

Policy Handbook on Natural Hazard Awareness and Disaster Risk Reduction Education



INTERNATIONAL NETWORK ON THE FINANCIAL MANAGEMENT OF LARGE-SCALE CATASTROPHES



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The Policy Handbook report was approved for release by the OECD Insurance and Private Pensions Committee. It was prepared under the leadership of the High-Level Advisory Board of the International Network on the Financial Management of Large-Scale Catastrophes.

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PREAMBLE

The growing impact of natural hazards on OECD and non-member economies has stimulated a demand for an in-depth evaluation of possible strategies to reduce their large-scale damaging effects. In both developed and emerging countries, the rise in direct and indirect costs of disasters is caused by several factors, most of which are human-induced. The increased vulnerability and exposure of people and assets to natural perils are, in significant part, due to the growing concentration of people and values in conurbations, inadequate land-use zoning and planning, inadequate construction standards, environmental degradation, the inability to adapt to climate change, and an insufficient level of disaster risk preparedness.

Changes in patterns of human behaviour and decision-making at all levels of government and society could, therefore, lead to a substantial reduction in disaster risk. In this respect, recent experience has shown that public awareness of natural hazards and disaster risk reduction education constitute a foundation and pre-requisite for effective catastrophic risk management strategies at country and regional levels. More generally, by influencing human actions and perceptions, information and education can play a crucial role in reducing the costs of catastrophes associated with natural perils.

Despite the presence of risk awareness and risk reduction education programs in many countries, there remains significant scope for improvement. Many government-sponsored and civil society programs continue to place heavy emphasis on emergency response and citizen response-preparedness. While important, this focus often fails to emphasise the individual and collective actions that can be taken prior to a disaster and may even promote a sense of public helplessness. Risk awareness and education efforts should place emphasis on concrete risk reduction tools and strategies that can be adopted; moreover, to be fully effective and efficient, these efforts should take place at, and be targeted to, every level of society – at the individual, business, civil society, and governmental levels.

As shown by recent events, the social and economic impact of large-scale catastrophes may severely hinder growth and development, especially in emerging countries: building more resilient societies is, therefore, widely recognised as a key priority policy objective at the international level.

An initial stocktaking of country initiatives to promote risk awareness and education on natural perils and related risks has been performed by the OECD, covering selected OECD countries as well as two major non-OECD countries, China and India. The findings and conclusions of the stocktaking report have been used as the basis for the development of this policy handbook.

This handbook is aimed at providing policy guidance in the field of natural hazard awareness and disaster risk reduction education¹ to OECD and non-member governments and has been developed under the auspices of the High-Level Advisory Board to the OECD International Network on the Financial Management of Large-Scale Catastrophes.

¹ While some of the principles and good practices set forth in this document may be applicable to other types of catastrophic risks, such as those posed by large-scale terrorist acts, technological accidents, or pandemic events, this handbook is focussed exclusively on natural hazards.

PRINCIPLES

1. Natural hazard awareness and disaster risk reduction education are a *foundation and prerequisite* for effective catastrophic risk management strategies at country and regional levels.
2. Risk awareness and risk reduction education priorities should be *risk-based*, tailored to the hazards of the region and the particular vulnerabilities and capacities of those exposed to risk. Resources, if limited, should be focussed on raising awareness and improving knowledge of risk mitigation and financial protection tools for the risks that are most likely to cause significant human, physical and financial losses.
3. *Hazard mapping* and *risk assessments* provide the basis for elaborating risk awareness and risk reduction education strategies and for informing their content. Consistent methods for the collection and dissemination of *data on physical damages and economic losses* from natural hazards will support risk assessments, encourage a better understanding of the benefits and costs of risk reduction strategies, and may support the development of risk financing, risk-sharing and risk transfer tools, such as insurance, reinsurance and capital market instruments.
4. Natural hazard awareness and disaster risk education efforts should aim at encouraging *voluntary risk reduction activities*, thereby building support for a shift in disaster management and enhancing public acceptance of any necessary compulsory measures.
5. *Disaster risk transfer and financing mechanisms* can provide a mechanism for enhancing risk awareness and risk reduction education. Risk-based disaster insurance, if correctly priced, affordable², and linked to measures that can be acted upon by policyholders, can provide not only coverage against damage, but also signals to individuals as to the hazards they face, as well as financial incentives to invest in cost-effective mitigation measures.
6. *Appropriate risk communication techniques* should be adopted to reach the targeted audiences and induce the desired changes in behaviour and perception. Information on natural hazard exposures should be communicated to the general public in a simplified way and be accompanied with practical illustrations of the actions that can be taken to reduce risk and of the expected benefits of such actions. Any risk reduction strategies contained in messages should be *specific and realistic for local conditions*.

² In a risk-based insurance mechanism, affordability can be promoted through public investment and regulatory intervention in support of disaster risk reduction measures (e.g., building codes, land-use planning), and may be obtained through the traditional risk-pooling functions of insurers operating in a competitive environment, in which insurer portfolio diversification benefits and market forces help to reduce insurance costs. However, if some risks are very high and premium rates are unaffordable for some parties, the partial subsidisation of policyholder premium payments may be necessary to ensure adequately comprehensive insurance coverage in such a system.

