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SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

USING TRADITIONAL AND INDIGENOUS KNOWLEDGES
FOR DISASTER RISK REDUCTION

WORDS INTO ACTION



WORDS INTO ACTION

Engaging for resilience in support of the Sendai Framework for Disaster Risk Reduction 2015-2030

The Words into Action (WiA) guidelines series aims to ensure worldwide access to expertise, communities of practice and networks of DRR practitioners. The guidelines offer specific advice on the steps suggested to implement a feasible and people-centered approach in accordance with the Sendai Framework for Disaster Risk Reduction 2015-2030. These guidelines are not meant to be exhaustive handbooks that cover every detail, and those who need more in-depth information will find references to other sources that can provide them with it.

Using a knowledge co-production methodology, WiA work groups take a participatory approach that ensures wide and representative diversity in sources of know-how. WiA is primarily a knowledge translation product, converting a complex set of concepts and information sources into a simpler and synthesized tool for understanding risk and learning. It is also meant to be a catalyst for engaging partners and other actors.

In summary, the WiA guidelines are pragmatic roadmaps to programming an effective implementation strategy. This is facilitated by promoting a good understanding of the main issues, obstacles, solution-finding strategies, resources and aspects for efficient planning. The guidelines can be a valuable resource for national and local capacity building through workshops and training in academic and professional settings. They can also serve as a reference for policy and technical discussions.

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CONTENTS

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Acknowledgements

Foreword

01

Introduction

1.1. What is the scope of Traditional Knowledges?

1

1.2 Objective of the WiA Guide:

2

1.3 The scope and target audience of WiA Guide:

6

1.4 The Structure of the Guide:

16

02

Why is traditional knowledge useful for Disaster Risk Reduction?

8

2.1 Why is traditional knowledges critical for DRR?

10

2.2 What existing international policies identify traditional knowledge and its importance in risk reduction?

13

14

16

03

How can we use traditional knowledge for Disaster Risk Reduction?

18

3.1 Why we need to move beyond documenting and packaging traditional knowledge?

32

3.2 How can we avoid the often false dichotomy of traditional vs. scientific knowledge?

34

3.3 How does traditional knowledge contribute to disaster resilience?

36

3.4 How can traditional knowledge help in coping with trauma and displacement?

38

40

04

Challenges for traditional knowledge and its application for DRR

42

4.1 Why has traditional knowledge not mainstreamed in the existing / recognised policies and practices for DRR at the national level?

44

4.3. What are the challenges for updating traditional knowledge in response to the changing environmental context?

48

4.4 How can lack of community engagement negatively impact the use of traditional knowledge?

50

4.5 How does the displacement of indigenous peoples and local communities affect their knowledge?

52

05

Approaches and enabling conditions to identify and apply traditional knowledge for DRR

54

5.1 What are the approaches for identifying existing traditional knowledge and their bearers/representatives?

57

5.2 What enabling conditions include the representation of local and indigenous communities at all levels?

58

5.4 How can we ensure a holistic implementation of traditional knowledge in DRR practices?

63

5.5 In terms of DRR, how can we achieve better outcomes for indigenous peoples?

64

5.6 What indicators are used to evaluate the effective implementation of traditional knowledge? How do we know they will achieve the targets set by global disaster reduction policies such as the Sendai Framework for DRR?

