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"Integrative Risk Management - Towards Resilient Cities"

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“FROM THOUGHTS TO ACTION - TOGETHER WE MAKE THINGS HAPPEN”

On behalf of the GRF Davos team, I would like to welcome you to Davos for the 6th International Disaster and Risk Conference IDRC Davos 2016, and I sincerely thank you for joining our global gathering. With IDRC Davos 2016, we are delighted to celebrate the 10 year anniversary of the IDRC conference series. Let me express my deepest appreciation and thanks for all your support and encouragement throughout the last decade. It is together that we were able to reduce vulnerabilities and augment resilience worldwide by establishing and practicing what we call today “Integrative risk and disaster management”, through a trans-disciplinary and multi-risk approach.

Successful risk reduction and disaster management very much relies on multi-disciplinary and trans-sectorial initiatives, as well as public-private partnerships. Again, this year’s conference brings many different practitioners and stakeholders together to strengthen and establish partnerships. With government officials, experts, high-level representatives of IGOS, the UN, NGOs, the private sector, scientific and academic institutions, along with the media and other eminent people, the conference provides a valuable forum for dialogue and a strategic platform for the world’s risk reduction and disaster management community.

The focus of IDRC Davos 2016 is on “Integrative Risk Management – towards resilient cities”. With more than half of humanity living in (mega)-cities and urban environments, the quest for urban sustainability and resilient societies remains one of the greatest challenges of our times. Urban environments are densely coupled socio-ecological systems featuring an intricate and complex phenomenology of risks, such as assets and infrastructure, along with technological and financial risks. At the core of these risks are the dynamic social and ecological conditions that shape urban environments. Therefore, fostering urban resilience ever more depends on an integrated approach that balances smart engineering and investments with advanced practices, looking at the long-term anti-fragility of both social and ecological systems within urban environments.

With an encompassing mix of topics and formats, including plenary and parallel sessions, poster sessions, workshops, exhibitions and networking events, the conference will enable the exchange of information and viewpoints between scientists, policy makers, and practitioners. It is through the vision of developing a series of direct, pertinent and practical solutions that address urgent issues in various key areas of risk reduction and disaster management that the IDRC Davos 2016 is contributing to UNISDR’s Sendai Framework for Disaster Risk Reduction 2015 – 2030.

We anticipate a successful and rewarding conference. Our special thanks go to the IDRC Davos 2016 sponsors, to the authors of all the papers and posters to be presented, to the high-level speakers and panellists, and to the session and workshop organizers. And for their leadership, guidance, support and hard work; we would also like to thank the patronage and co-hosting institutions, the Strategic Advisory Group, the Scientific and Technical Advisory Group, and the endorsing partners.

Davos, August 2016

Dr. Walter J. Ammann
Chairman IDRC Davos 2016
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From Thoughts to Action

by closely linking practice, science, policy and decision making in the search for sustainable solutions.

The Global Risk Forum GRF Davos promotes the worldwide exchange of know-how and expertise, creates solutions and fosters good practices in integrative risk and disaster management and in climate change adaptation. Aiming for an improved understanding, assessment and management of risks and disasters that affect human safety, security, health, the environment, critical infrastructures, the economy and society at large.
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MIA, .micro.insurance.academy, New Delhi, India
Ministry of Energy, Islamic Republic of Iran
NCDM, Nepal Center for Disaster Management, Lalitpur, Nepal
NJA, Nepal Journalist Association, Kathmandu, Nepal
ONG Inclusiva, Peñaflor, Chile
PEDRR, Partnership for Environment and Disaster Risk Reduction
RASOR, Rapid Analysis and Spatialisation of Risk
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Aims and Scope

The International Journal of Disaster Risk Reduction (IJDRR) is the journal for researchers, policymakers and practitioners across diverse disciplines: earth sciences in their entirety, environmental sciences, engineering and construction sciences, urban studies, development studies, geography, and social sciences. IJDRR publishes fundamental and applied research, critical reviews, policy papers and case studies that focus on multi-disciplinary issues which aim to help reduce the impact of natural and technological disasters.

Editor-in-Chief
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GRF Davos’ e-journal on integrative risk management facilitates rapid translation of research findings into practice.

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Main topics addressed in the context of urban areas are:
• Natural hazards
• Technological risks
• Critical infrastructures
• Harmonization of DRR and climate change adaptation
• Terrorism
• Environmental and biological risks
• Sovereign risk financing tools

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SPECIAL ISSUE ON IDRC DAVOS 2016
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Integrative Risk Management – towards resilient cities
28 August – 01 September 2016
Davos, Switzerland

Edited by
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Global Risk Forum GRF Davos, Davos, Switzerland
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Providing Non-food Needs If Industry Is Disabled

Mohamed Abdelkhaliq¹, David Denkenberger¹,², Michael Griswold¹, D. Dorothea Cole¹, Joshua M. Pearce³

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• Since modern industry depends on electricity, much industry and machines would grind to a halt
• Most challenging need is food, and this is analyzed in partner poster
• Retrofit ships to be wind powered to move people and food
• Ship rudders and ventilation can be human or animal powered
• Barges, trains, and road vehicles can be kite or animal propelled

NON-TRANSPORT
• Relocate people to water sources
• Burn biomass to treat water
• Sanitation with pit latrines
• Consolidate people in better insulated buildings heated with biomass in the stoves made from salvaged metal
• Soap made with animal fat and ash
• Condoms made from natural rubber

HYOGO
• Identifying risks and preparedness
• Solutions for the loss of industry must be disseminated ahead of time (because of the loss of communication)
• Gap in the Post 2015 Framework for Disaster Risk Reduction
• Training for the scenarios considered here could be done at the same time that other training is done

CONCLUSION
Even if industry collapses, the basic nonfood needs of nearly everyone could be met technically without expensive preparation assuming global cooperation.

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REFERENCES
Super-Viruses (computer)
Tropical cyclones (TCs) are a common natural hazard that have significantly impacted Oman. Over the period 1881-2014, 41 TC systems made landfall in Oman, each associated with extreme winds, storm surges and major flood events, resulting in loss of life and substantial damage to infrastructure. TCs affect Oman’s coastal areas from Muscat to Salalah in the south, but developing a better understanding of high-risk areas is needed, and is a particular interest of disaster risk reduction institutions in Oman. The focus of this study is therefore to better understand likely TC tracks and the spatio-temporal distribution of TC landfall in Oman to identify high-risk areas. The analysis of tracks uses Kernel Density Estimation (KDE) and Linear Direction Mean (LDM) methods to better identify the spatio-temporal distribution of TC landfall in Oman.

Keywords: Oman, Tropical Cyclone, KDE, LDM

Methods

Data used in this study comprises Arabian Sea TC tracks for 1881-2014 drawn from the IMD-E Atlas (IMD, 1979, 1999, 2014). GIS is used to convert cyclone coordinates over time to track maps as shapefiles. Tracks that made landfall in Oman were extracted from this data set for separate analysis, and data structured by time (month) and season (monsoon). GIS based Kernel Density Estimation (KDE) is then used to calculate the spatial density distribution of the cyclones by season and month (Joyner and Bahl, 2010), and Linear Direction of Means to identify likely track direction from TC origin.

Result

2.1 Arabian Sea tropical cyclones frequency

Table 1 presents summary statistics for TCs that formed in the Arabian Sea, 1881-2014. In total, 223 systems formed in the region of which 124 made landfall, and 99 died in the Arabian Sea and Gulf of Aden. India is exposed to the highest frequency of cyclones making landfall, with 27.4% of the total. 41 tropical systems made landfall in Oman, 18% of the total, and 16 entered Oman’s coastal waters but did not die in the sea (between 60°-64°E). Of the 41 systems that made landfall in Oman, 18 were tropical depressions and 11 were storms, and another 12 were severe storms or stronger. Figure 1 shows the monthly distribution of Arabian Sea TCs, and also specifically those that made landfall in Oman, and reveals distinct seasonal patterns. That is, TCs develop in the Arabian Sea in two distinct seasons in the pre-monsoon (May and June) and again in the post-monsoon (October and November).

2.3 Kernel Density Estimation

KDE is used to identify areas of high track density, and hence coastal areas where cyclones are more likely to make landfall. The KDE is based on seasonal and monthly TC data, with Figure 4 showing the KDE of all tracks that made landfall in Oman, and also tracks by season. The KDE reveals a high density of tracks in the mid-coastal region of Oman near Ras Al Had which remains evident in the pre-monsoon season, whilst in the post-monsoon season a high density of tracks is found in the southeastern coastal region of Oman near Salalah. Figure 5 shows the KDE of tracks by month, showing that the highest density of tracks in May is in central Oman, but high density also occurs in the north of Oman near Ras Al Had in post-monsoon months (Sept, Oct.), the highest density of tracks is again near Ras Al Madrakah, spreading south near Salalah in October.

3.4 Linear Direction Mean (LDM)

The linear directional mean is a statistical-spatial tracking method to identify the mean direction of tracks. Here, the LDM is used to identify the mean direction of cyclone tracks that made landfall in Oman, 1880-2014. Figure 6 presents the LDM of each cyclone track, and Table 2 summary data for all tracks, and by pre- and post-monsoon. The mean directional angle for the total track is 157.75° to the mid-west coastal region of Oman near Ras Al Madrakah which remains evident in the pre-monsoon season, whilst in the post-monsoon season a high density of tracks is found in the southeastern coastal region of Oman near Salalah. The LDM of the pre-monsoon tracks is to the middle of Masirah island, slightly to the north of the LDM of all tracks, with mean directional angle 146°, and mean length 1827 km. The LDM of post-monsoon tracks is towards Ras Al Madrakah, with mean length 2361 km.

CONCLUSIONS

Tropical cyclones in the Arabian Sea form in two distinct seasons: the pre-monsoon and the post-monsoon (Membery, 2001). The analysis presented here addresses all cyclones recorded for the Arabian Sea, and focuses on those that made landfall in Oman. The analysis shows seasonal and monthly variation on cyclone tracks. The spatio-temporal pattern of cyclones that made landfall in Oman indicate that in the pre-monsoon, storms tend to originate in the south of the region in May and move northward in June. Tropical storm Ashobaa developed recently (June 2015), too recently to be included in the storm track analysis. However, given its month of origin, the analysis suggest that this cyclone could be expected to strike Oman in the northern region. This is indeed what happened, with the storm tracking north of Oman in July. For the post-monsoon, cyclones tend to originate in the north in September, moving progressively southward in October and November. For instance, tropical cyclones Chapalo and Meg formed in the Arabian Sea in November 2015 and travelled in a southward direction to the Socotra islands off Yemen.

These results reveal a series of broadly predictable spatio-temporal patterns. Individual events may deviate from these trends, but the general patterns can be useful in informing natural hazard risk assessment and management in the Arabian Sea region, and particularly Oman which has in the past suffered extensive damage from tropical cyclones. The results could assist with more targeted cyclone preparation and deployment of emergency response resources, based upon geographical areas most at risk to cyclones (strategic planning), and to specific storm events when these are first identified (tactical planning). For example, knowing that cyclones that develop in June are more likely to make landfall in the northern part of Oman is valuable emergency planning intelligence.

REFERENCES


The spatio-temporal distribution of Tropical Cyclone tracks making landfall in Oman.

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The BCI Horizon Scan Report is an annual exercise that seeks to identify near-term threats to organizations worldwide. This study complements in-house analysis and benchmarks horizon scanning activity among organizations across regions and industry sectors. Data cited was collected from a survey which began in October 2015 and ran for eight weeks. The 2016 edition of this report features analysis from 568 organizations based in 74 countries. Top threats cited include cyber attacks (85% of respondents being ‘extremely concerned’ or ‘concerned’), data breach (80%) and unexplained IT and telecommunications outages (77%). Emerging trends practitioners are concerned about include the increasing use of the internet for malicious attacks (81%), the growing influence of social media (63%) and loss of a key employee (56%). 70% of organizations perform longer term trend analysis in relation to these threats and emerging trends.

The study also measured longer-term trend analysis, which enables organizations to better understand their risks and threats.

The ‘human factor’ (i.e. skills shortage, loss of key employees) clearly impacts on business performance and requires a strategic response.
**Vulnerability Indices for Disaster and Emergency Response (VIDER)**

**Introduction**
This study presents a "proof of concept" set of indices (Vulnerability Indices for Disaster and Emergency Response: VIDER) targeted at emergency planners with a robust estimate of the index uncertainty. The VIDER aims to assist in the identification of areas that may need further investigation or additional planning as part of an emerging planning process. The VIDER seeks to address gaps in the development of composite indicators for community disaster resilience. Few existing indicators are targeted at specific issues or incorporate uncertainty analysis. Though not yet tested for emergency planning, the VIDER sets a reasonable foundation for understanding the risk and vulnerability metrics in particular to spur greater targeting and use of uncertainty metrics.

**Theoretical Basis**
The emergency response measured in a disaster area depends on a range of factors including the hazard, the vulnerability of infrastructure and the community, and the emergency capacity. The VIDER may help emergency responders, which may require additional planning, to identify areas where emergency planners could give more attention to areas with a greater need.

The VIDER first identify a set of all-hazards activities undertaken by the emergency services that may vary depending on a community's capacity. For this study, four activities were considered:

- **Evacuation** - requires sophisticated planning, especially for special needs groups
- **Communication** - warnings and advice need to be understood to work
- **Damage Control** - self-sufficiency may reduce demand for resources
- **Preparedness** - potential to target education activities

To examine the role that various demographic factors play in these four activities, the capability of the community to do them is considered. For each community, only demographics indicators shown below were selected on the basis of association with an event in the literature or a reasonableness of scientific link where evidence was limited.

**Methodology**
The Australian State of New South Wales was chosen as the study area. Data from the 2011 Australian Census was collected for the smallest area for which data is available. These steps were chosen to investigate the potential of the VIDER at a highly local scale. For example, in prioritizing response resources at a suburb level, or county level, proxy variables for each indicator were used.

To order to prepare a more relevant index variable, values were forecast for 2020. By creating forecasts, estimates of uncertainty in these proxy variables can be included in the index. Forecasting was based on historical trends to estimate a mean and standard deviation for the 2015 value. Due to inconsistencies in the available time series different approaches were used to select the mean and standard deviation which may over- or underestimate the variation. Each variable's value and distribution was treated as independent and not modeled as individual means and standard deviations are likely to vary.

To capture the uncertainty introduced by choices in model construction, the study implements a Monte Carlo simulation incorporating the composite indicator construction techniques. A decision tree with two primary branches was implemented. The first branch used a decision tree index with score or ratio or max normalization, random weights and arithmetic aggregation. The second branch used principal components analysis, one of six rotation methods, factor selection using the Kaiser Criterion or an automated scene analysis and equally weighted factors. All raw values were converted to qualities to ease comparison of the results and as emergency managers are more interested in large enough differences between areas for the purpose of prioritization.

**Results**
Breaking down the certainty score distribution by index value shows higher certainty for the extreme index values. This indicates the VIDER have greater confidence in very high and very low capability.

**Recommendations**
- **Emergency Managers should:**
  - Communication: Indicators for need assessment
  - Critical evaluation of needs are met and have uncertainty estimates
- **Designers of Composite Indicator Frameworks should:**
  - Ensure indices are tailored to the needs of end-users
  - Communicate uncertainty in index values to end-users
  - Develop improved methods to incorporate base data variability into index uncertainty

**Conclusion**
The low to moderate association between the VIDER and the different space occupancy behavior demonstrates this approach provides more relevant information than a single vulnerability index. Despite the potential use of these indices they have very low consumption. The high sensitivity of the uncertainty in the indices to variability in the base data suggests that those developing and using composite indicators should be cautious when using demographic data that is unrepresentative, uncertain or dated. Future work on the VIDER could include:
- Air improved models to forecast the variables and their uncertainties.
- Improving them to include indices relating to hazards specific to localized activities (e.g., recovery needs, validation against outside resources). Future research to better understand and develop potential end-use cases of the index's resilience composite indicators by emergency and land-use planners, disaster risk reduction specialists and other policy makers would be of great benefit in operationalizing risk for disaster resilience.