7. Clear and consistent messages to all interested parties (including all levels of government) concerning the ***allocation of expected disaster costs and disaster prevention responsibilities*** can promote a shared understanding of roles and responsibilities and stimulate individual and collective actions to reduce vulnerability and exposure to the risk of physical and financial losses from natural hazards. Insurance supervisors should ensure that there is transparency and clarity in insurance contracts and industry communications concerning the scope of coverage, so as to avoid any confusion regarding the allocation of disaster risks between insurance companies and policyholders.
8. Promoting a culture of safety requires a ***long-term and sustained strategy*** by governments and must be based on a strong commitment of all institutional actors. To ensure continuity and sustainability, risk awareness and risk reduction education efforts should be well integrated into a cross-sectoral, national strategy for disaster risk reduction.
9. ***Continuous monitoring*** and ***periodic evaluations*** of awareness and education efforts should be conducted to assure accountability and transparency, and increase public confidence in the outcomes.

BROAD STRATEGY

New dimension of loss: large-scale

The growing impact of natural hazards on OECD and non-member economies has brought about a new dimension of disaster losses: *large-scale*.

Vulnerability and exposure to natural hazards are affected by human behaviour and perception

In several countries, the current levels of exposure and vulnerability to natural hazards are mostly due to human-induced factors, such as the increasing concentration of people and values in urban centres, inadequate land-use zoning and planning, inadequate construction standards, environmental degradation, the inability to adapt to climate change, and an insufficient level of disaster risk preparedness. *Changes in patterns of human behaviour and perception* at all levels of government and society, therefore, could lead to a substantial reduction in disaster risk.

Disaster risk awareness and education to promote a culture of safety and induce behavioural change

Disaster risk awareness and education strategies should be aimed at promoting a *culture of safety*, so as to achieve changes in current patterns of human behaviour that influence the risk of large-scale damaging effects of natural hazards. While in the past educational efforts in this field have often been based on a rescue and relief-centric approach, the orientation should change to a holistic disaster management approach that includes catastrophic risk prevention and risk reduction education. This reorientation requires an emphasis on disaster risk reduction tools and strategies and a combination of individual and collective actions.

Focus on individual and collective actions that can reduce disaster risk

Accurate and trustworthy information on hazards, vulnerability, risks and risk reduction measures and strategies provide the foundation for promoting a culture of safety. In addition, clear and consistent messages concerning the allocation of expected disaster costs and disaster prevention responsibilities that are conveyed *ex ante* to all interested parties can promote a shared understanding of roles and responsibilities and stimulate appropriate individual and collective actions. For instance, the rules governing *ex post* public compensation mechanisms, if any, should be clearly specified *ex ante* and any caps on disbursements should be made public. Also, insurance supervisors should ensure that there is transparency and clarity in insurance contracts and industry communications concerning the scope of coverage, so as to avoid any confusion regarding the allocation of disaster risks between insurance companies and policyholders.

Increased awareness of natural hazards and appropriate risk reduction measures can encourage voluntary risk reduction activities, including such key measures as safe construction, retrofitting, and household preparedness. As part of a broad national risk reduction strategy, increasing public risk awareness can strengthen public support for the investment of public funds in risk prevention activities and for the implementation of compulsory risk reduction measures such as land use planning, building codes, environmental stewardship and, where applicable, disaster insurance schemes. A primary mechanism through which these disaster risk

reduction efforts can be initiated and realised is through the education of relevant audiences, with a view to changing their perceptions of normative behaviour. Linking norms to socially accepted values, such as the social benefits and positive spillover effects of risk-wise behaviour, is the main way to achieve the goal of promoting a culture of safety in the long run.

Risk financing and risk transfer tools can play a role

Emphasis should also be placed on the relevance of education concerning available disaster risk financing, risk-sharing, and risk transfer tools, such as insurance. Promoting a better understanding and knowledge of the financial management of costs associated with disaster events should, indeed, be recognised as a priority in this area. In particular, risk-based disaster insurance, if correctly priced, affordable³, and linked to actionable measures by policyholders, can provide not only coverage against damage -- permitting more rapid economic and social recovery -- but also signals to individuals as to the hazards they face, as well as financial incentives to invest in cost-effective mitigation measures, thereby contributing to risk communication and education efforts. These incentives may need to be complemented by fiscal incentives (e.g., tax subsidies) in order to promote the adoption of effective risk mitigation measures at the individual or business level.

Knowledge of disaster risks, risk reduction measures and communication tools

Effective disaster risk communication and education strategies require an in-depth knowledge and understanding of:

- (1) the key features of the relevant natural hazards and disaster risks;
- (2) the behaviour and perception changes that the strategy is aimed at inducing in the target audiences (e.g. the type of risk reduction measures that can be adopted at different levels of government and society); and,
- (3) the most appropriate tools and methods to convey the information and to educate stakeholders and induce action.

Long-term strategic planning and commitment of all stakeholders

Risk awareness and risk reduction education initiatives should be integrated into broader national or international disaster risk management strategies. Risk awareness and risk reduction programs and policies should be scaled to the level of country exposures and vulnerability and be aligned with the geographical distribution of risks. Promoting a culture of safety requires long-term sustained strategic planning by governments and must be based on a strong commitment of all institutional actors. Higher levels of government should be the sources of innovation and lead the process, but local governments, communities, businesses and individuals are the driving force of implementation. Ongoing monitoring and evaluation of awareness and education efforts are essential to assure accountability and transparency, and increase public confidence in the outcomes.

