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A TIEMS Special Issue Covering TIEMS 2019 Annual Conference in Seoul, Korea



## Articles in this issue

This issue is dedicated to

TIEMS 2019 Annual Conference in Korea

## The International Emergency Management Society Newsletter - Special Edition

TIEMS network constitutes a large international multidisciplinary group of experts, with different educational backgrounds and various experiences. Their knowledge and experience are important to share with other experts worldwide. TIEMS has therefore decided to issue this additional newsletter, which we now call TIEMS Newsletter -Special Edition. This is the tenth issue, which we have dedicated to the TIEMS 2019 Annual Conference, 12 - 15 November 2019. We invite other conferences and workshops, and RTD projects to use the opportunity to present the conference and workshop presentations and RTD projects to present articles of their results in the upcoming Special Edition Newsletters. We plan to have an issue three times a year. Please, give us feedback, and send us new articles for publication.

#### Alex Fullick TIEMS Scientific Newsletter Editor

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✓ Conference Papers

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# Message from TIEMS President

### TIEMS 2019 Annual Conference

TIEMS 2019 Annual Conference took place in Seoul, Korea, 12 - 15 November 2019. It was attended by more than 100 experts from 15 countries. It had a comprehensive program comprised of important presentations of papers on international emergency management issues, workshops addressing details of selected different topics, and a guided tour in Seoul, visiting the safety control centre at Lotte Tower and Songpa Safety Experience Education Center. The technical program was blended with social events displaying the best of Korean culture. I am sure all participants left with a good impression of both Korea and TIEMS.

#### **TIEMS in Perspective**

Unfortunately, I could not attend because of a broken foot, and I missed the first annual conference in TIEMS 26 years history. That was a personal challenge, but it also gave me time to look back at the development of TIEMS, and I must say it has been a fantastic and enjoyable journey.

It started all in Washington DC in 1993, where a group of international experts in emergency management met and formed the society, which first was registered in Dallas, USA, as a non -profit organization. The registration place was then moved to Florida, USA, later on to Zürich, Switzerland, and finally to Belgium, where TIEMS is now registered in Brussels as a not for profit international NGO.

The first annual conference was held in Fort Lauderdale, Florida, USA, in 1994, and then the following years, moved around the world, to Sofia Antipolis, France, Montreal, Canada, Copenhagen, Denmark, Whasington DC, USA, Delft, Netherlands, Orlando, USA, Oslo, Norway, Waterloo, Canada, Sofia Antipolis, France, Melbourne, Australia, Thorshavn, Farao Island, Seoul, Korea, Trogir, Croatia, Prague, Czech Republic, Istanbul, Turkey, Beijing, China, Bucharest, Romania, Erbil, Iraq, Marseilles, France, Niigata, Japan, Rome, Italy, San Diego, USA, Kiev, Ukraine, Manila, Philippines and Seoul, Korea. This year it will be in Paris, and in 2021 it will be in South Africa.

During these 26 years of operation TIEMS has also established local chapter activity in 16 countries, and one is under establishment, in Australia. The only continent where TIEMS still has no activity, is Latin America and Carabbean (LAC). LAC is therefore a priority continent for TIEMS in 2020, where we hope to establih a chapter and get an agreement of arranging TIEMS annual conference there one of the coming years.

You can read more about TIEMS history at: <u>http://www.tiems.info/index.php/about-us/tiems-history</u>

I have enjoyed being part of TIEMS and its journey around the world, and I welcome all readers of TIEMS Newsletter, also to join TIEMS and be part of this excellent organization, with a goal of contributing to creating more resilient societies worldwide.

#### Enjoy Reading below Newsletter!



Oslo 10<sup>th</sup> January 2020 K. Harald Drager TIEMS President

## Editor's Message

Welcome dear readers. I know the TIEMS Special Edition comes rather quickly on the heels of the last edition. However, this edition focuses on our recent successful 26th Annual TIEMS Conference in Seoul, South Korea. I had the pleasure of enjoying some South Korean hospitality and food and listening to some great speakers with interesting topics; all of which, you'll find in the following pages of this newsletter. We were even treated to some Korean drummers and dancers during the Gala Dinner.

Sadly, we started off the conference without our fearless leader and Preside, K. Harald Drager, who was unable to attend due to doctor's order. I won't get into the reason, as that's not my story to tell. Still, he provided us with a pre-recorded video greeting, and I've included a snapshot from the video, as it just wouldn't be right to have a TIEMS newsletter without Harald.

This edition of the newsletter contains an introduction to all papers that were presented during the Nov 12-15, 2019 conference and I've even included the poster presentations and abstracts. It's one of our largest editions ever and that must attest to the fact there are many more individuals participating in TIEMS conferences and events. As there is so many papers, take your time going through the papers, as I'm sure you'll find some incredible information. <u>Please note that you may access all papers in full as well as the abstracts and pictures by clicking this link.</u>

My thanks to all the TIEMS Korean Chapter organizers and member, for their skill in organizing the conference and to the many speakers and presenters who shared their research and knowledge with us in Seoul - and now with you via this Special Edition.

I would be remis if I didn't mention that our next conference - the 27th Annual TIEMS Conference - will be held in Paris, France sometime in the fall of 2020. JP Monet, a member of the TIEMS Board of Directors and is from France, made the announcement letting us know that the final dates are just about confirmed but not in time for the newsletter.

