practices, disaster risk reduction, and policy-making. There are two distinct mechanisms that can lead to coastal flooding: storm surges and heavy precipitation – either by direct runoff (pluvial) or increased river discharge (fluvial). Where both occur concurrently or in close succession – as often happens – the adverse consequences can be greatly exacerbated. Despite this, compound flooding is currently not considered in coastal flood risk analyses, with sea and river flooding generally regarded as separate events. The Figure below illustrates how storm surges and heavy rain can combine to increase the risk of coastal flooding.

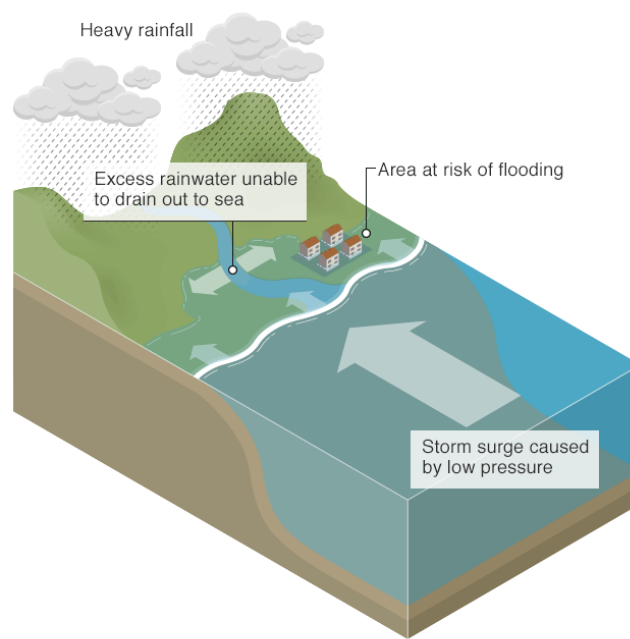
In a warmer climate, rising mean sea-levels pose the main threat to coastal areas, naturally increasing the likelihood of sea-level extremes in the future. Coastal planning agencies in Europe are currently becoming more aware of the rise in flood hazard and the need to take action. However, as the new study highlights, the sea-level rise will also increase the potential for compound flooding. Indeed, heavy precipitation events that today coincide with a relatively weak storm surge, may have a much stronger effect under higher sea-levels.

Furthermore, the study shows that the potential for compound flooding will not only be affected by sea-level rise, but also by changes in storminess and precipitation extremes. Future model projections show that northern Europe may experience an increase in the potential for compound flooding (in addition to that caused by sea-level rise) mainly due to increasing precipitation intensities.

In the study, climate modelling is used to show that around 3% of Europe’s coastal areas experience compound flooding events more than once every six years. At the moment, these are mainly in the Mediterranean, around the Gulf of Valencia in Spain, Algeria, the Gulf of Lyon in France, and in southern Turkey. The pan-European analysis suggests that the difficulties posed by compound events will increase in a warmer world, and will move to threaten Northern Europe far more than at present. According to the modelling, compound flooding is projected to robustly increase along the west coast of Great Britain, Northern France, and along the east and south coast of the North Sea.

The results of the study cannot directly be interpreted as projections of actual flood risk, since the latter is a complex phenomenon depending on several other factors not considered here (e.g. topography, presence of protection). The study identifies European regions potentially facing com-

Storm surge and heavy rain lead to increased risk of flooding



Source: Douglas Maraun/*Science Advances*

BBC

Graphic from: www.bbc.com/news/science-environment-49731591

ound flooding in a warmer future climate, thereby providing a continental-scale basis for follow-up local compound flooding risk assessments and adaptation planning. In areas prone to compound flooding, assessments of future flooding risk should consider changes in sea, pluvial, and fluvial flooding simultaneously, to take account of how multiple flooding drivers might combine to exacerbate flooding impact.

The new study on compound flooding was carried out by a team of researchers lead by the University of Graz in Austria, and including the European Commission’s Joint Research Centre (JRC) in Italy.

Michalis Vousdoukas

European Commission, Joint Research Centre (JRC)

For more information:

<https://advances.sciencemag.org/content/5/9/eaaw5531>
www.bbc.com/news/science-environment-49731591

Reference:

Bevacqua, E., D. Maraun, M. I. Vousdoukas, E. Voukouvalas, M. Vrac, L. Mentaschi and M. Widmann. 2019. Higher probability of compound flooding from precipitation and storm surge in Europe under anthropogenic climate change. *Science Advances* 5 (9). [www.doi.org/10.1126/sciadv.aaw5531](https://doi.org/10.1126/sciadv.aaw5531)



JRC study assesses global human population living in proximity to active volcanoes in last 40 years

A new study, led by the European Commission's Joint Research Centre (JRC), characterizes in unprecedented detail the changes in the last 40 years in the distribution of global human population living in proximity to historically active volcanoes.

Moderate to large volcanic eruptions are infrequent but potentially high-impact incidents, especially for nearby populations due to lava flows, ash deposition, "pyroclastic" events, etc. As was shown by the 2010 eruption of Iceland's Eyjafjallajökull volcano even modest eruptions in relatively remote locations can have global impacts. In densely populated areas, small to moderate eruptions may constitute severe threats, generating multiple hazards affecting areas from the immediate vicinity to hundreds of kilometres away.

Volcanic activity remains a constant threat globally and the number of people at risk from volcanism is rising with increased urbanization and population growth. However, volcanic risk analysis and assessment at the global scale is not as advanced as for other hazards such as flooding, earthquakes and tropical cyclones, being limited by the availability and quality of data, especially regarding consistency and detail.

Similarly to earthquakes, volcanic eruptions are difficult to mitigate technologically, as the hazard component can hardly be decreased by human action. While expected global losses may be less than those from other hazards, in affected regions they can be very significant. Since 1950, on average 31 volcanoes have erupted each year, and at any one time at least 20 are erupting. Thus, major gains to disaster risk reduction are to be obtained by reducing vulnerability and especially exposure, requiring improved assessments of these components.

