English version of
forwards, introduction, abstracts and authors' biographical notes[*]

translated by Serena Leone

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From the book

Building Back Better.
Idee e percorsi per la creazione di comunità resilienti

a cura di

Fulvio Esposito, Margherita Russo, Massimo Sargolini,
Laura Sartori, Vania Virgili

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Excerpted from the back cover

The essays collected in the volume *Building Back Better: idee e percorsi per la costruzione di comunità resilienti* (edited by F. Esposito, M. Russo, M. Sargolini, L. Sartori, V. Virgili) shed light on what should be made now in Italy to mobilize the best energies to start a virtuous cycle, in agreement with the United Nations' Sendai Framework for Disaster Risk Reduction 2015-2030.

The volume certainly concerns building back better, but also all the preventive measures which turn into a priority in contexts characterized by social and economic vulnerabilities, in addition to natural hazards.

The scientific community has the duty to boost some conditions increasing the resilience of territories and communities at risk or already affected. Only a prolific and concrete dialogue among the various kinds of knowledge, competences and responsibilities of the actors involved will allow the implementation of adequate actions aimed at obtaining incisive and lasting results in support of territories and communities.

An international hub, characterized by many multidisciplinary contributions, can promote a critical mass of research and innovation, as proven is this volume, by encouraging a fruitful debate with policy makers to plan and implement concrete actions in the territories.

The authors. The volume gathers the contributions of researches from Italian universities (Bologna, Camerino, Florence, Macerata, Modena and Reggio Emilia, Marche Polytechnic, Urbino), research institutes and research centres (Euro-Mediterranean Documentation Centre for Extreme Events and Disasters, Gran Sasso Science Institute, Italian National Institute for Nuclear Physics, Italian National Institute for Geophysics and Volcanology) and Action Aid. The section Strategies in action collects the interviews with the Agency for Territorial Cohesion, the "Casa Italia" Plan, the Civil Protection and the Loccioni Group.

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Building Back Better.
Ideas and pathways for the creation of resilient communities

by Fulvio Esposito, Margherita Russo, Massimo Sargolini, Laura Sartori, Vania Virgili

WITH THE COLLABORATION OF

Researchers from the universities of:
Bologna
Camerino
Macerata
Modena and Reggio Emilia
Marche Polytechnic
Urbino

Research institutes and research centres:
Euro-Mediterranean Documentation Centre for Extreme Events and Disasters
Gran Sasso Science Institute
Italian National Institute for Nuclear Physics
Italian National Institute for Geophysics and Volcanology
Labor-University of Florence

Researchers of
Action Aid

INTERVIEWEES

Maria Ludovica Agrò (Agency for Territorial Cohesion)

Giovanni Azzone (Piano Casa Italia)

Fabrizio Curcio (Protezione Civile)

Enrico Loccioni (Loccioni Group)

Fernando Ferroni's Foreword

Natural disasters bring about enormous losses in terms of human lives, destruction of buildings and damages to the quality of territory. However, disasters do also affect the communities as populations are uprooted from the territory, productive and commercial activities are interrupted, cultural heritage, traditions and collective memories are lost. All in all, these factors also affect the people's confidence in the institutions.

According to the Sendai Framework for Disaster Risk Reduction 2015-2030, the seriousness of a disaster is strictly correlated with the choices we make about our lives and the environment.Such choices are about the way we produce food, how and where we build our houses, what kind of social policies we adopt, and how our economic system works. So, all of our actions can turn us into more vulnerable or more resilient to disasters.

Adopting a coherent and holistic approach to disasters risk management is a challenging issue. Decisions should be taken considering economic, social, cultural and ecologically sustainable prerequisites which are validated on an evidence base. Research can provide us with those prerequisites, which must be intended to shape some solid, conscious and thoughtful long-run development policies.

That is what this volume tries to demonstrate by gathering together an array of multidisciplinary competences and knowledge. It is conceived as an innovative solution and good practices' review, which aims, through a collaborative approach, to translate research results into real-world applications at the disposal of individuals and communities. These applications can be efficiently put into practice by national and local governments, by the institutions in charge of training and preparing emergency responses, as well as by communities themselves.

The ability to anticipate, prevent (whenever possible), train, respond and better reconstruct (Building Back Better) is the result of a shared awareness. It is therefore necessary to assure that the disaster risk reduction finds increasing expression in European research policies.

We can and we must, of course, undertake concrete actions as soon as possible in our country too. There exist excellent studies, analyses and technologies concerning natural disasters (the following pages provide abundant proofs). Nevertheless, there is still not a centralised base, a hub of multidisciplinary knowledge that could contribute to the enhancement of an efficient and shared catastrophes management policy.

An international level centre for advanced studies situated in the very territories affected by the recent seismic events in Central Italy could represent a key resource in the formation of professionals with a strong expertise and a strong interdisciplinary openness. Moreover, it could also be essential for bringing about some relevant outcomes that might improve the resilience of individuals and communities, manufactures and the territory.