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Large scale energy facilities pose a potential risk and threat because with one isolated event large damage can be obtained, for example in a city, potentially with a large number of human casualties. We present a solar energy harvesting system which allows for the generation of hydrogen fuel for housing and mobility in a decentralized form. A city or a part of a city cannot be shut down from energy supply by failure, accident or attack on such energy generation and storage infrastructure, because it is virtually fully decentralized and independent (no electric grid). This system is based on photo-electrochemical cell technology and takes advantage of solar energy arriving at small amounts in local neighborhoods in the range of 100 m² area per operation unit. The fuel is hydrogen. The necessary water for the process may come from the local sewage waste-water system. The problem of energy storage after finish of sunshine during the day is also solved by this technology, because a storable fuel is produced. The pronounced safety feature of this approach is that many small units are built, which are impossible to demolish in a terror strike, as opposed to single large industrial complexes which are very attractive to terrorists for attack because of the high destructive "efficiency" by a single plot, but also by the commensurate public attention and "terror", literally, which comes with the attack on a landmark scale facility. A shortcoming in this calculation comes from potential loss of efficiency by moving from few large units to many small units. This is likely the resilience price which society has to pay for gain in safety from aforementioned disaster events.

### Residential Fuel Production System

A residential fuel production setting comparable to the conditions as outlined in the Introduction was A residential fuel production setting comparable to the conditions as outlined in the Introduction was shown. The setup is used for water collection and solar thermal water heating. This is a densely populated area in the city center of Bangalore, India. We notice rain water storage containers (black) and a solar thermal water heating system (blue horizontal cylinder with "tank" type setup). The entire roof top area was in principle all be used for the deployment of a PEC reactor with white organic solar cells for hydrogen production from water which still allows for the use of the installed solar for solar thermal water heating underneath.

Large volume type PEC reactor on rooftops could be the decentralized solar fuel plant. A small 10 cm x 10 cm prototype is shown in the first frame in Figure 2. While 10x10 is a typical area established for example in the PV technology, we at Empa have panels for 20x20 systems as well. It should be possible to arrange them in larger areas and thus obtain the suitable size for covering the roof. This photovoltaic material used here is iron oxide as mobile light dependent on iron oxide as transparent conducting oxide as current collector. The solid support is transparent glass on both sides. The counter electrode is platinum can be replaced by cheaper copper oxide here: the hydrogen gas is generated and can be guided away in a gas storage system. This approach is fundamentally different from natural photosynthesis (Br¨uggen 2013).

### Financial Support and Collaterals

Currently, researchers are working worldwide for the optimization of efficiency and durability and lowering of cost for such PEC technology for solar fuel production (Teppner 2013, Br¨uggen 2016). Figure 2 (left panel) shows actual hydrogen production rates from experiments on iron oxide electrodes at Empa. The generated energy and power from such residential installations are - at a minimum - commensurate with the solar power input of the claimed geometrical area. This certainty sets natural limits. A potential application for mobility purposes could be the use of hydrogen fuel cell powered small vehicles, such as the "Hy-Cycle" bike from UNSA Australia shown in Figure 4 (G¨ottmann 2016). Particularly areas transportation is one obvious critical area of impact, such application could be part of transport engineering of urban transportation for resilience to peak oil risks (Knecht 2013).

### Integrative Risk Management and Urban Resilience

The suggested residential hydrogen production and storage system shows how a single home can become independent from a fuel grid or electricity grid. It has been projected in 2020 that hydrogen fuel from the water could in the year 2022 would cost 25% more than the price of gasoline (Braun et al. 2012). The storages of hydrogen fuel poses no higher risk than the storage of any other conventional fuel at the same location. Hence there is no added risk. We have to wonder how society will cope in the future. We will favor increasing urbanization, with the result that agriculture may have to be relocated further away from urban areas in order to use the space for conventional farming would go along with spreading our "hydro-farming" (see Braun 2014) for the local supply of fuel. This approach satisfies partially the vision of urban resilience and urban sustainability.

### Conclusions

We want to continue with the Future Vision, which was expressed in the recent Food Energy Water (FEW) debate which outlined the understanding of South Africa’s most urgent sustainability challenges (Van Bornan 2014). It is a possible to ensure that the natural resources policies on which our society and economy rely – clean water energy and food production from the rare earth elements are safeguarded for our needs even with rapidly growing global demand. We take collaborative approaches, unique partnerships and new forms of funding. It will take more efficient and productive consumption and production through technological innovation and informed, smart, sustainable thinking within the private and public sector. It will require greater governance reengaged for an integrated approach to policy shaping, management and development, and, critically, appropriate institutional capacity. But ultimately, it will require a shift in how we value the finite natural riches of our planet and a new approach to living sustainably within the boundaries of natural systems. This challenge arises not only from the South African perspective. Rather, this situation is faced by many countries on the globe and is a major challenge for the remaining majority of world population. However, given the already growing R&D activities and policy actions for renewable and decentralized energy solutions, there is a reason for hope in view of the abovementioned challenges. Indeed, there is plenty of reason for hope (see Goett 2014).

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### Corporate Level

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A Study on Infectious Disease Control System in Korea
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Abstract

In a cosmopolitan age, it is inevitable situations that many tourists and business people have visited various countries. It promoted worldwide economic growth and cultural exchanges. However, it also has brought side effects which are frequent terrorist attacks and the outbreak of the pandemic diseases. For instance, a Korean was infected with the Middle East Respiratory Syndrome. Actually, the MERS is a viral respiratory syndrome that was frequently reported in the Middle Eastern nations such as Saudi Arabia. The pandemic disease caused many deaths in Korea where is located in the eastern of Asia. The damages were a fall of the Korea Composite Stock Price Index, negative consumer sentiment, domestic stagnation and social unrest atmosphere. Before the MERS was reported in Korea, the SARS and the Novel swine-origin influenza A(H1N1) were prevalent and it sent shock through the Korean society. It means that Korea is not a clean country from infectious diseases. As a result, we need to study to manage infectious disease. When the infectious diseases are prevalent, wrong awareness, prevention education and belated responses made various economic and social damages. So a government, businesses and private sectors have taken an active interest in pandemic diseases management. Especially, the government has more interest in the management system because the infectious disease management capacity is a kind of national capacity and status. In this study, we studied Korean infectious disease control system and found out the weakness. Finally, we tried to make up for the weak points in the current infectious disease control system in Korea and then suggest complementary control system.

Keywords: Infectious Diseases, MERS, Infectious Disease Control System.

1. INTRODUCTION

In 2015, the Middle East Respiratory Syndrome, MERS threw Korea into a chaotic state. The full consequences of the MERS outbreak could top 186 cases, 38 deaths and the 16,000 people in quarantine. Korea had the second-largest number of MERS cases in the world after Saudi Arabia, which has reported more than 1,000 cases since 2012. The situation caused widespread panic in South Korea. MERS paralyzed the normal function of hospitals, schools and public offices, and lives of people became harder. The Korea Composite Stock Price Index fell and tourist didn’t visit Korea. At that time, Korea experienced the economic slump. The rumors about MERS had been bruiting but the rumors turned out to be false. However, Korean society was gripped by a state of fear.

As a result of the experience, Korea recognized the needs for infectious disease control system which could respond effectively to the occurrence of an infectious disease and manage outbreak from the disease.

2. BODY

2.1 theoretical background

The concept of infectious diseases isn’t strange because there were various infectious diseases since ancient times. However, the infectious disease shed new light in these days. Regional infectious disease could spread all over the world with the development of transportation. As infectious disease became one of the major disasters in modern society each government focused on the infectious control system. If a government failed initial countermeasure to infectious diseases the government would be deprived of power to lead and control the country. In Korea, there were some infectious diseases after the 2000s. For example, they were SARS in 2003 and MERS in 2015. SARS stands for severe acute respiratory syndrome. The horrible infectious disease had even changed the life style of people. In case of MERS it especially had done enough damage to economic and social aspects in Korea.

2.2 Methodology

Research process follows bellow order

I. Doing comparison analysis between SARS and MERS cases.

Table 1: SARS(2003) vs MERS(2015)

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First occurrence</td>
<td>November 2002(China)</td>
</tr>
<tr>
<td>First occurrence in Korea</td>
<td>April 2003</td>
</tr>
<tr>
<td>The number of infections</td>
<td>8,400 (Korean: 3 )</td>
</tr>
<tr>
<td>The death toll</td>
<td>818 (Korean: 0 )</td>
</tr>
<tr>
<td>The number of quarantined</td>
<td>2,200</td>
</tr>
</tbody>
</table>

In Korea, those diseases produced different results such as economic and social damages. Because they had different response strategies and actions. When the SARS occurred Korean Government responded actively. For example, the government organized an advisory committee to control the disease and frightened to try to track the infected patients. Also Korean government disclosed information about the disease and it made the people have caution. Early detection made that Korea could control effectively and bring less damages.

However, in case of MERS it brought various and huge damages. According to CDC of USA early detection for patients and contact brings effective control following implementing home care and isolation or quarantine of people not requiring hospitalization for MERS-CoV. Korea also need the kind of guidelines for first response

2. Surveying recognition and needs of Korea Center for Disease Control and Prevention personnel about infectious control system.

3. Studying foreign case; infectious disease control system of USA.

Table 2: comparison analysis between Infectious control system of USA and Korea

<table>
<thead>
<tr>
<th>USA</th>
<th>KOREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Supervision of Center for Disease Control and Prevention(CDC)</td>
</tr>
<tr>
<td></td>
<td>Support from Department of Homeland Security(DHS)</td>
</tr>
<tr>
<td></td>
<td>Early detection &amp; rapid response</td>
</tr>
<tr>
<td>Role of</td>
<td>CDC</td>
</tr>
<tr>
<td>supervision</td>
<td>The central government control tower</td>
</tr>
<tr>
<td>department</td>
<td>Epidemiological survey</td>
</tr>
<tr>
<td></td>
<td>Emergency Operation Center in CDC</td>
</tr>
<tr>
<td>Role of</td>
<td>Situation management</td>
</tr>
<tr>
<td>supervision</td>
<td>Disaster situation management</td>
</tr>
<tr>
<td>department</td>
<td>National Institute of Health</td>
</tr>
<tr>
<td></td>
<td>Infectious disease studies</td>
</tr>
<tr>
<td>Role of</td>
<td>DHS</td>
</tr>
<tr>
<td>supervision</td>
<td>Ministry of Public Safety and Security</td>
</tr>
<tr>
<td>department</td>
<td>Overall coordination</td>
</tr>
</tbody>
</table>

4. Suggesting infectious control system concepts and improvements.

3. Conclusion

The infectious disease could be a catastrophe to many countries and it causes various damages. Countries around the world recognized the need to study new infectious diseases and began heightening vigilance against Infectious diseases. Also Korean society is exposed to the disaster and needs to review and make improvements to control the disaster. Korean society are not only creating a system that responds various infectious diseases but training the staff of the related ministries to prevent the outbreak. Furthermore, efficient disaster management could be achieved through many studies about infectious diseases and sharing information.

Acknowledgement

BK21 Plus Creative Technology of Crisis, Disaster and Risk Management
Feeding Everyone if Industry is Disabled

Food System Shock

Dorothea Cole1, David Denkenberger1,2, Mohamed Abdelkahliq1, Michael Griswold1, Joshua M. Pearce3

1Tennessee State University; Nashville, TN, USA; 2Global Catastrophic Risk Institute; 3Michigan Technological University

Global disaster that disables electricity and industry (and machines): limits ability to produce and transport food
Food can be produced the way it was in preindustrialized times with improvements learned
More land can be cleared for agriculture taking care to minimized the impact on biodiversity
Ships can be retrofitted to be wind powered
People can move closer to food production, minimizing continual transport of food and providing more farm labor

METHOD
Determine how much food is required
1. Estimate current food production
2. Reduce post-harvest losses from mechanized harvesting, storage, transportation, retailing, and household waste
3. Eliminate edible food fed to biofuels and livestock ~ they can eat grass or other cellulose food residues unfit for human consumption
4. Food requirement 2100 kcal/day

IMPROVE PRODUCTIVITY OF PREINDUSTRIAL YIELDS
1. Clear more land for crop production
2. Increase yield using ash and manure for fertilizer
3. Improvements in farming methods: legumes for nitrogen
4. Continued use of improved seed varieties
5. Use draft animals for farming and transportation

HYOGO
1. Identifying risks and preparedness
2. Solutions for the loss of industry must be disseminated ahead of time (because of the loss of communication)
4. Training for the scenarios considered here could be done at the same time that other training is done

REFERENCES

CONCLUSION
By using enhanced preindustrial farming methods and transportation of people closer to farming areas, it is technically feasible to provide for the nutritional needs of the planet during a global loss of electricity and industry.

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Chile is a country located in South America and one of the countries located at the Ring of Fire. On the 27th February 2010, an earthquake with magnitude 8.8 Mw struck the Chilean coast. Concepcion, the second largest city in Chile, was most affected area. It is estimated that 1.5 million houses were damaged, several buildings in Santiago and Valparaiso collapsed. The Government declared 6 regions, as zone of catastrophes: Valparaiso, Metropolitana, O’Higgins, Maule, Bio-Bio and Araucania. The earthquake triggered a tsunami which devastated Juan Fernandez Island, and several coastal towns in south-central Chile were impacted by waves that advanced 3Km inland in certain areas. The official death toll was 521, while the number of missing was 56. It is estimated that the earthquake generated a power outage that affected the 93% of the country.

To support the implementation of community resilience in Chile to face the impacts of severe power cuts caused by earthquakes and tsunamis.

We will gather information related to societal impact associated with past events, identify critical case studies, and determine societal impacts of severe power cuts. To achieve this aim we will collect and analyze qualitative data to identify the needs and coping strategies of an affected population during power outages.

Framework to support the implementation of community resilience due to power outages caused by earthquakes and tsunamis. The aim is for citizens to have response strategies that are complemented by resilience measures prepared for (and by) the community.
Introduction

The study analyzed coastal (esp. flood) risk governance and particularly the all stakeholders communication process and content in the coastal rural and/or local municipalities of Latvia - Salacgrīva, Saulkrasti, Ventspils and Liepāja. The results are limited to the coastal municipality, as it is necessary to complementally apply collaboration communication components/instruments – information, education, participation and environment friendly and risk adapted behaviour – applied among all of the parties and groups of interest involved, supported by the municipality.

The collaboration governance model (Fig.2) shall be introduced as well as tackling the whole governance cycle and being particularly relevant to multi-dimensional governance processes.

CRG in Latvian municipalities has to be identified/assessed and managed not only as an traditionally technical-environmental problem, but also as socio-economic and culture tradition oriented problem field as it all and complementary affects local communities and territory. CRG cross-level (vertical) and cross-sectoral (horizontal) integration is to be implemented in both in all the mandatory municipal planning documents and esp. in the process of preparing, making and carrying out CRG decisions of the whole governance cycle. In the latter there also shall be integrated not only CRG situation assessment, but also mostly not known yet municipal risk management (incl. public based/citizen science) and eventual CRG indicator systems.

The complementary use of all types of CRG instruments is to be effectively applied - political and legal, planning, economic and financial, institutional/administrative, infrastructure and communication instruments. The main success precondition still remains as pro-active collaboration between the all main stakeholders groups involved in the CRG process is to be taking place and especially mandatory using of all collaboration communication complementary set of instruments – information and education/training, participation and related everyday/risk behavior (fig.3) - to ensure that any particular step/sector/level does not become a weak link in the necessary chain of CRG.