67

06

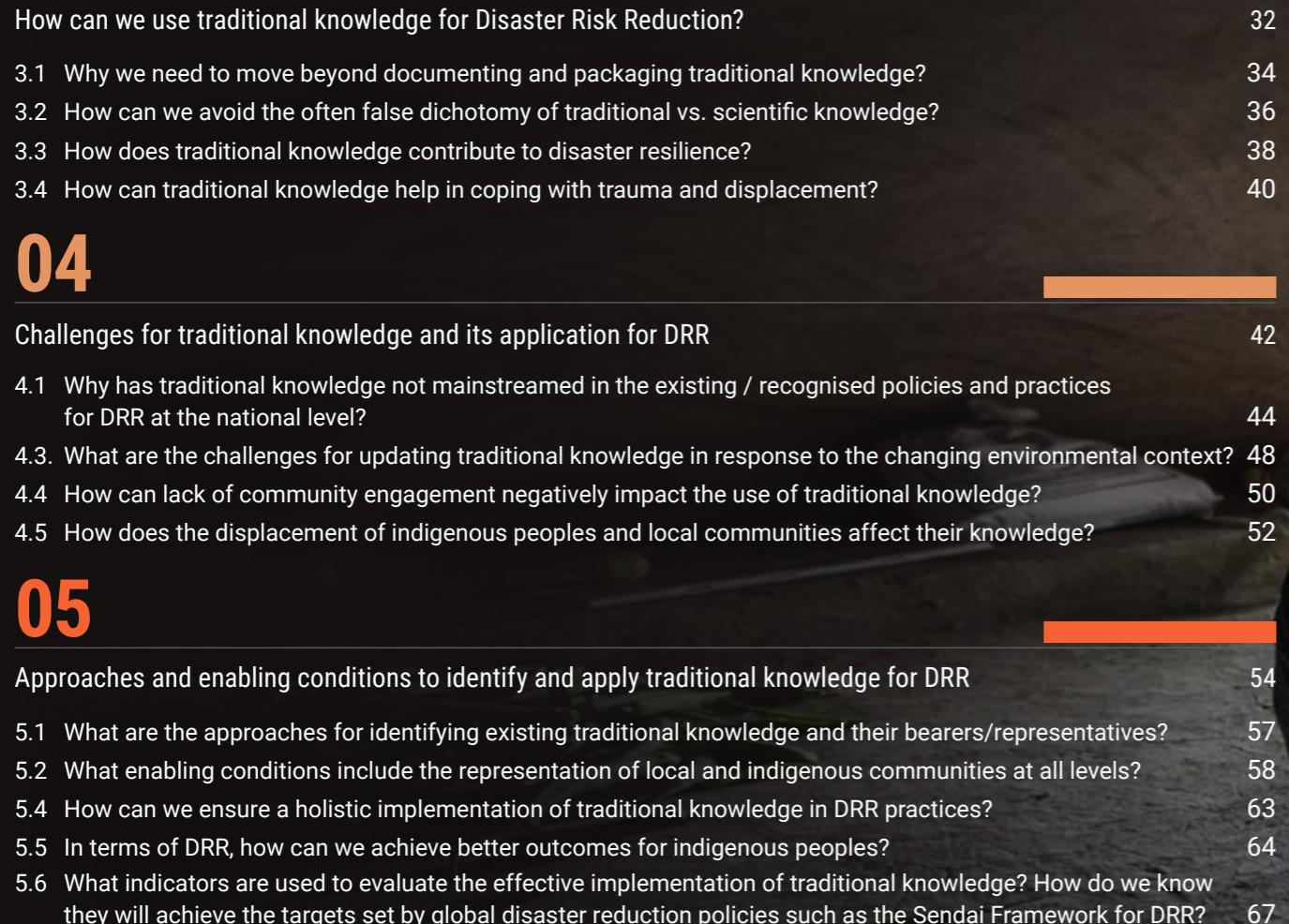
Annexure

6.1 CASE STUDIES

- | | | |
|---------------|--|----|
| Case Study 1 | Knowledge of spatial and temporal patterns of floods, droughts, and rainfall within local communities in Cambodia. | 71 |
| Case Study 2 | Government Officials, NGOs, and Consultants on why traditional knowledge is useful for their DRR work | 74 |
| Case Study 3 | Traditional water conservation through stone walling in the Philippines. | 76 |
| Case Study 4 | Traditional wooden building techniques of Japan | 78 |
| Case Study 5 | The Role of Culture and Tradition in International Aid- An analysis of the Typhoon Maysak Reconstruction Project in Chuuk, FSM | 80 |
| Case Study 6 | Local knowledge of water management and cultural landscape (Spain) | 82 |
| Case Study 7 | Controlled fires practiced by communities all around the Globe | 84 |
| Case Study 8 | Two communities in Alaska climate induced relocation – preventing displacement. | 86 |
| Case Study 9 | Post-Earthquake Lessons from Traditional Construction in Haiti | 88 |
| Case Study 10 | Seismic Performance of Traditional Urban Architecture in Morocco | 90 |
| Case Study 11 | Sustainable Construction Methods using bamboo adopted in Bihar, India. | 92 |
| Case Study 12 | Traditional Knowledge in times of COVID 19. | 94 |