Fernando Ferroni
President of the Italian National Institute for Nuclear Physics (INFN)

Carlo Doglioni's Foreword

Earthquakes, tsunamis, volcanoe eruptions and landslips are phenomena which are part of the natural evolution of the Earth since they are determined by the relentless force of plate tectonics.

Men should necessarily increase their knowledge of those phenomena in order to deal with them and safeguard human lives and their tangible and intangible properties. In-depth information and subsequent risk awareness are the first steps leading to a different relationship with natural disasters.

The earthquakes that have struck Central Italy in the last decades highlighted the strong vulnerability and exposition to which we are subjected. Seismic events force us to make an overall evaluation that cannot neglect the necessity of a collection of competences that are aimed at regenerating the social, economic and urban fabric. They must comprise the need of renovating and safeguarding cultural roots by looking to the future with a view to implementing post-earthquake reconstruction or anti-seismic adaptation projects. Such projects shall integrate several disciplines ranging from geosciences to anti-seismic engineering, history, economics and urban planning. They will be aimed at job creation as the absolute priority for the preservation of the territorial communities.

The signs of natural disasters shall remain clearly visible as a memento for future generations and become an integral part in the collective memory for a deep sharing of a new relationship between Man and Nature.

So, it is time for a cultural renaissance, with scientific knowledge as the multidisciplinary platform on which the future of Italy can be built and rebuilt, so as to give origin to a different world, one in which quality of life improvement is the primary objective to achieve. This objective will be attained by respecting the environment, safeguarding the inherited cultural heritage and increasing its resilience, in a way: by being led by virtue and knowledge (per seguir virtute e canoscenza).

The authors and editors of this volume are proposing an integrated action plan which is certainly worthy of attention. Culture, prevention and economy are the key words on which to create a centre of studies that will play a crucial role in boosting the national development and implementing at the same time a risk safeguarding advanced policy. Indeed, the planet we live in constantly holds some risks for us, so we should learn to accept and mitigate them.

Carlo Doglioni
President of the Italian National Institute for Geophysics and Volcanology (INGV)

Why we Need an Urgent Debate

A cura di Fulvio Esposito, Margherita Russo, Massimo Sargolini, Laura Sartori e Vania Virgili

The earthquakes that struck the city of L'Aquila (Central Italy) in 2009, the Emilia area (Northern Italy) and a very extended area in four regions in Central Italy in 2016 had a catastrophic effect: 634 persons died, thousands of people were injured and evacuated from their homes, extensive damages were suffered by material, cultural and relational heritage. Tragedies that, once again, have revealed the vulnerability of some largely unprepared communities and institutions to cope with such a foreseeable and foreseen risk.

The *preparedness argument* regarding natural disasters has been at the centre of attention of the UNISDR (United Nations Office for Disaster Risk Reduction), the United Nations agency dedicated to natural disaster risk reduction for decades. Since 2005, the Agency has actively guided governments and local communities in straightening their natural disasters prevention skills (whenever possible), in reducing (always) the vulnerability of the communities exposed to risk, so as to increase their resilience.

In the Framework for Action of 2015 proposed in Sendai (Japan), also known as *Sendai Framework for Disaster Risk Reduction,* the UNISRD reiterates two key factors to focus on: firstly, individuals, communities and socio-economic organizations' preparedness to cope with natural disasters and associated risks through appropriate measures reducing its impact at all levels (individual, social and economic); secondly, the post-disasters intervention in order to better reconstruct, by conceiving the reconstruction as a chance to mitigate the consequences of future disasters. Namely, through the improvement of population working and living conditions and the promotion of democracy and active citizenship in the struck areas.

The expression *Building Back Better* embraces all of this, it is a principle applying not only to buildings or material infrastructures.

The Sendai Framework reiterates the need for an action plan involving many interconnected aspects: the improvement in living conditions and employment opportunities, the environmental sustainability and a better quality of health, an increased individuals' and communities' awareness. The latter might be attained through a training process aimed at reducing their material, social and psychological vulnerability. Also the strengthening of the development potential, so as to make communities, social and economic organizations, public institutions and territories less vulnerable and more resilient. Therefore, with an increased resilience the risks associated to nature's power will lead to less destructive effects.

After having considered the state-of-the-art knowledge and communication on natural disasters, the 'Research Contributions' section will move on to the question of social innovation and medium and long-term perspectives of the communities struck by catastrophic events. The following papers focus on culture and environment development in accordance with the *Building Back Better* paradigm. They carry out an analysis of the effects of administrative, technical and juridical infrastructures on communities and territories' resilience. The book ends with four interviews conducted by the editors, who imagined an ideal dialogue among the 'Strategies in action' already implemented by the government, by exposing the point of view of the involved national institutions and that of an entrepreneur from the Marche region.