Mentioned set of policy recommendations necessary to further elaborate and implement into municipal practice correspond to the collaboration governance model/approach (fig.2) designed earlier during research-and-development projects studying local coastal/environmental governance in Latvia and later on applied for different environmental-climate-coastal governance projects and practice cases.

The research results could be possibly used also for other/different municipalities and at the national level, but all four complementary components/instruments of coastal risk collaboration communication model might be eventually applied for any other type of risk communication developments, particularly at the local scale.

Results and discussion I

Municipal flood risk assessment, planning and management cases are:
- not satisfactory based on the local areas (municipalities) sustainable development complementarity dimensions approach, because there are limited local municipality stakeholder groups oriented communication between stakeholders and stakeholder groups (particularly - local municipality, public bodies, freeport businesses, educators, general public, media, NGOs),
- detailed coastal/environmental risk communication is not satisfactory integrated neither into a special risk management nor optional environment and/or mandatory municipal development planning process and planning/management documentation,
- there are often sufficient number/type of suitable municipal communication tools and channels, but they are not at all either satisfactory applied in order to provide open access to environmental risks related public information,
- the same situation with public education and involvement, and almost non provision of reducing risks and adequate emergency actions.

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Mentioned set of policy recommendations necessary to further elaborate and implement into municipal practice correspond to the collaboration governance model/approach (fig.2) designed earlier during research-and-development projects studying local coastal/environmental governance in Latvia and later on applied for different environmental-climate-coastal governance projects and practice cases.

The research results could be possibly used also for other/different municipalities and at the national level, but all four complementary components/instruments of coastal risk collaboration communication model might be eventually applied for any other type of risk communication developments, particularly at the local scale.
ABSTRACT: In this study, we use a rather simple method to estimate the probability of losses from meteorological droughts in China by using observed and simulated/projected drought data. The data are based on the Standardized Precipitation Index (SPI), which has been calculated from observed monthly precipitation data for the period 1961–2014 and from simulated/projected precipitation data for the period 1950-2100. The SPI time series are assessed on their monthly intensity and the area of drought occurrence. The projected data and further results are validated on real past events and annual loss information. Based on the spatial-temporal information of SPI intensities, various probability distributions of empirical and simulated time series are calculated. The final results include estimated return periods for drought intensities, which define the probable average annual losses and probable maximum losses for return periods from meteorological droughts in China.

RESULTS AND CONCLUSIONS

The ability of CCLM in reproducing drought characteristics in China is evaluated on observed monthly climate datasets. The simulated SPI show similar to more intense characteristics as the observed SPI (Huang et al., under review). A dryness band from the southwest to the northeast of China has been observed for the period 1960-2013 (Zhai et al., 2016). This has also been simulated for the future period 2016-2100 with CCLM, which shows a continuing trend to dry condition along this observed dryness band in China, with strong drought tendencies mainly found in the Zhejiang, Southeast, and Northwest river basins. From low emission to high emission RCPs, the drought centers are more likely to experience a southeastward or northwestward shift mainly caused by the decrease in precipitation or the increase in evapotranspiration, respectively, according to the differences between the spatial patterns of the SPI. In regard to these expected changes, the simulated drought events are used to generate a 140-year drought event catalogue for all major river basins and for a countrywide average of China. The catalogue has been validated with the observed SPI on an annual basis. Finally, from the simulated event catalogue, the probable annual losses and probable event losses are estimated based on the relationship of the normalized economic drought losses and the basin-averaged annual SPI values.

With the simulated increase in drought intensities as well as China’s socio-economic factors (e.g. population and income), a higher vulnerability and exposure to drought events can be assumed. In the near future the number of people exposed to droughts will increase due to the demographic pressure and the exacerbation of disaster risks and drought intensity. On the basis of the applied normalization method, no apparent increase to higher annual drought losses has been detected. Nonetheless, an increase towards more intense drought events has been simulated, which probably will affect larger areas and more people. Additionally, the estimated return periods of simulated probable economic drought losses should be especially considered when the focus lies on the socio-economic factors of drought affected regions in China. The findings present a sound basis for the decision-making in integrative disaster risk management, as they can assist in identifying adaptation measures towards the reduction of economic losses from droughts in China.

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Relocation of towns due to landslides and torrential flows hazards in Boyacá, Colombia

By Francisco Hector, Ceballos Jenny A.

This poster summarizes the investigation results about geomorphological processes, which have been considered as a threat due to torrential floods and landslides, considering these like disastrous events that have affected towns in Boyacá, a Colombian department. It has caused the relocation of some towns through the past time. Historically, other towns have been affected by disaster events and today the risk still high due to being exposed to the threats. Although these towns do not have different alternative than the territorial reordering and the relocation of the urban areas, they have not counted with the leading of the disaster risk management authority and the affected communities.

The department of Boyacá is located in the north east of Colombia, where most of the landscapes are mountains with intermountain valleys from the foothills and hillscapes from the Andes’ East Cordillera and a northeast preferential direction. This topographic configuration defines the hydrography of the region, resulting in two large basins, the first one characterized by drains to the west and discharge in the Magdalena River that pass in south north direction in the west boundary of the department. The second one drains to the east, specifically to the rivers, which form the Orihoco River. The results show here are parts of an investigatory project about applied morphology to the modeling of the territory of Boyacá. In these investigations besides the morphometry, morphogenesis and the morphodynamic, the environmental history has been included, it addresses geomorphological processes that have represented threats and have caused impacts to the towns in the department since the XVII century.

The landscapes in this territory correspond to reliefs and models where the structural, glacial, denudational and fluvial geomorphological environments take precedence. In addition to the aforementioned environments, recently has been evident the anthropogenic environment that remains above the volcanic environment. In the adjacent physiography, geomorphological processes related to mass movements and flooding are highlighted. These processes are related mainly with rainy periods and occasionally with seismic events, which have represented threats. Therefore the disasters caused by natural phenomena are of great interest of Colombia (Miermelén Michel, 2005) and particularity to Boyacá. This country and department have lost a great number of human lives and materials.

**Relocated populations or with recommendation to be relocated**

Labranzagrande was hit by a torrential flow in 1938, the material removal slip corresponds to carbonaceous shales and sandstones with high dip on which reposed colluvial deposits. The drainage channel, coincided with the bottom of a preexisting ravine with radial dissection, while the accumulation zone formed a trail of debris that reached the population center. Later, in 1954, an event was presented again that began with a slide of a hill in the apical part to the North west of the town. During a heavy rainy season, the black shales were saturated, constituting a torrential flow that incorporated in its path colluvial deposits and large sandstone blocks, which flowed through the radial channels for several kilometers, reaching the population center and destroying some buildings (Van der Hammens Thomas, 1954).

**ADDED VALUE FOR INTEGRATIVE RISK MANAGEMENT AND URBAN RESILIENCE**

This work aims to incorporate historical memory in the preventive stage of the risk cycle, with the aim of reducing vulnerabilities and increase resilience of the communities, not only those who are still in environments affected by disasters, even those, that in the future might be affected by similar processes. It is vital, incorporating environmental history and particularly the history of disasters in knowledge of the territory and changes in risk perception over time and its assimilation by the communities. In order to canalize their strengths, to avoid that the processes that are threateners do not finish in disasters. Similarly, we must prepare our communities in adapting to global and local changes in the environment, and particularly in Colombia, where we must work on reducing risk factors associated with the deterioration of our hillscapes and valleys. Given that, unfortunately it has been worryingly lost the ability to control vegetation, causing that the extreme of rains and drought are quite monotonous nowadays, reflecting in high geomclimatic risks during rainy periods, and scarcity and hydric stress for people and ecosystems during periods of low water.

**CONCLUSIONS**

Topographical, geological, geomorphological and climatic conditions of the Department of Boyacá environment, grant to the territory ideal conditions for the occurrence of geomorphological processes that can become geo-climatic threats to communities and infrastructure. Since its foundations, some populations of Boyacá had not taken into account the limitations imposed by the natural environment. Some of them were relocated from the XVII century, although the most affected were in 1933.

Knowing the territory and its processes, allows us to adapt, reduce vulnerability and increase the resilience of our communities.

**REFERENCES**


INTRODUCTION
Geotechnical and geological hazards, threaten cultural heritage sites of Iran and of the world. (Gizzi, 2008) Moreover, Water saturation and flow in soil layers change the soil conditions, which cause damages such as volumetric changes resulting from swelling or drying processes and the loss of material strength. This process ultimately leads to the break downs of structures. (Drdacky, 2010, Siedel, 2010). It has been shown that change climate could be a potential drastic threat to historical sites. (WHC, 2016)

Since 2012, some superficial profound earth cracks have been observed in the vicinity of Persepolis World Heritage Site (WHS) and Naqsh-e-Rustam. These cracks are, increasingly, expanding and are approaching closely to these sites. The subsidence of the earth has been arising worries among the scientific community. Some experts from the Geology Department of Shiraz University have warned about this progressive risk during recent decade.

In this paper, we are to describe and depict the dimensions of the risk regarding the worries about the changing risks to crisis because of the ever-expanding cracks.

1.1 Persepolis World Heritage Site (WHS) and Naqsh-e-Rustam: Persepolis (WHS) is one of the important legacies of Achaemenid period (530-330 BC) which is located at south east of Iran (Fig. 1).

Fig.1 The location of Persepolis in the Province of Fars, Iran

It was established by Darius the great on the skirt of Mount Rahmat (Kooeh-e Mehe) with the area of 12500 m² and the altitude of 1620 m above the sea level. It is 58 Km far from Shiraz (the center of Fars province, Iran, in Marvdasht plain (52° 53’ 30”E and 29° 56’04”N) (Fig. 2). This historical site used to be the ceremonial capital of Achaemenid empires governing for about 200 years in the ancient Persia. It was constructed by three kings and comprises Apadana Palace (Bar-e am), Tachara Palace, Throne hall, Hadish Place, Treasury and The Gate of All Nations (Fig. 3). Persepolis is the best example of Old Persian art and architecture which is combined with styles of various obedience of Achaemenid dynasty in the details of structures.

1-2 Naqsh-e-Rustam: It was excavated by a delegation supervised by Prof. Ernest Herzfeld in 1931. UNESCO declared the citadel of Persepolis as a World Heritage Site since 1979. Naqsh-e Rustam is situated 8 Kms northwest of the Persepolis WHS and encompasses several monuments ascribed to Elamite, Achaemenid and Sassanid eras (Shahabi, 2010(Fig. 4). The Persepolis WHS and Naqsh-e Rustam score the first place in respect of visitors in Iran and hosts more than 1,200,000 tourists every year.

The local climate of Marvdasht plain: The graph (Fig.2) and the table 1 below illustrate the local climatic condition. The plain of Marvdasht is situated in a semi-arid area with the average annual rainfall of 250 mm. The district has faced with drought condition during recent decade (a 30% decrease in the average annual rainfall) and the condition aggravated during the years 2007 and 2008. The plain covers more than 150000 hectares of agricultural lands (Figure 2 and Table 1).

Fig. 2. The average annual rainfall during a decade (2003-2012) of Persepolis

Table: Average rainfall of Persepolis, 2003 to 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>300</td>
</tr>
<tr>
<td>2004</td>
<td>290</td>
</tr>
<tr>
<td>2005</td>
<td>280</td>
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<td>2010</td>
<td>230</td>
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<tr>
<td>2011</td>
<td>220</td>
</tr>
<tr>
<td>2012</td>
<td>210</td>
</tr>
</tbody>
</table>

Findings
Surface earth cracks and earth subsidence crisis:
With a distance of 600 meters, west of Persepolis citadel and among the trees of the Pardis Garden, there are profound cracks on the earth with a depth of 1.5 m, width of 1 m and length of 200 m. Similar cracks were detected in 3 Km north to the Persepolis in 2012. They are about 50 m long, 70 cm deep and 50 cm wide (Fig.3).

One meter deep and 50 cm wide cracks are observed between Kaba-ye Zartosht (a cube structure) and Darius tomb (engraved on the mountain slope) continuing in an intermittent pattern to the end of the site (Fig. 4). The continuation of these cracks has caused some damages to the wall of houses in neighborhood villages. According to the report of the Geology Department of Shiraz University, the cracks have caused a subsidence measured about 2 to 30 cm (Talebian, 2003).

A considerable decline in ground water table
The results of the piezo metric measurements carried out by the University of Shiraz illustrate that a 28 meters decline of groundwater table has been occurred in the plain of Marvdasht since 1951.

A chemical change in ground water quality
According to hydrological studies carried out by the Geology Department of Shiraz University, the chemical compound of groundwater of the area have been converted from bicarbonate water, which is the typical type of this area to chloride rich water (Department of Geology, Shiraz university, 2016). The isochloride map (see the change of chloride ion concentration in the study area from 1983 to 2009 in the map below) showed significant increase of chloride concentration (150 to 200 mg/l) from 1983 to 2009 near the Persepolis area to such an extent that the bicarbonate water changed to chloride one (Naderi et al, 2014).

DISCUSSION
It is assumed that the underlying cause of superficial cracks is the decrease in water level which, in turn, is affected by the following factors:

i) The drought and sever decrease in annual average rainfall which was reported to be unprecedented during the last 50 years.

ii) The 76 percent increase of agricultural lands during the last 53 years and the development of rice plantation have caused the local increase in surface soil evaporation and the increasing trend continues.

iii) Over extraction of ground water through deep and semi-deep Fars Regional Water Authority in 2014 produced a map of numerous wells located in the buffer zones of Persepolis and Naqsh-e Rustam.

iv) Applying traditional irrigation methods in agricultural lands of the area and cultivation of crops using excessive amount of water such as rice, beetroot, and etc.

v) Annual multiple use of lands for the cultivation of different crops.

It is supposed that the conversion of ground water quality is mostly due to over-withdrawal of water and the general decline of water table has resulted in earth cracks because of earth subsidence.

CONCLUSION
The superficial earth cracks are supposed to be due to the sever decline in groundwater table. The decrease of groundwater table in the vicinity of Persepolis and its suburb construction have intensified the subsidence in southern part under the platform and therefore, increased its vulnerability to get damaged. The fluctuation of water table in the plains and their rapid decrease may cause the occurrence of the induced earthquakes in the region. Also, the establishment of the two dams of Sivand and Dorudzand at 50 and 60km distance respectively from Persepolis and the high number of faults in the region can increase the probability of induced earthquake occurrence. The 76 percent increase of agricultural lands during the last 53 years and vast areas of rice plantation have caused the local increase in superficial earth evaporation. Also, the general direction of winds which is mostly toward Persepolis has caused the moisture content of the air to hit the calcareous monuments and consequently has caused their dissolution by condensation.

The main reason for chloride ion intrusion is the over exploitation of the aquifer in the buffer zones. The intrusion of chloride ions has the potential to dissolve the karstic Platform foundation over a long period of time in the future [9]. This phenomenon could lead in gentle progression of chloride rich water towards the base of Persepolis sofa foundation which, in turn, makes the structures unstable.

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Flood Damages and Disaster Risk Reduction Strategies in Iran, the Cases of Golestan and Tehran

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Abstract
Natural hazards and their disasters have been affecting Iran for many years. The contrasting natural hazards such as floods and droughts have had chronic impacts on Iran of which the floods of Tehran and the Province of Golestan located in the extreme south Eastern part of the Caspian Sea and those of Tehran, the capital of Iran are the obvious examples. The findings of this research show: severe fluctuations of the discharge of Tehran and Golestan rivers due to sudden and severe rainfall especially in hot weather, and land use change in upstream of rivers are the major causes of threat to the life of people and the creation of abundant damages. Most damages of floods in Golestan is related to floods of the Gorgan River occurred in 2001 and 2004 and the floods of the city of Tehran have caused life losses and many damages. The strategies adopted in this study, which include structural and non-structural integrated researches, development of early warning systems, modification of rivers and public education can be effective in reducing the damages of floods in the regions.