6.2 Policy References

References



68

70

71

74

76

78

80

82

84

86

88

90

92

94

96

98



FOREWORD



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Our world is facing an increasing number of natural and human-induced hazards that have caused extensive loss of life and property. Traditional and indigenous communities across the globe have been facing these hazards for centuries, armed with practices and knowledge developed over generations.

The Sendai Framework for Disaster Risk Reduction recognizes culture as an important dimension of disaster risk reduction (DRR), and highlights the need to protect and draw on heritage as an asset for resilience. The Framework further underlines the importance of addressing both the needs of indigenous peoples and the role that indigenous, traditional and local knowledge can play in tackling disaster risk.

Traditional and indigenous knowledges offer a lens through which we can understand risk reduction and engagement better, enrich resilience building efforts and develop empowering solutions. Many sources of traditional knowledge are based on cognitive schemes that favour careful and integrative observation and adaptive learning over generations; this often goes hand in hand with a more holistic and ecologically viable approach, leading towards sustainable, democratic and inclusive DRR, response and recovery.

The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) is an intergovernmental organization working to improve the quality of conservation practice, as well as raise awareness about the importance of preserving cultural heritage worldwide. To address global concerns for cultural heritage, and in line with the Sendai Framework, ICCROM strives to promote effective disaster risk management strategies in conflicts, disasters and complex emergencies.

The United Nations Office for Disaster Risk Reduction (UNDRR) is the focal point for disaster risk reduction and convener within the United Nations system, supporting countries and societies to implement the Sendai Framework and to monitor and review related progress. UNDRR partners with relevant actors, such as ICCROM, to develop Words into Action guides that feed into on-the-ground implementation of the Sendai Framework.

We hope this guide will support the work of disaster risk management actors and policy makers from the local to global level to translate the Sendai Framework into effective action.

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01

Introduction



1.1. What is the scope of Traditional Knowledges?

Formed over centuries and adapted to local cultures and environments, the term “traditional knowledge” refers to the knowledge, practices, and behaviours of indigenous and local communities all around the world. It is passed from generation to generation both orally and through practice. Usually, it is collectively owned and takes the form of songs, stories, folklore, proverbs, cultural values, beliefs, rituals, community

laws, agricultural methods, and more. It can often be sung, danced, painted, carved, chanted, and performed, as well as spoken. Traditional knowledge can also be referred to as local or indigenous knowledge although in the latter case it specifically refers to traditional knowledge held by indigenous peoples. Traditional knowledge is gained over time by people engaging with their local context.

Hazards have always threatened the everyday life and livelihoods of humans. This close and continuous interaction with their surrounding environments has enabled hazard prone communities to develop traditional knowledge. In addition, over many years, this knowledge has evolved and adapted, based on multiple factors such as geographic location, micro-climate, availability of resources, social and economic structure, novel

research on the subject and more importantly on-field practice. In hazardous areas, individuals and communities have learned to use their available resources in the most effective way possible to mitigate disasters and build resilience. However, their ability to do this is increasingly threatened by restrictive policies. In India’s Sunderbans National Park, for example, mangroves are an important native species, but a new policy of planting eucalyptus trees along riverine roads has reduced soil fertility and agricultural productivity.¹ Traditional knowledge is local in nature and specific to people at a given location. The value of this traditional knowledge needs to be recognised. Traditional knowledge tends to be very practical and likely evidence-based. Often it can be transferred to other local settings, albeit with some adjustments.

