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# Multi-Cooperation in Natural Hazards Warning and Mitigation

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## Abstract

In a time of increasing number and severity of disasters, global cooperation and coordination are more vital than ever before. Emergency management is the lynchpin on which effective cooperation and coordination depend. By working together, a proactive plan should be formulated for future disaster management collaboration and cooperation among countries. Moreover, sharing of experiences and exchange of views among the experts of different countries has the potential to result in a model that may be used for disaster prevention and mitigation in all nations.

Key parameters must be developed based on type of disaster, frequency, magnitude and cost, and the expected continuation of these trends worldwide. This will be decisive for future cooperation of all stakeholders involved in early warning and mitigation of natural hazards.

The overall map of identified vulnerable areas, however, needs to be followed up locally with detailed risk assessments, which identify disaster risk reduction means, with early warning and mitigation solutions, with priorities and funding opportunities. Most important is that responsible and contributing stakeholders create and identify early warning and mitigation solutions.

Access to information is critical to successful disaster risk reduction, because it is difficult or even impossible to manage what is not measurable. However, it is necessary, when the problem is identified, and the solution proposed, to point out who is responsible for implementing the solutions, and how it can be financed. This requires international multi-cooperation of responsible and involved stakeholders. Successful disaster risk reduction implementation can only be achieved by identifying responsible stakeholders and relevant and feasible financial solutions. It is difficult to implement without a liable party with a supportive financial solution.

An international multi-cooperation model needs to focus on the challenges often faced in international disaster risk reduction work, like competition, fragmentation and excessive administrative costs, which reduce the efficiency of international efforts in minimizing the consequences of disasters. The multitude of actors worldwide, such as NGOs, industries, private foundations and others, should cooperate with the large supporting actors like UN, EU, World Bank, Asian Development Bank, IMF and the international insurance industries and others in a beneficial way leading to enhanced effectiveness and use of funds available for early warning and mitigation means.

Research and development activities and education in the field of disaster risk reduction (DRR) are very important and decisive for better warning and mitigation means in the future. Hence, it is also necessary to address how international research and development projects funding could be more result oriented, and how to bridge the gap between theory and practice through a faster mechanism of feedback of research findings and improvements into the education system at all levels, from primary school education to policy briefs to the politicians.

TIEMS works within DRR through its vision, its mission and goals, in close cooperation, coordination and collaboration with its international chapters and other partners. Observations, ideas, and experiences of TIEMS, and how this organization operates internationally in meeting various challenges, defines how TIEMS works to improve international multi cooperation in natural hazard warning and mitigation, and to achieve safer and more resilient societies.

*Keywords-Collaboration; Coordination; Emergency Response; Planning; Mitigation*

## I. INTRODUCTION

The fact that the population of the globe is rapidly growing concomitantly with the ever-increasing reality of natural and man-made disasters is not coincidental. Civil strife, stress on the environment, immense demand for energy, and rapid rise of economies in developing countries are the result of this convergence. It is not surprising, then, that the loss of life and damage to physical property has increased so significantly in developing countries [1, 2]. Although a disaster may cause physical effects in a single nation, it produces ripples that are felt in neighboring nations and can cause long term impacts on productivity, growth and the economies throughout the world.

Effective, efficient response and rehabilitation capabilities/mechanisms are equally important to minimize and redress disaster losses and damages. Despite the need, or perhaps because of it, there is great variability concerning the level of cooperation and coordination that exists at all levels. Cooperation and coordination varies from community level to local, village, municipality, district/province and region. At the international level [3] it also varies from regional to global. Just as the number and severity of disasters are increasing across the globe, so are social and economic costs of disasters and global humanitarian challenges increasing in scope and complexity. The need and importance of cooperation and coordination among the national/international organizations and countries is pertinent particularly in the field of the development of humanitarian assistance.

This situation calls for attention to the need for a solid coordination mechanism. Hence, coordination and cooperation among government authorities, international organizations and NGOs are fundamental for an effective disaster management [4]. As the impact of a disaster in a particular country or region can have a multitude of effects in other countries or regions, cooperation and coordination are needed to cope with the disasters. Cooperation is considered by many to be the ideal form of management of humanitarian activities. The act of cooperation and coordination is required for making different people or things work together to attain a specified objective or goal.