JP also gave a quick presentation on Resilience France, which I've also included for your review. I hope to talk to someone from Resilience France in the future and have them on my radio show 'Preparing for the Unexpected'.

So, enjoy this very information-packed edition and I hope to see you in Paris next year.

All the best,

Alex Fullick

Editor - TIEMS Special Edition Newsletter



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# **Emergency Benefits And Risks Of Artificial Intelligence**

T. V. Robertson

## EMERGENCY BENEFITS AND RISKS OF ARTIFICIAL INTELLIGENCE

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#### Abstract

The research and development field of Artificial Intelligence develops computer systems (called "AIs") that can perform tasks normally associated with human intelligence. Fifty years ago, AIs could play excellent checkers, solve algebra word problems, and prove logic theorems. In recent years AI capabilities have increased rapidly, taking advantage of exponentially increasing computational power and machine learning to identify patterns by sifting through massive amounts of data available online and in digital form. Newly developed AIs do a good job of translating spoken or written languages, recognizing faces, driving cars, and beating the best human players in the games of chess and go.

AI has been beneficially applied to emergency management, using historical and recently collected data to predict the impacts of earthquakes, flooding, and crop diseases. Our online, "wired" world creates mountains of digital data that emergency managers can mine using AI to assess emergency situations and plan and prepare for responses.

However, AI can create new risks to our societies, and according to some experts, potentially new forms of disasters and emergencies. Today, use of AI threatens cybersecurity and privacy, and there is a growing debate about the safety of autonomous systems. Scientific and technical experts such as Stephen Hawking and Elon Musk have warned that as AIs become more intelligent and more ubiquitous, they might become dangerous masters of inferior humans. This paper reviews these concerns, their plausibility, and the role emergency management might take to reduce the risks associated with AI.

Keywords: Artificial Intelligence, Emergency Management, Deep Learning, Super Intelligence, AI Risks

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# Training & Technology for Safer and More Effective Forest Fire Fighting

J. Giles & C. du Plessis

## TRAINING & TECHNOLOGY FOR SAFER AND MORE EFFECTIVE FOREST FIRE FIGHTING

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#### Abstract

This paper focuses on the need for specialised collaborative tools and effective training to better enable first responders to do their job more effectively and more safely. This paper addresses the need to provide situational awareness and real time monitoring and management for front line teams in disaster situations specifically to enable them to more effectively and more safely fight forest fires.

Intaero was founded in 1986 and has developed software for military and quasi military applications to exchange data in real time between operators in a mobile ad-hoc networked environment. Recently we have updated our command and control software to produce SMART (Situation Management and Awareness in Real Time) which shares data to provide command & control and situational awareness in the air and on the ground.

GeoSim is an established Australian company which has over 17 years of focused development and supply of high quality, cost-effective, fixed wing and simulation tools designed to meet specific training needs. They have produced in excess of 85 simulators and achieved over 57 CASA accreditations.

Our two companies have formed a Joint Venture to provide training and operational tools to enable disaster situations to be handled more effectively and to provide better safety for aircrew and first responders.

The paper will cover the following:

- 1. Command & Control: SMART is a real-time solution for exchanging data over low bandwidth links to support effective command & control and situational awareness to make forest fire-fighting safer and more effective.
- 2. Systems Integration: Integration of SMART with real time, airborne, Infra-Red videos and with fire spread prediction software.
- 3. Crew Training: Training pilots and crew members on helicopters and SEATs by day and night to support disaster management operations, including fire suppression and mission rehearsal

**Keywords:** Tools to make fighting forest fires safer and more effective, Training ground teams and aircrew to support disasters

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# A Study on Flood Prediction Model Using Machine Learning: Focused on Busan Metropolitan City

J. H. Ha & J. E. Kang

## A STUDY ON FLOOD PREDICTION MODEL USING MACHINE LEARNING: FOCUSED ON BUSAN METROPOLITAN CITY

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#### Abstract

Recently, flood damage in urban cities have been aggravated due to the increase of abnormal rainfall from climate change and localized heavy rains along with the urbanization from economic development. Therefore, there needs to be a comprehensive urban planning and preventive strategies. To reduce the flood damage in urban cities, there should be spatial structure designs and land use planning to evaluate the flood risk. However, as flood damage is affected be various factors, it is difficult to develop a predictive model. Therefore the purpose of this study is to develop a flood prediction function using machine learning and establish a flood risk map.

This study used the 2014 Busan Metropolitan Flood Information Data, and analyzed after dividing the grid on a 30m×30m scale. The actual analysis used four machine learning techniques such as Decision Tree, Random Forest, Naïve Bayes and Support Vector Machines using R-programming to develop the flood prediction model, and the study developed the flood risk map using the Jenks Natural Breaks Classification of ArcMap and categorizing and visualizing the risks into five levels.

After comparing the four models, it was shown that the Random Forest model was the most appropriate model for flood predictions. Therefore the weight of the variables was deduced by the importance of the contribution to the model, and the values from the results were used to develop the flood risk map. The results showed that the districts with the highest risks were Jeonggwan-eup, Gijang-gun, Geumjeong- gu, Dongnae-gu, and Yeonje-gu, and it was shown that the application level of the flood risk map is high as the results showed overall similar results when comparing with the actual areas with flood damage. The results of this study will lead to avoiding inappropriate developments in areas with flood risks and inducing developments for areas with low risks, and will be applied as important data for guidelines on flood risk evaluations in the future.