This volume describes the main challenges and opportunities for research and the possibility of translating them into policies and practices for disaster risk reduction. Particular emphasis is placed on those preventive measures involving all levels of society: from governments to citizens, from the public sector to the private one. The necessity to develop a connection between science, politics and practical solutions should be considered, indeed, as a priority in the implementation of the Sendai Framework.

The scientific community, which can contribute with its tools and knowledge to the study of natural disasters' effects, has the duty to boost some conditions increasing the resilience of territories and communities at risk or already affected. Therefore, thanks to its competences, it can efficiently contribute to supporting the process through which the reconstruction can take place. Furthermore, by engaging in a prolific dialogue between the many multidisciplinary kinds of knowledge at stake, it is possible to obtain extraordinary results in support of the actions to be undertaken. Actions in which the local communities' participation is essential if we consider the vastness and heterogeneity of the territories affected by seismic events in Italy only over the last decade: more than three thousand towns covering approximately 45 % of the whole national territory, accounting for 40 % of total population and 31 % of working population. Those are territories that significantly differ in altimetric data, population density, demographic trends, economic and productive structure, together with health, education and transport infrastructures' conditions. The challenge taken up by a vast team of researchers in this volume was to advance an interpretation of the connections between the several elements of analysis.

Their goal is to draw the attention of the national community on the need to raise awareness about what should be made now to start a virtuous cycle, in agreement with the Sendai Framework, and on which resources to mobilize for promptly improving our country's condition.

From the contributions of a plurality of disciplines and scientific sensibilities involved, it is possible to shed light on the need to support research on those themes and to engage a critical mass of researchers for filling the existing knowledge gaps. So, there is a strong need for research and innovation, both incremental and radical.

Unfortunately, what makes Italy such a beautiful country, is, at the same time, what makes it so vulnerable to the effects of natural disasters. Therefore, it is reasonable to present this book as an international hub intended to deepen the understanding of natural disasters risk reduction, and to submit that idea firstly to the Italian Chamber of Deputies VII Culture, Science and Innovation Committee. This priority is motivated by the role that the Parliament, and particularly the VII Committee, can play in mobilising the most powerful forces of our country.

Ministry of Education, University and Research, Technical Secretariat of the Department for the universities, higher education establishments in art, music and dance
University of Modena and Reggio Emilia
University of Camerino
University of Bologna
Italian National Institute for Nuclear Physics and the Ministry of Cultural Heritage and Activities and Tourism

RESEARCH CONTRIBUTIONS

KNOWING, UNDERSTANDING AND COMMUNICATING NATURAL DISASTERS

Risk prevention: A Three-Act Tragedy

Nicola Casagli, University of Florence

Act I: Once upon a time there was a King

Once upon a time there was a king who ruled a newly-founded country, which had been chronically affected by all sorts of geological disasters since ancient times.

One day, a massive earthquake destroyed some cities of the Realm.

Tens of thousands of men, women and children lost their lives under the rubble. Other tens of thousands of people run to find shelter on the beach, but were swept away by the giant waves triggered by the earthquake, because they had not been informed about the existence of tsunamis.

More than one hundred thousand died and countless people were injured or lost their homes. Entire cities were wiped out by the tsunami.

It was a disaster of biblical proportions.

The whole population of the State was shocked by the sheer misfortune.

The king relied on two wise counsellors, experts in geology and engineering: after he had briefly consulted them, he issued a decree compulsorily prohibiting the reconstruction of what had been destroyed by natural disasters.

Not only did he decreed this, but he also prohibited all future buildings in the entire country's risk areas. Unfortunately, what had already been built in the risk areas had to be relocated, in other words, moved to a safer area.

To do that, the government allocated adequate funds for a state safety program.

The citizens of that country started gathering information on the security of the territory, by consulting experts – geologists and engineers – and acted in accordance with the information they had collected.

The administrators strictly applied the decree norms, by issuing building permits only after proper verifications of soil stability and security.

Since that day, the subjects of that wise King started building only robust houses in safe areas. A less vulnerable and more resilient community was born, in today's language.

Of course, as in fairy tales, they lived happily ever after.

Act II: This is a true story …

The King's name was Victor Emmanuel III, prince of Savoy and the year 1908, when he was ruling over Italy. The cities were Messina and Reggio Calabria.

On December 28, 1908 at 5:20 a.m. local time a devastating earthquake occurred, with a magnitude of M=7.2, more than thirty times stronger than the earthquakes that were to strike Central Italy almost a hundred years later. It

reached the Mercalli intensity of XI, corresponding to catastrophic earthquakes.

The Prime Minister of Italy, whose name was Giovanni Giolitti, was the head of a fragile coalition government primary engaged in solving the longstanding internal debt problem. Exactly as we do today.

The economic damage caused by the earthquake and the tsunami has been estimated to amount to 600 million of Italian liras, corresponding today to more than 2.5 billion euros.