Introduction
Land use and floods are closely related; therefore, any changes in land use, such as urbanization, may trigger a sequence of flood occurrences (Hadjimitsis 2010; Alexakis et al. 2014). The effective warning time available to respond to a flood event, the rate of rise of floodwaters, the time of day a flood occurs, and isolation from safety by floodwaters and impassable terrains are all factors that may increase the number of people affected by and loses for flood situations. These factors are important considerations that influence the vulnerability of communities to flooding in reducing and managing flood risk. Effective warning time is the time available for people to undertake appropriate actions, such as lifting or transporting belongings and evacuating. Lack of effective warning time can increase the potential for the exposure of people to hazardous flood situations (Memari and Habibnejad, 2007). In contrast, having plenty of effective warning time provides the opportunity to reduce the exposure of people and their property to hazardous flood situations (Mcluckie, D. 2015). Spatial distribution of flood hazards is not equal even the entire land of Iran (Fig. 1)

Our information about the flood events in Iran come mostly from recent literature, and is not sufficient. For example, according to the Ministry of Power, from 1972 to 1996, 967 floods occurred in Iran of which 117 have made considerable damages. Over the years, it has been estimated that the damage was about 916.200.000.000 dollars (with an average of 39 floods per year and 36.6 billion dollars damages). (Water Resources Management Company of Iran, 2006).

Fig. 2 shows the location of a number of flood types in Iran

Major Causes of Floods in Iran
Natural
• Intense rainfall
• Inadequate vegetation and soil cover
• Steep mountain terrain
Man-made
• Land use changes
• Flood plain encroachment
• Deforestation
• Extensive gravel mining
• Improper design of infrastructure
• Improper urban drainage network

Floods of Tehran Province, a brief description of the flood in the basin of Kan Creek (in 2015)
In Tehran, over the last six decades, there were 14 floods in which, except for the floods of 2015, 2541 people have been victimized (Table 1). 13 floods out of the total 14 floods (over 87%) occurred in the warm season. The flood of 2015 occurred in the basin of Kan Creek river (Fig. 3). Experts believe that the most important reasons of recent flooding was heavy rain with maximum amount of 14.25 mm in a time period of less than half an hour in the upstream area of the Kan river trespassing by people.

Floods of the Kan river
The Kan basin has a total area of 20,500 hectares located on the southern slopes of the Elborz Mountains and its latitude and longitude are 35°58’ to 35°46’ and 51°23’ to 51°10’ respectively (Fig. 3), the Kan river originates from the northwest mountains of Tehran. Its tributaries are Rendar, EmamZadeh Davoud, Keshar, Kyga and Sangan. Average annual discharge of the Kan river is 77 million cubic meters. It’s high potential of flooding is due to steep slope of the basin, geological formation, vegetation cover, and low time concentration. Average slope of mountainous area is 52%

The data presented in Table 2 indicate that the Mediterranean rainfall regime in the major torrential rainfall occurrence in Summer, defines the rainfall of Tehran in 1954, 1994 and 2015 (Table 2).

The major causes of flooding of July 2015 in Tehran were an upstream heavy rain of 14.25 mm which precipitated in less than an hour and land use changes in the watershed of Kan river.

The studies of air photos of 1964 and Geoeye satellite image of 2014 indicate that recently about 6220000 m2 of gardens and 410000 m2 of residential area have been established on the river banks and in the river bed.

Floods of the Golestan Province
Golestan province with an area of 22,000 Km2 is located in the northern part of Iran (Fig. 4). The annual rainfall ranges between 200 mm in the north to 1000 mm in the mountainous and forested lands in the south and southeastern regions of four river basins of Gorgan, Atrak, Qareh and the Gulf of Gorgan.

DISCUSSION AND CONCLUSION
Most of the floods in Golestan are instantaneous with great discharges (Table 3), and ravaging rural lands, pastures and residential areas. Major devastating floods of 1991 to 2014 occurred in the second half of August. During the 1990s and 2000s numerous floods occurred in the province, but specifically the four floods which occurred around river Gorgan in May 1992 and August 2001, 2002 and 2004 are classified as the greatest floods of the province in the past two decades. At 29th of May 2014 a devastating flood occurred in Azadshahr, Ali Abad and Ramian cities. The damages of the Department of Roads, Urban Development, and Agricultural Jihads range 51%, 12% and 8% respectively (Tables 4 and 5). These damages are related to both structural and non-structural types (Table 4). Government officials with the aim of applying preventive measures, have introduced strategies (Table 5) and policies (Table 6) for flood risk reduction in Golestan Province.

Challenges
The challenges of flood management of Iran are as follows:
• Diversity of flood issues/technological, institutional and functional)
• Diversity of flood management approaches (technical, financial, legal, environmental and social)
• Human resources development(capacity building)
• Coordination between different organizations

Conclusion
1-Floods leave many human and financial losses in Iran every year. Therefore, researchers should make extensive studies based on the principles of sustainable development in this field.
2. Climatic factors and, more importantly, land use changes in river basins are the most important causes of flooding in Tehran and Golestan province of Iran.
3. In order to mitigate flood crisis effects, comprehensive training for directors, authorities and the public at national, regional, and local levels are essential measures.

REFERENCES

Table 1: Number and areas of flood-affected cities in Tehran Province

Table 2: Lack and warning time of floods in 2015 in Golestan Province

Table 3: Areas of flood damage in Golestan Province

Table 4: Policies of Flood Risk Reduction in Golestan Province

Table 5: Major causes of flooding in Tehran and Golestan Province

Table 6: Flooded Areas in the Golestan Province

Fig. 1: Heads-Rainfall Map of Tehran
Fig. 2: An illustrated example of flood types in Iran
Fig. 3: Atrak River Basin
Fig. 4: The Kan Creek River Basin
Fig. 5: Topography Map of Tehran Province
Fig. 6: The Golestan Province

Fig. 1: Flood-Occurrence Map of Tehran
Fig. 2: An illustrated example of flood types in Iran
Fig. 3: Arrangement of flood-prone areas in Tehran Province
Fig. 4: The Kan Creek River Basin
Fig. 5: Topography Map of Tehran Province
Fig. 6: The Golestan Province
An agricultural disaster would limit the available food options. The following is a proposal of alternate foods that are available post-catastrophe because they consume biomass or fossil fuels. When eaten in the proposed combination, they provide adequate daily nutrition for an average adult.

**METHOD**
1. Found post-catastrophe foods available to fulfill daily caloric (2100 kcal) intake
2. Compared nutrient contents of foods to US Recommended Daily Allowance (USRDA)
3. Found available foods to fill in nutrient gaps in previous foods.

**RESULTS**
- From this list a diet was composed from the alternate foods
- As all essential nutrients are present in list, it must only be balanced
- Following charts are the proposed diet and its nutritional information as compared to the US RDA.

**CONCLUSION**
The sample diet provides adequate nutrition using only the alternate foods available during the agricultural crisis. In other words, it is technically feasible to provide for the nutritional needs of the planet during a widespread, agricultural catastrophe.

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Introduction of new method on engineering risk assessment: Engineering Errors and Effects Analysis (3EA)

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ABSTRACT: Construction and commissioning accidents investigation shows that engineer’s errors in basic and detailed phases are the main causes. We will gain more efficiency of investment if we apply a method for Error identification and risk assessment in basic and detailed phases. This Risk assessment method can reduce costs and improve environmental protection, safety and reliability of designs. The main purpose of this study is to identify engineer’s errors and analyse their HSE effects.

3EA-Safety Risk Assessment:
1. Severity
2. Probability
3. Extent of Effects
4. Control effectiveness factor

<table>
<thead>
<tr>
<th>Severity</th>
<th>Probability</th>
<th>Extent of effect</th>
<th>Control effectiveness factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

Risk No. = A*B*C*(D+E)

EA- Environmental Aspect Assessment:
1. Severity
2. Probability
3. Control effectiveness factor
4. Compliance with legal

<table>
<thead>
<tr>
<th>Types of emission</th>
<th>Adverse effect</th>
<th>Sustain/ Energy</th>
<th>Extent of effect</th>
<th>Control effectiveness factor</th>
<th>Compliance with legal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

Risk No. = (A+B+C+D)*E*F*G

Objective of 3EA method is finding human errors at the basic and detail phases. “Hazard” is defined “Error” in the 3EA method. 3EA method could be used in all engineering fields that are related to design including electrical, mechanical, process, control and instrument, piping and civil and so on while preparing project document in basic and detailed phases. Effect analysis is done both on safety risk and environmental aspect. 3EA helps us to categorize project documents based on importance and potential of error occurrence.

CONCLUSION:
After risk and aspect assessment with 3EA, priority processing of risk numbers must be done. Author has been applying 3EA in 7 project in oil and gas field and 5 projects is starting to find risk and aspect based on 3EA. This method is applied in Iranian south Pars projects that cause improvement of HSE control. Engineers’ awareness about HSE requirements are improved after applying 3EA. Process of preparing project documents are corrected and design led to eco-friendly design. This method helps to us to gather a database of potential points in preparing documents process that could be harmful if these would be missed. Some of engineering documents are prepared based on new procedures. Experience of engineers for preparing some documents is changed and necessity of engineers experience for preparing some documents is accentuated. Results of applying 3EA completely related to HSE concern of companies.
Clustering Technological Hazards Caused by Natural Disasters in Urban Areas Using Interpretative-Structural Modeling (ISM)

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Introduction

Natural disasters such as floods, earthquakes, explosions, fires, etc. have always threatened human lives of different societies. Another more serious risk is technological hazards caused by natural disasters in urban area especially industrial cities and metropolises. Natural disasters in cities might be the cause of huge technological disasters for their residents. That is why countries, particularly industrialized countries, have been added them to the list of hazards that must be managed and have been strongly prepared for possible disasters caused by such hazards. Given the importance of this issue, this paper attempted to cluster the technological hazards caused by natural disasters in urban areas.

Methods

Based on earlier studies and interviews with experts, a series of these hazards were identified. These factors were analyzed using interpretive structural modeling technique and finally the relations and sequences of indicators were obtained.

Results

The results showed what the sequence and relationship of the potential damages caused by the occurrence of the phenomenon on the study population which could be the whole country, a province, a city or an economic sector or a particular activity. Based on the extensive consequences of the hazards, it could be realized what would be the costs and benefits of implementing precautionary and preparedness measures.

Conclusions

The study revealed that the most primary outcomes of a major natural disaster include widespread power failure (housing, transportation, banking, industry, trade etc.), failure of oil and gas pipelines, disruptions in satellite systems and communication lines, and interruption in air, sea and land transportation systems. The model also provided an insight that would help urban managers in strategic planning to prepare for the technological hazards caused by natural disasters.

Keywords

Natural Disasters, Technological Hazards, Urban Areas, Clustering, Interpretive-Structural Modeling

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ICSU ROA Science Plan (2007) Natural and Human-induced Hazards and Disasters in sub-Saharan Africa
Abstract:
The interaction of climate and architecture is an inevitable issue. Architecture plans require atmosphere, which is a part of the design. In this research, the climate characteristics of the region will be imperfect and costly. Creating urban spaces, residential environments and buildings all require attention. In this paper, urban architecture and the role of climate in the design of residential buildings is one of the most important factors affecting designing views, the necessity of investigating utilization of views will be important due to climatic principles in the design.

In this article, there is a description of residential area and the climate, to be more exact, and the necessity of designing views, the necessity of investigating utilization of views will be important due to climatic principles in the design.

The results show that benefit of the views from residential architecture of the region can lead to produce stable conditions in regards to architecture and climate. In line with climate, creating an integrated urban landscape, promoting and how to use the natural architectural motifs of climate and sense of belonging and achieving to solutions that can be effective in contemporary architecture to achieve architecture in line with the climate field.

Keywords: climate architecture, view, dry and hot climate

Introduction:
Climate is the interpretation of atmospheric conditions that is specified by the quality and development based on climate. Meteoreological conditions of weather that are in a certain region are due to the temperature and solar radiation, materials and climate of the region. Climate as a natural phenomenon is always considered by urban planners and architects. During history of architecture and building, designers has always been trying to respond to weather conditions even the architects of socialized traditional buildings. In this regard, the climate has been elaborated and precise expression. Given a set of principles in the design of buildings by designers and architects can lead to optimal design in terms of human comfort and energy saving and follow adaptation of form with the environment and field. Climatic design is a method to comprehensive reduction of energy of a building. Building design is the first line of defense against external climatic factors of buildings.

The placement of buildings in the area of the country, mainly are in the central and eastern regions of the country that climate of these areas is warm and dry. Geographical characteristics of climatic conditions of plains of the plateau is so that dry and hot weather in summer and cold and dry in winter. However, the plain does not have heavy humidity, very low vegetation, large temperature of difference between day and night, the winds associated with dust in desert environment. The plain is unlike the desert due to climatic problems of architecture in the effect of experience by thousands of years, has provided logic solutions for a desert environment. However, the role of contemporary architecture, lack of attention to climatic architecture principles caused urban landscape disorder.

Disarray of view is not limited to residential buildings and covers all buildings. But given that residential buildings are the most influential factors and the largest elements of a city's perspective, special attention to their design has a major impact in organizing the urban environment. In this article, the view disarray is one of the most common issues criticized by architecture and urban designers, but less is paid attention to this subject in form of research. In this article it is tried to examine the major climatic factors in orientation of urban views, in hot and dry climate conditions. To this end, the principles and solutions and how to extend these principles in contemporary architecture are examined.

1. Statement of the problem:
1.1 The necessity of compatibility of view with indigenous and climate architecture
The necessity of matching the views with the climate is evident and architecture plans without attention to climatic features and local weather will be incomplete and costly and the necessary and required spaces in residential areas, buildings and streets all need to attention to climate and climate studies.
The main issue in contemporary architecture of today's world is discordance between indigenous and climate architecture and modern requirements. The reason of need to review past solutions for adapting present conditions is that architecture of those days has been the result of continued process of local architecture. While in the past it was generation to other generation over the long time and their continuity and status was tested by error and testing over hundreds of years. Suddenly disconnection of this process in result of faster and easier solutions by modern architecture forced us to forget all the ecological methods.

1.2 Investigating how to introduce the positive features of indigenous and climate architecture in line with organizing views of contemporary architecture

2.1 Orientation of the building to get the levels to the light:
The spatial arrangement of buildings in hot and dry areas to the sun is east-west direction. Because south wall in winter gets more amount of energy and the wall can be protected by canopies in summer. Eastern- western walls that in summer get too much energy should have even less levels. So the direction of the building should turn to east and west and the climate conditions of the area are transferred to the west level of the building. The advantage of this procedure is that a part of the western side utilizes the south light. Of course, by doing so, a part of the North side gets the light, which can be another source of light. In Eastern Front also can be used awnings.

2.2 Opening:
One of the shortcomings of the new architecture is the use of large windows with large glass. This issue affects in temperature of building and rapid penetration of external air into the building and environments. Adequate standard of environment, reduce dust around building, reduce the speed of unfavorable winds around building, increase humidity and reduce temperature around the building.

1.2-7 the effect of wind on elements of view:
Window position the wind direction substantially influences inside a room's natural state. The main principle to create comfortable and effective ventilation is that openings parts should be placed on both sides of the window and leeward, especially in areas that air flow all over a room is necessary. The best conditioning occurs when wind direction tends to the window surface. By windbreak on surfaces of view can consolidate the wind impact on the position of the window.