In the JRC-led study, the worldwide distribution of population from 1975 to 2015 was assessed and characterized in relation to recent volcanism, using the best available global population grids - i.e. the global population distribution grids for 1975, 1990, 2000, and 2015, produced by the European Commission's Global Human Settlement Layer project - together with two widely used global databases of the latest information on volcanoes: the Holocene Volcano List

of the Smithsonian Institution's Global Volcanism Program, and NOAA's Global Significant Volcanic Eruptions Database. The latter two datasets include 1,426 volcanoes with eruptions in the Holocene period (approximately the last 10,000 years, beginning after the last glacial period), and those where there is evidence of significant eruptions.

Results of the study show that in 2015 over 8% of the world population lived within 100 km of a volcano with at least one significant eruption, and 14.3% (over 1 billion people) lived within 100 km of a Holocene volcano, with human concentrations in this zone increasing since 1975 above the global population growth rate. While overall spatial patterns of population density have been quite stable in time, they have varied with distance, with a higher concentration of people within 10-20 km from volcanoes. (See Figure below).

A comparative analysis conducted for the volcanic hot spots of Southeast Asia and Central America also shows that in the last 40 years, in Southeast Asia the highest population growth rates have occurred in close proximity to volcanoes (within 10 km), whereas in Central America these are observed farther away (over 50 km), especially after 1990 and for Holocene volcanoes.

The JRC study on changes in the proximity of global population to volcanoes (full details of which are at the web-link below) demonstrates how emerging open and free geospatial datasets can narrow gaps in population distribution data and knowledge, supporting disaster risk management and reduction activities.

Sergio Freire

European Commission, Joint Research Centre (JRC)

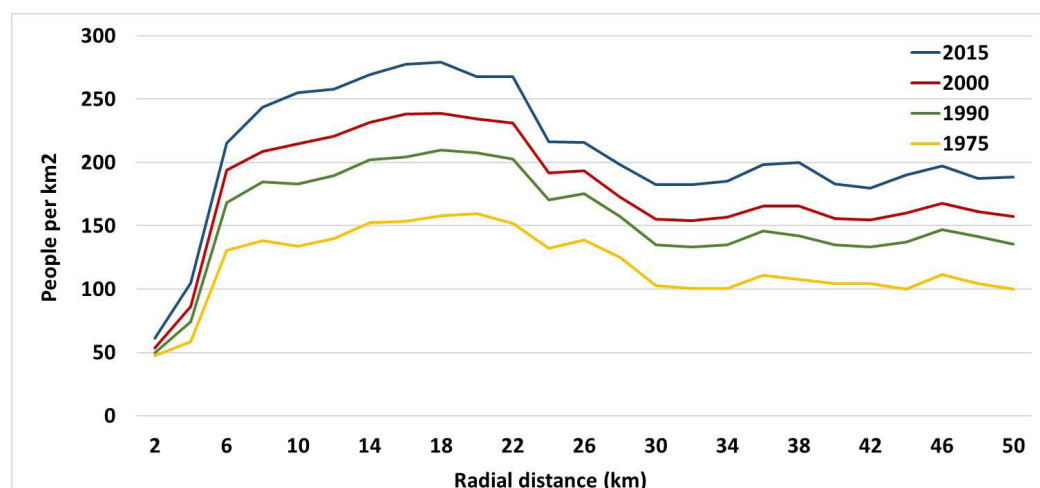
For more information:

www.mdpi.com/2220-9964/8/8/341

<https://ghsl.jrc.ec.europa.eu/>

Reference:

Freire, S., A.J. Florczyk, M. Pesaresi and R. Sliuzas. 2019. An Improved Global Analysis of Population Distribution in Proximity to Active Volcanoes, 1975–2015. *International Journal of Geo-Information*, Vol. 8, Issue 8, 341. [www.doi.org/10.3390/ijgi8080341](https://doi.org/10.3390/ijgi8080341)



Average population density as a function of radial distance to volcanoes in the Significant Volcanic Eruption Database, in 1975, 1990, 2000, and 2015. From: Freire et al. (2019).

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JRC study on the challenges of increasingly scarce water resources for EU energy and water policies



A recently published study by the European Commission's Joint Research Centre (JRC) analyses the strong inter-dependency between the energy and water systems, and proposes actions for addressing problems posed by increasingly scarce water resources in EU energy and water policies.

Thermal power stations are vulnerable to global warming as they need large quantities of cooling water to function. In July 2019, for example, several nuclear power plants were temporarily closed in various parts of Europe due to high water temperatures. Hydropower output and stocks were also affected in France, Spain, the Balkans and Scandinavia. With energy demand predicted to increase, scientists see the rising temperatures as a threat to the proper functioning of our energy and water systems.

As highlighted by the JRC's Davide Magagna, rising temperatures from a warming climate have an impact on the energy and water systems. The energy industry depends heavily on the availability of water, but also the water sector depends on energy to collect, pump, treat and desalinate water.

In the JRC study, the strong inter-dependency between the energy and water systems is seen as a "critical uncertainty" that may become an issue in terms of achieving the EU's ambitious decarbonisation goals for 2050, if the proposed solutions rely on water-intensive energy technologies.