The whole country was mobilized, with his usual great generosity, to send volunteers, to host homeless persons and to provide assistance and funds to the affected populations. Great support came from all over Europe, Russia and the United States.

Only four months later, the Royal Decree No. 193 was formulated on April 18th 1909, containing technical standards for the strengthening and reconstruction of existing buildings, and the design of new buildings in the area affected by the earthquake. This decree was based on the following criteria:

> *No new buildings or rebuilding on fractured, unstable and steep lands, or on lands which could convey vibrations and turbulent stress to buildings, because of different geological constitution or different resistance of their parts.*

These few lines concentrate, in a very concise and essential way, the solution to the risk prevention issue. 20th century experts did understand that, in order to avoid any risk, it was just necessary not to reconstruct existing buildings nor to erect new buildings in the most hazardous areas.

All subsequent legislation so far did nothing but repropose again the same issue, although not in such a clear and direct way.

Act III: …but ended differently

So far, the story exactly matches the fairy tale. But, unfortunately, the Italians did not have any happy ending with the geological safety theme.

To cope with this great disaster the government actually adopted some building technical standards prohibiting, in a crystal-clear way, to build or rebuild on areas subject to geological and land instability. However, as can be seen to date, there has never been a less respected norm. Additionally, today's problem of Italian seismic risk is far more serious than it was at the beginning of the century.

Over the last years, our country has been affected by a strong earthquake every 6 years. And every 3 years[1], on average, a new definition of building standards has been issued. However, rather than keep on issuing new regulations the best solution could be enforcing at least the existing ones.

[1] Sources: Italian National Institute for Geophysics and Volcanology (INGV) Parametric Catalogue of Italian Earthquakes 2015, Italian National Association for Earthquake Engineering (INAEE/ANIDIS)

Getting to know, Assessing and Preventing Natural Hazards: three challenges for 21th century Italy
Gianluca Valensise, Italian National Institute for Geophysics and Volcanology

In the last eight years, Italy has been struck again by earthquakes and again has been caught tragically unprepared. Acknowledged as the cradle of Seismology and now at the forefront of research on earthquake prevention, Italy turns out to be unable to protect herself anew. Italy has forgotten to promote knowledge about earthquakes, leaving the country, therefore, in the grip of a pre-scientific instability on such a crucial theme. The National Research Programme 2015-2020 does not include the theme among its priorities, in an already stingy European context with respect to the field of research and innovation. Lastly, for almost two decades the country has systematically procrastinated the implementation of more stringent seismic standards at all levels (national, regional, local). Consequently, future generations are going to live in an even weaker country than the one in which we have grown up in. What still needs to happen before the seismic safety issue finally enters our governs' political agenda?

Seismic Disasters and Reconstructions in Italian History. The Seismic Hazard in an Unresolved Historical Issue
Emanuela Guidoboni, Euro-Mediterranean Documentation Centre for Extreme Events and Disasters

Italy is struck, on average, every four or five years by a highly destructive earthquake, which brings down countries and even cities for decades. Those extreme events, which have existed for centuries and are being studied in great detail by specific research areas – in which Italy is at the forefront – are not known to the wider audiences in the country. Neither are they perceived as a 'permanent' characteristic of the physical and social environment. More than 4,800 sites (towns, villages and cities) since the Middle Ages have suffered serious damages requiring extensive reconstruction which modified not only the architectural nature of many monuments and attractions, but also networks of settlements. Generally, when a strong earthquake occurs, it erodes the historical and artistic heritage, starting or accelerating depopulation processes, with the subsequent abandonment of monuments and historic sites. Nevertheless, since it is the national community which is bearing the costs of reconstructions, rebuilding has become a synonym for great opportunity and a new way to plan the future. Yet still there is no national law regulating objectives and strategies.

The Role of Communication
Stefano Martello and Biagio Oppi, Italian Federation of Public Relations (FERPI)

What is, and what will be the role of communication in the processes of environmental crisis management and response? Stefano Martello and Biagio Oppi offer a detailed answer to this question, starting from a strong multi-disciplinary action scenario providing economic, productive, psychological and environmental sustainability evaluations. Although with a necessary forward-looking approach, this contribution targets our present issues highlighting the most vulnerable areas. It is on the strengthening and implementation of those areas that the more and more central role of communication will depend. Namely, in terms of citizens' participations, crisis management and orientation in the still

underestimated reconstruction and recovery phase. There are three strategic tasks requiring –even before than a methodological framework – a transversal cultural accreditation involving private and public organizations, and decision-makers at all levels.

INDIVIDUALS AND COMMUNITIES

Social innovation: Resilience and Vulnerability of Communities and Territories

Laura Sartori, University of Bologna

The paper aims at linking social innovation to the sociology of disasters. This is an area of research, which emphasizes the social, political and economic dimension of catastrophic events (such as earthquakes and floods), in addition to the natural dimension, in the analysis of effects and total damages. In this scenario, the communities play a central role in the local governance, as also recognised by the Sendai Framework. Vulnerability and resilience are two key aspects of the community which should be evaluated jointly when addressing a 'disaster cycle', with special reference to the prevention and risk reduction phases. In this sense, an approach of social innovation can contribute to rethinking and contextualizing the community and territory's socio-economic characteristics, which can be both sources of vulnerability and resilience.