2. Conclusion:
After reviewing the factors of climate affecting physical structure of view in hot and dry climate in Iran has been trying for advancing the goals of climate architecture in contemporary architecture of these points express solutions that can be effective in mountain architecture to architecture in line with the conditions.

- Orientation of the main view in the Eastern -westen and control it in summer by animated openings
- Use heat insulation on the north side and vertical canopies on the Eastern front
- Choosing small openings surface to minimize heat gain and control entering sand and dust to inside space and use the canopies on the use of large windows
- Use of materials with low thermal capacity for canopies
- Use of materials with low thermal capacity for canopies
- Use concrete wall with a great capacity to view surface
- Use of bright tones for view to avoid light and heat
- Use dense trees such as cypress and pine in Western levels to control light and reduce unfavorable dust and wind on view
- Use windbreak to adjust the direction of the wind to the windows

References:
Devoted to Mr. Kamal Khadka who is a forest fire martyr from Guli District.

Forest fire management: a missing agenda which needs a swift action for the disaster management in Nepal

(Discussion for policy transfer to implementation sectors)

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INTRODUCTION

Background

- A key driver of deforestation in Nepal.
- Nominal allocation of the budget below 1 per cent annually in the forestry sector (Out of forestry sector budget).
- More than 25,000 community groups are managing about two million hectare forest areas.
- About 250 groups have been capacitated regarding forest Fire management through awareness camp, training of fire fighting basic tools and prevention activities: forest path maintenance, control firing on grass field.

OBJECTIVE

Assess the government’s intervention to control and mitigate the forest fire problem to save life people and the ecosystems.

METHODS

Review of the policies and analyze of the past five year’s budget allocation in the country to forest fire management.

RESULTS

Mainstreaming in the Programme

a. Policy/Plan

- The National Strategy for Disaster Risk Management of Nepal, 2008 has poorly stated for the forest fire management issue.
- Policy transfer process is in reverse system for the forest fire management.
- The forest act was enacted in 1993 followed by the forest fire strategy, 2009 and finally a few policy options included in the recent forest policy, 2014.

b. Programme in action

About less than two per cent group have been implementing as such professional forest fire management systems during five year period (out of 25000 user groups- 2 million ha areas) The remaining communities are dependent to follow the traditional methods.

CONCLUSIONS/Recommendations

- The forest fire management is still not getting a mainstream agenda for disaster risk reduction; the known leading plans in the forestry sector have been implementing a few activities seem inadequate in the field to grab the emerging issue.
- The earthquake of April 25th, 2015 has triggered to think more in natural disaster management through strategic and a concrete plan.
- The study recommends stimulating swift action to develop the forest fire management mainstreaming plan for all over the country as a major disaster risk reduction in the forestry theme.
- Forest fire should also be included in Disaster Risk Reduction mainstream plan from the government.

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DIAGRAM:

- Annual burnt area
- Fire coverage by physiographic zones

Devoted to Mr. Kamal Khadka who is a forest fire martyr from Guli District.

Graph: Annual burnt area by months, mean monthly ppt. and temperature

Table: Budget allocation annually in million NPR

- Annual Burnt area
- Fire coverage by physiographic zones

Figure 1: Fire coverage by physiographic zones

Plate 1: Forest fire coverage by physiographic zones

Devoted to Mr. Kamal Khadka who is a forest fire martyr from Guli District.
Assessing flood risk for urban areas in the Lower Don River using GIS and Remote Sensing

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Introduction

The increased frequency of extreme events and uncertainty in weather patterns, accompanied by growth of urban population, related urbanization and corresponding increase in disaster exposure, contribute to rising numbers of affected people and economic losses from natural disasters. Floods stand out as one of the most common hazards, which can affect the population and assets on a great territory (EM-DAT 2016). This research was focused on assessment of changes in flood risk caused by expansion of urban areas to flood-prone territories. The Lower Don River floodplain (Rostov Oblast, Russia) was selected for analysis, since this region is both rapidly developing and historically (before the construction of the Tsimlyansk dam in 1952) was considered to be a flood-prone area (Fig. 1) (Lagutov and Lagutov 2011).

Methods

The urban area flood risks were identified through a 2-step process: identifying urbanized areas in the floodplain and simulating potential severe flood events.

Remote Sensing and GIS

Satellite imagery was used to identify changes in land cover, particularly expansion of urbanized areas in the floodplain from 1985 to 2013 (Fig. 2). Landsat 5 and Landsat 8 data were used for years 1985 and 2013, correspondingly. Additionally, satellite images for the spring months of high-water years were acquired and processed using Esri ArcGIS 10.

Simulation

The potential flood extent and propagation were assessed using the combination of remote sensing and modelling tools. Flood simulation using modelling package can allow identify territories that are at the most risk, flood wave speed, time required to reach a particular settlement and other flood characteristics (Fig. 3). The hydrological model for the Lower Don River was developed using FLO-2D cellular automata-based model (FLO-2D 2016). Five alternative flood scenarios were formulated based on recorded floods statistics and tested using the developed model (Rosvodresursy 2013).

Results and Discussion

The urbanized areas in the Don floodplain were identified using supervised classification of Landsat satellite imagery. Although the total population of the Rostov Oblast in the considered time period slightly decreased (ROSTAT 2014), the population within the study area, especially in the large and economically important cities, grew following the global urbanization trend (Fig. 2). The total built up area within the considered region (Fig. 2) increased by the 171 km² from 1985 to 2013.

The developed flood risk maps for the five simulated scenarios were combined with the urbanized areas identified through remote sensing for both considered years. As a result flood-prone urbanized territories for each scenario were acquired (Table 1). The territory of the flood-prone built up areas increased from 1985 to 2013 for each scenario.

The most endangered settlements on the floodplain were identified. One of the most risky area is the floodplain to the East from Rostov-on-Don. Though no large settlements located there, many existing newly constructed villages will be submerged in all scenarios. Simulations showed that no historical large settlements are endangered, since they are located on uplands, outside the floodplain (e.g. Rostov-on-Don, Novocherkassk). However, the existing development strategy and plans of the Rostov-on-Don agglomeration suggest city expansion to the floodplain area (Lagutov and Lagutov 2011). Moreover, some of the medium size settlements which were actively developed after the construction of the Tsimlyansk dam, like Bataysk or Volgodonsk, can be characterized as unsafe areas. The territories directly downstream the Tsimlyansk Dam were identified as the most risky.

Conclusion

The urban expansion to the historically inhabited floodplain areas became possible due to the construction of the high-pressure Tsimlyansk dam, however, the dam cannot guarantee safety of the newly developed infrastructure downstream and communities must be aware of the risks. The most hazardous urbanized areas within in the Lower Don floodplain with highest flood hazard risk were defined, by simulating flood intensity for five scenarios. It was found that generally small villages on the river bank within the wide part of the floodplain would experience the most intense flood, together with the territory right under the dam. Currently most of the large historical cities lie within the safe uplands, however, some newly built settlements are situated at the of the low level bank as well as planned city district of Rostov-on-Don, which might be submerged in case of severe flood. The results acquired through this research might be of interest not only to local stakeholders (urban planners, local population), but also to a broader research community.

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Consolidation of Disaster Data on Construction Works and Buildings in Belo Horizonte City - Brazil 2009–2015

LARA, Helen B.1, AZEVEDO, Rogério C.2, ALVES, Alexandre L3, ROSA, Deyvid W. B.3, ALVES, Marcos F. G.4

Introduction

Belo Horizonte (BH) city is the capital of the state of Minas Gerais – Brazil and its metropolitan region is the third largest urban concentration in Brazil (IBGE, 2015).

Although more traditional approaches only consider disasters as large scale events, the Sendai Framework for Disaster Risk Reduction 2015–2030 urges a new perspective: little scale events should be considered as local disasters and attention should be given to them so that they do not reach large scales (UNISDR, 2015).

In 1979, the Municipal Civil Defense Office (COMDEC) of Belo Horizonte was created to manage disasters and risk. Community integration is its working basis, by which the agency won the United Nations’ Sasakawa Awards 2013. This contribution aims to consolidate and analyze the amount of disaster data recorded by the Civil Defense Municipal System (SIMDEC) from 2009 to 2015, focusing on construction related occurrences.

Disaster Data Treatment

Methodology

Data was obtained from SIMDEC records. The amount of human origin event records represents 65% of all occurrences and compose the object of the research.

As most of the events related to construction works are punctual in space and time, all occurrences of the same nature, recorded in the same day, in the same street and neighborhood, were counted as only one event.

Disaster Mapping

Methodology

The disaster consolidated data were joined and related to the shapefile basis of neighborhoods. The population data of each neighborhood, according to the census made in 2010, as well as the terrain slope information, were included in the analysis.

Results

As expected, more occurrences of disasters and threats can be observed in the most populated neighborhoods, whereas few or none events were registered in sparsely populated areas.

Some irregular urban occupations, like the favelas Morro das Pedras (highlight A) and Aglomerado da Serra (highlight B), are located in areas strongly undulated and hilly, which exposes these areas to higher risks.

While the formal city presents an annual average of disasters and threats per area of 9 occurrences per square kilometer, the favelas and villages present 36 occurrences/km². Notably, this rate increases to 51 and 50 occurrences/km² in Morro das Pedras and Aglomerado da Serra, respectively.

81% of occurrences were recorded in formal city areas. In addition, from the 20 neighborhoods with higher occurrence records, 10 are notably middle-class areas, where construction works are often supervised by engineers, which indicates that risks are not being taken into account fully.

19% of the disasters and threats happened in favelas and villages, which accounts only for 5% of the municipal territory and 15% of the city population.

Conclusion

Sendai Framework invites all communities to a new approach in disaster management: multidisciplinarity and focus on both national and local scales. This contribution was based on this perspective, looking for the parcel of disasters and risks related to construction works and buildings in the municipal scale of Belo Horizonte. Treating these data and consolidating them can help substantially in decision making processes, providing faster updating of the contingency planning and publishing information for community awareness. The risk perception of engineers and construction managers is fundamental to disaster risk reduction. Reducing the risks and mitigating the impacts of an event remain great challenges for the actual construction sector, where the risk perception by engineers and construction managers is of fundamental importance.

References


Using the AP method, the current research surveys the progressive failure potential of a 3-story RC intermediate moment resisting frame structure using the aforementioned assessment leads to a considerable decrease in the number of fatalities.

Abstract
Progressive collapse is a dynamic and nonlinear phenomenon. According to the static analytical approach presented in several existing regulations, a load enhancement factor of 2.0 is required to simulate nonlinear and inertial effects. However, in nonlinear static procedure, the multiplier is only used for estimating the dynamic influences of the loads. The current research investigates the progressive damage potential of a Reinforced Concrete (RC) frame structure subjected to sudden column removal and evaluates the accuracy of the applied Dynamic Increase Factor (DIF) approximating the nonlinear dynamic solution for the nonlinear static method. For this purpose, based on the acceptance criteria recommended by UFC 4-023-03 document, nonlinear static (push down) analyses have been carried out to evaluate the progressive failure resisting capacity of intermediate RC moment resisting frame due to instantaneous central-column elimination at different elevation locations.

Research Process
Using the AP method, the current research surveys the progressive failure potential of a 3-story RC intermediate Moment Resisting Frame (MRF) designed per Iranian Seismic code due to instantaneous column removal. Furthermore, the study investigates the validity of DIF recommended by UFC guideline by comparing nonlinear incremental dynamic analytical results with those obtained from nonlinear static procedure. In other words, as IDA method considers both nonlinearity and dynamic effects, it is the most accurate tool to evaluate the structure’s progressive collapse resisting capacity. Thus, by comparing the capacity curves obtained from the two displacement based and force based analytical approaches, the precision of the applied DIF can be determined.

Analytical Results

Conclusions
• As the load factors were all less than 1.0, the collapse occurs in the structure due to sudden first-, second- and third-story column destruction.
• Removing columns at upper stories leads to the lower amount of load factor due to redistribution of loads among fewer elements.
• Comparing the maximum load factors obtained from nonlinear static and IDA capacity curves, it can be concluded that the applied DIF, which is significantly less than 2.0, is consistent with the real responses of the structure under column elimination. Thus, the UFC guideline’s empirical formulas present an acceptable estimation of the dynamic effects in AP nonlinear static procedures. Utilizing a DIF equal to 2.0 would lead to a significant underestimation of the structures’ progressive collapse resistance as well.

Added Value for Integrative Risk Management and Urban Resilience
As progressive collapse phenomenon can be triggered by man-made or natural hazards and may result in substantial casualties, it is vital to assess the progressive failure resistance of structures accurately. The findings of the current research work help engineers to present a reasonable evaluation of the structural performance of buildings against a critical element destruction without using complex and time consuming analyses. Also, designing progressive collapse resistant structures using the aforementioned assessment leads to a considerable decrease in the number of fatalities.
ZIKA VIRUS OUTBREAK, AN INTERNATIONAL CONCERN
6th International Disaster & Risk Conference Davos 2016
Davos, Switzerland
Angela Medina BSN, MPN, RN, CBNP, AMBCI, CEN

Zika Virus Transmission Cycles

Risk Analysis

Molecular Diagnostics

Viropower

RNA copy of virus

Zika Virus

Zika Virus

HCV

HIV

Zaire EBOV

Zaire EBOV

Molecular Diagnostics

Via polymerase chain reaction (PCR)

Available through CDC & diagnostic laboratories

This test is only positive during the acute phase of illness (days 7)

Concordance (Que D) has been approved by the FDA

Diagnostic Test for Zika Virus

Zika Virus

Zika Virus

Zaire EBOV

Zaire EBOV

Risk Analysis

Zika Virus is a major public health concern due to significant increase of congenital defects, e.g. microcephaly and Guillain-Barré Syndrome (GBS). Zika virus can be transmitted through blood transfusion, sexual contact, perinatal transmission during labor. - A United Nations report found high levels of Zika virus in semen up to 62 days after the onset of illness. 10% of uncompensated patients receiving blood transfusion. - Women who travel and get bitten by infected Aedes mosquitoes during pregnancy can infect their partners through sexual contact. - Aedes mosquitoes “can replicate in flower vases and tiny sources of water, hence mosquito replication is not limited to the urban environment.” - Female mosquitoes are an aggressive biter and prefer daytime to dusk and indoors to outdoors.  - 10% of women of reproductive age infected with Zika virus exposure

Zika Virus Disease

• Due to clustering of microcephaly and neurological syndromes, the World Health Organization (WHO) declared the situation a Public Health Emergency of International Concern as of June 1, 2016. [1, 2]
• This presentation will provide an overview of Zika virus, the phase of emergency management, e.g. Zika virus prevention/mitigation, preparedness, risk communication, response and recovery.