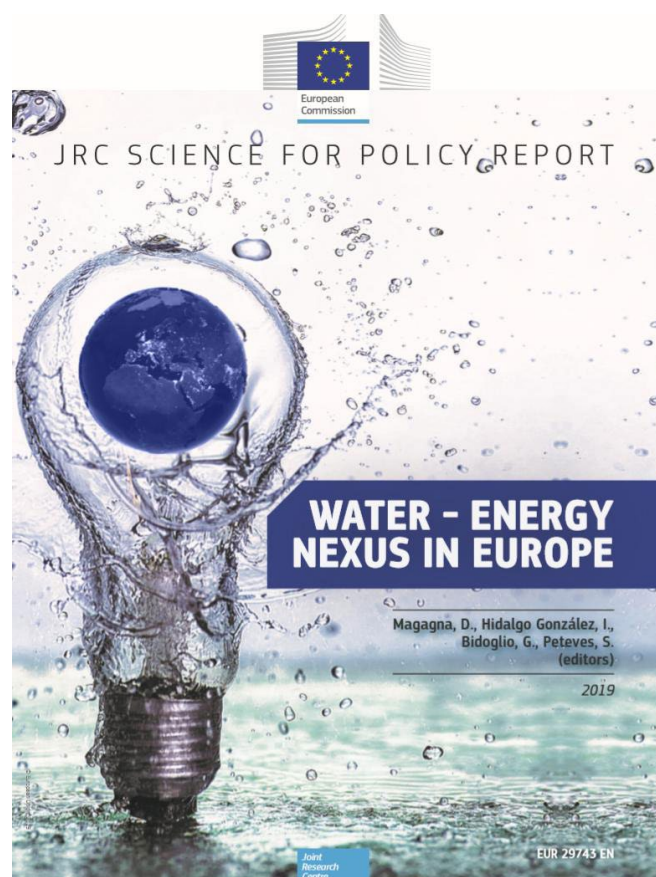
It is expected that by 2050, overall water demand by the energy sector will decrease, but the sector will still need a lot of water to function. Climate change will negatively impact water availability and water scarcity may lead to more power generation problems in several EU regions.

As pointed out by the JRC's Giovanni Bidoglio, climate models suggest that disruptions such as those in summer 2018 will become more common and harsher. Water scarcity will be felt across Europe, affecting at least 90 million Europeans, not only in the Mediterranean regions, but also in other countries like Poland, Czech Republic and Germany. More floods and droughts, higher water temperatures and changes in the seasonal patterns of river flows will impact both the cooling of power plants and hydropower generation.

The JRC report presents some technology options that could help reduce the water needs of the energy system. Increasing the shift from coal and nuclear to renewable energies is one. Although decarbonisation of the energy system is expected to significantly reduce water use by 2050, coal and nuclear power plants would still account for 50% of projected water use in 2050.

The report also recommends the use of air-based and advanced cooling systems, as well as finding proper trade-offs between open- and closed-loop cooling systems (the latter withdraw less but consume more). Further options include the use of waste heat for heating, and the replacement of water by other means in the oil and gas industry. Smart meters can help optimise power plant and water management, reduce waste and leaks, and improve data collection.

Currently, the use and management of water and energy are addressed separately both at the level of EU policy and



individual EU member countries. The JRC study calls for integrated water-energy policies, and provides several policy recommendations on how to boost the use of low-carbon energy sources while keeping water resources sustainable.

The study, which is described in a JRC Science for Policy Report (see web-link below), was carried out under the JRC's Water-Energy-Food-Ecosystem (WEFE) Nexus project, which analyses inter-dependencies and interactions between the water, energy, agriculture, and environment sectors.

This news item is based on an article published in the JRC Newsletter on 12 August 2019 (see web-link below).

Niall McCormick

European Commission, Joint Research Centre (JRC)

For more information:

<https://ec.europa.eu/jrc/en/publication/water-energy-nexus-europe>

<https://ec.europa.eu/jrc/en/news/heatwaves-test-limits-energy-and-water-systems-europe>



OECD High Level Forum on investment in resilient infrastructure, on 18-19 September 2019

A meeting entitled “Investing in infrastructure: Costs, benefits and effectiveness of disaster risk reduction measures”, was held under the auspices of the Organisation for Economic Co-operation and Development (OECD) High Level Forum, on 18-19 September 2019 in Paris. The aim of the meeting, which was co-organized by the Platform for Climate Adaptation and Risk Reduction (PLACARD), was to showcase, share and discuss the different approaches and methodologies for cost benefit analyses (CBA), broader cost effectiveness analysis and the different tools used to inform and support infrastructure resilience investment decisions. A brief summary of the meeting’s sessions is provided below.

Modelling the net present value of resilience measures: This session compared present costs and future benefits of investments in disaster risk reduction (DRR). A set of existing discount rates was identified, focussing on variables in calculation of discount rate values (up to 7%).

Assessing the value of intangibles: In this session, the following methods of revealed preferences (i.e. methods of analysing choices by individuals) were found to apply: Hedonic pricing method (HPM); Travel cost method (TCM); Cost of illness (Col) approach; Replacement or restoration cost method (RCM). Also, stated preferences utilise the following approaches: Contingent valuation method (CVM); Choice methods method (CMM); Life satisfaction analysis (LSA).

Monetisation of the benefits of multi-purpose resilient infrastructures: Here, CBA could be used to monetise and integrate co-benefits of DRR projects. Economic effectiveness tools to monetise or estimate the value and co-benefits of hard and soft resilience packages, were explored.

Post-disaster analysis: Post-disaster analysis often highlights the disproportionate socio-economic impacts of a disaster experienced by different genders and social groups. It is important to consider the vulnerability of different population groups when analysing the impact of DRR projects.

Resilience of infrastructure systems for local emergency management: This session focused on the 2009 L'Aquila earthquake. After that event Italy's government

spent €965 million on seismic risk reduction activities, with the introduction of a seismic risk index which was used to allocate the funds among regions.

Impact of community-based DRR projects: Tools such as comprehensive climate risk management (CRM), which reflect on current and future climate-related risk, involve a layering of measures related to DRR and climate change adaptation (CCA) at local and national levels, to enhance coverage of communities and population. CRM may include fiscal risk assessments with longer-term budget analyses and fiscal stress testing for economic effectiveness at national level, with local-level training and soft investments.

Assessment of the economic value of ecosystem-based measures: Usually DRR projects include hard and soft infrastructure improvements, the former providing physical protection and the latter reducing communities' exposure to hazards. Events in Colombia were discussed to identify the positives and negatives of the country's experience.

Finally, after two days of discussions and presentations, the participants summarized the main challenges in this area, as follows: (a) Changes in governance are needed to meet the above-mentioned challenges. (b) Different CBA approaches (history, social welfare economics) are being used to identify the best projects in the area of DRR and CCA. (c) Inclusion of intangible factors differs in countries around of world. (d) A wide range of discount rates is applied and there is a need to improve the existing approaches.