The Earth Trembles: Learning from the Emergency to Build Resilient Communities

Ezio Scatolini and Federica Colli, University of Florence

Abstract
This paper illustrates the work of a group of volunteer experts who projected and cooperated in the creation of a post-emergence community support service, successfully combining solidarity, initiative and psychosocial-educational competence.
Those bottom-up forces have provided a concrete example of intervention based on solid conceptual prerequisites, among which we can list: the promotion of the community competence, health promotion and disease prevention, action research, and the open system concept. Furthermore, this paper illustrates some of the fundamental principles of community psychology that create the conditions to increase the collective resilience of the affected community. So, it is the task of the political institutions to include comparable official protocols that might be readily integrated into the existing emergency management plans. In particular, the emphasis is on the necessity for professionals to get adequately prepared for their roles.

Thousands of Different Local Communities, all Equally Vulnerable

Elisa Lello and Fabio Turato, University of Urbino

When planning the post-earthquake reconstruction not only structural variables come into play. The social variables, and particularly the social capital concept, play a crucial role. The affected territories present a socio-economic and urban structure in line with the Third Italy model. Such model has not severed a diffused development, but has rather straightened the reciprocal ties and networks with the territory. Yet, not only did the economic

model suffer a severe setback, but also the social cohesion and the community networks revealed a certain degree of weakening, which made the territory more vulnerable. So, it is important to reconstruct and repair the social fabric through participatory planning approaches, which turn out to be some effective tools for converting the traumatic event into a driver for social regeneration. Furthermore, those approaches can foster real policies and can stimulate the elaboration of a response plan limiting the sense of impotence and resignation in the affected communities.

Individuality and Community: ICT in Emergency Phase

Christian Quintili, ActionAid and Matteo Tempestini, "Terremoto Centro Italia" Project

When natural disasters occur, the cooperation between citizens and institutions is essential. To achieve it, a careful information management and the intervention of digital communities based on the civic hacking culture are necessary, since they might provide solutions to social problems by using open technologies. Two examples of this kind of cooperation are Open Ricostruzione and Terremoto Centro Italia, born respectively following the 2012 Emilia earthquake and the 2016 Central Italy earthquake. Those examples differ mainly in the informative flow: from institutions to citizens in the former case, and from citizens to institutions in the latter case. The interrelationship between these approaches, in terms of technology, typology of persons involved and relationship with the territory, can generate a qualifying ecosystem capable of increasing the territory resilience and guaranteeing a better reconstruction.

CULTURE, ECONOMY AND ENVIRONMENT: New Development Paths

Existing Masonry Buildings and Earthquake: Innovative Technologies to Increase Resilience

Stefano Lenci, Pardo Antonio Mezzapelle and Francesco Clementi, Marche Polytechnic University

An urban system resilience towards seismic events essentially depends on the building features of the architectural and construction fabric. The majority of the building stock, including the most recent reinforced concrete part, has been constructed without meeting antiseismic standards. Thus, it is necessary to think up some innovative technologies to increase building resilience. This is the case of the Equivalent Frame Method, mostly used due to its modelling ease and low computational resources requirement. Another example is the Finite Element Method (FEM), which is still mainly used in research for its modelling complexity and computational burden.

Resilient Cultural Heritage: Research and Innovation Contributions

Vania Virgili, Italian National Institute for Nuclear Physics

The disaster risk reduction paradigm in the Building Back Better priority of the Sendai Framework finds its application also in the protection of cultural heritage. Research has the responsibility for proposing and realizing innovative solutions and action plans. Not

only to increase sites, museums and monuments resilience, but also the community ability to deal with disasters effects. Heritage is not a static element but a dynamic system of community-territory interaction and risk adaptation. The array of good practices highlights the possibilities and limitations of the Disaster Risk Reduction (DRR) implementation in an ecosystem as fragile as the Italian one, where culture is part of the environment and its communities. So, the desired direction is that of a stronger and stronger cooperation between local authorities, entrepreneurs and citizens, in which research results are effectively applied, transferred and communicated.

Natural Disaster Impact: University, Diffused Cultural Heritage and Economic Analysis

Alessio Cavicchi, Mara Cerquetti, Rosita Pretaroli and Claudio Socci, University of Macerata

The example of the University of Macerata represents a starting point for discussing the role of universities in the post-earthquake reconstruction strategies. Universities are called upon to rethink their teaching, research and third mission, in favour of place-based policies that could encourage the relationship between researchers, stakeholders and local communities. In order to be really efficient, the interventions on cultural heritage should focus on the integrated enhancement of all assets that characterize the territory. For instance, through preventive conservation plans, networks and itineraries promoting the relationship between museum sites, diffused cultural heritage and local productions. The economic revitalization plan of the affected local economies requires an impact assessment focusing on the affected areas' productive activities, and the key sectors that can facilitate the economic recovery. Also, the plan should assess the impact of public and private investments and evaluate the ex ante and ex post effectiveness of the action undertaken.

