Chapter 10
Feeding the Sendai S&T Road Map on Capacity Development and Resilience

Introduction

Stakeholders should be trained in biosafety and biosecurity response by including planning and preparedness scenarios. This should foster logistical, cognitive, emotional, and communication skills. The National Veterinary Institute (SVA) of Sweden attempted to strengthen these skills through mock anthrax, Q-fever, and food and mouth disease scenarios; exercises included training in decision-making and in determining the likelihood of a terrorist attack using Bayes’ theorem. Local authorities participated in the SVA’s exercises to enhance their abilities in threat assessment, quantitative risk assessment, and surveillance system on all aspects of bioterrorism (Andersson et al. 2013).

European and International Projects on Risk Assessment and Crisis Management

Pioneer EU projects on biosecurity research applied to agriculture were CROPBIOTERROR,\(^1\) prevention and management of biological threat of plant pathogens as weapons against crops; then EMPHASIS (Effective Management of

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\(^1\)https://cordis.europa.eu/project/id/6403/fr.
Pests and Harmful Alien Species: Integrated Solutions)\textsuperscript{2} (see Gullino and Vivani’s Chap. 12 in this book); and PLANTFOODSEC,\textsuperscript{3} a project with a focus on biological threats having the potential to affect and damage agriculture, infect plants, and ultimately affect the food and feed at any stage in the food supply chain. All these projects were coordinated by Prof. Lodovica Gullino, Universita’ degli Studi di Torino (UNITO), who is a distinguished contributor to this book. There have also been projects focusing on other areas of biosecurity and biosafety. Both the ISIS and SECUREAU projects have been centred on water security (prevention) and decontamination (response) in the case of intentional contamination. BIO-PROJECT aimed at creating fast, user-friendly devices to detect airborne bacteria, spores, viruses, and toxins. SNIFFER developed capabilities to secure all parts of the food chain from major CBRN attacks. On the quality and technical side, CAST wanted to assess the comparative quality of security-centred training curricula for first responders during disaster management. Bridge attempts to develop a system that supports technical and social interoperability in large-scale emergency management. TARGET created a pan-European “serious gaming platform” with tools, techniques, and content that train and assess the skills and competences of agents, border guards, counterterrorism units, and first responders in the event of a CBRN attack. TOXI-triage developed instruments to detect and trace CBRN contamination victims. All of these projects were part of the broader Horizon 2020 framework for EU-funded research and innovation projects.\textsuperscript{4}

**Stakeholders’ Training Strategy**

International organizations have also been active in training stakeholders on risk and crisis management. The United Nations Environment Programme (UNEP) organized its first Massive Open Online Course (MOOC) in 2015 on Disasters and Ecosystems: Resilience in Changing Climate. The Global University Partnership on Environment and Sustainability (GUPES) and the Cologne University of Applied Sciences (CUAS) collaborated with UNEP in order to increase experts’ and policymakers’ awareness on advances in disaster risk reduction. Objectives included increasing knowledge and skills on resilience, transformation, and relations between sustainable development, ecosystem management, and risk reduction. Beneficiaries of the UNEP’s MOOC were disaster managers, development planners, and project implementers by providing new training tools that were accessible through an online course. Subjects included disaster trends and statistics, disaster risk reduction fundamentals, climate change, disasters and environmental linkages, tools for ecosystem-based disaster risk reduction and adaptation, and global, national, and

\textsuperscript{2}http://www.emphasisproject.eu/.

\textsuperscript{3}https://cordis.europa.eu/project/id/261752.

\textsuperscript{4}https://ec.europa.eu/programmes/horizon2020/en.
local processes of disaster risk reduction. Such initiatives provided a useful guide for potential training courses in the European Union, expanded to biosecurity issues.

UNDP Global Risk Identification Program (GRIP)

The United Nations Development Programme (UNDP) with the help of the EU has also been active from a risk assessment standpoint. It established the Global Risk Identification Program (GRIP) in 2017 to reduce the impact of natural disasters by providing risk information for policymakers. Officially launched as an ISDR thematic platform for risk identification at the first GRIP session, it was adopted by the UN-ISDR system to support international initiatives that identify and monitor disaster risk. Three steps are essential for the GRIP system to function:

1. Developing the ability and capacity of initiatives to fulfil their objectives.
2. Basing all information and guidelines on evidence-based approaches. In addition, past disaster information should contribute to understanding present research and studies.
3. Establishing international monitoring and evaluation mechanisms to measure the effectiveness of risk assessment strategies. GRIP supports a country-by-country approach to this issue.