For generations, indigenous peoples and local communities have successfully been using traditional methods to prepare for, and respond to, disasters. They were using these methods and passing them on from generation to generation. Their risk reduction practices were based on knowledge and experience of surrounding context, well before the existence of technology-based early warning systems, disaster risk mitigation strategies, and operating procedures for response (UNISDR 2018). Science, modernisation and upgraded knowledge systems have allowed researchers and practitioners to develop the means by which various hazards and vulnerabilities can be assessed in detail. Policymakers now have advanced information, with which to mitigate hazards and reduce disaster risk. However, a distance has grown between scientific and traditional knowledge. Note also that traditional knowledge is constantly evolving as new layers of understanding are added. In many cases, it can become obsolete if it does not keep pace with the changing social, economic, and environmental contexts. Traditional knowledge must be dynamic in order to stay effective.



¹ Information acquired through interviews during field study for project Climate Wall, an initiative by the Living Waters Museum and US Consulate, Kolkata.

Scientific knowledge

A scientific theory or truth is one that is developed on the basis of certain laws that have been inferred through the application of scientific methods such as observation, prediction (or hypothesis) in practical phenomena and belief in universal truth. Over the last 150 years, these theories have generated testable knowledge, leading the scientific community to view them as the best way to understand the natural world. For example, much of the evidence that we have today about climate change is based on reliable weather and climate records. These records were generated using modelling techniques which further enable us to make projections about the future.