It is vital that those in charge of complex and multi-sectoral/multinational emergency operations be trained and educated in the basic competencies of emergency management. It is clear that as the largest countries struggle with the pressing need for disaster management, there has been an increasing interest in structured and consistent disaster management education of first responders and emergency managers. Developing nations have a critical need for structured learning programs. In the United States, although there has been great activity in creating academic programs at all levels, there is much work on standardization yet to be done. An international perspective must be taken on what the most important knowledge and skills would be for basic training in emergency management. Emergency managers must be educated and trained in the management skills of leadership, teams and team building, and conflict resolution. They must also have great respect for the experiential knowledge possessed by all nations as well as by the indigenous peoples of the world.

## II. CAUSES OF DISASTERS

There are several natural and human induced disasters. However, major causes of disasters are: (i) geo-physical structure of a country, (ii) climate, (iii) environmental degradation, (iv) mismanagement of natural resources, (v) widespread urban and rural poverty, (vi) unplanned and haphazard settlement, (vii) rapid urbanization, (viii) inefficient public policies, (ix) dealing disaster risk through response-focused civil defense-type structures, (x) leaving a serious underinvestment in hazard prevention and mitigation; and (ix) lagging and misguided investments in infrastructures [5,6]

When considering these major causes, it has become axiomatic that due to issues of global climate change, urbanization, alteration of fertile land to desert, population growth, and environmental degradation, frequency and severity of natural disasters are on the increase. Natural disasters increase in both magnitude and number [7]. The United Nations projects that by 2030, 60% of the world's population will reside in cities [8]. It is these urban areas that will be sites for greatest destruction and life lost. Globalization and other factors, combined with global political instability and poverty, create an environment that is exceedingly fragile, and populations that are increasingly vulnerable. The effects of urbanization and poor economic conditions have resulted in developing countries accounting for 96% of natural disaster-related deaths [9] and the number of affected survivors in developing countries being 40 times higher [10]. As a foreshadowing of the devastation in Haiti, a study of Guatemala City 20 years after the massive death and destruction of the 1976 "poor-quake," still identified 589,900 inhabitants living around the city that were living in areas "considered highly susceptible to earthquakes, floods, and landslides" [11]. The term "poor quake" was used because most of those affected were in slum areas in the ravines in Guatemala City. In that event and the second quake that followed two days later, over 22,000 people were killed, over 70,000 injured, and 1 million homeless [12]. There must be an effort made to "ensure harmonious interactions between natural and human systems" to minimize vulnerability [13].

## III. EFFECTS OF DISASTERS

Disasters not only damage infrastructure but have long-term impacts on productivity, growth and economy [14]. As mentioned earlier, the effects and impacts of disasters go beyond local and national levels to having global ramifications depending upon the extent of disaster. For example, the adverse results of climate change, global warming and green house effects are major concerns for all the countries and people of the world. It is not surprising that the impacts must be borne by millions of innocent people. In fact, climate change is already affecting the frequency, severity and intensity of hydro-meteorological hazards. It is to be noted that the vulnerability to disasters is determined by a complex set of physical, economic, social and political factors. From 1970s to 1990s, the number of affected population in the world tripled while the decadal economic cost increased by a factor of \$5 billion to more than \$600 billion. Recently, global climate change has become accepted as an additional incubator. In such a way, increases in frequency and intensity of climatic hazard

impacts could aggravate trends in many vulnerable areas. More importantly, since the impact of disaster determines whether people live or die, helping each other saves precious human lives. Humanitarian assistance when needed is essential in accomplishing this goal [15].