The GRIP’s target groups are decision makers and technical professionals related to risk assessment. Four comprehensive solution packages have been developed for these stakeholders: A Country Situation Analysis for Risk Assessment, a National Disaster Observatory, a National Risk Assessment, and an Urban Risk Assessment. Like the UNEP’s MOOC, training is included in the solution packages. This includes training on applying risk information in decision-making and establishing international networking for projects and financial support. For further information, the program has created an interactive website called GRIPWeb (www.gripweb.org) that provides knowledge management tools. Stakeholders that join can access professional networks in disaster risk from the international community. This will facilitate best practice exchanges and development of joint tools and methodologies. All of this should empower stakeholders to find solutions to local and global threats. Training courses are divided into introductory, intermediate, and advanced. For the introductory level, beneficiary stakeholders are expected to develop conceptual knowledge on disaster risk assessment by:

1. Being introduced to GRIP’s disaster risk assessment solution
2. Developing country-specific action plans for disaster risk assessment
3. Developing skills in planning, facilitating, and coordinating disaster risk assessment activities

5 https://elearning.unep.org/moocs/courses.
6 www.gripweb.org.
The intermediate level is focused on technical skill development through modelling, mapping, and disaster risk assessment profiling. In addition, beneficiary stakeholders participate in data and information management courses. The course content includes:

1. Hazard-specific disaster risk modelling and scenario building
2. A hands-on approach towards specific tools
3. Designing information management systems

Finally, the advanced level of the GRIP aims at developing beneficiary stakeholder’s ability to analyse risk data and information, as well as developing the ability of translating said data into evidence-based knowledge for policies and decision-making. The course content includes:

1. Uncertainty analysis, using disaster risk information for decision-making
2. Setting priorities for disaster risk reduction and establishing effective cost-benefit analysis
3. Analysing risk information from a spatial and thematic perspective

Risk Communication

European and international academics have also been active in defining the role that scientists should play in biosafety and biosecurity issues, especially when it comes to risk assessment and crisis management. This debate has extended beyond the technical realm and to discussions on how the scientific community may provide added value in communication issues to the general public. To this end, stakeholders agree that communicating risk and crisis concepts in accessible language is essential to improve average scientific literacy among citizens. Scientists are key in transmitting said knowledge, and there are many ways in which this can be done. Beyond rethinking education systems, scientists can conduct outreach activities on the practical implications of technological advances and scientific discoveries. The British Royal Society, which also stressed the importance of avoiding academic “ivory towers” often present in research centres and universities, developed this approach. Policymakers should also benefit from accessible language and there should be exchanges between and among these stakeholders on mutual concerns, perspectives, and priorities. One way of giving access to academia was through an open-access journal subscription model guaranteeing access to publications by researchers while combining classic quality controls such as peer reviews. In order to improve risk assessment, stakeholders should also focus on five major points:

1. Improving understanding of the probabilistic frequency-size distribution of hazard events, aggregate development impact of small events compared with large

7https://www.globalhand.org/en/browse/global_issues/7/resource/document/27883.
Implementing Biosafety and Biosecurity Preparedness in the EU

We have talked about the importance of crisis management and risk assessment in avoiding the psychological, economic, social, political, and environmental degradations of population and world regions. We have also talked about how the internationalization of risk and crisis potential has complicated the ability of governments to prepare for these threats on a unilateral basis. Adding contemporary threats to biosafety (environmental disaster, climate change, health, etc.) and biosecurity (bioterrorism, agroterrorism, etc.) we see that discussions, recommendations, and coordination on a European and international level are essential to minimize risks and maximize the well-being of people. Initiatives such as the UNEP’s MOOCs and the UNDP’s GRIP certainly help in this direction. Risk assessment and crisis management development in the EU through solidarity clauses, security agendas, green papers, civil protection mechanisms, and CBRN action plans have also been
contributing to strengthening preparedness and resilience. Several points could be stressed to continue towards an implementation of biosafety and biosecurity preparedness in the EU from a resilience and psychosocial perspective:

1. Raising awareness and training stakeholders in the psychology of risk perception in the case of a biosecurity or biosafety crisis. Tying this to the psychological perception of biological risk and its economic and mental consequences on European societies.

2. Ensuring that policy actors understand the populations’ perceptions and negative psychological reactions to a crisis and how this can affect crisis management. This should aim at maximizing the effectiveness of the European crisis response systems and building emotional and logistical resilience among actors, especially on climate change issues, epidemics, and pandemics.

3. Offering community-based and tailor-made risk and crisis education programs on biosecurity and biosafety, especially for agricultural and environmental stakeholders. An important focus of these training sessions should be on developing rational attitudes to risk perception and panic-minimizing behaviours in the case of a crisis.