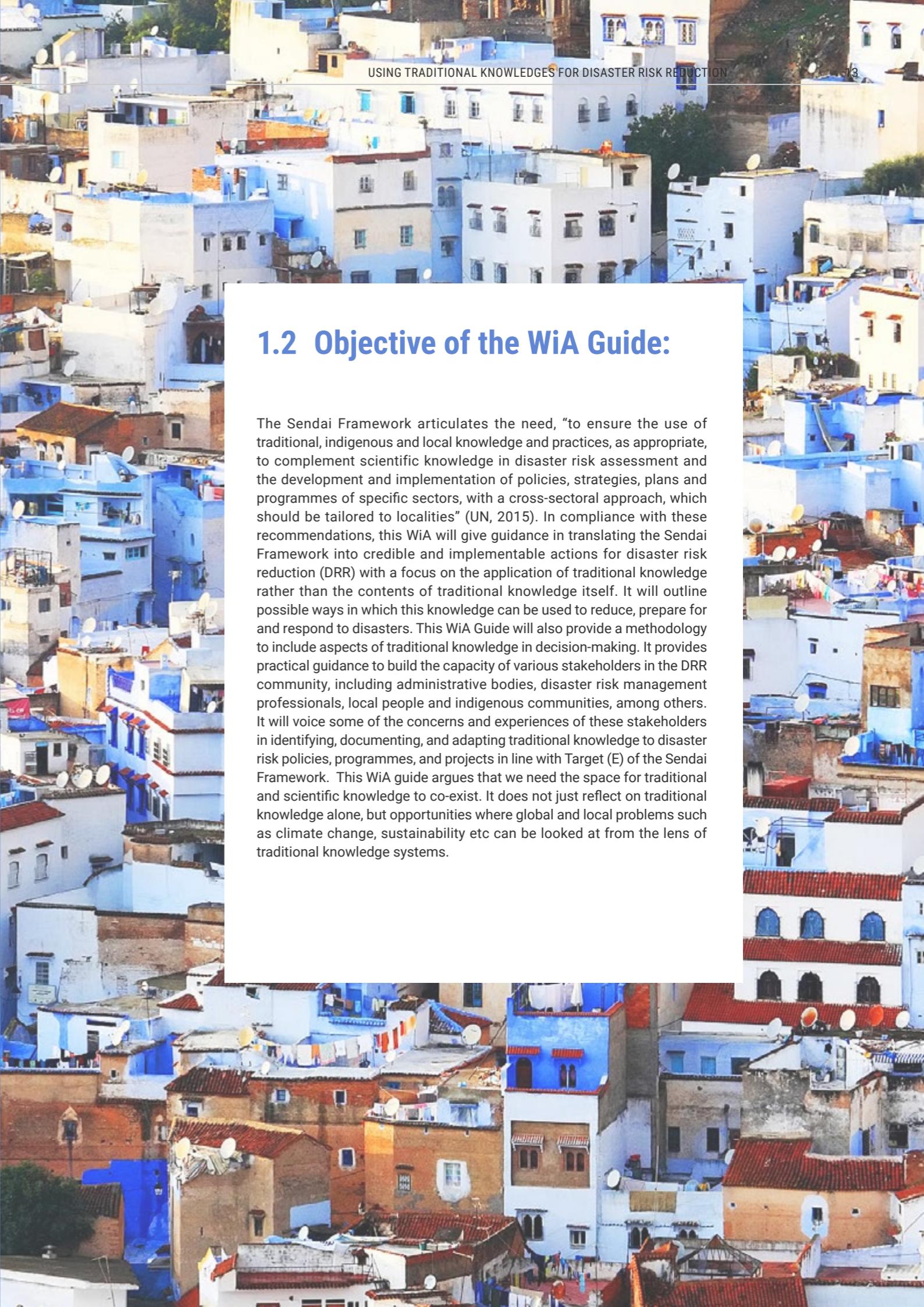
Indigenous knowledge

Internationally, there is no single definition of indigenous peoples or their knowledge systems (Petzold et al., 2020). However, a widely agreeable definition might be that systems, which are “integral to cultural complexes, and encompass language, systems of classification, resource use practices, social interactions, values, ritual, and spirituality”, can be termed indigenous knowledge. Despite the large number of cultural and linguistic differences between indigenous knowledge systems around the world, Tewa scholar Cajete (2016, p. 370) says “there are underlying similarities in their approach to the nature of the interrelationship and development of individuals in the context of the community”. Knowledge is developed and adapted over many generations, based on observations, lessons learnt and skills developed. It is a living phenomenon. For example, several indigenous peoples use celestial and terrestrial observations as indicators to predict the weather.

Local knowledge

When cultures and community practices are specific to non-indigenous communities, then it can be termed local knowledge (FAO, 2018). It comes from the continuously generated collective, inter-generational and place-based knowledge that is based on personal and collective experiences, which are often shaped by historical and social processes, (Escobar 1998). An example of local knowledge might include the knowledge developed by migrants in new settlements, which is somehow different from the local population. Like scientific or indigenous knowledge, local knowledge can inform decision making. It may or may not be based on a single specific culture or embedded in wider systems.²

² For additional definitions, please refer to <https://www.ipcc.ch/srccl/faqs/faqs-chapter-7/>



1.2 Objective of the WiA Guide:

The Sendai Framework articulates the need, “to ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans and programmes of specific sectors, with a cross-sectoral approach, which should be tailored to localities” (UN, 2015). In compliance with these recommendations, this WiA will give guidance in translating the Sendai Framework into credible and implementable actions for disaster risk reduction (DRR) with a focus on the application of traditional knowledge rather than the contents of traditional knowledge itself. It will outline possible ways in which this knowledge can be used to reduce, prepare for and respond to disasters. This WiA Guide will also provide a methodology to include aspects of traditional knowledge in decision-making. It provides practical guidance to build the capacity of various stakeholders in the DRR community, including administrative bodies, disaster risk management professionals, local people and indigenous communities, among others. It will voice some of the concerns and experiences of these stakeholders in identifying, documenting, and adapting traditional knowledge to disaster risk policies, programmes, and projects in line with Target (E) of the Sendai Framework. This WiA guide argues that we need the space for traditional and scientific knowledge to co-exist. It does not just reflect on traditional knowledge alone, but opportunities where global and local problems such as climate change, sustainability etc can be looked at from the lens of traditional knowledge systems.