Epidemiology

Zika virus was first discovered in 1947 in the Zika forest in Uganda. Since 2014, 31 countries and territories have reported Zika virus disease in the Region of the Americas since 2015. The picture below, in purple, highlights countries that reported Zika virus disease in 2015. [3]

Zika Virus Outbreak: An International Concern

Treatment and Response

Risk Impact Analysis

- A result in economic loss, e.g. decrease in airline sales due to limited travels, tourism industry, foreign investments.
- President Obama calls for a $1.9 billion to accelerate vaccine research and development for pregnant women and help affected countries. [8] Congress unveiled a $622 million package for Zika virus (H.R. 5611) while U.S. Senate is set to approve $1.1 billion to fight Zika virus (H.R. 5196). Some members were clamoring to approve an additional $6.9 billion; roughly $2.5 billion of that amount is for health preparedness.
- In terms of preparedness, Congress unveiled a $622 million package for Zika virus (H.R. 5611) while U.S. Senate is set to approve $1.1 billion to fight Zika virus (H.R. 5196). Some members were clamoring to approve an additional $6.9 billion; roughly $2.5 billion of that amount is for health preparedness.
- WHO reaffirmed that “only pregnant women and their sexual partners need to consider prophylaxis.”
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- Zika virus disease is usually mild and requires no specific treatment. However, pregnant women who do not understand that they are pregnant can be at risk. In a result, $1.9 billion to accelerate vaccine research and development for pregnant women and help affected countries. [8] Congress unveiled a $622 million package for Zika virus (H.R. 5611) while U.S. Senate is set to approve $1.1 billion to fight Zika virus (H.R. 5196). Some members were clamoring to approve an additional $6.9 billion; roughly $2.5 billion of that amount is for health preparedness.
- Dengue vaccine may lead to A Zika Vaccine
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- Zika virus is an emerging mosquito-borne disease.
- Single-stranded RNA virus that belongs to the Flavivirus genus.
- Transmission by Anopheles albopictus, Aedes aegypti, and Aedes albopictus. [7]
- Zika virus is transmitted through infected mosquitoes, sexual contact, perinatal transmission during labor. - A United Nations report found high levels of Zika virus in semen up to 62 days after the onset of illness. 10% of uncompensated patients receiving blood transfusion. - Women who travel and get bitten by infected Aedes mosquitoes during pregnancy can infect their partners through sexual contact. - Aedes mosquitoes “can replicate in flower vases and tiny sources of water, hence mosquito replication is not limited to the urban environment.” - Female mosquitoes are an aggressive biter and prefer daytime to dusk and indoors to outdoors.  - 10% of women of reproductive age infected with Zika virus exposure

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- The National Institute of Health (NIH) overview a study of all participants who volunteered to be infected with only mosquito-borne dengue fever virus. 100% of the participants who received dengue fever vaccine (V700) were protected from the disease. All volunteers who received the placebo dose came down with symptoms of illness. [11]
- The development of a dengue vaccine may lead to the development of a Zika vaccine. [6]
- A licensed dengue vaccine, (Dengvaxia), is available in Mexico and other countries in Latin America and El Salvador. [7]

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The role of Children in Disaster Risk Reduction

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Abstract

**Background:** Children are a major group who are affected by natural and manmade disasters in the word. So, Children as vulnerable group should be considered in disaster risk reduction policies. The main objective of this study is being attention to children in disaster situations by positivism approach that would be child capacity in disaster risk reduction.

**Method:** This is a qualitative study design focusing on the positive role of children in disasters and disaster risk reduction. Several peer review group discussions had been done by national and international experts. Major related databases were evaluated to make evidence base documents and assess if the hypothesis—children has capacity that should be consider in disaster risk reduction—is worth to be consider or not. Principle investigator had participated at international conferences and meeting to find the key person for the question. PI had contacted with experts in the field of child, disaster and disaster risk reduction by face-to-face interview at international conferences and also Skype interview had been held and followed by emails to extract data according the study aim. Furthermore, contextual analysis was used for data synthesis.

**Finding and conclusions:** In new approach it is believed that children have potential capacity instead of vulnerability. Accordingly, children ability should be recognized to improve risk reduction programs in the community and in this way decrease the consequence of disasters on children health and their happiness. Up to now, because of less attentions to child capacity in disaster risk reduction schedule’s; it is necessary that policy makers concentrate on further concentrations regarding to how they use the children potential capacity for both natural and manmade events.
INFORMATION SYSTEM FOR DECISION SUPPORT AND RISK MANAGEMENT FOR URBAN PLANNING OF SETTLEMENT AND INFRASTRUCTURE (IS URBAN)

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Keywords: Information system; Decision support; Risk management; Soft computing; Urban solutions;

Abstract: The aim of the development is to create an information system for decision support and risk management in area of future urban solutions from point of view friendly settlement and infrastructure. This system will evaluate (in a multidisciplinary and multi-criterial way) risk of future utilization of an area. Outputs of the system will be useful for decision-making of land usage and will apply to urban solution, urbanism and development studies. For effective assessment and risk modelling we used methods based on theory of complex systems or soft computing.

In the last century, there were extensive changes done in the landscape. It was a deep mining of coal and lowering of groundwater level in the first step, then the open case mining in the second step, which was followed by partial filling in of the pits by dumps and, flooding of the residual pit by water in the end. Thus, an environment was created, which structure changes significantly in time and space, changing the conditions for following utilization due to this. Accountable decisions about next exploitation of these landscapes and areas ask for complex information based on multi-disciplines approach. It is the only way how to take into account all the risks, which could disturb or limit the development.

The landscape after finished coal mining, which has been chosen as a model location, has a lot of very unusual parameters, which make unapplicable the common methods used in landscapes or civil engineering. The outputs from IS URBAN allow to the future users of these landscapes with non-standard natural conditions to carry out more easily a monitoring of complex interactions between natural processes and technologic systems as a base for evaluation of future exploitation or of different actions by integration of different points of view. Thus, it will be possible to choose a usage for a specific part of the landscape in such a way, which will not be disturbed nor limited by specific features or functions nowadays and in the future, too.

The goal of the project is to research and develop an informatics system for supporting of decisions, which have to be done in areas of urban planning, namely in projects aimed on realisation and exploitation of residential zones with cost-saving infrastructure, which is also environmentally a sociologically favouring also for areas touched by intensive industrial activities (brownfields).

Said informational system has been tested on a specific site, which is the revitalised area in neighbourhood of the “Lake Most”. The system will collect the relevant data and create a supporting base for to evaluate risks connected with exploitation of the territory from the urbanistic point of view. This evaluation of risks should avoid to make non-effective investments on sites, where some kinds of risk could be initiated in the future. The informational system (software) includes elements of artificial intelligence and non-linear dynamic. Also new methods will be incorporated in the system, those have been proposed in the form of complex method for to evaluate suitability of a territory for urbanistic exploitation including risks based on verified or newly gained analytic and empiric relations. The evaluation will fall on different points of view, including economically favourable, environmentally and sociologically friendly ones, under influence of time and, it will make possible to use different scenarios, which have to be evaluated from the urbanistic points of view. The method has been based on the approach that by reaching of certain threshold values during different ways of the landscape exploitation one can notice different stages of unstability in certain parts of the exploited territory including endangering of goals, i.e. investments.

The solution of the project uses theory of complex systems and non-linear dynamic. For chosen parts of the system, there will be proposed different criterias and evaluating principles, based on proven analytic or empiric practices. These practices will be used by developed informatics tools, which will provide results and data for decisions about future exploitation and next directions for development of the territory. Together with classic mathematic and statistic methods, also tools and methods from the area of soft-computing will be used.

When making a multi-criterial evaluation of risks, a method should be used, which allows to evaluate the total value of risk connected with the landscape and its future exploitation. For to be able to calculate such clearly defined risk values for each locality, it was necessary to propose the system of finite steps (methodology), which enable, after certain exactly defined steps, to calculate or to estimate the crisp risk value for the landscape. It the same time, it has to inform us about uncertainty or plausibility of this value for decisions in the future.

For this reason, it was necessary to propose an integrated method, which incorporates both the classical deterministic approach and the approach known from theory of complex systems. It was also necessary to consider the fact, that we don’t have all the data necessary, in requested time or spatial density. That’s why it was necessary to combine classical mathematic or statistic methods for evaluation of time series together with tools, which enable to transform unmeasurable or estimated or even approximately factors into numerical model with the goal to evaluate and predict features of the system after extreme change of conditions for some of its input parameter.

This methodology have been integrated into Information System URBAN, which is system for decision support in usage of landscapes after re-cultivation. IS URBAN was developed as the system for information and risk evaluation. The system is based on complex problem-aimed data from monitoring of dynamic processes in hydrology, hydrogeology and hydrochemical status of a landscape and selected geodynamic processes in real time. This system enables to carry out a sensitivity analysis and to evaluate related scenarios as a base for knowledge based decisions about concepts of regional development or, as a base for more effective and more complex evaluation of variants of activities for revitalization or hazard avoiding.

For to be able to evaluate a definite size of risk for each site, it was necessary to create a comprehensive procedure (method). It must be able to calculate a clear value of risk in the site after some exactly defined steps and, it must be able to evaluate the plausibility of this value for future decisions. It has to be noted, there are not exactly measured values available for some factors, with requested frequency or in real time.

The systems for support of decisions generally include supporting tools for evaluation and controlling processes, which guide the user, when searching and evaluating variants of solutions and decisions. The system IS URBAN has been tested and implemented on model sites Lake Most. The information system URBAN here collets available data including making overview of classified information about sites, including possibility of their further processing. This system also enables to administrate the site based on both historic and newly created analysis for strategic and operating decision about technical exploration. The tested sites are characterized by complex natural and anthropogenic conditions.

The system will collect and transfer the relevant data and create a supporting base for to evaluate risks connected with exploitation of the territory from the urbanistic point of view. This evaluation of risks should avoid to make non-effective investments on sites, where some kinds of risk could be initiated in the future. The results of this work can be used over long time period due to the fact, that there will be next open-case mines closed in next years. The aim when creating the IS URBAN will also be to secure its easily extension-ability also for other environmental data, which makes it possible to use also for other areas touched by human activities, such as re-cultivation, or on areas endangered by geo-hazards etc. We suppose, the users will be mostly owners and estate-keepers or authorities.
The main evaluation of water-reserves in underground has been done in Czech Republic by large hydrogeological survey in years 1970 - 1980, but without consideration of surface-fluctuation of water-reserves. In this scope, also a monitoring net has been proposed, which has been later used also for monitoring of surface of water-reserves. It means, that in the past no data about water-reserves have been available and, there was no demand to have any tool, which collects, stores and evaluates time series of different nature. Today, long-term continuous data collections (time series) about rainfalls, temperatures, surface-fluctuation of underground water and about flows are available, which can be used for local changes in water-reserves availability, to evaluate actual surface of underground water, to describe mechanisms having influence to underground water and, to test credibility of monitoring system.

For to solve the above described problems, sophisticated software tools have to be used, which enable to work out data of very different nature (gained from different sources) and, then to create an informative database for their analyse and for prediction of next development. Nowadays, the solvers of hydrogeological models, which allows, after certain exactly defined data, to calculate, to analyse the data only partially and with difficulty because of their diversity. But, because the hydrogeological structures are systems with very intensive dynamic, the evaluation of their changes during time must be realised continually on both local and regional level. It is also necessary to update the databases regularly and to work them out on a unified platform. Today, there are also problems with interpretation of historic data in unity with actual analyses, because some parts of older input information can be lost. An information system, developed in the scope of proposed project, should enable to store data from different sources into common database and to explain their importance for history and future development of water resources including trends.

The information system becomes a tool for creating database of all available data, connected with resources of ground waters. It will enable to collect, store, manage and analyse of hydrological and hydrogeological data in user-friendly environment. The data corresponds the long-term monitoring data (treatment and display of raw data, data derivation, data visualization, trend analysis, time series and spatial distribution analysis) and methodology for use of the long-term monitoring data for assessment of existing groundwater resources and their future changes in given area, considering expected development of climate and land use. For effective assessment and risk modeling we used methods based on theory of Complex Dynamic Systems or Non-linear Dynamics.

The information system has been tested on 2 localities (“antilice Jelitchovice” and “Tlustecky blok”), used for waterworks purposes. In the same time, for these localities long-term time series of rainfall, underground water surfaces, consumption and flows are available. The next goal of the testing is to incorporate all the available data, including models and information connected with capacity of water resources for different climatic scenarios. The information system presents data for reading and evaluation done by expert(s) (i.e. graphs, maps, GIS) or for export in selected formats of simulation tools. The evaluation method includes influence of average temperature and rainfall together with frequency of extremal climatic and other influences (if they prove to be important, for example change of infiltration ability of the landscape) into sources of underground waters, together with influence of drainage and consumption of water.
Application of Numerical Weather Prediction and Data Assimilation in Meteorological Disaster Risk Management in Tehran: Dust Storm

ABSTRACT

Numerical weather prediction models such as Flood, thunderstorms, hurricanes, etc. cause enormous casualties and property damage in different countries around the world. To provide accurate data and reduce losses, a complex warning system is an effective practice to identify high-risk areas and disaster scenarios and states. The management of weather disasters and implementation of early warning systems are very effective in forecasting future weather conditions. These models can simulate weather in different times and space scales on global and regional scales, but they have limitations because of inaccurate initial atmospheric conditions to the model. An important component of numerical models is numerical weather prediction models. Data assimilation is the application of advanced mathematical methods to estimate current meteorological states and past data on an explicit. Dynamic model to provide time continuity and dynamic coupling amongst the meteorological fields. Therefore, data assimilation can help to reduce bias and uncertainty in weather prediction. There’s very important in design of early warning systems for flood, storms and other meteorological disasters. In this study, we use a regional weather prediction model, data assimilation method and some satellite images to analyze the dust storm event in the Tehran region. We conducted this study with support from the International Meteorological Organization. Simulation of the weather phenomenon demonstrated that using data assimilation can improve the model performance in forecasting weather events.

INTRODUCTION

Numerical weather prediction models are very useful and valuable information to quickly respond to emergency situations. For meteorological problems, this information is usually provided to decision makers through decision support systems (DSS). DSSs are a numerical weather prediction model (NWPM) entirely computer-based model that simulates various meteorological phenomena and the computer-based model is used to implement an an early warning system for the local area and other meteorological disasters. An important component of NWPM is data assimilation. Data assimilation is the process of computing the best estimate of the initial state for NWPM through analysis of numerical weather prediction systems. The first time they have been introduced, data assimilation systems have been developed. The data assimilation systems are used to reduce the error and increase the accuracy of its output estimates. Therefore, data assimilation is very important in numerical weather prediction systems.

RESULTS

Figure 1 shows the dust storm speed and direction of the dust storm that occurred in the city of Tehran. Table 1 shows the wind direction in terms of speed and direction. Table 2 shows the wind direction and direction of the dust storm. Figure 2 shows the dust storm speed and direction by using NWPM model for the period of occurrence of dust storm in Tehran. The initial and boundary conditions are obtained from 09 UTC. The dust storm condition is determined by using NWPM model. The initial and boundary conditions are obtained from 09 UTC. The dust storm condition is determined by using NWPM model. The initial and boundary conditions are obtained from 09 UTC. The dust storm condition is determined by using NWPM model. The initial and boundary conditions are obtained from 09 UTC. The dust storm condition is determined by using NWPM model. The initial and boundary conditions are obtained from 09 UTC. The dust storm condition is determined by using NWPM model.

CONCLUSIONS

Using numerical weather prediction models and data assimilation method is very important to detect and reduce disaster risk and help disaster risk reduction communities to receive information about meteorological disasters such as flood, storms and hurricanes. This research used data assimilation technique plus high-quality observation to be considered for a comparison for decision makers of Minister 11th reduction and meteorological progress.
Social Determinants of Mid- to Long-term Disaster Impacts On Health: A Systematic Review

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Introduction

The design and delivery of measures to reduce disaster risks and enable better health outcomes can be achieved by better understanding of the health impact of disasters and the potential risk factors that influence the disaster related health burden. However, information about disaster health impacts in the post-acute periods is particularly scarce, and understanding how through which socioeconomic factors may affect the disaster impact on long-term health are even less well evaluated.

Objectives

We investigated the existing literature in relation to disasters with two objectives: a) to assess the mid- to long-term health impact of disasters with regard to the presence of persistent negative health consequences, and b) to identify the social determinants associated with these impacts.

Methods

To address potential social determinants of health in post-disaster situations, we considered the conceptual framework proposed by the World Health Organization’s Commission on Social Determinants of Health. In the framework, individual health outcomes are considered as the result of the interaction of several determinants functioning at three different domains: (1) determinants related to the socioeconomic and political context, (2) structural determinants, and (3) intermediate determinants.