Keywords: Urban Flood, Big Data, Machine Learning, Random Forest, Decision Tree

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# Assessing the Impact of Wild Fires in Land Reform Farms, a case of Land Reform Beneficiaries in South Africa

S. Shwababa

## ASSESSING THE IMPACT OF WILD FIRES IN LAND REFORM FARMS, A CASE OF LAND REFORM BENEFICIARIES IN SOUTH AFRICA

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#### Abstract

South Africa has a diverse climate and an equally diverse range of vegetation types, many of which are veld fire-prone. Wild fires (otherwise also known as veld fires) form an integral process in many of these ecosystems, and indeed are often necessary for the maintenance of healthy ecosystems and biodiversity. However, in land reform farms headed by land reform beneficiaries wild fires are increasingly viewed and experienced as a destructive force, impacting on crops, livestock, pastures, forestry plantations, human habitation and even on human life.

Land reform beneficiaries are part of the state's programme which seeks to provide the poor and the previously disadvantaged population with land to improve their livelihoods, and also use the land for establishing farming enterprises. These beneficiaries are mostly black emerging farmers, farming with crop and livestock and are largely dependent on the government's recapitalisation programme for the support of their agricultural enterprises. These beneficiaries are faced with various trade-offs and constraints as wild fires expose them to greater risk and renders some of their current practices unworkable. Their vulnerability to wild fires, mitigation, adaptation and coping practices towards wild fires has never been researched before. This study therefore is an attempt to fill this gap.

The management of wild fires within the South African land reform programme, leaves much to be desired and calls for new institutional arrangements and a coordinated approach. This research paper seeks to facilitate wild fires management in land reform farms, through the introduction of measures to combat veld, forest and mountain fires throughout the land reform farms in South Africa and thereby reducing the damage and losses to natural vegetation, life and property. The unequivocal evidence presented in this paper balanced the social, environmental, and economic aspects of veld fires through a risk management strategy that emphasises hazard mitigation, preparedness, and recovery, as well as efficient veld fire response and suppression.

**Keywords:** risk management, wild fires, a wild fires mitigation strategy, hazard mitigation, eco systems, land reform, land degradation

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# Water Sanitization And Disaster Management in Isolated Settlements in the Pacific Islands

E. Vhiriri, Y. Irwin & R. Tandlich

## WATER, SANITATION AND DISASTER MANAGEMENT IN ISOLATED SETTLEMENTS IN THE PACIFIC ISLANDS

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#### Abstract

Inadequate sanitation and drinking water facilities play a role in transmission infectious diseases. Islands states in Asia Pacific are prone to natural disasters and climate variations. Four Island states in the Pacific were looked at namely Fiji, Maldives, Nauru and Tuvalu. WASH Vulnerability criterion (WVC), Social Vulnerability Index and Economic Vulnerability index were calculated. In this study literature review was used risk assessment of contracting infectious diseases by referencing the risk equation. This was done by looking at the current sanitation system and how it maybe resulting a widespread of infectious diseases. The paper further looks at how sanitation may be weakened by natural disasters and hence increasing the risk of contracting infectious diseases. Of the four states Nauru had the highest *WVC* with a value of 0.082. The social vulnerability indices fluctuated throughout the years. A comparison was also made between vulnerabilities between urban and rural areas. There was a positive correlation between WVC and MCFURY using the Pearson correlation coefficient for three of the states except for Fiji. Data used was extracted from World Bank Data and UNDP. The results are used to propose strategies of improving disaster management to decrease vulnerability to infectious diseases. Rainwater harvesting is the primary source of safe drinking water in these areas. Ways of improving rainwater harvesting techniques are also suggested to maximize access to safe and affordable drinking water.

Keywords: Disaster management, sanitation, natural disasters, infectious diseases, Asia Pacific, climate changes

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# Examining Factors Contributing to Crime Occurrence in Urban Areas, Korea

W. S. Kim & D. K. Yoon

# EXAMINING FACTORS CONTRIBUTING TO CRIME OCCURRENCE IN URBAN AREAS, KOREA

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#### Abstract

The frequency of criminal offenses has been on the rise, and incidence of criminal offenses in urban areas such as Seoul, Busan and Incheon increased over the past decade. Violent crimes among criminal offenses have increased 43.5% in the last 10 years in Korea. This study examined factors that socially affect the occurrence of crime to reduce the crime in the cities. The study analyzed crime data of 74 local communities in terms of socio-demographic, spatial, economic and environmental factors. The study employed crime data of 2015 to 2017 using statistical analysis. The result of the study will contribute to making appropriate plans to reduce crime occurrence in Korea.

Keywords: Crime occurrence, Urban Areas, Socio-demographic factor, Urban spatial structure

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# The International Emergency Management Society 2019 Annual Conference

Toward the Bright Future of Safety

> November 12-15, 2019, KINTEX II, GOYANG, KOREA

Conference Host TIEMS Korea Chapter jointly with the Korean Society of Disaster & Security

Supported by

# Disaster Emergency Services And Humanitarian Activities With The Goal Of Disaster Resilient Society In Northern Cyprus, National Achievements, International Challenges And Obstacles

Y. Eker

## DISASTER EMERGENCY SERVICES AND HUMANITARIAN ACTIVITIES WITH THE GOAL OF DISASTER RESILIENT SOCIETY IN NORTHERN CYPRUS, NATIONAL ACHIEVEMENTS, INTERNATIONAL CHALLENGES AND OBSTACLES