It is necessary that we extend our measurement of disaster effects beyond easily quantifiable aspects: number of dead and injured, people displaced, homes and businesses destroyed, cost, loss of income, and other discrete measures. Increased attention must be paid to aspects of disaster that are far more difficult to understand and measure. This is what Ismet Fanany [16] called a reconstruction of the “invisible landscape.” He said that the “wreckage of the physical aspects of people’s lives lay all around where their homes and villages once stood, but the wreckage of the psyche of the Achenese lay inside each person, where it was not easily accessible and where it could not be perceived by the eye alone.” He also suggests that internal reconstruction lagged behind the physical for the Achenese following the Indian Ocean tsunami. A rebuilding of the internal environment of survivors might be beyond the ability of the aid workers. Perhaps creating a new reality is more likely, the integration and reconciliation of what existed previously and the old reality – a new normal, rather than a return to what existed prior to the disaster. We need to have a better understanding of those invisible factors to foster creation of the new normal.

Another important aspect to consider when rebuilding a “community” is the psychological vulnerability of its residents. Whether these individuals suffer from depression or one of many anxiety or psychosis-related disorders, a disaster within their community has a high probability of exacerbating their symptoms and placing them in a state where they struggle with any form of recovery [17]. Within this category of vulnerable populations are individuals with diagnosed psychological conditions that may affect their cognitive functioning, their ability to cope with a disaster or process the recovery process. There may also be other individuals within a community who have an undiagnosed pre-existing psychological condition that may be exacerbated as a result of disaster. Then, there are also others who may develop symptoms of a psychological disorder, such as post traumatic stress disorder, as a result of the disaster. Recovery teams and relief efforts need to be aware of the impact of psychological factors in the rebuilding process and must address them as vital components to the community’s recovery needs [18]. In order to accomplish this, recovery teams should collaborate their efforts with psychologists, social workers and other mental health professionals. Without addressing psychological factors as a part of the community rebuilding process, members within these vulnerable populations may feel disconnected or permanently estranged from their surroundings and inhibited, or even prevented, from regaining a sense of community.

#### IV. GAP ANALYSIS

Disaster prevention and preparedness require a wide range of measures, both long and short term, aimed at saving lives and limiting the amount of damage caused. Particularly, to confront recurrent calamities is a stupendous task with all its attendant regulatory, institutional, resource and technological

and managerial pre-requisites [19]. Some of the more pertinent gaps that need to be addressed are highlighted below:

- It is imperative that all countries should seriously take into account the impact of global warming, green house effect and climate change when planning a multi-hazard early warning system or network and formulating and implementing the policies on disaster management.
- Emergency managers must be educated and trained in core competencies related to coordinating response to large, complex disasters. There must be a focus on mentoring leadership and working with teams on an inter-sectoral, interdisciplinary, international basis.
- There needs to be a comprehensive and unified disaster management policy to reduce the social and economic costs to the community caused by disasters. The policy should properly address problems in urban/sub-urban areas and elsewhere. Policies suitable for the type of problems faced by urban and rural communities should be formulated.
- The use of satellite, Terrestrial Trunked Radio (TETRA), the Global System for Mobile Communications (GSM), Worldwide Interoperability for Microwave Access (WI-MAX), etc. and telemedicine needs to be considered as critical in saving lives when disasters strike. Health entities to include the World Health Organization (WHO) and telecommunications experts such as the International Telecommunication Union (ITU) should provide such services in the post disaster situations.
- The Common Alert Protocol which was adopted by ITU as an OASIS (Organization for Structured Information Standards) standard through its Recommendation X. 1303 is used throughout the world, and should be encouraged as an effective way of ensuring that the media can efficiently and effectively pass on alerts.
- The link between environment and environmental related management and telecommunications/ICT needs to be highlighted in order to mitigate disasters.
- Experiences, ideas, and strategies should be shared with all stakeholders and should be mapped

To attain the above goals, cooperation and coordination at the national, regional and global level is needed.