1. Gain scientific knowledge of hazards and risks

A pre-requisite for any natural hazard awareness and disaster risk reduction education strategy is an accurate scientific knowledge of the relevant natural hazards and of the vulnerable conditions that

³ See *supra*, footnote 2.

may cause disaster losses in each geographical area. A coherent perspective on the exposure to all different natural perils must be adopted and high-resolution mapped information on the relevant natural hazards and risks should be collected and continuously updated. Risk awareness materials must be based on sound science and mapped hazard and risk information should be disseminated.

Hazard mapping is a core component of successful spatial planning and constitutes the foundation for effective disaster risk management strategies. The undertaking of assessments of *physical and economic exposure and vulnerability* to natural hazards (i.e., *disaster risk assessment*) and of the geographical distribution of risks across the territory is also fundamental. The use of the most advanced *disaster risk modelling* techniques can help policymakers evaluate the potential physical and financial losses due to extreme natural events and prioritise the areas of intervention and the allocation of available resources.

Improved capacity to assess the economic consequences of past catastrophes and the potential impact of future disaster events on the economy is also a necessary precondition for the development and widespread adoption of *effective risk financing, risk-sharing and risk transfer tools*, such as insurance, reinsurance and capital market instruments. For this purpose, consistent methods for the collection and dissemination of data on physical damage and economic losses from natural hazards should be promoted in close collaboration with the private sector and other stakeholders as relevant.

2. Identify the desired behaviour and perception changes

Based on scientific information about natural hazards, vulnerabilities and resulting disaster risk exposures, the next step is the identification of the desired changes in behavior and perception. The language for risk awareness must have real meaning and be actionable for those receiving the message. It is, therefore, extremely important to identify the desired behavior and perception changes that the strategy is aimed at inducing at all levels of government and society.

Assessment of awareness and specific needs. An assessment should be performed of the current disaster risk perception and awareness of the population and of concerned audiences to assess the level of awareness of natural hazards and related risk reduction measures and to identify factors possibly contributing to any passive behaviour. From a broader perspective, developing an understanding of the actual causes of deaths, injuries and economic losses from disasters in a particular location is also important. Post-disaster investigations can determine whether losses resulted from infrastructure collapses, inappropriate evacuation procedures, breakdown of early warning systems, a lack of resources or skills, or inaccurate perception of risks. These investigations will support the development of better risk reduction tools and inform risk awareness and risk reduction education efforts and strategies.

Identification of risk reduction measures appropriate for the target audiences. Different stakeholders can take different actions and they should be informed about the range of cost-effective risk reduction tools that they can employ to reduce their exposure to hazards and related physical and financial vulnerability. While central governments should be responsible for leading and coordinating the process, the most relevant risk reduction measures, such as land-use regulations, building codes and spatial planning, very often will fall within the competence of local governments. Businesses, communities and individuals, in turn, may be best placed to adopt effective risk mitigation measures such as safe construction, environmental stewardship, retrofitting, and household preparedness.

Better financial management of disaster risks. The development of a more efficient approach to the financial management of large-scale disaster risks should be included in the objectives of a risk awareness and education strategy. The adoption of appropriate disaster risk financing, risk-sharing and

risk transfer tools should be encouraged, highlighting the economic impact that future disaster events may have on individuals, businesses and national economies, as well as the benefits of a sound financial management strategy at all levels of government and society.

Building a culture of safety. While increased awareness of natural perils and disaster risks education may induce people to change their behavioural patterns and adopt risk-wise conducts, it may also contribute to change their perceptions, thereby reinforcing support for and legitimacy of public sector initiatives such as the investment in more resilient infrastructures, the provision of seed capital for the establishment of disaster risk reduction research centers, and the introduction of compulsory measures, such as land-use planning and building codes. Public education campaigns, in other words, can develop support for a national shift in disaster management, build local capacity for disaster risk management and reduction, and build public acceptance for stricter regulations and insurance programs that may be instituted.

Building response and preparedness capacities. Within a broader framework for action, programs and policies should support and promote individual, organisational and community response capacities. Early warning systems, evacuation drills and business continuity plans help reduce human and economic losses when risk reduction tools are insufficient, unavailable or unaffordable.

3. Identify roles, methods and tools

Finally, it is crucial to identify the respective roles of the various stakeholders, as well as the tools and methods of communication that will be effective in raising disaster risk awareness, improving knowledge and understanding, encouraging the desired behaviour and perception changes and, in the long run, promoting a culture of safety.

Roles of stakeholders

Long-term strategic planning and cross-sectoral collaboration are fundamental components of successful education programs for risk awareness and reduction. Many stakeholders have a role to play and responsibilities in this respect: the parallel and collaborative actions of international organisations, governmental bodies, insurance sector representatives, corporate leaders, civil society organisations, and educational institutions should be encouraged.

Role of public sector. The public sector, at all levels (local, regional, national, and supranational), should take a leading role. The public sector's roles and responsibilities largely depend on the scope and level of hazards and vulnerabilities, existing initiatives, and available resources. The public sector should first set priorities and then focus on coordination and leadership in the development of national or regional programs and policies: public awareness campaigns, informational websites and the distribution of educational material are among the available tools. Support should also be granted to existing programs at local and community level, as well as to private and civic sector initiatives. Special attention should be devoted to the opportunity to incorporate risk awareness and reduction strategies into school curricula and higher-level educational programs. The provision of fiscal incentives (e.g., tax subsidies) may bring attention to cost-effective risk mitigation measures at the individual or business level.