Oleksandr Sushchenko and Reimund Schwarze
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Leipzig,

Markus Leitner
Environment Agency Austria (Umweltbundesamt), Vienna

For more information:

www.placard-network.eu/our-work/investing-in-infrastructure-costs-benefits-and-effectiveness-of-disaster-risk-reduction-measures/



Participants in the OECD High-level Risk Forum, from Austria, Canada, Finland, France, Italy, Japan, Netherlands, Portugal, UK, USA, Colombia, Ukraine © PLACARD

New European Seismic Risk Service released by the European Facilities for Earthquake Hazard and Risk (EFEHR)



Earlier this year, a new web platform - the European Seismic Risk Service - was released as part of the European Facilities for Earthquake Hazard and Risk (EFEHR). The EFEHR Consortium is a non-profit network of organisations and community resources aimed at advancing earthquake hazard and risk assessment in the European-Mediterranean area.

The hazard service of EFEHR currently provides access to a number of outputs from the 2013 European Seismic Hazard Model or ESHM13 (available on-line from www.efehr.org/en/hazard-data-access/). The new risk service of EFEHR has been set up with the main objective of providing interactive access to seismic risk products, including:

- ➔ European exposure data and models for residential, commercial and industrial buildings and their occupants.
- ➔ European fragility, consequence and vulnerability models.
- ➔ Indicators and composite indices of European social vulnerability, resilience and recovery.
- ➔ European seismic risk results in terms of average annual loss (AAL), probable maximum loss (PML), and risk maps in terms of economic loss and fatalities for specific return periods and indicators of the Sendai Framework for Disaster Risk Reduction.
- ➔ Methods and data to test and evaluate the components of seismic risk models.
- ➔ Access to and support for OpenQuake Engine, the free, open-source software (developed by the GEM Foundation) for the assessment of earthquake hazard and computation of seismic risk.

- ➔ Documentation on all of the datasets and models.
- ➔ Scientific support on the development of the models and seismic risk computations.

Currently users of the new European Seismic Risk Service can access various layers and web services for European exposure data (see Figure below), as well as a number of reports and deliverables documenting the development of the exposure, vulnerability, and site amplification models.

The first model of European seismic risk under the EFEHR umbrella - the European Seismic Risk Model 2020 or ESRM20 (Crowley et al., 2019) - is currently being developed within the EU Horizon 2020 project SERA (Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe; www.sera-eu.org), and will be released in April 2020. Following the release of ESRM2020, all input models and results will be provided through the European seismic risk service web-site.

Helen Crowley

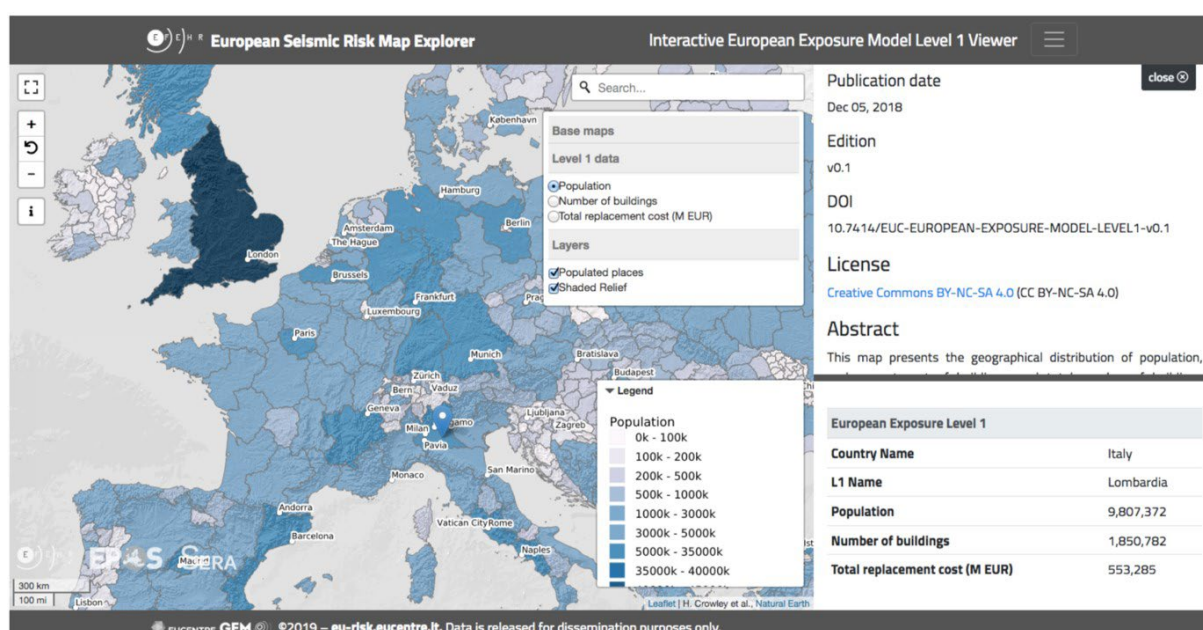
European Centre for Training and Research in Earthquake Engineering (EUCENTRE), Pavia, Italy

For more information:

<https://eu-risk.eucentre.it>
www.efehr.org/en/home

References:

Crowley, H. et al. 2019. The European Seismic Risk Model 2020 (ESRM20). Proceedings of the 2nd International Conference on Natural Hazards and Infrastructure, on 23-26 June 2019 in Chania, Greece. www.researchgate.net/publication/334958167



Screen snapshot of the European Seismic Risk Service - Interactive European Exposure Model Level 1 Viewer. From: www.doi.org/10.7414/euc-european-exposure-model-level1-v0.1 © EUCENTRE



Towards an Action Plan on integrated techniques for seismic strengthening and energy efficiency of buildings

The European Parliament has entrusted the European Commission's Joint Research Centre (JRC) with a pilot project on integrated techniques for the seismic strengthening and energy efficiency of existing buildings. The pilot project will define solutions which - at the same time and in the least invasive way - reduce seismic vulnerability and increase energy efficiency, in such a manner as to produce a significant environmental impact. It will also aim to stimulate the use of integrated solutions, and to create awareness about the topic with a view to prevention.