#### V. THE NEED AND IMPORTANCE OF INTERNATIONAL COOPERATION AND COORDINATION

In addition to the inter-country cooperation and coordination among disaster management stakeholders, there is the growing need of regional, international and global cooperation and coordination among the countries that have common problems, as a country's disaster situation may affect many other nations. For example, an earthquake disaster can have wide geographical coverage. Where much of the region's transport and communications infrastructure crosses several

borders, the need for regional-level services is obvious. Similarly, failure to apply disaster risk management in any one country can affect such infrastructure and, thus, the region as a whole. The Gislengen disaster in Belgium is an example of international cooperation and optimized coordination between the border of Belgium and France [20]. An accident at a pumping station in Belgium very near the French border resulted in a mass influx of burned casualties. Due to the proximity to the border and both countries being in the Schengen area, there was cooperation and common action in handling the disaster that exceeded local resources. Special burn hospitals were used in the North of France during the operation. A potentially complex international operation hindered by geographic boundaries, sectors, and jurisdictions was carried out successfully.

Regional and international cooperation is essential not only to cope with the impacts of disaster but also to help ensure that the region sustains economic growth. Moreover, enhanced regional and international cooperation and coordination in disaster risk management offers attractive opportunities to provide resources. Disaster preparedness has remained inadequate in many countries where there are needs to national level up-date disaster legislation to enhance the national focal agency and strengthen inter-institutional and intergovernmental coordination. Many aspects of disaster management are trans-border. As a result, those countries could be economically and socially affected due to the serious natural disasters in a neighboring country. A neighbor may be able to provide valuable help in evaluating risk, mitigating, forecasting, developing and communicating early warnings and responding to disasters. There is incredible value in utilizing international and indigenous knowledge systems when facing the challenges of reconstruction following disaster [21,22]. Regional planning and joint efforts should be carried out to solve the disaster problems as the uncertainty of disasters are major concerns for all countries. Countries that have common goals and interests should share disaster data and information so as to reduce the impact of potential disasters. International cooperation is critical to find more effective ways to forecast risk, to better manage the response and to develop organizational resilience to interruption and different types of crisis and disasters [23].

In addition to the importance of national, regional and international level cooperation and coordination, there is also the need for enhanced cooperation and coordination at the United Nations. In particular, there needs to be improved coordination between the:

United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA),

United Nations Human Settlements Program (UN-HABITAT),

United Nations Disaster Relief Organization (UNDRO),  
United Nations International Strategy for Disaster Reduction (UNISDR),

World Meteorological Organization (WMO),

United Nations Environmental Program (UNEP), WHO

This cooperation needs to also extend to NATO-EADRCC (Euro-Atlantic Disaster Response Coordination Center) and EU-MIC (European Union Monitoring and Information Center) that will act mainly in their AOR. [24].

## VI. TIEMS AND INTERNATIONAL COOPERATION

TIEMS was founded in 1993 in Washington, USA, and is today registered as an international, independent, non-profit NGO in Belgium. TIEMS is an International Network of Users, Planners, Researchers, Industry, Managers, Response Personnel, Practitioners, Social Scientists, and other Interested Parties and individuals concerned with Emergency and Disaster Management.

TIEMS stimulates the exchange of information regarding the use of innovative methods and technologies within emergency and disaster management. In this way, it will improve society's ability to avoid, mitigate, respond to, and speedily recover from natural and technological disasters. TIEMS is building a network of experts through local TIEMS Chapters all over the world, with the aim of "think globally and act locally".

TIEMS believes in a global dialogue to learn from the exchange of expert information and experience between all stakeholders involved in emergency and disaster management. Last year TIEMS arranged 13 conferences and workshops around the world, in Norway, Japan, Italy, Russia, Romania, Korea, China and Iraq. They focused on important and timely topics in emergency and disaster management. In the first 9 months of 2013, TIEMS had conducted 9 conferences and workshops in the USA, Japan, Iraq, France, Germany, China and Finland.

TIEMS also initiates and takes part in research and development projects that aim at developing and/or improving methods and technologies in emergency and disaster management. TIEMS is also developing an International Education Training and Certification Program in Emergency and Disaster Management. The International Education Program is composed of TIEMS Chapter Training and TIEMS QIEM (Qualifications in International Emergency and Disaster Management) Certification. More details are found on TIEMS web-site: [www.tiems.org](http://www.tiems.org).