Role of private sector. Private sector initiatives can play an important role; for instance, the research, advocacy and public education efforts of international reinsurers and national insurance companies can provide significant sectoral leadership in developing and promoting physical and financial protection tools for catastrophic risk. Leadership by example can also be provided by

corporations through the adoption of employee education programs, risk reduction measures, and business continuity plans.

Role of civic sector. Independent civic organisations and public-civic partnerships addressing natural hazard awareness and disaster risk reduction at community level should be promoted. Grassroots efforts are grounded in the local physical, cultural, economic and political context of a community and they can prove to be extremely effective even if sometimes they may lack sufficient human capital and economic resources. Partnerships with the civic sector, therefore, should be supported and enhanced as part of a holistic, top-down and bottom-up integration strategy. Support should also be provided to community-level preparedness by ensuring that appropriate emergency supplies are available, thus helping well-prepared communities to act as the first line of defence.

Role of international organisations. International organisations and regional and international collaborations can help focus the attention of national governments and policy makers on the importance of natural hazards awareness and disaster risk reduction education programs. International organisations have a key role to play with regard to long-term planning as they are decoupled from the shorter-term political mandates of national, local and local decision-makers. International efforts may also lead to the establishment of transnational platforms and networks aimed at developing a coherent cross-border approach to disaster risk management strategies.

Tools and Methods

Risk information should be provided in a non-technical, personalised, and consistent manner. Despite inherent uncertainties that exist in the understanding and prediction of natural hazards, people need clear, consistent and persistent messages to internalise basic information and move towards action. A consensus message, from a broad array of trusted sources, can be crucial to effective risk education. Research suggests that the use of probabilistic language should be used with caution and that messages should put disaster risk into perspective, with a view to reducing the emotional impact of the threat posed by natural hazards. While negative images of disaster destruction can be overwhelming, positive, empowering and accurate visuals can reinforce proactive behaviour.

Effective communication of disaster risks requires conveying an accurate picture of the expected benefits of prevention and risk reduction measures. Risk reduction education strategies will be most easily accepted when the promoted risk reduction strategies are specific and realistic for local conditions and disseminated through an engaging format. Trust in the efficacy of these risk reduction strategies will increase when the effectiveness of these strategies is also promoted. In this respect, governments, businesses and households must have access to physical, legal, and financial tools for addressing natural hazard risk; these tools are more likely to be adopted when they are locally available, affordable, and are of sufficient quality so as to engender public trust in their effectiveness.

Since vulnerability to hazards can vary across populations, education efforts should find effective dissemination avenues for vulnerable sub-populations and reach the greatest number of at-risk individuals. These efforts must take into account the specific needs, languages, cultures, as well as vulnerabilities and capacities of each audience. With diverse populations exposed to natural hazards, successful risk awareness programs should repeat their messages to each audience for maximum impact. The use of multiple dissemination strategies supports the process of behavioural change from contemplation, to action, and finally habit development.

The ongoing monitoring and evaluation of risk awareness and risk reduction education initiatives and efforts are essential to assure accountability and transparency, and increase both public confidence and empowerment.

GOOD PRACTICES

National governments are in a position to provide the needed policy-level guidance and leadership in promoting risk awareness and risk reduction education. Through long-term strategic plans, each sector can seek ways to enhance their impact through collaborative partnership and by building upon the efforts and lessons learned across all sectors, jurisdictions and boundaries.

As part of an extended and sustained effort, the following steps can help to raise public risk awareness, enhance disaster risk reduction education, and thus help to reduce catastrophic losses due to natural hazards:

Government initiatives

Leadership and Coordination

The public sector should take a leading role in establishing a national framework and strategy for action and in coordinating the development of coherent national hazard awareness and risk reduction education programs and policies.

Public-sector action can involve the development of initiatives, but it can also involve efforts to coordinate, structure, or encourage existing or new initiatives undertaken by other stakeholders. In this respect, national governments can provide an important supporting role by encouraging programs undertaken by regional and local governments, the insurance sector, the private sector (including industry and trade associations), the education and academic sectors, and the civic sector.

Assessment of Needs and Identification of Priorities

In order to identify priorities for action, an assessment should be performed of national circumstances and specific needs in respect of disaster risk awareness and risk reduction education. The initial assessment should also cover:

- The natural hazards to which the country is exposed;
- The exposures, vulnerabilities and risks of the country;
- The existing awareness and education initiatives and their efficiency in providing reliable and relevant information and knowledge on risk and risk reduction strategies and in changing public perceptions and behaviours regarding risk and risk reduction measures;
- The current risk perception of the population and concerned audiences, the extent to which appropriate risk reduction measures have been undertaken in society, and factors possibly contributing to any passive behaviours; and,
- The priority attached to risk awareness as part of national policies and economic strategies, and the appropriateness of the level of this status in light of current risk exposures, global developments such as climate change, and available resources.

Hazard Mapping and Disaster Risk Assessment

The availability of constantly updated high-resolution mapped information on all relevant natural hazards is a prerequisite for disaster risk awareness and risk reduction education. High-quality natural hazard information is, for instance, a precondition to the development of zoning schemes, the regionalisation of building codes, and evacuation plans. The public sector can play an important role in collecting hazard information and generating hazard maps and/or encouraging private-sector initiatives.