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#### Abstract

The national and international organizations operating in the field of Disaster Management mainly carry out studies in order to minimize the loss of life and property in disaster and emergency situations. In order to achieve this goal, while traditionally developing intervention elements, the tendency of the measures to be taken before the disaster occurs will be more effective in preventing these damages. While implementing these practices, firstly the risks in the region where the implementation will be carried out are assessed, then activities aimed at mitigating the risks are planned and implemented. The basis of these practices is to educate and raise awareness of all segments of society about disasters and the right way of action in such cases. Another important and indispensable point in reducing disaster risks is the intervention phase. Preparations for search, rescue, rehabilitation and reconstruction activities to be carried out in case of a situation that will hit the country in spite of all the precautions to be taken before the disaster occurs also play an important role in reducing the damages to be encountered. Measures to be taken in line with the economic development level, social, cultural and political situation of the countries vary within the framework of the concept of disaster risk reduction. Countries with a nationally stable structure face significant difficulties due to the challenges they face internationally. Although the Turkish Republic of Northern Cyprus has an identity that fulfills the requirements of being a state with all its institutions in this sense, it continues to exist in the field of disaster management as a "de facto" state which is ignored by the international community for political reasons, but also against the disasters affecting other states and communities in the region has a sensitive stance and offers assistance and, if requested, the first teams to reach the disaster area. In this study, the difficulties encountered as a result of the initiatives carried out with the aim of integration to the international system with the successfully implemented international actions, as well as the activities, practices and measures taken by the Civil Defense Organization, which is an important element of the disaster management system of the Turkish Republic of Northern Cyprus, will be discussed. This study on the case of the Turkish Republic of Northern Cyprus reveals that the difficulties experienced in the field of humanitarian disaster and emergency services can cause problems not only regionally but also globally.

Keywords: Disaster, Resilience, Humanitarian Aid

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# The New National Emergency Management Systems Inchina, Its Focus, Experience So Far, And Future Plans

G. Qu

## THE NEW NATIONAL EMERGENCY MANAGEMENT SYSTEMS IN CHINA, ITS FOCUS, EXPERIENCE SO FAR, AND FUTURE PLANS

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#### Abstract

Since March, 2018, the emergency management system in China was changed from individual type of disaster management to comprehensive disaster management. The new ministry was founded with the name of Ministry of Emergency Management. After the foundation of new ministry, a lot of changes and achievements were built up: more focus on the emergency preparedness, capacity buildings of international heavy USAR and 7 kinds of international rescue teams, 4 kinds of domestic rescue teams (water, mountains, USARs and aviation search and rescue) of natural and working safety catastrophe, focus on some important S&T plan on emergency management (preparedness, response, rescue and recovery), assessment of disaster risks, rescue coordination and NGO's rescue teams in China, disaster risk monitoring and early warning, urban and forest (wild) fire fighter strengthen program, National Accredation Process (NAP) and USARs certification (by UNOCHA and China) and opened cooperation for international scale. From last year, 9 big projects were set up, now the disaster risk survey and hazard identification project, the regional rescue commanding centers project, and natural disaster monitoring and early warning system and broadcast project were performed that will be the big plans which will make a great role to China emergency management development in the future.

Keywords: New System, Emergency Management, Capacity Buildings, Comprehensive Response

<sup>&</sup>lt;sup>10</sup> China



# The French Chapter

J.P Monet



- Has been founded in 2019
- Is supported by « High Committee for French National Resilience", HCFNR a NGO focused on civil protection, disasters survey and resilience.
- Chairman and head of TIEMS F.
   chapter is Christian SOMMADE







## Social Media Based Emergency Decision Supportsystem

S. Knezic & M. Baucic

## SOCIAL MEDIA BASED EMERGENCY DECISION SUPPORT SYSTEM

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#### Abstract

One of the most challenging parts in disaster and emergency management is the inclusion of citizens through social media. The key issue is the trustworthiness of the information posted by citizens and how to efficiently integrate them into the emergency operations. Apparently, the communication has to be two-way, from civil protection service to citizens and vice versa, fostering citizens to be as responsible as possible when tweet about emergency situations. This paper brings the idea which is being developed within Interreg project E-CITIJENS where citizens will be directly involved in awareness raising activities and in virtual communities on risk management. The proposed decision support system aims at enhancing the capacity of Italian and Croatian Civil Protection systems to reduce natural and man-made risks by means of advanced "social media based" emergency management tools. The solution in the project will still rely on human judgment and gathered posts from social media will be checked by emergency operators. The valid tweets will be used by commanders during the decision-making operations.

Keywords: emergency, disaster management, social media, citizens

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# Development of disaster analysis and rescue treatment standard in plateau and ultra cold area of China

M. Yuwen, H. Yongpan & Q. Tingxin

## DEVELOPMENT OF DISASTER ANALYSIS AND RESCUE TREATMENT STANDARD IN PLATEAU AND ULTRA COLD AREA OF CHINA

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#### Abstract

This paper compares the different definitions of plateau and ultra cold area by various institutions and gives the geographical definition of plateau and ultra cold area in China. On the basis of what has been down above, the types, frequency, effects and rescue situation of the disaster in the plateau and ultra cold area of China are described. This paper analyzes the site placement and equipment allocation requirements of disaster rescue in plateau and ultra cold area, combs out the standard formulation and patent authorization of disaster rescue in plateau and ultra cold area, and points out the direction of the disaster rescue equipment system and standard system construction in plateau and ultra cold area in China.