Nowadays practically everybody lives, works, socialises, studies, shops, gets hospitalised, takes exercise, and gets entertained in buildings. People spend a big part of their everyday lives in buildings. The built environment is the largest industrial sector in Europe not only in economic terms, but also in terms of resource flow. In the EU, it is estimated that there are about 25 billion square metres of built-up area, of which about 10 billion was built before the 1960s. The building stock that is well into its sixth decade of existence requires substantial maintenance, due to structural deterioration caused by aging, but also because the buildings constructed more than half a century ago were designed for different environmental conditions and according to building regulations that are now obsolete.

Two major problems for old buildings are resistance to earthquakes, and energy performance.

In EU Member States where seismic hazard is medium to high (e.g. Italy, Greece), and low to medium (e.g. Germany, France, Spain), the building stock is particularly vulnerable. Seismic events have caused thousands of casualties and extensive economic damage in recent years. Notable examples are the earthquakes in July 2017 in the Aegean Sea (especially the Greek island of Kos, and the city of Bodrum in Turkey), in May 2012 in the Emilia-Romagna region of Northern Italy, and in April 2009 in the Abruzzo region of central Italy (especially the city of L'Aquila).

At the same time, the energy performance of buildings is unsatisfactory. The energy consumed in buildings is one of the biggest sources of CO₂ emissions in Europe. The Energy Performance of Buildings Directive or EPBD (2010/31/EU) is - together with the Energy efficiency directive - the main legislation to promote the energy performance of buildings and to boost renovation within the EU.

Reducing buildings' vulnerability while increasing their energy efficiency, is thus of major importance for our safety and for the reduction of greenhouse gases. Finding simultaneous solutions to both problems will make retrofitting of buildings cheaper, more practical and achievable.

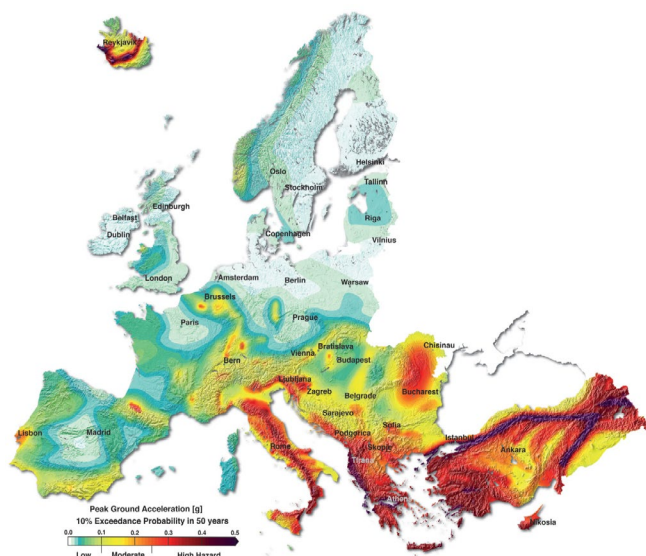
The new pilot project will propose relevant tools and guidelines and will aim to underpin an EU Action Plan to redevelop and modernise the existing building stock in the EU. In view of the huge number of constructions involved, the Action Plan will be based on criteria of high efficiency and economic and environmental sustainability. The new idea for holistic approach to renovation of buildings and the Action Plan will support the integration between disaster risk reduction and cohesion policies.

The work of the JRC plays an important role in improving safety in construction, for example through scientific support for the development and implementation of the Eurocodes, a set of European standards for the design of buildings and other civil engineering works, which include Eurocode 8, the European Standard for the design of structures for earthquake resistance. (See web-link below).

Georgios Tsionis, Silvia Dimova, Paolo Negro, Dionysios Bournas, and Desislava Strezova
European Commission, Joint Research Centre (JRC)

For more information:

<https://ec.europa.eu/jrc/en/research-topic/improving-safety-construction>



Map of seismic hazard in Europe. © 2013 European Seismic Hazard Model (ESHM13). From: <https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1002/2014E0290001>

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Recently published JRC guidelines on selecting proper security barrier solutions against vehicle ramming

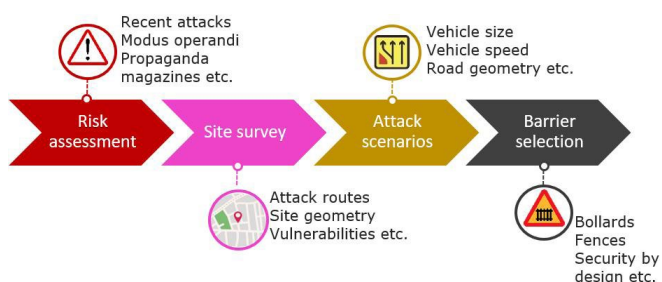


A guidance document on the design, testing and installation procedures of barriers for the protection of public spaces against malicious attacks with the use of vehicles, has been published by the European Commission's Joint Research Centre (JRC).

In the last number of years, public spaces - such as open markets, fairs, tourist sites, pedestrian zones and city squares - have been the target of deliberate vehicle ramming attacks. Particularly high profile and deadly examples of such incidents were carried out in Nice (July 2016), Barcelona (August 2017), London (March and June 2017), Berlin (December 2016), Stockholm (April 2017), New York (May and October 2017), and Toronto (April 2018).

Against this background, the recent JRC Technical Report addresses the shortcomings encountered in the design of such security solutions, and strives to provide a simple, self-contained practical guide enabling security officials to conduct a preliminary study of elements that are capable of stopping and / or deterring possible vehicle ramming attacks.

The JRC guideline provides a detailed analytical procedure for risk assessment, through the identification of security weaknesses of a public space and the calculation of the parameters that influence the motion of a threat vehicle, before it enters an area to be protected. The JRC guideline also provides advice for selection of the appropriate protective barrier types (varying in performance ratings, cost, mechanism, attractiveness, permanent or temporary use), depending on the level of risk and particularities of the public space. Special attention is dedicated to the balance between the open nature of public spaces and the security measures needed. Security by design - which refers to the idea that security considerations are to be addressed from the very beginning of the planning and designing of a public space - is seen as the way to integrate security measures in the urban environment in the most efficient and aesthetical manner.