Hazard maps generated by the public sector should be made available to the public where possible. When well publicised, hazard risk maps and assessments can be tools for raising risk awareness among policymakers and the public. When properly disseminated and explained, these maps can help the general public and local policymakers better understand risks and risk mitigation prioritisation. For example, hazard maps may help individual decision-making, for instance in purchasing or building a house. Hazard maps can also increase understanding about appropriate zoning and land-use planning, placement of flood-defences, and infrastructure strengthening. Hazard maps that are disseminated to the public should be simple in nature (e.g., different colours), with risk zones defined according to probable risk exposure, so that probability and uncertainty concepts can be readily understood and exploited by the uninitiated.

The development of disaster risk assessments by governments, industry, and other relevant interested parties should be promoted. Information on the factors that provide inputs for risk assessments (e.g., population densities, building types and standards of construction, soil conditions) should be disseminated to the extent possible and appropriate.

Public Awareness Campaigns and Events

The most systematic public education efforts are often built around widespread campaigns. The chief features of these campaigns are a series of messages and materials that are distributed through a wide variety of print, radio, television and internet outlets, as well as sometimes through performing and cultural arts. Mascots, appealing graphics and iconography and positive messages to take action are part of these campaigns. They involve mass distribution of messages and typically involve partnerships between government, civic organisations, mass media outlets, and private sector sponsors.

To be effective, preparedness campaigns should ensure that the public receives consistent messages repeated over an extended period of time and from multiple sources. Preparedness events must be repeated annually, so as to create public recognition, anticipation and to reinforce what was learned during previous events. Sustained and repeated campaigns can also generate similar activity, while continuing to remind the public of natural hazard risks and risk reduction. In the public sector, these periods can also be a time for scrutinising past efforts and planning for the future.

National-Level Guidelines on Public Service Message Content

While multiple organisations and sectors can be encouraged to develop and disseminate risk awareness and reduction education materials, guidelines on important content will help limit confusion, conflicting messages and disinformation. Trusted organisations and sectors (e.g., regional and local authorities, non-profit associations, industry) should collaborate, with the support or possible direct involvement of national governments, in developing standardised material that organisations can take and modify for their particular target audiences.

When trusted institutions collaborate in developing broadly accessible and high quality risk awareness material, widespread repetition of the same basic message throughout national awareness and educational material can be achieved. In developing national guidelines for risk awareness and risk reduction messages, care should be taken to include the perspectives of children, minority language groups, persons with disabilities, the elderly, and those who have experienced disasters. This can help avoid the dissemination of incorrect, inappropriate, or simply ineffective guidelines to target audiences.

National risk awareness and risk reduction guidelines can also be used to counter common myths or develop new public messages. Yet care must be taken to ensure that new information disseminated is based on sound science, accurate and will not need to be re-developed soon after its dissemination. It is crucial to test the quality and accuracy of risk awareness and risk reduction messages prior to their widespread dissemination.

Distribution of Public Education Material

The mass distribution of printed material outlining major hazards, appropriate emergency responses, and strategies for reducing risks can be used as a risk awareness and risk reduction education strategy. Mass mailings can raise awareness about hazards and be valuable references for the public. Mass distributed education materials are effective when they aim to increase understanding of specific, local risks and list explicit risk reduction strategies.

The costs and continued relevance of printed material may be a concern. These concerns may be addressed by targeted measures. For instance, attempts could be made to directly contact those at greatest risk in time for risk reduction or prevention actions to be taken. Increased effectiveness may also be achieved by linking warning services to effective support venues that provide additional risk information and guidance on protective action during emergencies.

Developing specific educational material for tourists is also important. Governments in highly exposed countries should disseminate information materials, translated into multiple languages, explaining local hazards, early warning and evacuation procedures in highly touristed areas.

Simulations and Drills

Mock evacuations and drills can be an engaging method of raising risk awareness across a wide cross-section of the population. Drills in schools are a basic way of sensitising children to risks. Practicing response skills regularly is significantly responsible for protective action during an emergency. Public inclusion in simulations and drills can also stimulate people to consider their own risk and preparedness.

Mock evacuations and drills tend to focus public attention on protective actions people should take during a hazard event and emergency response and thus do not often highlight risk reduction steps that can reduce losses *ex ante*, and may even convey the wrong impression that response preparedness is synonymous with risk reduction. Accordingly, in order to capitalise on the extensive resources used for such mock events, increased public risk awareness and risk reduction education should be in place both prior to and following these drills. Media coverage should also be drawn towards the benefits of preventative actions that can minimise the need for emergency response.

Informational Websites

Risk awareness, preparedness, and risk reduction information should be made available on governmental websites. These websites should focus on natural hazard information (including, where relevant, simplified hazard maps), the benefits of collective and individual disaster risk reduction actions, the availability and scope of disaster risk financing, risk-sharing, and risk-transfer tools, such as insurance, as well as on event response and emergency planning for post-event preparedness.

Information on suggested risk reduction activities aimed at preventing or lessening the impact of natural hazards should be fully integrated with appropriate and specific risk awareness material or descriptions of risk reduction effectiveness, both necessary components of effective risk reduction education. Special sections of such websites should be devoted to dedicated education and awareness material that targets a range of audiences including children, minority language speakers, tourists, policy makers and knowledge disseminators.

Disaster Parks and Museums

Locations of past disasters and sites of visible geophysical hazards can be effectively used as risk awareness tools. While interpretive sites are often limited in geographical impact, appropriate sites are plentiful in most communities and can be an immediate and local reminder of hazards and risk reduction. Educational sites can be incorporated into areas where land-use regulations restrict development due to natural hazard risk. They can help reinforce the necessity and importance of zoning laws, a risk reduction strategy often not well understood by the general public. To be effective, they should include not only easy-to-understand descriptions of the hazard, but specific strategies for reducing risk at the individual, household and community level.