Keywords: plateau and ultra cold area, emergency rescue, equipment system, standard system, disaster rescue site placement

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# Accessibility vulnerability analysis of fire fighting response service using network analysis in Seoul, Korea

Y.W Choi & D.K Yoon

## ACCESSIBILITY VULNERABILITY ANALYSIS OF FIRE-FIGHTING RESPONSE SERVICE USING NETWORK ANALYSIS IN SEOUL, KOREA

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#### Abstract

In order to reduce the damage from fire accident, it is very important to secure the golden time of the firefighting response. However, dense building and traffic congestion are the major obstacles to secure golden time for fire-fighting. This study analysed the accessibility vulnerability of fire-fighting response service of Seoul in Korea. We analyzed accessibility vulnerability using service area search method among the network analysis in GIS program based on the level of traffic congestion such as optimal, low, middle, high level. Also, we additionally considered the level of fire risk such as occurrence, economic damage, human injury based on hotspot analysis and cluster and outlier analysis (COA). Finally, we deducted the regions which simultaneously are vulnerable to access and dangerous at fire accidents. As a result of research, there are the general tendency that as the level of traffic congestion becomes higher, more regions become vulnerable to access of fire-fighting response services. Also, the areas where accessibility vulnerable areas and fire risky areas overlap. We found that there are areas which need to be managed to enhance accessibility of fire-fighting response services in Seoul and other alternatives are supplied to solve the problems. To manage these areas, smart services which can rapidly access accident areas, such as smart fire drone, can be appropriate alternatives.

**Keywords:** Fire-fighting response service, Accessibility vulnerability, Network analysis, Hotspot analysis, Cluster and outlier analysis, Smart fire response service

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## Development And Application For Mobile Emergency Drainage System In Urban Flood Rescue

Z. Shifu, X. Changhua, M. Yuwen, Z. Dongmei, D. Xianyi & L. Cunjing -

## DEVELOPMENT AND APPLICATION FOR MOBILE EMERGENCY DRAINAGE SYSTEM IN URBAN FLOOD RESCUE

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#### Abstract

In order to solve the urgent needs of large-flow persistent water supply and drainage equipment for emergency rescue of urban flood and firefighting, the vehicle-mounted emergency water pipeline system is developed. The systems consist of two basic units, which are pump station vehicle and flexible pipeline operating vehicle. The pump station vehicle is used for water drawing and pressurized transport in the field. The flexible pipeline operating vehicle is used for pipeline storage, development and fold. The systems can reach the max flow rates of 1500m3/h, and the transport distance can reach as far as 2000m. The mechanized rapid development and wrap of large-caliber flexible pipeline is designed. The system can be used independently as well as combined. The use of vehicle-based integration, pipeline mechanized development, automatic station laying and operation scheduling, lightweight floating water pump and other comprehensive technical means significantly increases the operation efficiency and mobility of the system. A production base is built in Hubei 3611 Mechanical Co., Ltd in China to achieve industrialization. The system is sold to more than 30 provinces and cities in China, and has played important roles in many major disaster rescue tasks in recent years.

**Keywords:** emergency flood control and drainage in cities, urban flood disaster rescue, drainage system for long distant, emergency rescue

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## Examining The Disaster Response System For The Disabled In Korea

Y. J. Lee, H. R. Kim, S. Yoon & D.K Yoon

## EXAMINING THE DISASTER RESPONSE SYSTEM FOR THE DISABLED IN KOREA

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#### Abstract

The number of disaster occurrence is increasing every year, and there is an increase in the average annual number of the disabled that have been experiencing damage from disasters. The disabled are exposed to more than 200 disaster situations every year in Seoul. However, existing disaster response system does not include specific instructions that reflect different characteristics of the disabled and is not used efficiently during actual disaster situations.

The objective of this study is to analyze the problems faced by the disabled due to the inefficiency of disaster response system. This study examines the characteristics of the disabled in existing disaster response system using text-mining analysis. To improve the disaster response system for the disabled, measures should be taken such as reinforcing existing disaster response manuals to reflect the characteristics of the disabled, enhancing individualized accessibility to disaster-related information for different types of disabilities, improving evacuation planning that considers different types of mobility constraints and conducting regular evacuation drills along with additional emergency training.

**Keywords:** Disasters, the disabled, disaster response system, text-mining

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# A set of Good Practices and Recomme ndations for Smart City Resilience Engineering and Evaluation

S. Bologna

## A SET OF GOOD PRACTICES AND RECOMMENDATIONS FOR SMART CITY RESILIENCE ENGINEERING AND EVALUATION

Sandro Bologna, Glauco Bertocchi, Luigi Carrozzi, Donato Di Ludovico, Donatella Dominici, Priscilla Inzerilli, Luisa Franchina, Alberto Traballesi

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#### Abstract

Aim of the paper is to report the scouting activities performed by some Members of the Italian Association of Critical Infrastructures Experts (AIIC), addressing the state of the art in the area of Smart City Resilience, with a special emphasis on the relation between "smartness" and "resilience". The justification for the research activity dealing with urban resilience and smartness is clear: urban areas, the engines of economic growth are projected to provide the living and work environment for two-thirds of

the engines of economic growth, are projected to provide the living and work environment for two-thirds of the global population of close to 10 billion by 2050.

The AIIC Document, on which is based this paper, is primarily intended for use by organizations with responsibility for urban governance. However it is equally applicable to all types and sizes of organizations that represent the community of stakeholders, and in particular those organizations that have a role in urban planning, development and management processes in urban areas around the world.