Literature search criteria

Peer-reviewed observational studies that both assessed disaster impacts on health in the ≥3-month period following a disaster by quantitatively comparing exposed- and less/unexposed- (or control) groups, and addressed associations between social determinants and the disaster impact in a quantitative or non-quantitative/descriptive manner or by reference to the conceptual framework included. Disasters due to natural, technological and societal hazards were included. Wars and conflicts were excluded from the scope of the study. Any quantitative health outcome measures were eligible for inclusion. Health consequences of radiation damage were excluded. No language restrictions were applied.

Literature search method

The following electronic databases were searched from their dates of inception to August 2014: PubMed, Embase, POPLINE, LILACS, CINAHL and PsycINFO. Key personnel and organizations working in disaster risk management for health were contacted to identify additional references. The proceedings of major disaster conferences were also searched. The data collection were based on guidance from the Cochrane Handbook for Systematic Reviews.

Results

As a result of the literature search, we identified 28 studies.

Characteristics of the studies

Most of the studies investigated a ‘major’ disaster, where an internationally recognized name had been given (n=27; 96%). Major event sites were disaster-prone Pan-Pacific countries, including China, Colombia, Japan, and Taiwan. The most frequently studied single type of disaster was earthquake (n=16; 57.1%), followed by cyclone/hurricane (n=4; 14.3%) and tsunami (n= 2; 7.1%). Four studies addressed multiple-hazards, i.e. the 2011 Great East Japan Earthquake, subsequent tsunami and nuclear power plant accident. Post-disaster periods studied ranged from 3 months to 40 years (median: 1 year).

Mid- to long-term disaster impacts on health

In the 28 studies identified, the following outcomes were addressed: 1) mortality (excluding suicide); 2) suicide death; morbidities from 3) mental and behavioural disorders, 4) diseases of the circulatory system, 5) infectious and parasitic diseases, and 6) nutritional diseases; and 7) outcomes based on biometric data (e.g. BMI, HbA1c, SBP). The most frequently studied outcome was mental and behavioural disorders (n=15, 53.6%), followed by mortality (n=4, 14.3%), and diseases of the circulatory system (n=4, 14.3%). All the health outcomes, evaluated by several outcome measures, demonstrated a statistically significant increase in risk in the post-acute (> 3 months) phase after the disaster in more than one study. Table presents the range of post-disaster relative risks by health outcome.

Social determinants influencing the disaster impact on health outcomes

Major themes were identified as proxy indicators of the potential social determinants of the disaster impacts on health in accordance with the WHO’s framework on SDH. The themes were stratified by the three domain.

(1) Socioeconomic and political context

Five studies (17.9%) addressed this domain, in which we identified six themes: the insurance system (n=1), national and international societal attention (n=1), public security (n=1), cultural mortality (n=1), evacuation policy (n=1), and policy for vitamin A supplementation (n=1).

(2) Structural determinants

Fourteen studies (50.0%) were identified that included analyses of the impact of the structural domain, addressing nine themes: age (n=8), gender (n=8), marital status (n=8), education level (n=8), immigrant background (n=1), social class (n=1), income (n=1), and occupation (n=1).

(3) Intermediate determinants

This domain was addressed by 16 studies (57.1%), with a total of 20 themes identified.

3.1 Behavioural and biological factors

(n=5, 17.9%): smoking, alcohol consumption, change in exercise, change in diet, and substance abuse.

3.2 The health system

(n=5, 17.9%): insufficient sanitation, insufficient food supply, loss of medical records, lack of health insurance, and post-disaster psychosocial aftercare.

3.3 Social-environmental or psychosocial circumstances

(n=14, 50.0%): lack of social and community support/attention, displacement/living in a temporary housing, experience of life threat, financial loss (aid), insufficient litigation, living without family, loss of job, loss or injuries of family members or loved ones, property loss/damage, and social disruption.

Table: Disaster impacts evaluated in included studies (n=28)

<table>
<thead>
<tr>
<th>Effect measure by health outcome</th>
<th>References</th>
<th>Follow-up period in months</th>
<th>Statistical significance of relative risk (p&lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (n=4, 14.3%)</td>
<td>Nomura et al. (2013)</td>
<td>12</td>
<td>◯</td>
</tr>
<tr>
<td>Incidence rate</td>
<td>Chiu et al. (2003)</td>
<td>12</td>
<td>◯</td>
</tr>
<tr>
<td>Number of cases</td>
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<tr>
<td>Suicide (n=6, 3.6%)</td>
<td>Kario et al. (1997)</td>
<td>3.5</td>
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<tr>
<td>Hospital admission rate</td>
<td>Hyodo et al. (2010)</td>
<td>36</td>
<td>◯</td>
</tr>
<tr>
<td>Certain infectious and parasitic diseases (n=3, 10.7%)</td>
<td>Nauser et al. (2009)</td>
<td>16</td>
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<tr>
<td>Certain infectious and parasitic diseases (n=3, 10.7%)</td>
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<td>16</td>
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<tr>
<td>Measured value</td>
<td>Ogawa et al. (2012)</td>
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Conclusions

The health impacts of major disasters persist over months/years. More dedicated investment should focus on underlying determinants of health/vulnerability to identify entry points for more effective action. Such a focus would also support the development of meaningful strategic directions for health policy work on post-disaster recovery, including long-term disaster risk reduction. In addition, more research attention with regard to the mid- to long-term health impacts should be given to events including transport accident, infectious diseases, and drought as well as diverse health impacts, such as chronic diseases, and their social determinants, which are not well covered in the literature.

Acknowledgments

We would like to express our gratitude to The Cochrane Collaboration’s Evidence Aid staffers for their useful recommendations on the study concept, and Mr. Tim Reeves for the assistance in database searching. We are also grateful for the assistance given by Mr. Jonathan Abrahams, Dr. Elena Chekmeneva, Ms. Natalia Przyziesza, Mr. Christopher Stevens, Ms. Tina Johnson, Mr. Hakim-Moulay Dehbi, and Ms. Monika Bednarek in the screening and data extraction for non-English papers, and Prof. Virginia Murray and Dr. Nathalie Robille in the identification of additional references. We would like to offer our special thanks to Prof. Kenji Shibuya. Without his sincere help and guidance, our study could not have reached its present form.

Footnotes

This study was in part supported by Department of Global Health Policy, University of Tokyo, Japan. This study is already published at International Journal of Disaster Risk Reduction, and authors retain copyright: Nomura S, et al. Social determinants of mid- to long-term disaster impacts on health: a systematic review. International Journal of Disaster Risk Reduction 2010; 16: 53-67.
Abstract
Climate change has now emerged as one of the most serious threats impacting on the conservation of archaeological buildings. Protecting and managing World Heritage sites in a sustainable and effective manner is a shared responsibility. Therefore, there is a need to publicize all available information.

As a result of recent periods of drought, subsols with a significant clay component have been subject to shrinking as they dry out. Where buildings are supported on such soils (also known as reactive clays) they will tend to settle unevenly as shrinkage takes place. This often leads to cracking in brickwork and stonework. Conversely after periods of rain the dry soils will tend to swell. This tends to lift buildings (also called heave). Again this can be uneven and can cause cracking in different places to the shrinkage cracking.

In some cases the shrink and swell cycles will simply spend and close cracks.

There are several measures that can be taken to reduce the amount of movement and damage. Some measures include remedial works to drainage, site grading, moisture control by paving or buried membranes, crack reinforcing, wall jointing, tree removal and in some cases underpinning.

Reactivity refers to the tendency for the clay soil beneath the footings to shrink and swell with changes in moisture content which can lift and lower the building.

In this research the effect of drought on 33 pol as a heritage bridge in Isfahan is investigated.

Introduction
The 1972 UNESCO World Heritage Convention is the principal instrument for identifying and protecting, for the benefit of current and future generations, the outstanding natural and cultural heritage of the world, and encouraging international cooperation for its conservation.

The fact that climate change poses a threat to the outstanding universal values of World Heritage sites has several implications for the 1972 Convention. Lessons learnt at some sites show the relevance of designing and implementing appropriate adaptations measures. Research at all levels would also have to be promoted in collaboration with the various bodies involved in climate change work, especially for cultural heritage where the level of involvement of the scientific community needs to be enhanced.

Protecting and managing World Heritage sites in a sustainable and effective manner is a shared responsibility under the Convention. Therefore, there is a need to publicize all available information on the threats posed by climate change and the potential measures for dealing with them.

Climate change has implications for natural and societal systems (agriculture, human health, forestry, and infrastructure) including natural and cultural heritage. The assessment of the impacts of climate change on cultural World Heritage must account for the complex interactions within and between natural, cultural and societal aspects.

History
33 Pol Bridge is a stone double-deck arch bridge in Isfahan, Iran. It is also called Siose Bridge (which in Persian means “33 Bridge” or “Bridge of 33 Arches”) or Allah-Verdi Khan Bridge. Si-o-se Pol Bridge is built by the chancellor Allahverdi Khan Unaladze on commission from Shah Abbas whose chancellor he was.

Construction of the bridge began in 1599 and ended in 1602. Bridge is long 296 meters and wide 13.75 meters. It has 33 spans from which it gets its name with the longest span of 5.6 meters, crosses Zayandeh River and is located in the southern end of Chahar Bagh Avenue. Bridge has a large plane at the beginning of the bridge where Zayandeh River flows faster. There it has more arches making with that a suitable place for a tea house that can be accessed from the southern bank. There are two levels of arches. Lower level has 33 arches while upper has two arches above lower lever arch and one arch above pier. Road that goes on the upper level is bounded by two high walls that protect travelers from winds and pedestrians that can walk there, from falling.

33 Pol Bridge is considered largest Iranian construction on water.

Discussion
The drought that has devastated southeastern Iran and Afghanistan has wreaked its own peculiar havoc on Isfahan, in north-central Iran. For two years, its river has been bone dry, except for brief periods when man or nature managed to make the water flow again. Where once water beckoned, there is only a sandy, rocky plain stretching as far as the eye can bear to look. Imagine Paris without the Seine, London without the Thames, Isfahan, with just over a million people, may be smaller, but its people are no less passionate about the Zayandeh River, or Zaindeh-Rud, as it is called in Persian.

“Isfahan doesn’t have a meaning without the river.”

The river’s arid turn has had some serious consequences. A power station had to be shut down. A hundred thousand farmers are out of work, their fields parched. Water is being rationed in the city; for the poor in particular, drinking water can be hard to find and very important heritage structure will be damaged by lack of water. Zaindeh-Rud means “the river that gives continual life,” and once it did. It irrigated fields upstream and irrigated the city’s social life as well. Couples walked along its grassy banks, catching their reflections in the water. Children took off their shoes and waded on the cobblestone ledge running beside the brick and stone bridges that arched over the river. Boats moved dreamily along the surface. “All the beauty of this city was this river.” “It gave the city life. Now it’s like a desert in the middle of the city. They would be better turning it into a park.”

Doing so – barring the river’s return once the drought ends – might take a visionary equal to the one who devised Isfahan in the first place. Zaindeh-Rud sink day by day, thinning in some patches more quickly, like a man losing his hill, until the riverbed was completely bald. Now the bridges seem like redundancies, crossing over a stretch of land that people just walk across. “The bridges have no meaning.”

There are also worries that the bridges, constructed to be lubricated by water, may crumble. Drought is certainly the most to blame for the river’s disappearance.

Poor water management, with much of the water used for irrigation lost through poor pipes and drainage, has not helped.

Risk Assessment
Drought is one of the most important natural disasters that have high socio-economic and environmental impacts. However, drought is more than a physical phenomenon or natural event. Its impact results from the relation between a natural event and demands on the water supply, and it is often exacerbated by human activities. The traditional approach to drought management has been reactive, relying on crisis management. Over the past three years, however, the river has been dry, the result of little rainfall and a lack of sufficient water management. Residents who in the past would stroll along Isfahan’s riverbanks and breathe in the cool breeze off the flowing water instead cover their faces to defend against the dust blowing from the dry riverbeds Zaindeh-Rud sink day by day, thinning in some patches more quickly, like a man losing his hair, until the riverbed was completely bald.

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Conclusion
Due to the drawbacks of crisis management, employing proper risk management techniques has been suggested. In order to move from crisis management to risk management, risk of drought in Isfahan province should be evaluated. Drought hazard index and vulnerability index are components of the drought risk management. Standardized Precipitation Index (SPI) must be used as the index of drought hazard. Weighted Linear Combination (WLC) technique has to be applied for combination of vulnerability indicators. To assign weights to the criteria, an Analytical Hierarchy Process (AHP) also should be used. After providing the maps, fuzzy membership functions for every criterion will be used for their standardization.

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Since bottled water is the essence of life and is widely consumed by all ages worldwide, why not use water bottles to spread awareness during emergencies? Bottles can carry instructions and direct messages that can guide people on how to act when facing an unexpected situation. People who purchase water bottles will benefit from various forms of preparedness and precautionary measures. This gives both the producer and consumers a comparative advantage.

**THE ESSENCE PROJECT**

**THINK . ACT . SAVE LIVES**

Since bottled water is the essence of life and is widely consumed by all ages worldwide, why not use water bottles to spread awareness during emergencies? Bottles can carry instructions and direct messages that can guide people on how to act when facing an unexpected situation. People who purchase water bottles will benefit from various forms of preparedness and precautionary measures. This gives both the producer and consumers a comparative advantage.

**PRE-MEASURES**

Labeling on the bottles in the form of:
- Written form: For the literate
- Visual form: For the literate & illiterate
- Braille characters: For the blind & visually impaired

A certain percentage of the total sales will support people in need during emergencies situations.

**POST-MEASURES**

At the same time, a certain percentage of the profits will be donated in the form of water bottles so people in need can also benefit from the information.

All manufactured water bottles have to be environmental friendly, and:
- Toxin Free (bisphenol A: BPA-free plastic bottles)
- 100% Recyclable (biodegradable PET plastic bottle)
- Eco-Friendly (Less PET Plastic to be used per Bottle)
THE POLICIES OF SEISMIC RISK MANAGEMENT: CASE OF THE PROTECTED AREAS OF DELLYS AND TENÊS CITIES, ALGERIA

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ABSTRACT
The greater part of urban heritage, especially of the medium and small Algerian cities, is subject to a major seismic risk. The probability of a happening earthquake is strong and the territories vulnerability is great. Legislative processes are implemented to support urban heritage and managing natural disasters. In fact, the Permanent Plan of Safeguard and Enhancement of Saved Sectors (PPSMVSS) as an instrument of protection, preservation and enhancement of this heritage, in its content, does not guide decision makers on how to manage the vulnerability of preserved areas from the earthquake. After the disaster of the earthquake that hit the Algerian Centre (wilaya of Boumerdes) in 2003. A legislative framework was created while other texts have been adapted. Emergency measures operations are launched to preserve the under threat monuments and protected areas. Saved sectors of Dellys, in the wilaya of Boumerdes and Tenes in the wilaya of Chelif are all the time subjected to seismic risk. This poster presents a comparative study of two PPSMVSS Dellys and Tenes and the management of the vulnerability of their two safeguarded areas. As a first result of this study the setting up of indicators to be taken into account in the development of plans for the protection and management of conservation areas.

Keywords: safeguarded Sector PPSMVSS, catastrophe, seismic risk management.

INTRODUCTION
Algeria is a land of great diversity; it presents a number of various regions and very distinctive with rich historical, cultural and natural heritage. This rich cultural and natural heritage is stunning by its historical and symbolic meaning, witnessed the civilization passage through this territory. This is an invaluable archaeological, architectural and urban variety.

However, the country is facing a huge housing needs, new construction became the dominant preoccupation of Algerian public authorities. Thereby, the existing heritage is left for its sake and is even daily deteriorating due to the lack of maintenance. The deteriorating constructions were often cleared than rehabilitated.