Museums can also be effective tools for risk awareness and risk reduction education. The activities and material should be presented in a way that both entertains and educates, promoting individual and collective action to reduce risk. Online museums sponsored by the national government can help extend the reach of natural hazard museums, targeting youth and others with Internet access.

Training Courses

Risk awareness and knowledge of hazard resistant construction among construction workers, self-builders, and construction professionals is a crucial aspect of risk awareness and risk reduction education, particularly in countries with a high degree of unauthorised construction.

Seminars and courses within trade schools can be piloted in such countries with a view to teaching risk reduction techniques to the rural and urban poor who are likely to engage in informal construction.

Training of officials in local and regional public authorities can complement these efforts and thus help to ensure compliance with building codes and planning regulation.

Supporting community-based disaster planning at the village and local self-government levels in tropical cyclone and flood prone regions are also important. These local planning initiatives help to raise awareness of hazard risk reduction and response strategies, building local capacity to manage emergencies.

Accountability, Transparency and Effectiveness

The public sector should promote accountability, transparency and effectiveness of awareness and education policies, by supporting the development of scientific evaluations and validation, including identification of evaluation criteria. Public action should also include the performance of on-going monitoring as well as stand-alone evaluation to gauge the long term impact of programmes and initiatives, and to increase public confidence in the outcomes.

Cross-sectoral partnerships for school education

Incorporating risk awareness and risk reduction strategies into school curricula is the strongest method for institutionalising the reach of these messages to the largest percentage of the population in perpetuity. What is learned in childhood becomes incorporated into collective knowledge and carried into future decision-making. Educating children about natural hazards and risk reduction, moreover, is of significant importance since in most countries they are very effective knowledge disseminators at the family level.

The task of infusing risk awareness and risk reduction education into curricula is a multi-decade effort. It begins with elaborating the scope and sequence and competencies expected at each age level and undertaking a full curriculum audit in all subjects to identify the appropriate insertion points. Textbook revisions, development of supplemental teacher training material, introduction of the subject matter through teacher-training colleges and in-service training plans are the subsequent steps for full integration. Education material should include not only hazard identification, risk awareness, drills and emergency response, but also and primarily risk reduction education, a necessary component for encouraging wider adoption of risk reduction strategies and financial protection across society. It should also introduce students to land-use planning, building codes, financial pooling of risk and risk-wise environmental stewardship as means of managing and reducing disaster risk.

Formal curricula approaches can include infusion into existing courses at all grade levels, insertion of modules into existing courses, and supplemental stand-alone courses. Informal and co-curricular approaches can include special assemblies, drills, projects, competitions, festivals, exhibitions and performances. Development of leadership in teacher training, targeting both education faculty as well as a program for in-service training of existing teachers, will support any effort at national risk awareness and reduction curricula. Successful programs have included both curriculum and teacher support materials and have formally incorporated these materials into national curricular guidelines.

The content of risk reduction and placement in school curricula is important. Historically, hazard awareness content has been placed in science and geography courses, but important opportunities exist for integration of content in social studies, civics, life-safety, health or life skills courses, language and literature, and mathematics. More broadly, risk awareness curricula can support students and communities in learning skills to identify and reduce hazard exposure and vulnerability, even as these evolve. Impact can be maximised by including practical guidelines for risk-wise actions, problem-solving skills for risk reduction, and education on financial tools for risk sharing and protection.

Support from teachers' unions, education ministries, and official mandates can help to fully integrate risk awareness and reduction education into school curricula, developing a culture of safety within the next generation.

At the post-secondary level, natural hazards awareness, risk reduction, risk mitigation and emergency management should be taught through certificate programs in a wide variety of disciplines

and in dedicated disaster risk management programs. Specialised research centres connected to natural hazard risk reduction and emergency management should also be encouraged.

Successful school programs have integrated student learning with community risk preparedness programs through learning extensions at home and the encouragement of child-parent and teacher-parent communication. This has been achieved through community risk mapping projects, community-based fairs and exhibits, publicised drills, and other community based projects.

Public risk awareness and risk reduction education can develop consciousness about the need for school and community-based disaster management planning. These education activities may also create citizens eager to participate in local and regional risk mitigation and planning.

Private-sector initiatives and sponsorships

The Insurance Sector

The insurance sector should work with the civic, private, and education sectors to educate current and potential policyholders about risks, insurance, and risk reduction measures. Insurance companies and industry consortia can play an important role in designing and providing appropriate, effective, accessible and affordable tools to protect households and the economy against the financial consequences of large-scale disasters. These products can also provide incentives for individuals and businesses to adopt cost-effective risk reduction measures.

The insurance and reinsurance industry have a key role to play in developing hazard mapping and risk modelling, in partnership with the public sector. Computer-based risk modelling and hazard mapping have become strategic tools for risk management within the insurance and public sector. This technology provides an opportunity to reduce the financial burdens of natural hazards on insurance and reinsurance companies, governments, and the public. When disseminated in non-technical formats, hazard mapping and risk modelling information also has the potential to increase public understanding of geographic risk variation and corresponding policy premiums.