The Document describes a framework and principles that want to be coherent with the entire UN Agenda 2030, in particular to goal 11 Sustainable Cities and Communities, to make cities and human settlements inclusive, safe, resilient and sustainable.



# Mainstreaming Disaster Risk Reduction Into Development in the SAARC Region: Need for Integration of DRR into Development Activities and Strengthen Knowledge Management

B. Rao

## MAINSTREAMING DISASTER RISK REDUCTION INTO DEVELOPMENT IN THE SAARC REGION: NEED FOR INTEGRATION OF DRR INTO DEVELOPMENT

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#### Abstract

The SAARC Region is highly susceptible to all types of natural and human induced disasters. Climate Change, pollution and environmental degradation are further compounding the problems in the region. Governance plays a very important role in Disaster Risk Reduction (DRR). Mainstreaming Disaster Risk Reduction (MDRR) into development activities should be an underlying principle in all development sectors of the member countries for an effective DRR strategy in the SAARC Region. Good Governance and DRR are mutually supportive and complementary. Principles of Good Governance such as broad participation, openness, transparency, accountability, efficiency and responsiveness are as important for DRR as they are for development at large. Mainstreaming DRR should be a governance process enabling the systematic integration of DRR concerns into all development spheres in the SAARC region.

DRR requires knowledge for informed decision making and coordinated action. Although the knowledge production and implementation processes are critical for DRR, these issues are seldom systematically addressed in-depth in South Asia. While efforts and improvements have been made with regards to data and information, only limited resources are committed to improving knowledge management structures and integrating knowledge systems at different spatial levels in most parts of South Asia. The Sendai Framework for Disaster Risk Reduction (SFDRR) addresses these knowledge-related issues and highlight the importance of promoting the collection, analysis, management, and use of relevant data and practical information at national and local levels as well as to ensure its dissemination, taking into account the needs of different categories of users.

This paper briefly discusses the importance of Knowledge Management in Disaster Risk Reduction and the need for Mainstreaming DRR into development and strengthening governance and provide a framework, mechanisms & strategies for strengthening Knowledge Management in DRR to ensure a safe and disaster resilient South Asia.

**Keywords:** Good Governance, Mainstreaming Disaster Risk Reduction, SFDRR, Disaster Resilience, Climate Change, Pollution & Environmental Degradation

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# Examining The Effects Of Community's Social Capitalon Disaster Risk In Seoul, Korea

M. Choo & D. K. Yoon

# EXAMINING THE EFFECTS OF COMMUNITY'S SOCIAL CAPITAL ON DISASTER RISK IN SEOUL, KOREA

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#### Abstract

Recently, unpredictable disasters around the world caused by abnormal climate and so on have consistently caused severe damage to our societies. Social capital has been researched that it plays a substantial role in enhancing community resilience in disaster settings. The objective of this study is to examine social capital level of community in Seoul regarding disaster risk reduction. For this purpose, we developed several indicators to measure social capital index based on the Seoul Survey data in 2017 and verified its validity using factor analysis. Moreover, we analysed the relationship between community's social capital and disaster damage in Seoul. The results of this study showed that community's social capital level has a negative relationship with disaster risk. It implies that communities with high social capital are more likely to reduce disaster risk and have faster recovery, further, this study is expected to help establish disaster management policies.

Keywords: Social Capital Index, Disaster Risk Reduction, Factor Analysis, Seoul

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## Natural Disaster Prevention and Mitigation System Based on Disaster Investigation and Assessment

B. Zhang & al

## NATURAL DISASTER PREVENTION AND MITIGATION SYSTEM BASED ON DISASTER INVESTIGATION AND ASSESSMENT

**Bijia Zhang, Shufeng Xi, Yuyang Liu, Yuanyuan Jiao** Shenzhen Urban Public Safety and Technology Institute<sup>20</sup>

#### Abstract

Disaster investigation and assessment is an important path to systematically sort out the current level of disaster management system. By analysing the successful investigation and assessment cases of major meteorological disasters in China, this paper establishes the index system of disaster investigation and assessment, improves the prevention capability of urban typhoon and rainstorm emergency response, and constructs comprehensive typhoon and rainstorm prevention and mitigation system. The paper provides a reference for checking the deficiencies of disaster prevention and mitigation system, identifying and solving problems in a timely manner, and improving the ability of natural disaster prevention and mitigation of the community.

**Keywords:** natural disaster, prevention and mitigation, investigation and assessment, index system, meteorological disasters, typhoon, rainstorm

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# Geodisaster-Induced Landslides And Debris Flows Inregional Scale Area

M. Hong & S. Jeong

## GEODISASTER-INDUCED LANDSLIDES AND DEBRIS FLOWS IN REGIONAL SCALE AREA

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#### Abstract

Globally, damages from debris flows have been reported in mountainous areas. Various studies indicate that increases in landscape exploitation and climate instability can grow up the incidence and impacts of debris flows. Therefore, the prediction of possible hazardous areas by debris flows is a public and private concern. In this study, a proposed method for a regional-scale analysis combining landslides and debris flows has been described, and the Umyeonsan (Mt.) landslides and debris flows, Seoul, Korea in 2011 were simulated to validate initiation points by landslides analysis and flow paths of debris flows. The recorded rainfall causing the landslides was applied to the simulation. All the simulation results of the landslides prediction and the propagation of debris flow were compared with the observations, and it has been confirmed that the regional-scale analysis conducted in this study can provide a meaningful prediction of possible hazardous areas by the rainfall-induced landslides and debris flows.