Analysis Data and Tools to Build Back Better

Margherita Russo and Paolo Silvestri, University of Modena and Reggio Emilia

The speed and efficiency of the reconstruction depend on many conditions rooted before the disaster occurs – in the institutions, each individual and local communities' skills, and in the network of relationships linking the different sites. The extraordinary emergency and reconstruction action restores interrupted ties, embarks upon new projects, and accelerates transformation processes that marked the territory before the disaster changed it. Indeed, the competences of many private organizations and public administrations operating in a variety of spheres are put into action. Under normal circumstances, the efficiency of those actions is evident within each sector, but the emergency and the reconstruction reveal their close interconnection. So, essential data supporting those interconnections should become part of the common heritage available to everybody: public administrations, scientific research, citizens, private organization and voluntary work.

The Role of an Advanced Research Centre in Territorial Development

Eugenio Coccia and Alessandra Faggian, Gran Sasso Science Institute

Infrastructure investments and physical capital are clearly indispensable conditions that encourage growth. But they are not enough when there is a lack of knowledge that prevents taking advantage of them. It has been decades since the concept of human capital became

a central element in the debate over a region's growth and success factors, being associated to positive externalities. In other words, a more educated population correlates positively with a higher degree of entrepreneurship and innovation and, as a consequence, with a stronger economic growth. That is why the presence of important research centres (INFN - National Institute for National Physics and LNGS – Gran Sasso National Laboratories) and an international PhD school (GSSI – Gran Sasso Science Institute) can revamp local economies, assuring a continuous and dynamic interaction between the stakeholders, in pursuit of a more knowledge-based economy.

Regenerating Landscapes
Massimo Sargolini, University of Camerino

Landscape is the result of the interaction between various natural and cultural components, conveying a feeling that is strictly linked to the population residing there. The damage deriving from a disaster can be double: on the one hand, the destruction and the related physical loss of assets (historic-artistic, archaeological, environmental) marking a site's landscape features; on the other hand, the local population abandonment of the devastated areas. Indeed, a site lacking any landscape value cannot keep its attractiveness, so it enters a negative cycle that fosters the sharpening of marginalization and abandonment. The disaster response from a site's endogenous forces, focused on the search for a more resilient and sustainable new territorial equilibrium, is the best way to trigger durable development pathways that can give back to us better landscapes and more solid communities.

Development Paths in Agro-food Industry and Livestock Farming
Annette Habluetzel, University of Camerino, and Francesco Pagliacci, University of Modena and Reggio Emilia

The 2016 seismic sequence had a strong negative impact on Marche agro-food industry, and particularly on the livestock production chain. In addition to some structural features, the vulnerability of that sector is also related to the degree of local heterogeneity (livestock typologies, farming systems, geographical location). Among other things, important policy implications should be considered in the development of proper contingency plans, so as to improve risk management practices and future local development plans. With regard to those action plans, all considered necessary in accordance with the Sendai Framework line of reasoning, this paper suggests a research and action line, which is rooted in the analysis of the structural and economic characteristics of Marche's livestock breeding. Therefore, the final goal is highlighting the vulnerabilities of production, by considering the damages reported to productive structures and livestock farming.

INFRASTRUCTURES: Organizational, Technical and Legislative

Local Authorities, Reconstruction and Reorganisation: between Regulatory Constraints and Incidental Needs
Anna Francesca Pattaro and Marco Ranuzzini, University of Modena and Reggio Emilia

In the event of natural disasters, the local authorities are called upon to play a crucial role in managing the emergency, especially during the reconstruction. Local authorities are

both victims of the disaster and responsible for finding the right solutions for citizens and local stakeholders; they must respect the existing regulatory framework and emergency legislations. In fact, many local authorities had to reinvent their own activities, and their policies and services 'contents, in order to face old and new demands. The case of the Digital Model for Building Construction (MUDE – Modello Unico Digitale per l'Edilizia) is an interesting informatic platform created by the Emilia-Romagna commission, for the request and concession of public subsidies for private buildings damaged by the 2012 earthquake. This e-government approach has triggered reorganisation and adaptation dynamics, but also a search for more autonomy in the objectives laid down by higher levels of the hierarchy.