4. Establishing tailor-made, sectorial, multilingual, multicultural, and country-specific communication programs on risk and crisis in biosecurity and biosafety. This should aim at minimizing potential panic and maximizing stakeholder trust and resiliency processes.

5. Educating local actors and populations on the benefits and possibilities of environmental risk reduction from a cost-benefit standpoint. Costs and benefits should go beyond economic notions including ecological, social, and psychological measurements provided by case studies of areas fitting similar disaster risk profiles.

6. Using past experiences of environmental disasters to train European and national policymakers through best and worst practices from a psychosocial and resilience perspective. This should lead to dialogues between stakeholders in order to establish minimum standards for disaster preparedness and to enhance actors’ disaster resilience.

7. Establishing a framework for constructive post-crisis and disaster feedback based on the psychology of building trust and emotional budges. Such initiatives should focus on coping with powerful emotions that might cause resentment and lead to defensive attitudes among stakeholders. The ultimate objective is improving future frameworks on risk assessment and crisis management in order to make them understand the behaviour of themselves and others in exceptional situations.
Development and Resilience

Biological hazards had been included, for the first time, in the Sendai Framework for Disaster Risk Reduction (United Nations, March 18, 2015). The United Nations’ Global Assessment Report on Disaster Risk Reduction (GAR 2019) presaged about the rising risk of biological hazards, particularly epidemics and pandemics: “Another Ebola epidemic or a new influenza pandemic are likely and almost certain. The only unknowns are when and where they, or a new but equally lethal threat, will emerge” (UNDRR 2019:105). COVID-19 crisis is a real example of how interconnected we are in this global village and it could represent, despite all the sufferance it has provoked, an opportunity for scientists and policymakers/diplomats to strengthen resilience joining their attention on negotiating preventive strategies. To this end, it will be decisive to strengthen their interpersonal cooperation processes to adaptive decision-making under conditions of uncertainty and increased risk potential. The complexity and interdependence of natural hazard in specific environment combined with man-made errors is what makes many disasters particularly dangerous and spread throughout communities, societies, environments, and economies increasing potential risks. International community should carry on working (at organizational level) on capacity building with multidimensional and multidisciplinary methodologies, implementing cohesive, coherent, integrated, and coordinated comprehensive approaches. We live in a multi-hazard era of systemic risk. Actions aiming at reducing the risk of cascading disasters involve complex processes and should be studied and researched as a whole as they cannot be analysed as isolated, randomly assessed actions within development processes. Few interdependent variables for instance are strategic planning, local institutional frameworks, local law-making processes, native traditions and appropriate use of local resources, participation of key actors (all), tailored training aimed at strengthening capacity building and human resilience, strategic preparedness plans, prevention and alleviation activities, emergency preparations and management, and post-disaster rehabilitation and reconstruction long-term programs. In practice, we should continue to strengthen strategic societal challenges to identify, assess, and monitor disaster risks; to enhance early warning mechanisms; and to strengthen human personal and collective development. Resilience and mental capital capacity building should be the core strategic elements on which to focus behind the post-COVID-19 recovery for instance. When we talk about resilience we talk about human development, and then capacity building is essentially the HOW we can apply this comprehensive approach. Do not forget that we work in fragile environments for the most part of times and that societies touched by disasters are traumatized societies (i.e.: PTSD, anxiety, depression, hopelessness to name but a few) (Galluccio 2019). The international community needs to work with and within those environments so as to integrate tailored intervention policies to local community interventions. Training is only one methodology and it should not be conducted in isolation. At the end of the day we need to use knowledge, innovation, and education to build a culture of safety and resilience at all levels. Certain challenges must be tackled such as potential
coordination strategy between national and European actors. Internationalization of risk and crisis is also a challenge to be undertaken along with the psychological and physical demands of citizens. This is the only way to build, foster, and nurture sustainable resilient societies.