TIEMS network constitutes a large international multidisciplinary group of experts, with different educational backgrounds and various experiences in the field of emergency and disaster management. They represent a unique source of expertise and ideas, which are important to creating resilient societies.

TIEMS contribution as an NGO can be within the organization's focus, namely in Education and Research. In our opinion, this is the key to a better understanding of disasters and spreading the information on causes and consequences. Our belief is that as we repeat the message with better and more accurate information, global

understanding will increase. Along with this improved understanding will be a willingness to make the necessary changes in our society and to seriously deal with vitally important DRR issues.

## VII. GOOD PRACTICES

To cope with this situation there are some good practices to adopt. For example Romania has concluded to sign with all neighboring countries the memoranda of understanding and other diplomatic documents to better manage the resources in common in case of disasters with trans-boundary consequences. These actions encompass measures to improve early warning, specific notification, coordination and intervention for mitigation actions.

It is axiomatic that the response to large-scale disasters in any nation, whether the effects of the disaster are multinational or not, will involve the consideration of involvement and aid from other nations. Categories of involvement involve binding regulatory agreements, non-binding regulatory agreements, or aid offered without pre-agreements. The 2012 earthquake that struck near Port-au Prince affected over 3.5 million peoples, and killed an estimated 220,000, and the resulting cholera epidemic killed over 5,899. Since 1973, the United States has been the largest donor to Haiti, and it is not surprising that the US, working with the Government of Haiti and the United Nations, executed what became the largest international humanitarian response to a natural disaster in U.S. history. The immediate outpouring of aid in the form of money and expertise was incredible, although the long term support is certainly less impressive. As one of the most complex humanitarian efforts undertaken in response to a disaster, the response and recovery efforts for the 2010 earthquake in Haiti is worthy of continued discussion and analysis. Much can be learned in the area of coordination and cooperation between and among nations.

In analyzing the response to the Haiti earthquake of January 12, 2010, Benjamin et al. [25] noted that poor coordination among aid organizations, refusal of aid from some organizations, and lack of transparency and accountability for donations were some of the most obvious mistakes made. Other mistakes include deficient disaster planning, inadequately prepared rescuers and excessive emphasis on security as other mistakes made. In questioning coordination, however, one must realize the difficult logistical problems and lack of stable government in Haiti. Hopmeier et al. [26] stressed from their analysis of the Haiti response that there needed to be an international incident command system developed, agreed upon, and implemented in order to coordinate an effective international response. Although often ignored or overlooked in response and recovery, mental health issues remain as one of the needs in massive natural disaster. There are mental health success stories that have been reported in Haiti. In one international success story from Haiti, Raviola et al. [27] reported how a transnational team expanded mental health and psychological services in Haiti. It was noted that there are often difficulties in coordinating interventions by

NGOs, government, and local groups, especially in the area of culturally sensitive treatment. This model was proposed as being ideal for replicating in other disaster scenarios. The fact that this model can be used in low-resource settings makes it ideal in locations such as Haiti.

Katrina has been called a “case of ‘grand failure’ in crisis and emergency management” [28]. Although there are a myriad of lessons to be learned by hindsight and “second-guessing” those under stress of the event, this was the first event in US history where many international NGOs (INGOs) felt compelled to become involved, whereas their normal field of operations was developing countries. It sent shock waves through the international community and in many ways undermined their faith in the ability of the US to render aid to anyone in time of need. More than one dozen INGOs provided humanitarian relief in the US for the first time. For example, the International Rescue Committee that normally focuses on humanitarian aid for victims of war and persecution dispatched an Emergency Response Team to Louisiana for assistance in public health, emergency health, and mental health counseling. Visions seen on televisions around the world invoked images of third world countries and an impoverished population not seen before. It was a lack of collaboration and interrelationships, even within the country, that was most troubling.