The insurance sector should be further encouraged to collect and disseminate, systematically, sufficiently detailed information on insurance industry losses from natural hazards to support risk assessments, encourage a better understanding of the benefits and costs of risk reduction strategies, and support the development of risk financing, risk-sharing and risk-transfer tools, such as insurance, reinsurance, and capital market instruments. Industry efforts in this direction should be harmonised, to the extent possible, across countries to ensure comparable data. The provision of information on the extent of consumer and business insurance coverage against natural hazards may also be beneficial.

While the insurance sector has often taken the initiative, largely without public funding, to promote and educate policymakers and private citizens regarding natural hazard risks and financial protection, there remains scope in several countries for additional efforts to routinise catastrophic risk awareness in consumer education programs that currently cover non-catastrophic risks and improve the quality of risk awareness and risk reduction education material insurers and insurance associations offer to the general public.

The insurance industry can also provide industry experts as volunteers in order to inform and educate the public and in particular children on natural hazards and risk reduction measures.

The Corporate Sector

Forward thinking businesses and corporations are increasingly concerned about business continuity planning for natural hazard events. In the wider community, the corporate sector is often involved in charitable giving following natural hazard events, but there is great potential for their further involvement in risk awareness and risk reduction education for the general public and their employees.

Leadership by example can be provided by corporations through the adoption of employee education programs, risk reduction measures and business continuity plans. Hazard and preparedness seminars for workers, school children and local community members can become part of corporate good neighbour policies. Corporations can also encourage their suppliers to adopt sound business continuity practices, thus enhancing the resilience of the supply chain. Business efforts such as these often contribute to and build upon wider risk awareness and risk reduction education efforts.

The engineering industry and some segments of the construction industries, moreover, can effectively support many risk reduction initiatives, including strict and mandatory building codes, hazard-conscious land-use planning and environmental stewardship as a means of encouraging risk-wise behaviour.

Civic sector initiatives and sponsorships

Grassroots Initiatives

Many excellent risk awareness, risk reduction and advocacy programs have begun with grassroots efforts rather than through national initiatives. These programs are often more grounded in the local physical, cultural, economic and political context of a community than nationally developed programs, and they are able to target vulnerable or marginalised members of a community. These are important not only for the content of the materials they have created, but also for the social networks on which they rely for dissemination. Much can be learned from these efforts.

Grassroots initiatives, while creative, dynamic and flexible, often lack the financial and human capital to sustain and expand their efforts. Endeavours to capitalize on the strengths of grassroots risk awareness and risk reduction through scaling-up of local programs are most successful when grassroots organisations partner with governmental agencies, larger civic organisations or businesses. Partnerships such as these should be supported and enhanced as part of a holistic, top-down and bottom-up integration strategy.

Independent civic organisations and public-civic partnerships addressing natural hazard awareness and disaster risk reduction should be promoted and supported. There is much untapped potential for sustained partnerships with local grass-roots organisations to effectively disseminate scientific knowledge in a non-technical manner for the public.

International efforts

National risk awareness and risk reduction education programs and policies should serve to support and reinforce international strategies, such as:

- The Hyogo Framework for Action, led by the UN International Strategy for Disaster Reduction (UN/ISDR), which mandates that disaster risk reduction principles should be integrated in all development planning. These include effective research, monitoring and analysis, promoting risk reduction awareness, sharing relevant information, developing early

warning systems, enforcing appropriate building codes, protecting natural environments, creating social and financial safety nets, conducting preparedness drills and taking into account the effects of climate change. Priority Three of the Hyogo Framework is "to build a culture of safety and resilience at all levels through the use of knowledge, innovation and education."

- The UNESCO-led *International Decade of Education for Sustainable Development* incorporates risk awareness and risk reduction education in its program and is expected to continue this focus.
- The Council of Europe's *European-Mediterranean Major Hazards Agreement* (EUR-OPA) also maintains risk awareness and risk reduction education as an ongoing focal area, bringing together 25 member states to build a culture of safety through information exchange, awareness, education and training.
- Similarly, in Asia, the *Asian Disaster Preparedness Center* currently works with 26 countries participating in the Regional Consultative Committee on Disaster Management's Mainstreaming Disaster Risk Reduction into Development program. The program has been drafting guidelines for "Integrating Disaster Risk Reduction into School Curriculum".
- In the Americas, the Organization of American States promotes strategic planning for public awareness through its *Eduplan Hemisferico* initiative and in Mexico is collaborating on a pilot school safety campaign with Earthquakes and Megacities.

International efforts should also focus on improved hazard mapping and risk modelling in order to raise awareness of national governments regarding the hazards and vulnerabilities affecting their countries. Global risk maps are useful for helping nations to compare risk levels across a region and develop appropriate national and cross-border risk management strategies. For countries with under-developed risk mapping capacity, these maps can also strengthen country level knowledge of natural hazards and risks. Improved capacity to assess the potential economic impact of disaster risks can facilitate the access to affordable risk financing, risk-sharing and risk-transfer tools, such as insurance, reinsurance, and capital market instruments.

General strategies

Promotion of Cross-Sectoral Collaboration

Disaster risk awareness and risk reduction education are effective when representatives from the public, private, education, and civic sectors collaborate. In order to involve these many stakeholders, cross-sectoral platforms such as disaster risk reduction task forces or networks can promote a collaborative process for the creation, implementation and dissemination of risk awareness and risk reduction education programs and strategies. At all levels, cross-sectoral collaboration can help develop processes for achieving broad consensus and ownership of disaster risk reduction mechanisms, a key component when educating the public and policy makers about disaster risk reduction.