The JRC guidelines on selecting proper security barrier solutions against vehicle ramming, is not available on-line, but are available from the JRC upon written request (by email to: JRC-PUBLIC-SPACES@ec.europa.eu). Two other related recent publications by the JRC - one providing a review of available information sources focusing on the protection of public spaces against terrorist and other types of malicious extremist attacks, and the other presenting a review of vehicle barrier protection guidance - can be downloaded at the two web-links shown below.

Martin Larcher and Artur Pinto
European Commission, Joint Research Centre (JRC)

For more information:

<http://publications.jrc.ec.europa.eu/repository/handle/JRC110885>

<http://publications.jrc.ec.europa.eu/repository/handle/JRC109289>

Design procedure for anti-ramming vehicle barrier selection.

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European Commission's new on-line newsletter on the Protection of Public Spaces

The first issue of the European Commission's new on-line newsletter on the Protection of Public Spaces was published in June 2019. The Protection of Public Spaces Newsletter - which can be accessed at the first web-link listed below - serves as one of the Commission's fora for promoting the exchange of related expertise and best practices, in the context of the Commission's commitments:

- ➔ To increase cooperation at EU level in the field of security, under its European Agenda and Security (see second web-link below), and
- ➔ To implement its Action Plan to support the protection of public spaces (see third web-link below).

The Protection of Public Spaces Newsletter, which is prepared by the Commission's Directorate General for Migration and Home Affairs (DG HOME) and the Joint Research Centre (JRC), and is published on a quarterly basis, contains information on scientific and technical findings, targeted guidance material, and in-depth analysis of practical issues related to the protection of public spaces, reports of best practices and lessons learnt from urban administrations, and information regarding upcoming events and opportunities for funding of projects.

The Protection of Public Spaces Newsletter is aimed at urban administrations (i.e. urban planners, architects, counter-terrorism security advisers, security operators, designers of urban protective solutions), local and regional authorities, researchers, private stakeholders and anyone interested in the field of protection of public spaces. The objective is to share information and offer an EU-level channel for pooling experiences on issues of relevance to the security of European citizens.

The protection of public spaces is in the mandate of each Member State, but the threat of terrorism and other mali-

cious acts may be better mitigated by working together at an EU level. Knowledge-sharing, dissemination of our collective experiences and awareness-raising could have a significant contribution to our ultimate goal - the security of European citizens.

In this context, in June 2018 at the JRC the Commission organised a technical workshop with local authorities, urban planners and researchers focusing on technical issues regarding physical protection and in particular, the protection of city centres against vehicle ramming.

The first two issues of the Protection of Public Spaces Newsletter include, for example, reports on the Commission's recently published guideline for the selection of appropriate anti-ramming vehicle barrier systems, and the Commission's Staff Working Document (SWD(2019) 140) summarising identified good practices to support the protection of public spaces, and covering the aspects of assessment and planning, awareness and training, physical protection, and cooperation, which was published in March 2019. A report on the aforementioned Guideline is featured elsewhere in this issue of the DRMKC Newsletter.

Desislava Strezova

Editor of the Protection of Public Spaces Newsletter,
European Commission, Joint Research Centre (JRC)

For more information:

https://ec.europa.eu/newsroom/index.cfm?service_id=1410
https://ec.europa.eu/home-affairs/what-we-do/policies/european-agenda-security_en
https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/european-agenda-security/20171018_action_plan_to_improve_the_protection_of_public_spaces_en.pdf



PROTECTION OF PUBLIC SPACES

Protection of Public Spaces Newsroom

- ➔ The EU is committed to provide support to member states and regional and urban authorities in the protection of public spaces.
- ➔ The new on-line Protection of Public Spaces Newsletter (see below) is part of the Commission's activities that foster the exchange of best practice, share information and guidance material and promote the enlargement and strengthening of networks of practitioners in the field.

https://ec.europa.eu/newsroom/index.cfm?service_id=1410

Call for Papers - Special issue of Big Earth Data: the convergence between Big Earth Data and Artificial Intelligence



A Call for Papers was published recently for the forthcoming Special Issue of the journal Big Earth Data, entitled “Big Earth Data Intelligence: the convergence between Big Earth Data and Artificial Intelligence”, under the Editorship of the European Commission’s Joint Research Centre (JRC).

In recent years, the advent of Big Earth Data (BED) has modernized research in Earth sciences, by providing globally established, massive, high-resolution, highly dynamic and multi-source Earth observation (EO) datasets. At the same time, artificial intelligence (AI) developments have brought transformative opportunities to the Earth sciences and understanding of the Earth system, with the convergence of factors such as processing power, increased connectivity between different platforms and improved algorithms.

Today, more than ever, BED and AI are merging into a synergistic relationship - Big Earth Data Intelligence - wherein AI, learning from available BED, can generate that intelligence promised by the recent digital transformation of the EO sector. By processing data faster and on a larger scale, AI pushes the boundaries of big data analytics, accelerates the generation of global information layers, and drives the development of autonomous decision-making to meet the challenges of Big Earth Data Intelligence.

Big Earth Data Intelligence faces several challenges to unlock its full potential. The first is technological, with the aim to build truly transformational tools and systems, easy to use in real-time for monitoring purposes, open access and

“data-dense”, in the sense that information is high-resolution, scalable and aggregates environmental and socio-economic datasets. The second is methodological, covering issues related to data incompleteness and quality, data aggregation, harmonization and contextualization, identification of anomalies in long-time series, while considering the need for comparative approaches of computational intelligence methods against different analytical frameworks.

This Special Issue on Big Earth Data Intelligence aims to highlight recent progress in the field, both from the theoretical and applied stand-points. Potential topics include:

- New advances in disparate data integration and AI (e.g. surveys; digital footprints; Internet of things; remote sensing) for addressing environmental and global development challenges.
- Role of Big Earth Data Intelligence in the generation of global or large scale information layers (e.g. biophysical variables, mapping informal settlements, exposure to natural hazards, crop monitoring, mapping poverty).
- Big Earth Data Intelligence for predictive modeling of socio-economic and environmental processes (e.g. urban development, population modeling and future projection, numerical weather prediction, data assimilation and forecasting, as well as for extreme weather prediction and now-casting).
- Discussion papers on the limitations of AI in the context of BED (e.g. optimization for remote sensing data; need for large training samples and benchmark datasets; striking the balance between the global context and local details).
- Infrastructural solutions and digitalization processes to enable Big Earth Data Intelligence generation and its application.
- The ethical and transparencies challenges raised by Big Earth Data Intelligence.