Keywords: Regional-scale analysis, Landslide, Debris flow, Rainfall

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# Eu's Rtdprograms, And The Participation Of Non-Eucountries In Rtd Proposals

D. P. Drljaca

## EU'S RTD PROGRAMS, AND THE PARTICIPATION OF NON-EU COUNTRIES IN RTD PROPOSALS

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#### Abstract

The Framework programmes are the World's largest, multinational, financial instruments funding research and innovation in the European Union (EU). The keywords and characteristics of these Framework programmes are Excellence, Competitiveness, Innovativeness, General Openness and Collaboration. The programmes are results-oriented and focused on societal challenges as defined in relevant EU strategies (such as Europe2020) and Sustainable Development Goals as defined by the United Nations.

The aim of this paper is to present the EU Framework programmes for research and innovation – on- going programme Horizon2020 (value of 80 billion Euros for period 2014 – 2020) and its successor Horizon Europe (estimated value 100 billion Euros for period 2021 – 2027). The Framework programmes support breakthrough innovation intending to provide more impact (scientific, societal and economic) with investments in research and innovation.

Disaster resilient societies are playing an important role in Horizon2020 and will be continued in Horizon Europe under the cluster named "Civil security for society". Tackling global challenges and enabling disaster-resilient societies are in the core of this cluster. For this, international cooperation is essential and provides important window for collaboration of world-wide researchers with European. The paper presents the examples of calls that will be actual in 2020 and inviting researchers to be more active in collaboration on joint projects on topic of disaster-resilient societies.

The paper also presents the overall success of three selected non-European countries from the Asia region -China, South Korea and Japan- in the on-going Horizon2020 programme. Since Horizon2020 soon comes to the end, the paper provides an insight into the successor programme called Horizon Europe and position of Disaster Resilience in Societies within this programme.

Keywords: European Union, Horizon2020, Horizon Europe, Disaster resilient societies, Excellence

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# Applying the perspective of regional competitiveness of urban resilienceAStudy on Improvement of life safety Index

L. Sehun, J. Kyungok & L. Dongeun

## APPLYING THE PERSPECTIVE OF REGIONAL COMPETITIVENESS OF URBAN RESILIENCE A STUDY ON IMPROVEMENT OF LIFE SAFETY INDEX

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#### Abstract

In recent years, different natural and social disasters have occurred in different regions of the city, and in the field of life safety, unsafe risks continue due to various safety hazards. Therefore, there is a growing interest in urban resilience and regional security indices, and the need for research is emerging.

Urban Resilience is a series of activities aimed at minimizing the damage caused by a disaster in a city. Urban resilience is the strengthening of resilience to physical and non-physical factors needed to recover the damage that occurred in the city and the systematic operation of structural and non-structural measures.

According to Article 66-10 (Publication of Safety Index) of  $\lceil$  Disaster and Safety Management Basic Actfloor, the Minister of Public Administration and Security develops and examines the index indicating the level of safety and safety consciousness objectively (hereinafter referred to as "safety index"), Can be published.

The regional safety index is a measure of safety level in seven areas (fire, traffic accident, natural disaster, crime, life safety, suicide, infectious disease). These regional safety indexes play the following roles in order to strengthen local government safety management responsibility and to promote autonomous improvement of vulnerable sectors.

First, it can be utilized for the safety management activities and support of local governments and the central government by providing safety indices of each area using statistics. Second, municipalities can perform efficient safety management tasks by easily judging areas with low safety. Third, the central ministries can improve the safety level of the whole country by supporting municipalities with low safety index by sector.

However, there are limitations in many aspects of the regional safety index. There are no practical safety measures that reflect the inherent environmental factors of each region, humanities and social, industrial and economic indicators that are not directly related to the level of safety in each region.

This study is based on the concept of 'regional competitiveness' among the five concepts of 'urban robustness', 'redundancy', 'rapidity', 'resourcefulness' and 'regional competence'. The purpose of this study is to find out the improvement plan for the problem of diagnosis of local safety index by applying the living safety in the regional safety index.

In conclusion, the inherent environmental factors of each region are derived and reflect the characteristics of regional competitiveness. Through this, the local safety index improves the accuracy of the life safety figures, thereby improving the acceptance of local governments and securing the reliability of the safety indices in the internal and external regions.

Keywords: Regional Safety Index, Urban Resilience, Life Safety, Regional Competitiveness

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<sup>&</sup>lt;sup>24</sup> South Korea



# The Effective Disaster Response in Cambodia: Implications from Focus Group Interview

J. Hyesook & al

## STUDY ON THE EFFECTIVE RESPONSE FOR DISASTER IN CAMBODIA: IMPLICATIONS FROM FOCUS GROUP INTERVIEWS

#### Jeon HyeSook, Lee Kwonmin, Lee Yeseul, Choi Yong-Sang

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#### Park Eun-Gyu

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#### Abstract

This study investigates effective measures for disasters in Cambodia, since this country undergoes high economic growth and encounters severe damage from disastrous weather events. We could deduce effective disaster measures ten topics from two times of focus group interviews. First, the need of realistic and effective policies, securing budget for policy implement, technical development support, official education and training expansion were suggested for effective government policy and improvement of plan. Second, enhanced disaster response training and monitoring by NGO, improved social responsibility of enterprise, careful execution of hydro-eletric development were mentioned for socially responsible support and cooperation in private sector and civil society. Third, regarding reinforcement of community activity, active tree planting, enhancement of awareness training of importance of disaster response, focusing on participants of disaster response education were agreed for effective disaster response. This study would provide preliminary data to help reducing disaster damage and planning socio-economic security for vulnerable people.