Telecommunication Infrastructures in Emergency Scenarios
Maurizio Casoni, University of Modena and Reggio Emilia

Natural disasters and terrorist attacks can bring about a high number of victims, damages and also massive destruction of telecommunication infrastructures playing a strategic importance in the integrated action of the various agencies operating in the field of public protection. The lack (or breakdowns) of communication between emergency operators, and also between civilians affected by the disaster, can worsen dramatically the very effects of the disaster. So, it is necessary to plan and bring into operation better communication systems, not only during the emergency phase but also before possible disastrous events. Along with the use of the most advanced telecommunication technologies, an inter-agency communication is required, to significantly increase the amount of data transmitted, the number of support services and improve the affected population resilience.

Emergency Management Regulations: Why We Need a National Law
Margherita Russo and Simone Scagliarini, University of Modena and Reggio Emilia

Many of the problems arising from natural disasters are always the same, and the response of the legislator (before) and of the government-appointed commission (later) may not always be appropriate. From the analysis undertaken on the ordinances issued in the event of the 2012 Emilia earthquake it is possible to classify the relevant areas for regulatory intervention. Furthermore, the analysis includes some examples of the post-earthquake economic effects in the affected families' ordinary life, such as on loans, insurance policies or service contracts for goods lost after the earthquake. The authors propose the adoption of a general law that would identify in advance a series of government measures to be promptly activated in the occurrence of natural disasters. In other words, they suggest some measures aimed at reducing the negative effects deriving from the uncertainty in families' decisions.

A Continuous Multidisciplinary Training: the EmTASK Course Case
Paolo Lauriola, Regional Agency for Environmental Protection and Prevention in the Emilia-Romagna region (Arpae), Enrico Giovannetti, Simona Marchetti Dori and Mauro Soldati, University of Modena and Reggio Emilia

One of the top priorities of the Sendai Framework is the dissemination of knowledge– through individuals, communities and organization's prevention and preparedness – which can mitigate the effects of natural disasters and reduce, whenever possible, the risk for

those to occur. In Italy, such kind of educational training is still not adequate to satisfy a growing demand for training, while already active in public administrations and volunteer activities. Following the calamitous events of recent years, in Modena, the University together with the Municipality, the Regional Agency for Prevention, Environment and Energy of Emilia-Romagna, has organized a course on territorial, environmental and health emergencies (EmTASK). This educational experience provides insights into contents, methods, didactic activities and the partnership which has been established to define objectives and methods of the course: all the relevant elements for a modular and scalable planning.

STRATEGIES IN ACTION

How to Build Back Better: a Dialogue with the Public and Private Sectors

by Fulvio Esposito, Margherita Russo, Massimo Sargolini, Laura Sartori, Vania Virgili

According to the Sendai Agreement (*Sendai Framework for Disaster Risk Reduction 2015-2030* of the United Nations[2]), the severity of a disaster is closely related to the choices we make for our lives and the environment. Those are choices that concern the way we produce food, how and where we build our houses, what kind of social policies we adopt, how our economic system works. Each action can make us more vulnerable or more resilient to disasters. The Sendai Framework describes seven objectives [3] to be fulfilled within 15 years, which require the cooperation of all countries in an action targeting 5 priority fields: understanding the risk of disasters; strengthening the governance and the disaster risk management; investing in the disaster risk reduction for resilience; improving disaster preparedness for an effective response, and "build back better" in the recovery and reconstruction phases.

To date, only 18 countries have joined the Sendai Framework, whose governments committed to carrying out actions for achieving the risk reduction objectives at national and regional levels. Only six are European countries, and among them there is still not formally Italy, although some strategic actions implemented at a national level by the Civil Protection and the "Piano Casa Italia" (a government long-term plan to safeguard the national territory) were inspired by the Sendai Framework. The Agency for Territorial Cohesion fosters those strategies, closely connected with the areas where Italy is implementing an Inner Areas Strategy (SNAI – Strategia Nazionale per le Aree Interne), which also has to do with the Sendai Framework contents.

The authorities in charge of those three public strategies have welcomed the proposal for contributing to the collection of ideas about 'how to build back better", which are presented in this volume through the answers to an interview conducted by the editors.

[2] http://www.unisdr.org/we/coordinate/sendai-framework

[3] The seven objectives are: substantial reduction in disaster-related deaths worldwide; substantial reduction in the number of people affected; reduction of economic losses in relation to world GDP; substantial reduction in the damages to infrastructures and in the interruptions in access to basic services, particularly in health and educational facilities, in case of catastrophes ; increase in the number of countries adopting national and local disaster risk reduction strategies by 2020; Strengthening of international cooperation on the theme of disaster risk reduction; increase in the access to multi-risk early warning systems, information and disaster risk assessments.

Together with that public action, equally important is the action of the enterprises actively operating in the territory in order to support the Sendai Agreement and SNAI key points. To include also this point of view, we turned to a firm located in the Marche area, the Loccioni Group, a model company active in the local community and, therefore, promoter of solutions improving the responsiveness of individuals and communities.