THE POLICIES OF SEISMIC RISK MANAGEMENT OF SAFEGUARDED AREAS OF DELLYS AND TENÉS

The existing heritage is left for its sake and is even daily deteriorating due to the lack of maintenance. The deteriorating constructions were often cleared than rehabilitated.

Since the promulgation of the Law on the protection of heritage, seventeen conservation areas are created and defined. Transition and Phases of the Permanent Plan of Safeguarding and Valorization of Saved Sectors (PPSMVSS) are divided into three phases as defined as follows:

First phase: Diagnosis and if necessary emergency measures project.

Second phase: Historical and typological analysis and draft of PPSMVSS.

Third phase: Final drafting of the Permanent Plan of Safeguarding and Valorization of Saved Sector (PPSMVSS).

The plan consists of a presentation report that highlights the current state of the conservation area and outlines emergency measures taken for its conservation and enhancement.

The plan is referring to the Master Plan of Urban Planning and Development. “PDAP”, if existing, and shows the following synthesized aspects: frame of the conservation status, condition and layout of road networks, water supply and irrigation of rainwater drainage and wastewater removal and disposal of solid waste. Demographic and socio-economic aspect. Economic activities and equipment, legal nature of real estate and demographic and socio-economic perspectives and the proposed programs of public facilities.

RESULTATS
These analytical studies enable the identification of existing interactions. After that, regulations and guidelines aiming to develop an integrated conservation and coherent development for this sector were set up.

Map enacted by Art. 18 of executive decree no. 05-318 of September 10th 2005 amending and completing the executive decree no. 91-178 of 28 May 1991 laying down the procedures for the preparation and approval of the land use plan.

We found that geological maps, easements and the conservation status of the built environment are the only ones that superficially dressed, the asessment of natural and technological hazards and the identification and classification map of seismic zones according to the degree of vulnerability of the two protected areas is not established.

The PPSMVSS must also have the same contents.

AFTER THE EARTHQUAKE OF 2003

After the disaster of the earthquake in 2003, a legislative framework was established while other texts have been adapted to manage this natural phenomenon.

There are several measures concerning the prevention of major risks at different territorial and urban scales.

The Article 18 of executive decree no. 91-178 of 28 May 1991 specifies in its content that the POS must have:

A plan for geological constraints, a plan of servitudes and a plan of the conservation status specifying the degree, nature and the cause of buildings deteriorations and undeveloped areas and other typological plans.

It is particularly striking to note the general state of degradation of this heritage. Consolidation works, with their rows of scaffolding and shoring, are ubiquitous in urban landscapes.

CONCLUSIONS

After a decade of the earthquake that whips Algeria in 2003, the safeguarded sectors of the old towns are still fragile due to the seismic hazard.

In the context of the Permanent Plan of Safeguarding and Valorization of Saved Sectors (PPSMVSS) to prevent the seismic risk:

The identification and classification of seismic areas of these safeguarded sectors according to their degree of vulnerability;

Establishment of vulnerability maps of the safeguarded sectors and seismic micro zoning;

Establishment of a general prevention plan.

Today, managers must take action of preventing anticipation, forecasting and natural risk management by integrating them into the different policies they put and implement in the time and the space.

The Algerian government should support different aspects of urban and architectural heritage research and promote quality in heritage in all its forms. An innovative use of this heritage can be an investment opportunity for Algeria enabling urban sustainability.

In fine, this work focused on better assessing and understanding the mechanisms by which damage to tangible heritage occurs in order to find the adequate measures and means to ensure that heritage and protect it. In addition, this paper tried to raise question and debate concerning modern tools that can be applied to this precious heritage assets and specific damage risks.
Designing Restoration Strategies for Degraded Forest Ecosystems: Increasing Resiliency in Human-dominated Landscapes

ABSTRACT: Camp John Hay watershed and forest reserve in Baguio City, Northern Luzon, Philippines is one of the last remaining contiguous pine forest block in the city. Various factors, mostly anthropogenic in nature, act as the key drivers to land use change, and eventually the degradation of these pine stands. Since forests provide vital ecosystem services especially in mitigating the effects of climate change, and recognizing the close association between the state of the ecosystem and the impact of disasters, there should be a sense of urgency to address the problem. With due consideration to the socio-economic and political factors relevant to the site, this study designed a restoration plan to repair degraded sites in the forest and watershed area and to preserve the ecosystem services it provides. The different objectives of the project include: a) Restoration of degraded sites through Assisted Natural Regeneration (ANR) and enrichment planting; b) Restoration of degraded sites through planting of native species in addition to the dominant Pinus species; c) Establishment of Riparian buffer zones along the tributaries of the watershed to mitigate eroded areas in the sites; d) Maintain functionality and improve the existing nursery. Close monitoring by the major stakeholders including the indigenous community will ensure the sustainable management, conservation and restoration of this forest ecosystem to reduce disaster risk, with the aim of achieving sustainable and resilient development.

1. INTRODUCTION
The Philippines is part of a few mega-diverse countries characterized by biodiversity and endemicity. This high level of biodiversity in this archipelagic country is largely intertwined with the presence of different ecosystems and habitat types, most especially forest ecosystems. Unfortunately, tropical rainforests in the Philippines, similar to that of other Asian countries, have seen a massive deforestation and land use change. Lasco and Pulhin (2009) mentions that, in the last century alone, the Philippines have lost 149.9 M hectares of tropical rainforest or an average of 150,000 ha/yr. The project site is located in Camp John Hay Watershed and Forest Reserve, Baguio City, found in the Northern part of the Philippines. It has the last remaining contiguous pine forest block in the said locality. Various factors, mostly anthropogenic in nature, act as the key drivers to land use change, and eventually the degradation of these pine stands. Thus, there should be a sense of urgency to address the problem, with due consideration to the socio-economic and political factors relevant to the site.

Forests play a vital role in the delivery of various ecosystem services. Lasco and Pulhin (2002) asserts that, although tropical forests are sources of carbon, they also have the largest potential to mitigate the effects of climate change and this underscores the important role of the Philippine tropical forest in carbon sequestration. Various forest types in the Philippines, including watershed areas and forest reserves, store significant amounts of carbon stock, varying from as low as 5 tC/ha to a maximum of 200 tC/ha. These ecosystems, although having different rates of sequestrations, contain a cumulative amount of 1.046 GtC in its different carbon pools and sequester an estimated 30 GtC annually (Lasco & Pulhin 2000).

This same pine forest provides a buffering function against air pollution present in this highly urbanized area, and more importantly as a carbon sink to mitigate the effects of climate change. Tapnio (2013) in her study on P. kesya in Bucas watershed, Baguio City, Philippines measured the carbon stocks in the 2 sampling plots at a total cumulative estimated carbon density of 62.8 MgC/ha. The forest vegetation, aside from also sequestering carbon also contributes to the stability of the soil against erosion.

2. DISCUSSION
2.1 Recommended Restoration Treatments
The main goal of the project is to restore degraded sites in the forest and watershed area and to preserve the ecosystem services it provides. The different objectives of the project include: a) Restoration of degraded sites through Assisted Natural Regeneration (ANR) and enrichment planting; b) Restoration of degraded sites through planting of native species in addition to the dominant Pinus species; c) Mitigate eroded areas in the sites by establishing Riparian buffer zones; d) Maintain functionality and improve existing nursery.

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Critical infrastructures are the backbone of modern society and provide many essential goods and services to urban areas. Given the risks associated with the impact of natural hazards on critical infrastructures, the move towards safer and more resilient cities requires the development and application of an improved risk assessment framework to address high-impact and low-probability events. In this context, the STREST project developed a stress test framework to determine the risk and resilience of non-nuclear critical infrastructures.

Low probability – high consequence hazard assessment

Innovative approaches were developed to define the epistemic uncertainties in hazard assessment, address the hazard definition for extended facilities, evaluate correlated hazards and consider cascading events. Probabilistic seismic hazard analysis showed that forward directivity could have an important impact on near-source structural demand.

Once fault rupture cascading is considered, the maximum magnitude increases, which may have an impact on pipeline stress tests.

ST@STREST – stress test methodology for non-nuclear critical infrastructures

ST@STREST is a risk-based multi-level stress test methodology.

- Pre-Assessment phase: data are collected; risk measures and objectives, time frame, costs and stress test level are defined.
- Assessment phase: design demand levels for each component are compared with their capacity; probabilistic risk analysis is performed.
- Decision phase: results are compared to the risk objectives. A grading system prescribes by how much the safety should be improved. Critical events that most likely cause the exceedance of a loss value are identified through a disaggregation analysis. Risk mitigation strategies and guidelines are formulated based on the identified critical events.
- Report Phase: results are presented to authorities and regulators.

Exploratory applications

The stress test framework was applied on selected critical infrastructures, representative of classes with different potential for local and regional consequences, degree of interdependencies, and economic and environmental impact.

Component functionality in the harbour application for a 475-years earthquake scenario for equivalent linear (top) and nonlinear approach (bottom)

Disaggregation of average annual loss in the industrial district application, according to building sub-class for each component of loss
Analysis of the flood disaster characteristics and disaster mechanism caused by super typhoon Rammasun in 2014

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ABSTRACT

Typhoon is a serious destructive weather event, and the damage caused by typhoon is serious. Understanding characteristics of typhoon disasters, disaster mechanism and social response have an important significance for disaster prevention and mitigation. Through investigation of typhoon disaster in Hainan province caused by super typhoon Rammasun, we found that the disaster lead to a big number of affected population and serious casualties; agriculture affected area and inundated area accounted for a larger share of the planting area. Disaster losses are serious, and agriculture loss accounted for a larger share. Further research shows that the building design standard, the infrastructure management, the ability of professional disaster management, the community residents’ disaster risk perception, the social disaster prevention and reduction system, the disaster prevention plan and regulations system should be responsible for the disaster loss. At last, this paper recommends that mitigation super typhoon disaster need do many detail works including structural disaster mitigation strategies (Infrastructure construction) and the non-structural disaster mitigation strategies (plan or regulations system, social participation).

INTRODUCTION

The typhoon is a serious destructive weather event. Tides and heavy rainfalls caused by typhoon often have a devastating impact on the social economy of coastal areas. According to statistics, there are 428 typhoons landed in China during the period of 1949-2010, about 6.9 typhoon landed per year. Since 2000, the typhoon flood caused casualties showed a decreasing trend year by year, but disaster loss show the inverse trend. Every year, about 34.66 million people affected by typhoon flood disaster, 223 people died, and the direct economic loss reached 42.7 billion yuan. A large number of historical records indicate that Hainan province is the most serious area affected by typhoon in China, the regional social and economic conditions are the most sensitive to typhoon disaster. In particular, with the progress of the Hainan international tourism island, developing effective regional disaster prevention and mitigation measures become the current priority of disaster prevention and mitigation. This paper, Hainan Province as study area, focus on super typhoon Rammasun’s disaster characteristics, analyse the disaster causing factors, in order to provide experience and technical support for the disaster prevention, reduction and recovery.

SUPER TYPHOON RAMMASUN

On 15:30 of July 18th, 2014, No. 9 super typhoon Rammasun landed in Wenchian town, Wenchang, Hainan, China. Under its impact, Hainan province suffered serious damage. According to statistics, the affected population is 3.36 million during June 18th-23th, and 25 people were killed in this disaster. The crop area affected by typhoon is 162.97 × 10^6 mu. The direct economic loss reached 11.95 billion yuan.

RESULTS AND DISCUSSION

Typhoon Rammasun brings a serious disaster loss.

The number of people affected by Rammasun is large. The affected population of Wenchang, Wanning, Chengmai, Tunchang and Chengmai is more than half of the local population. The affected population mainly concentrated in the northern part of Hainan, such as Wenchang, Haikou, Chengmai and Dingan.

Typhoon Rammasun bring huge influences to agricultural production of Hainan province. According to statistics, the affected area of crops in Hainan province is 162.97 × 10^6 mu, accounting for 38.97% of the total arable land in Hainan province.

Disaster economic loss is serious, especially agricultural economic loss. According to statistics, agricultural loss is 7.42 billion yuan, up 62.11% of the total economic loss. The cash crop loss reached 4.49 billion yuan, accounting for 60.61% of agricultural loss.

Table 1: The condition of community building structure and infrastructure.

<table>
<thead>
<tr>
<th>Building</th>
<th>Condition</th>
<th>Repair Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>Poor</td>
<td>91.6%</td>
</tr>
<tr>
<td>Hospitals</td>
<td>Fair</td>
<td>59.6%</td>
</tr>
<tr>
<td>Houses</td>
<td>Poor</td>
<td>49.1%</td>
</tr>
<tr>
<td>Roads</td>
<td>Poor</td>
<td>37.2%</td>
</tr>
<tr>
<td>Bridges</td>
<td>Poor</td>
<td>29.3%</td>
</tr>
</tbody>
</table>

(1) The poor condition of community building structure makes the house could not withstand strong winds. Meanwhile, the infrastructure management needs to improve.
(2) Social disaster prevention and mitigation system did not work perfectly.
(3) The local government has not formulated the laws and plans for the prevention of typhoon, especially for the super typhoon.

The poor condition of community building structure and infrastructure.

RECOMMENDATIONS

We think that the typhoon defense work should strengthen the infrastructure construction, formulate relevant technical standards, and improve the design standard of building. Meanwhile, we need to develop or amend the laws and regulations for the prevention of super typhoons. And the last, we should enhance the community’s ability to defend the typhoon, and strengthen the community education of typhoon, and raise the awareness of the community residents, and improve the emergency management capacity of local government.
Evaluation of Urban Resilience against Communicable diseases Outbre.
Case study: al-Qadir district west of Kerman/Iran

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ABSTRACT: Experience of recent communicable infectious diseases outbreak has shown urban resilience challenges. Urban challenges include urban density, urbanization, and urban sustainability. This paper aims to propose an effective strategy to overcome these challenges.

Keywords: Communication, Infectious disease, Epidemic, and city resilience.

INTRODUCTION: Urban

The rapid urbanization and increasing population in urban areas have led to an increase in communicable infectious diseases. This study aims to propose a strategy to overcome these challenges. Urbanization and urbanization challenges have been studied in previous papers.

Aims and objectives: The objective of this paper is to propose an effective strategy to overcome these challenges.

Methodology: A qualitative research methodology was used to collect data through interviews with experts in the field. The data was analyzed using thematic analysis.

RESULTS AND DISCUSSION: The results show that urbanization and urbanization challenges have increased in recent years. The proposed strategy can help to overcome these challenges.

CONCLUSION: The proposed strategy can help to overcome urbanization and urbanization challenges. Urbanization and urbanization challenges have been studied in previous papers. The proposed strategy can help to overcome these challenges.

REFERENCES:


Citizen Activity in Water Monitoring

Two surveys in BalticFlows project “Water Monitoring Via Citizen Activity” within the regions of Hamburg, Tallinn, Turku, Uppsala and Riga

“Clean river or stream has been indicated as compensation in 70% of responders for installing, maintaining and storing water quality monitoring devices.”

A modern day volunteer is not necessarily willing to donate a fixed amount of time on a regular basis, however they are motivated to participate in social initiatives.

Data privacy issues may rise to be a central issue in activities such as environmental monitoring, but based on the surveys it is too early to tell whether the general public is aware and concerned about their personal privacy related to the use of their own hand held devices.

A clear majority of the respondents of the second survey have an account at least for one social media service, Facebook being the most popular. Respondents were identified to mainly utilize social media for informing their network of their selected personal or public matters.

In total, based on the survey analysis, citizens see sensor technology as an attractive and potentially useful way of creating content for social media purposes and via social media networks.

Would you be willing to install a small water quality monitoring device (max size a cigarette box) in a river or stream? Would you be willing to maintain a small water quality monitoring device?

Would you be willing to let your smartphone/tablet/home computer to analyse some of the data produced by such a device?
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