## VIII. THE WAY FORWARD

Disaster prone countries need to formulate and implement strategies, plans of action, and programs for disaster risk reduction. They should develop their institutional and technical capabilities in order to cope with the disasters. Preparedness and preventive measures are highly desirable to reduce the disaster losses. Effective and efficient response and rehabilitation capabilities are also equally important to minimize and redress disaster losses and damages. Hence, the need and importance of cooperation and coordination among the national/international organizations and countries is pertinent particularly in the field of the development of humanitarian assistance [29].

Disasters must also become a core development issue. Integrating disaster risk reduction into development policy, programs and practice is of great importance. It needs to be ensured that disaster risk reduction is included in Poverty Reduction Strategy Papers and development plans and programs [30]. To give an example of the benefits of disaster risk reduction approach, the World Bank recently estimated that, on an average, countries can save \$7 in disaster recovery costs for every \$1 spent on risk reduction measures. On the other hand, better systems for the collection, analysis and dissemination on disaster impacts and links with climate change, health, livelihoods and governance by developing performance targets and indicators to assess progress in integrating disaster risk reduction into both humanitarian and development policies are also important. Examples of strategic activities include:

- Explore possible national, regional and global cooperation mechanisms for sharing information, exchanging views and knowledge in order to replicate best practices required for the effective response and mitigation of disasters.
- The national, regional and global level capacities and links should be further developed and strengthened by reinforcing links between preparedness and response, by seeking support for the work done in communities to reduce risk and prepare for disasters and in generating learning from that work.
- Strategic partnerships, cooperation and coordination with the national and international key stakeholders within the humanitarian community (UN agencies, NGOs, INGOs, academic, corporate sectors etc.) should be strengthened to improve the support to national societies and their partners.
- For an effective cooperation and coordination wide range of contacts among the stakeholders is needed.
- The use and application of Disaster Management Information System (DMIS), information, best practices, guidelines, newsletters and other resource materials should be compiled, analyzed and synthesized and shared among the national and international stakeholders. An example of a free open source DMIS would be Sahana [31] software that has been deployed in response to disasters around the world [32]. While sharing of experiences, exchanging views and learning lessons from each other help to minimize losses and damages.
- Public information, education and disaster awareness are crucial. Therefore, it is highly essential to raise disaster awareness and education on the behavior and impact of disasters among the vulnerable population.
- Adequate funds and resources should be arranged to enhance national and international capacity in emergency preparedness and disaster mitigation and response.
- Capacity building is necessary thorough trainings, seminars, workshops and exposure visits.
- The use of remote sensing technique is essential in particular for earthquakes, fires, volcanic eruptions and tsunamis.
- Hazard mapping of vulnerable areas is of utmost importance. Similarly, high risk areas should be identified and integrate with population distribution infrastructure and building stock databases by preparing new Tectonic maps of such areas.
- Emphasis should be given to disaster risk mitigation.
- More importantly, disaster resistance resilience communities are to be developed.
- Establishment of early warning systems for natural and human induced multi-hazards is highly desirable.
- It is to be realized that preparedness, response, rehabilitation and development are all part of a same process. Therefore, the holistic vision of this process must be reflected in the disaster risk management policy framework that should encompass existing policies.
- While developing and implementing a development plan/project, its sustainability and proximity to disaster should be taken into account.
- All the disaster management activities should meet the noble interest and good of the affected population by measuring the respect of agreed policies and standards such as Sphere and Code of Conduct.
- It is also desirable to work on a new disaster risk management policy framework, which includes cross-cutting issues like gender equality and accountability and environment perspectives.
- The most effective way to reduce losses from disasters is to integrate disaster risk into overall economic and development processes.
- Mock exercises, drills and simulations should be carried out to sharpen the skills of the disaster managers.
- Public participation and preparedness should be enhanced. There must be respect for, and inclusion, and incorporation of, local and indigenous knowledge.
- An international perspective must be taken on essential knowledge and skills for education and training in emergency management.