The dialogue with the four interlocutors concentrated on the fundamental 'questions' originating from the Sendai Agreement contents. Indeed, it has the purpose of collecting some starting points for a common reflection, that might lead to the introduction of the strategies and initiatives representing each interviewee's organization in that framework. The questions have been grouped into four macro themes:

- In which way do the strategies and initiatives of the organization you are representing relate to the priorities set out in the Sendai Agreement?
- Considering the strategies and initiatives of the organizations you are representing, how is it possible to reach an equilibrium point between the emergency management necessities and medium and long-term policies for disaster risk reduction and the territories and communities' resilience development?
- How can the local communities' participation foster the strategies and initiatives of the organization you are representing in the direction requested by the Sendai Framework?
- Technology and data science (big data) provide more and more precise information that, if appropriately analysed, enable the effective construction of short, medium and long-term scenarios. To what extent can the digital transformation and big data be used effectively in prevention, preparation, emergency, reconstruction and development initiatives? How can those 'tools' be made accessible to local authorities, communities, entrepreneurs and individuals?

The interviewees are: Maria Ludovica Agrò, Director General of the Agency for Territorial Cohesion, which coordinates the SNAI action, Giovanni Azzone, Coordinator of the Piano Casa Italia and President of the Loccioni Group.

The interviews were conducted between May and June 2017 on the premises of the interviewees, and were recorded and transcribed[4].

The elaboration of their contents is presented in this volume [5].

[4] Transcripts were made by Chiara Florini (interviews with Azzone, Agrò and Curcio), intern at CAPP-DEMB (Centre for the analysis of public policies of the Department of Economics, Univ. of Modena and Reggio Emilia), Stefano Tripi with Lucia Cambo' and Giulia Mennuti (interview with Loccioni) from the EmTASK specialisation course and interns in in the research project Energie Sisma Emilia-DEMB. The texts were revised by the volume editors and approved by the interviewees.

[5] An automatic analysis of the corpus created from the transcribed interviews was made by P.Pavone and M.Russo (2017),), "Strategie, pubbliche e private, in azione per ri-costruire meglio. Analisi dei testi di quattro interviste", DEMB Working Paper Series 115, http://merlino.unimo.it/campusone/web_dep/wpdemb/0115.pdf , with the aim of offering a systematic reading of all the contents and connections between the themes. The considerations proposed in this volume, in the 'dialogue between strategies' section, are based on this analysis

Considerations about the Dialogue between Strategies

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The dialogue around the four issues, which was established in the analysis of the interviews, highlights how all the strategies, although in the specificity of their respective field, are related, one way or another, to the Sendai Framework priorities. Notwithstanding the differences in role and action, they all share the same strategies: the understanding of disaster risk; the investment in risk reduction and resilience; the improvement of disaster preparedness for an effective response to disasters and for 'building back better' in the recovery, restoration and reconstruction phases. While, a specific task of the Civil Protection is the strengthening of governance and disaster risk management.

As regards the issue of the community involvement, which is a common point in all the strategies, we found different perspectives. Namely, according to the Agency for Territorial Cohesion the communities are the 'objects' of the action. They are relevant actors that need to be guided by a regulatory framework, to make the necessary set of actions possible and effective. While, according to the other strategies the communities are the 'subjects' of the action. In the Piano Casa Italia they are required to put into practice the solutions that will be developed, and to some extent, they come into play in the very development of such solutions. According to the Civil Protection they represent the essential force so that the prevention can widely establish roots in the population, and the emergency become more effective. Finally, as reported by Loccioni, the communities need to become the engine driving the process of environmental protection, in which new practices and development opportunities have been identified.

Data science (big data), available information, digital transformation, are all elements opening new scenarios in which all the strategies are moving towards, that require the participation of many institutions. First of all, research organizations (Universities and Research Institutes) that engender, organise and make accessible the data. But also the subjects who have the ownership of administrative data (like the Register office or the Agency of Revenue) that must participate actively so that information could be retrieved from those data. Clearly, the access and integration of data (open data) is essential, through their interaction with the world of research. In other words, with those in charge of processing data through theories and models, analysing and interpreting them. The information understanding and sharing theme is included in all of the strategies, but, to date, it has not been perceived as a priority in any of the examined actions.

Finally, the balance between emergency management and medium and long-term policies – for the prevention and development of resilient territories and communities - is fragile and linked to different areas for action. The Agency for Territorial Cohesion sets out the planning framework – and, therefore the medium-term plan – and supports its implementation. The Piano Casa Italia starts with an experimental phase to define some solutions that could improve the country's natural disasters prevention ability. That is, buildings resilience, contributes to the strengthening of the local communities' ability to follow the adequate development path and, consequently, mitigate the damages in the aftermath of disasters. In the Civil Protection's perspective, the quality of the emergency response depends on the changes that would be produced in the medium and long-term period. Those changes will depend not only on the Civil Protection's specific action, but on the

whole system of interconnections between increased knowledge and training, cultural changes (regarding individuals, communities and institutions) and institutional actions.

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