The Expected Impact on the European Society

Biological threat reduction (BTR) is at first instance the responsibility of national authorities in the EU. However, the nature of bioterrorism makes supranational and intergovernmental solutions inherently desirable. For starters, biological agents are very mobile between national borders. This is especially the case in the EU, where high population density is combined with the free movements of goods, services, and citizens. In light of the need for multilateral solutions, programs have been launched to tackle issues specific to bioterrorism yet have often been divided due to how BTR crosses sectorial boundaries. This is often seen in institutions such as the European Commission. Health security initiatives, including monitoring and coordination, take place within DG Health and Food Safety. The Commission’s ECHO department is in charge of preparing effective responses to civil protection. Research activities related to vaccines and detection techniques can be found in DG Research and within the semi-autonomous European Medicines Agency (EMEA). Border control and export regulation issues related to bioterrorism are dealt with in DG Migration and Home Affairs and DG Internal Market (respectively). Finally, all bioterrorism issues with an external component fall under the competence of the Common Foreign and Security Policy (CFSP) (Bengtsson and Rhinard 2018). As can be seen, bioterrorism’s cross-sectorial nature has resulted in a scattered division of competences between DGs of the European Commission. When adding national authorities as first responders to such a crisis, it becomes easy to envisage difficulties in making different bureaucracies coordinate, cooperate, and communicate. Unfortunately, such difficulties are not just limited to logistical questions. Psychologically speaking, counterproductive assumptions on the “real motivations” between stakeholders can lead to an atmosphere of mistrust and competition. This is problematic, as crisis management under bioterrorism needs efficient interactions between all stakeholders.

Advisory skills should be strengthened in order to assist the EU and international institutions and organizations in supporting human resilience in biosecurity, and in helping place the EU security-related decision-making on a strong evidence-informed footing within the context of the longer term. The European Commission, DG Home, in the wake of the new Global Strategy for the EU’s Foreign and Security Policy, is strengthening a multidisciplinary Community of Users on Safe, Secure and Resilient Societies8 for disaster and crisis management. Its key objective in the

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8“Strengthening capacities in disaster risk and crisis management and increasing resilience form
field is to identify the most promising tools and methods that have the potential to be taken up by practitioners to improve adaptive decision-making processes. Along the same line, the International Network for Government Science Advice (INGSA)\(^9\) aims to enhance the global science-policy interface to improve the potential for scientific evidence-informed policy information at both national and transnational levels. Then, the United Nations Science and Technology group\(^10\) on the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 (Royal Society 2015; United Nations 2015)\(^11\) is working on bridging the gap between scientists-researchers and policymakers/diplomats. We hope the European Commission of the EU will continue the good work it is doing to foster ideas and tools to improve science diplomacy strategic cooperation among main actors and the scientific communication at large.

**Concluding Remarks**

In addition to well-functioning institutional levers, bioterrorism responses cannot be successful without effective communication strategies. Policymakers, spokesmen, and responders at large must do their best to anticipate what psychological effects the population will experience in order to use appropriate Crisis and Emergency Risk Communication (CERC). Some negative behaviours could be due to (but are not limited to) denial, stigmatization, fear, hopelessness/helplessness, PTSD, grief, and occasionally cognitive bias. Discourse under crisis management must therefore include strong knowledge of cognitive and emotional responses in populations (Galluccio 2019). All of this makes us to focus efforts on comprehensive and strategic approaches to reduce exposure and vulnerabilities. It is evident that resilience-building process will be a strong concern for the future. Policymakers and key decision makers are not neutral as they bring to the “table” their own set of perceptions, cognition, feelings, attitudes, and behaviours, which are of course influenced by events. Biosecurity is a policy area involving several disciplines: psychology, sociology, and political sciences, but also agricultural, environmental, and health sciences (referring to One Health concept). In a biosecurity threat scenario, the backbone of key EU policy and research challenges. Therefore, effective coordination and interaction are essential between the various EU’s stakeholders involved. Exchanges between the stakeholders, ranging from policymakers, research, industry, and practitioners in the EU Member States, are facilitated by targeted research projects commissioned by the EU. The complexity of the security domain thwarts identification and dissemination of relevant information. This results in a lack of awareness about policy developments and research outputs. The Community of Users aims to address this issue by making the latest policy updates and research outputs, accessible and more visible via its events, its webpage and its annual mapping document” (https://www.security-research-cou.eu/).

\(^9\)http://www.ingsa.org.  
\(^10\)https://sustainabledevelopment.un.org/majorgroups/scitechcommunity.  
\(^11\)https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf.
for improving sustainable functioning of policymaking mechanisms, it is important to understand how decision makers perceive, think, feel, and behave when they analyse complex environments under conditions of expanded ambiguity and high uncertainty. Learning from experience is the most powerful way to lead. It fosters tacit knowledge that is crucial in a crisis (Nye 2008). However, a simple accumulation of knowledge in a field is not an example of specific experience. The experience is represented by the way our cognitive and emotional processes and metacognitive functions guide us to use our knowledge to tune our attention. In such conditions, experience based on accumulated knowledge could mitigate the shock that calls to action in introducing an element of effectiveness and predictability for sustainable policymaking processes (see Chap. 2, this book).