## IX. THE FINAL NOTE

As disaster management is a multi-sectoral activity, it needs cooperation and coordination among stakeholders. This means a sharing of experiences, exchanging views and learning lessons help to minimize losses and damages. The overarching issue is to improve governance for disaster risk management. Risk considerations must be factored in into all aspects and levels of government and society. Disaster risk analysis should be undertaken for all new development plan, program and activities. Building relationships requires time and a wide range of contacts. Disaster risk reduction should be included in strategy papers and development plans. It is of interest to note that donors, governments and aid agencies prefer to invest in response rather than cost-effective disaster prevention and preparedness [33].

The Hyogo Framework for Action 2005-2015 also emphasizes on the efforts to reduce disasters through systematic integration of disaster risks by integrating them into policies, plans and programs for sustainable development and poverty reduction which must be supported through bilateral, regional and international cooperation. More importantly, a humanitarian agenda should be given high priority. It is also needed to further develop and maintain strategic partnerships



among the national and international stakeholders in order to fulfil the goal of alleviate the human sufferings.

Finally, cooperation and coordination mechanisms in disaster management should be established at all levels of government. The private sector also must be involved due to its demonstrated ability to provide vitally important resources [34].

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## Authors Brief Bio

### **K. Harald Drager**

K. Harald Drager, Oslo, Norway, is the Managing Director of QUASAR Invest AS in Norway, a consultancy in global safety, emergency and disaster management. He has a Master's degree in control engineering from the Norwegian Technical University in 1966 and a Master's degree from Purdue University in USA in industrial engineering in 1973. His specializations are international organizational development, emergency, disaster and risk management, and project management. He has done consultancy work for numerous clients internationally amongst others the World Bank/International Finance Corporation, NATO and the European Commission, and he has been project manager of several international research and development projects for methods and software development in risk, emergency and disaster management.

He was employed by Det norske Veritas, <http://www.dnv.com> in 1967 and a member of the Board of Directors of the company for 5 years until he left the company in 1983 and founded his own consultancy. He took the initiative to establish TIEMS (The International Emergency Management Society; [www.tiems.org](http://www.tiems.org)) in 1993, and was the International Vice President of TIEMS since its inauguration until 2002, when he took over as TIEMS President. TIEMS has under his leadership developed to a global well known organization with local chapters in many regions/countries, and TIEMS arranges each year workshops and conferences all over the world with focus on disaster risk reduction. Recently TIEMS has initiated development of a global education, training and certification program and a research coordination service for its members. He has published numerous papers internationally on emergency, risk and disaster management.

He was TIEMS representative in the EU funded NARTUS project with the responsibility for consensus building and establishing the PSC Europe Forum, [www.psc-europe.eu](http://www.psc-europe.eu), an all stakeholder forum for public safety communication. PSC Europe Forum is now a sustainable organization after it was launched at the end of the NARTUS project in 2009, and arranges two assembly conferences each year and is a leading global advocate for standardization and research initiatives in public safety communication. He was a member of the advisory board of the EU project, ACRIMAS, <http://www.acrimas.eu/>, and is now a member of the advisory boards of OptiAlert, <http://www.opti-alert.eu/> and CRISMA, <http://www.crismaproject.eu>. He was an European Commission appointed evaluator for EU Security Calls for FP7 2013, see: <http://ec.europa.eu/research/index.cfm>

### **Meen Poudyal Chhetri**

Meen Poudyal Chhetri is the Chairperson of Disaster Preparedness Network-Nepal and the President of Nepal Center for Disaster Management. He has been appointed as the Adjunct Professor at the Queensland University of Technology, Brisbane, Australia from 1 March 2009. He served as the Director of the Department of Disaster Management of the Government of Nepal from 2001 to 2003. In 2004 He worked as the Deputy Regional Administrator in Hetauda, Nepal. From 1995 to 1996, he was the Chief District Officer and Chairman of District Disaster Relief Committee in Dhading district of Nepal. Prof. Chhetri also held positions of Under Secretary, Investigation Officer and Special Officer in various government agencies of Nepal including the Commission for the Investigation of Abuse of Authority, Ministry of Home Affairs, Ministry of Finance, Ministry of Agriculture and Ministry of Education. He was the member of the Drafting Committee of the Disaster Management Bill of Nepal in 2007.