The Guest Editors for the Big Earth Data Special Issue - all from the European Commission’s Joint Research Centre - are:

- Christina Corbane (christina.corbane@ec.europa.eu);
- Martino Pesaresi (martino.pesaresi@ec.europa.eu);
- Stefano Nativi (stefano.nativi@ec.europa.eu);
- Max Craglia (massimo.craglia@ec.europa.eu).

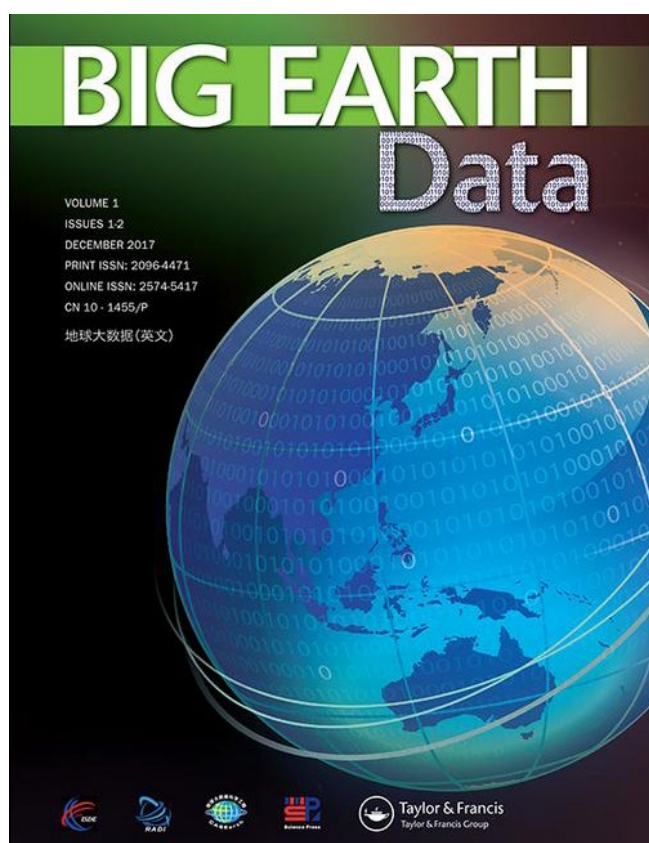
Full details about the Special Issue on Big Earth Data Intelligence, including paper submission guidelines, are provided at the web-sites below. The paper submission deadline is 1st March 2020.

Christina Corbane

European Commission, Joint Research Centre (JRC)

For more information:

<https://think.taylorandfrancis.com/bed-2019si7/>
<https://ghsl.jrc.ec.europa.eu/news.php>



Upcoming events and calls for submissions

4th Disaster Risk Reduction Conference in Warsaw

23-25 October, Warsaw (Poland)

The 4th DRR aims to bring together leading academic scientists, researchers and young researchers to share their experiences, research results and questions about all aspects of Disaster Risk Reduction. It also provides the premier interdisciplinary forum for researchers and practitioners to present the most recent trends, practical challenges and the solutions for disaster risk reduction connected with natural hazard. In the fourth edition, we would like to focus on local problems and solutions highlighted in the Sendai Framework.

Session topics will cover theoretical and practical issues of disaster risk reduction. There is a place for geographical physical and social issues as well as the risk reduction management in the context of natural hazards. Interdisciplinary approach is expected. We are looking forward to the discussion with your participation!

UN-SPIDER Bonn International Conference "Space-based Solutions for Disaster Management in Africa: Challenges, Applications, Partnerships"

06-08 November, UN Campus, Bonn (Germany)

The United Nations Office for Outer Space Affairs (UNOOSA), through its UN-SPIDER Bonn office, and the University of Bonn's Centre for Remote Sensing of Land Surfaces (ZFL) are organizing the UN-SPIDER Bonn International Conference.

The event aims to share opportunities for strengthening local disaster management capacities in Africa using space-based information. This will be done in an interactive way, making use of technical solutions ranging from desktop packages to cloud computing tools. Additional discussions include exploring partnerships to facilitate access to space data, and evaluating the opportunities and challenges associated with using new approaches, such as big data, machine learning, and artificial intelligence, to assist the disaster management process in Africa.

The deadline for applicants seeking

funding is 30 August 2019. The deadline for self-funded applicants is 18 October 2019.

Security Research Event 2019

06-07 November, Helsinki (Finland)

The Security Research Event is the annual meeting where industry, governments and knowledge institutions come together to discuss the state of play and current challenges for security research in Europe, and where EU funded security-related projects are on show.

The SRE 2019, organised by the European Commission and the Ministry of the Interior in Finland as a side event of Finland's Presidency of the Council of the European Union, will take place on 6th and 7th of November at the Helsinki Congress Paasitorni, in Helsinki, Finland.

The event will gather 400 participants representing a wide range of security stakeholders: researchers, industry representatives, public security providers and practitioners - including fire departments, police, border guards, and intelligence agencies - as well as policymakers from across Europe.

Making Climate Services a Reality in Europe

13-14 November, Brussels (Belgium)

Making climate services a reality in Europe is a two-day conference that will bring together more than one hundred climate researchers, policy-makers and industry experts as well as city and regional actors to showcase how climate data can serve both cities, regions, and businesses.

The conference is co-organised by Climate-fit.city, a H2020 project that provides cities with high-resolution climate data, and VITO, the independent Flemish research organisation in the area of cleantech and sustainable development.