Keywords: Effective disaster response, Cambodia, Climate change, Focus group interview

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<sup>&</sup>lt;sup>26</sup> South Korea

# Simulation And Test On Explosion Resistance Of Tunnel

# Lining Concrete Using 3d-Autodyn And Shock Tube

J. Shim & al

## SIMULATION AND TEST ON EXPLOSION RESISTANCE OF TUNNEL LINING CONCRETE USING 3D-AUTODYN AND SHOCK TUBE

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#### Abstract

3D-AUTODYN, which is a commercial computer simulator, and Shock Tube, the test simulator of a virtual explosion, were used to re-enact blast waves in various forms of condition in order to simulate actual explosions and their effects of lining concrete for a vehicle explosion. First of all, the energies of BLEVE of vehicles passing on highway tunnel were calculated in the form of the TNT equivalent, and then we performed the simulation of BLEVE of a lorry by applying to the maximum 50kg of TNT equivalent as the input data on the 3D-AUTODYN. And then, the artificial shock waves, which are equivalent to the explosive pressure of a van, were applied through a shock tube in order to verify a limitation of small vehicle explosion and the test simulations to the same specimen were repeatedly carried out 6 times. As a result, the simulated damage, such as the maximum deformations, support rotations and others, and the shock damage were rarely found and both deformations were less than about 0.6 mm. Then the guidelines based on these data would be given to field officer for the tunnel maintenance, and it will be used as reasonable data for explosion event in future.

Keywords: BLEVE, TNT-equivalent, AUTODYN, Shock tube, Vehicle explosion

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# INSTALLATION OF RIVER INFORMATION DISPLAY SYSTEM

Myoungsun Han

## INSTALLATION OF RIVER INFORMATION DISPLAY SYSTEM

**Myoungsun Han** 

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#### Abstract

As land development progresses, land use near rivers is increasing. Various facilities such as riverside parks and roads that cross rivers are in operation. In addition, the number of people and vehicles using the same is increasing. In response, 16 river information systems have been installed and operated. However, as times change, improvements are needed to increase utilization. We analyze the current installation status and expressions, select the installation area in the high utilization area to improve the system efficiency, and present the presentation content with high visibility

<sup>28</sup> South Korea

# A Conceptual Framework for An Intelligence Natural Disaster Management System

V. T. Tuan & al





# Safety Issues in Construction market Facing Industry 4.0

Dr. S. H. Lee

### Introduction



### Introduction

## " Technology Transformation "

Technological advances are now evolving almost all points in the construction life-cycle Many digital technologies can be applied along the engineering and construction industry's value chain

PLANNING	DESIGN AND ENGINE			OPERATIONS		
	Life cycle integrat	tion				>
User interfaces and	Big data and analytics					P
applications	Simulation and V	/irtual Reality (VR	8) 🙃	Mobile Interface	es and Augmented Reality (AR)	
Software platform	Building Information Modeling (BIM)					
and control		In	ternet of Thing	is (Io⊥)	•	
Digital/physical	3D Printing / Prefabrication				1	
integration layer	3D Scanning				٩	
Sensors and	Intelligent construction equipment and robotics					읓
equipment	Dr	one	*		Embedded Sensor	٢
ource : BCG analysis						

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- Development Of Decision Tree For Response Forest Fire Through The Comparative Case Analysis Of Large Wildfire – Namgyun Kim & Al
- Through Analysis Of Domestic Earthquake Data Relationship Between Scale And Epicenter Damage – K. T. Lee
- An Overview Of The Current International Regulation And Standards For Disaster Risk Reduction And Civil Protection – A. Samberg
- Liquefaction Analysis Of Earthquakes In Korea H. Park & Al
- Engineering Design Considerations For Small Debrisflow Mitigation Structures S. Im & S. Eu
- Fire Safety Plan At Occupation Area Under Bridge To Minimize Fire Damage On Bridge – J. Rhee & Al
- Practical Use Of Geospatial Data For Extremetemperature Disaster Response C. W. Lee & Al
- Search And Rescue (Sar) In The Arctic, Status And Challenges B. Jamtli
- A Study On The Evaluation Of The Vulnerabilities In Climate Change D.E. Lee & Al
- International Crisis Management, How To Evaluate The Quality Of Interoperability? Definition Of A Methodology, Study Cases At National And International Level – Jp Monet & Al
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- A Study On The Current Status And Method Of Seismic Retrofit Of Public Facilities In Gyeonggi-Do – P. K. Jung & Al
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- Current Status And Future Tasks For Marine Disaster Management In Korea J-Y. Gu
- A Hierarchical Bayesian Approach To The Neymanscott Rectangular Pulse Model For A Joint Estimation Of Model Parameters Across Stations – J-G. Kim & Al
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# **Next TIEMS Newsletter**

The next TIEMS Newsletter is planned for Spring 2020.

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Next issues of TIEMS Newsletters are planned for Spring 2020 and contributions are welcome. Please, contact one of the editors or TIEMS Secretariat if you have news, articles of interest or like to list coming events of interest for the global emergency and disaster community or like to advertise in this issue.