Prof. Chhetri is the Chairman of The International Emergency Management Society (TIEMS)'s Paper Review Committee. He authored two books namely; "Mitigation and Management of Floods in Nepal" and "Analysis of Nepalese Agriculture." He has also published a number of articles in national and international journals. Prof. Chhetri completed Post Doctorate (Post Doc.) Research Study on "Disaster Risk Reduction: Policy Implications for Nepal, Australia and Beyond" from the Queensland University of Technology (QUT), Brisbane, Australia in 2011. Prof. Chhetri earned his doctorate degree in Economics from the University of Vienna, Austria in 1995. He also holds an MA and Law degree. He carried out 14 months Drug Abuse Research

Study at the Johns Hopkins University, Baltimore, U.S.A. from 2002 to 2003. He attended the Pandemic Disaster Preparedness Training Course at the Queensland University of Technology, Brisbane, Australia from August 24 to November 29, 2008. Apart from the above, he has carried out a number of research works in various fields in Nepal and beyond. In addition to the above, Prof. Chhetri worked as the consultant and resource person in a number of projects and programs related to disaster risk reduction in Nepal. He has significantly contributed in formulating and implementing disaster management policy and legislation in Nepal.

### **James C. Hagen**

Dr. Hagen is a Professor in the Saint Xavier University Graham School of Management in Chicago, teaching in the areas of Strategic Management, Emergency Management, and Public Health. He is the Regional Director for North America of the International Emergency Management Society TIEMS, and is a Certified Emergency Response Coordinator, a Certified Public Health Administrator, and is certified by Homeland Security as a Master Exercise Planner. In May of 2012, Dr. Hagen spoke in Tokyo at the *Workshop on the 2011 East Japan Earthquake Disaster* and in June provided training in Bucharest, Romania on Global Competencies in Emergency and Disaster Management. As a representative of TIEMS Dr. Hagen was honored to be invited to participate in the Seminar on Transatlantic Civil Security (STACS) Program in Garmisch-Partenkirchen, Germany and presented work on post-disaster reconstruction at the International Symposium on Catastrophic Disaster Management in Chengdu City, Sichuan Province, China in 2010. As a member of the Association of Threat Assessment Professionals (ATAP) and FBI/Private Sector InfraGard Organization, Dr. Hagen also participated in the NORAD/ NORTHCOM Civic Leader's Tour in 2009. Dr. Hagen is a Professor of Business Strategy, as well as Public Health and Epidemiology, and served as Deputy Executive Director of the DuPage County Health Department from 1999 to 2005. Prior to joining the health department, Dr. Hagen was also Professor of Public Health at Benedictine University, and before that spent 12 years at Loyola University Medical Center, where he served as Associate Professor of Microbiology and Immunology, Assistant Dean for Research, and Assistant Dean for Basic Sciences. He is also a licensed Nursing Home Administrator, and has worked to prepare long term care organizations for the special needs of vulnerable populations. He has been the recipient of federal, academic and foundation research grants and has published his scientific work in several journals.

Dr. Hagen is a graduate of Michigan State University and obtained his M.S. from the University of Montana. He was trained as a research microbiologist at Loyola University Medical Center, where he earned a Ph.D. He also holds a Master's Degree in Public Health from Benedictine University, and a Master's Degree in Business Administration from Saint Xavier University.

### **Nicolae Steiner. MD, PhD**

He was alongside with Dr Manastireanu in the leadership of the course of Medical Management of Disasters followed by obtaining of a Complementary practice certificate in Medical Management of Disasters.

This course was followed by organizing in the leadership of both professors of the Master course in Disaster Medicine, for first time in the Central and South Eastern Europe.

For the outstanding results in international activity dedicated to development of Disaster Medicine he received as award the Honorary Membership in the National Medical Disasters System of USA.

He authored over 95 treaties, handbooks and monographs, a representative part of them being retained in the National Medical Library of USA.

He was NATO International expert in Disaster Medicine, member of Health security Committee of EU and Chairman of ad-hoc working group in Critical Infrastructure Protection in Health care systems of NATO-JMC .