3rd European Reference Network for Critical Infrastructure Protection (ERNICIP) Workshop

11 November, Brussels (Belgium)

The European Reference Network for Critical Infrastructure Protection (ERNICIP) organizes its 3rd Workshop on the 11th of November 2019 in Brus-

sels. During the last 2 years ERNICIP has made significant progress towards proposing new standardization items in the domain of CBRNE, guidance documents for improving the protection and resilience of critical infrastructures as well as certification aspects in cybersecurity. During this one day workshop, 6 thematic groups will present their achievements and get input towards the next phase of ERNICIP for 2020-2021.

The deadline for registration is 6/11/2019 at: <https://web.jrc.ec.europa.eu/remjrc/screen/meeting/4652/registration-form>

Making Climate Services a Reality in Europe

13-14 November, Brussels (Belgium)

Making climate services a reality in Europe is a two-day conference that will bring together 100+ climate researchers, policy-makers and industry experts as well as city and regional actors to showcase how climate data can serve both cities, regions, and businesses. The conference will focus on climate services for the following topics: energy, future cities, water, agriculture, mobility, tourism, health, disaster risk reduction.

Besides presentations by climate services that mean business, the programme includes an ice-breaking network event in our climate services marketplace, policy pitches for a resilient Europe, data matchmaking with experts who can offer key insights and a site visit to a sustainable hub.

The conference is co-organised by Climate-fit.city, a H2020 project that provides cities with high-resolution climate data, and VITO, the independent Flemish research organisation in the area of cleantech and sustainable development.

Understanding Risk (UR) Europe

27-29 November, Bucharest (Romania)

The Global Facility for Disaster Reduction and Recovery (GFDRR), the World Bank and the Romanian Ministry of Internal Affairs, through the Department for Emergency Situations, will jointly host the "Understanding Risk Europe" regional conference in Bucharest. Under the theme "Innovate for Resilience",

More information on: <http://drmkc.jrc.ec.europa.eu/overview/Events>

the conference aims to gather more than 400 experts in the region and practitioners active in the creation, communication, and use of disaster risk information.

COP 25

02-03 December, Santiago de Chile (Chile)

The Conference of the Parties (COP) is the supreme decision-making body of the United Nations Framework Convention (UNFCCC). The Parties meet annually to review progress in the implementation of the Convention where other instruments that support the implementation of the Convention are proposed, evaluated and approved.

First International High Level Conference and Exhibition (IHLC2020)

13-15 January 2020, Bali (Indonesia)

**Call for abstracts:
Open until 25 October 2019**

"The Space Options for Africa: Knowledge Sharing, Partnerships, Exploitation, Space Solutions, Technologies Development, Disaster Risk Reduction, and Integration". The conference will bring together over 1000 space pioneers and actors with endless opportunities for both space faring and non space counties. The knowledge sharing frontiers deals with capacity building, discovering, exploration, research and understanding natural phenomena in space and observe from space and into cosmos involving interstellar and interplanetary.

Evidence for policy school - disaster risk management: science and technology in support of decision making, in an environment of uncertainty

13-15 January, Florence (Italy)

To help researchers to have more impact and policymakers to use evidence for policy solutions, the Joint Research Centre (JRC) and Directorate General for European Civil Protection and Humanitarian Aid (DG ECHO), in collaboration with the Italian Civil Protection Department, the International Network for Government Science Advice (INGSA) and the University of Florence (UNIFI),

organise an Evidence for Policy School in Florence, Italy. The thematic topic of the 2020 Evidence for Policy School is disaster risk management. The school will focus on the tools and approaches to inform the policymaking process through evidence.

NEEDS 2020

10-12 March 2020, Östersund (Sweden)

**Call for abstracts:
17 November 2019**

The Northern European Conference on Emergency and Disaster Studies (NEEDS) aims to explore the status quo of disaster research and management. The conference wishes to harness its broad, interdisciplinary expertise by gathering disaster researchers from academic institutions and practitioners from the disaster management community (European and beyond) to build networks and to discuss the most pressing issues in disaster research across the academic and practical disciplines.

General Assembly 2020 of the European Geosciences Union (EGU)

03-08 May 2020, Vienna (Austria)

**Call for abstracts:
15 January 2020**

The EGU General Assembly 2020 will bring together geoscientists from all over the world to one meeting covering all disciplines of the Earth, planetary and space sciences.

The EGU aims to provide a forum where scientists, especially early career researchers, can present their work and discuss their ideas with experts in all fields of geoscience.

14th INTERPRAEVENT Congress

11-14 May 2020, Bergen (Norway)

The 14th INTERPRAEVENT Congress will focus on integrated management of natural hazards and risks, equally considering causes of disasters as well as measures of prevention, preparedness, response and recovery in the view of climate and social changes. The topics are varied: Risk Governance and Policies; Data Acquisition and Modelling; Hazard and Risk Assessment; and Hazard and Risk Mitigation.

RIMMA 2020

26-27 May 2020, Berlin (Germany)

**Call for papers:
Open until 15 January 2020**

This international interdisciplinary Conference on Risk Information Management, Risk Models, and Applications will enable sharing of best practices as well as giving space for discussing methodological problems in risk modelling from the information systems point of view for all phases of the disaster cycle.

12th International Conference on Risk Analysis and Hazard Mitigation

23-25 June 2020, Lisbon (Portugal)

Open for abstracts

The conference covers a series of important topics of current research interests and many practical applications. It is concerned with all aspects of Risk Analysis and hazard mitigation, associated with both natural and anthropogenic hazards.

Current events help to emphasise the importance of the analysis and management of risk to planners and researchers around the world.

ICUR2020 - 2nd International Conference on Urban Risks

25-27 June 2020, Lisbon (Portugal)

**Call for abstracts:
31 January 2020**

ICUR2020 will serve as an international forum at which specialists in urban risks and stakeholders may exchange the latest research results and methodologies. The aim of the Conference is to provide a platform for researchers and practitioners, from a broad range of disciplines, to collaborate in the reduction of the impact of natural and technological hazards on urban societies. Following the former ICUR2016, issues related to the management, assessment and mitigation of natural and technological risks, as well as their impact on health and societies, will be addressed. Particular emphasis will be placed on the risks associated with climate change, with significant impacts on urban areas, and on risk communication.



<http://drmkc.jrc.ec.europa.eu>

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