Support Outreach Programs to Opinion-Leaders and Knowledge Disseminators

Increasing awareness of natural hazards and risk reduction can be made easier by prioritising the education of key knowledge disseminators and policymakers. It is especially important to target opinion-leaders trusted by the public and well-known "champions" of safety issues who can promote awareness and education on a sustained basis.

People often seek out or receive risk related information from a small number of trusted sources. Religious leaders, neighbourhood leaders, business managers, school principals, media personnel and others may be effective and trusted disseminators of risk and risk reduction information. It is important that these and other knowledge disseminators have heightened awareness of risks and reduction strategies and have easy access to further information.

Community Participation

Broad community engagement is vital not only in the civic sector where it is currently most prevalent, but also in private, public, and educational sector efforts. Communities should be invited to participate throughout the process of program development and message dissemination. Communities should be full participants in risk awareness and risk reduction initiatives. Care must be taken so that efforts to include communities do not become marred in political alliance-building or become seen as a means of extracting favours. Funding stipulations that require extensive community engagement are one method to promote more effective and sustainable risk awareness and risk reduction.

Past experience has shown that it is especially important to involve community members in risk education efforts when these efforts have been initiated by technical experts. Technical experts often need assistance in communicating risk messages in ways that take into account factors that are important to targeted individuals and communities. Moreover, technical experts may not be well equipped to know what information is most sought after and which information will most likely lead to increased risk reduction behaviour.

Direct community participation in the development of hazard and risk reduction education materials will lead to a higher quality of targeted products. The creation of very local materials (e.g. children's posters for their own community) can promote deeper questioning of, and engagement in, the material. It can also create a more thorough understanding, longer retention and implementation.

Scaling-Up and Sharing

Fundamentally, developing a "culture of safety" is about building local, regional and national momentum for disaster risk reduction. Many pilot programs have been successful and can be expanded through policies, guidelines, curricula, training programs and mass material distribution that is scaled to reach the entire risk-exposed population. In larger countries and those with federally organised governments, scaling-up may entail a complementary patchwork of efforts.

Multi-level participation in strategic planning, educational and scientific workshops and conferences, broad publication of case studies and sharing existing material for adaptation contribute to bringing successful efforts at one scale to the attention of those working at other scales.

Effective communication and education methods

The following disaster risk communication and education methods should be employed:

- 1. Messages should be clear and consistent.** Despite inherent uncertainties that exist in the understanding and prediction of natural hazards, people need clear, consistent and persistent messages to internalise basic information and move towards action. Inconsistent and conflicting messages from the scientific, governmental, or civic communities and the media can lead to confusion, wasted energy or apathy. A consensus message, from a broad array of trusted sources, can be crucial to effective risk education.

2. **Non-technical language.** Complex information is most easily understood when described using everyday terms and concepts. The public often needs new terms to be fully explained, easily recognisable landmarks, features, and boundaries on maps and logical and consistent symbols (e.g. indicating 'right' and 'wrong', danger levels, etc.). Research suggests that the use of probabilistic language should be used with caution.
3. **Messages should put disaster risk into perspective.** This serves to reduce the emotional impact of the threat posed by natural hazards. The comparison of unfamiliar and unusual risks (the eruption of a volcano) to familiar risks (the use of domestic electrical appliances) may help illustrating that we face many risks in our daily lives and are able to cope with them.
4. **Promotion of both awareness and action.** The language for risk awareness must be immediately actionable for those receiving the message. Effective communication of disaster risks requires conveying an accurate picture of the expected benefits of prevention measures. In general, a problem-solving approach is more effective than a rule-based approach to risk communication. Particularly disempowering are myths that victims of hazard events will be quickly saved by national or international rescue. Persistence of these myths among the public, in the media and even within the emergency response community, can work against the development of a culture of safety. These myths must often be addressed in order to effectively teach risk reduction strategies and promote self-efficacy.
5. **Engaging format.** Without direct experience of a hazard event, many people do not independently seek out hazard and risk reduction information. Educational material that is engaging, attractive and interactive can catch and keep the public's attention. Innovative strategies such as games, toys, models, videos, experiential demonstrations, mass media ads, mascots and catchy slogans have heightened engagement for many audiences.
6. **Positive, empowering and accurate examples.** Negative images of disaster destruction can be overwhelming. Positive, empowering and accurate visuals can reinforce proactive behaviour.
7. **Targeting of multiple audiences.** Vulnerability to hazards can vary across populations. Education efforts that have found effective dissemination avenues for vulnerable sub-populations have been able to reach the greatest number of at-risk individuals. These efforts have varied to take into account the specific needs, languages, cultures, as well as vulnerabilities and capacities of each audience. They have also included positive and empowering illustrations of women, children, and members of minority groups, allowing the receiver to identify positively with the examples.
8. **Multiple dissemination strategies.** With diverse populations exposed to natural hazards, successful risk awareness programs have found ways to repeat their messages to each audience for maximum impact. The use of multiple dissemination strategies has supported the process of behaviour change from contemplation, to action, and finally habit development.
9. **Long-term strategic planning and cross-sectoral collaboration.** Successful education programs for risk awareness and reduction are ones that have been sustained, repeated, and applied consistently across the public, education, private and civic sectors. They are carried out through parallel and collaborative actions of governmental bodies, insurance sector representatives, corporate leaders, civil society organisations, and educational institutions.

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