1.3 The scope and target audience of WiA Guide:

The guide is primarily intended for:

- National and local governments and policymakers,
- Regional, national, sub-national and local DRM actors, particularly disaster management agencies, civil defence and emergency responders,
- Primary carriers of traditional knowledge, including communities, indigenous peoples and their leaders,
- Inter-governmental and non-governmental organizations, donor agencies, and NGOs,
- Research and socio-cultural institutions.



1.4 The Structure of the Guide:

This Words Into Action (WiA) guide has five primary sections:

Section 1 enumerates the scope of traditional knowledge, the purpose of this WiA Guide and the Guide's target audience;



Section 2 discusses how the inclusion of traditional knowledge and its practitioners is crucial for DRR. It explains how the Sendai Framework and other policies address the need to integrate traditional knowledge into DRR practices;



Section 3 considers how traditional knowledge can be used for DRR;



Section 4 articulates the challenges and bottlenecks of applying traditional knowledge to DRR;



Section 5 proposes key approaches for the identification and application of traditional knowledge to DRR in a way that can be used by multiple stakeholders/target audiences in diverse contexts. It focuses on the key considerations for implementing traditional knowledge in DRR policies and practices, and the indicators for assessing their integration.



02

Why is traditional knowledge
useful for Disaster Risk
Reduction?



2.1 Why is traditional knowledges critical for DRR?

By living in hazard-prone areas and experiencing frequent natural hazards, local communities have developed a multi-layered knowledge of disasters in their localities. This includes knowledge of the components of disaster risk (i.e., hazard, exposure, vulnerability, capacity, though most often in their own language and with definitions in the context of their respective cultures) as well as ways to reduce risk, prepare, respond, and recover. Crucial aspects which are less "visible" and "tangible" include the role of local formal and informal governance structures, kinship and other social networks, and various cultural aspects.

Traditional knowledge has allowed communities to thrive and build capacity in challenging physical landscapes and multi-hazardous environments, as well as in various socio-economic, political, and cultural contexts. For instance, communities in the north of Zimbabwe have extensive locally relevant flood early warning indicators (Dube and Munsaka 2018); traditional knowledge has been proven to be extremely useful for handling extensive and complex fires in Norway (Setten and Lein 2019); visible (e.g., early warning) and invisible (e.g., social relations and experiences) local knowledge is a prominent component of anticipating, preventing and overcoming landslide damage among the Songhe, an indigenous people in Taiwan (Lin and Chang 2020).

It is apparent that traditional knowledge is a critical component of how communities across the globe reduce and manage disaster risk in their respective localities. However, and more recently, there is an increased interest to use the principles of this knowledge in wider disaster risk reduction policies and practice, beyond the communities themselves. This became evident especially after the 2004 Indian Ocean Tsunami, when the story of the 'smong' (Pasotti 2014), was widely shared, saving people in Aceh, Indonesia (Hiwasaki, Luna, et al., 2014).

How the inclusion of traditional knowledge benefits the delivery of sustainable DRR at local levels:

- When traditional knowledge is taken into account, people are given voice, and are therefore empowered, as partners in the process of risk reduction and not considered as vulnerable communities in need of help (Dekens 2007);
- People impacted by natural hazards are the best ones to voice their needs and provide guidance for locally relevant solutions. Taking traditional knowledge into account means that those affected by such hazards will be better heard. Solutions will be entrenched in the local context and sustainable over the long term (Allen 2006).
- Traditional knowledge takes into account local capacities and integrates them into local-level disaster risk reduction. This often leads to cost-effective solutions that may reduce the need for external assistance and aid; and
- Externally introduced interventions and technologies are more likely to be sustainable and accepted when local knowledge is taken into account (R. Trogrić, M. Duncan, et al. 2021).

Case Study 2

Why local knowledge is useful for DRR- A perspective of the government, NGO's and consultants.

See page 76

Case Study 1

Detailed knowledge of spatial and temporal patterns of floods, droughts, and rainfall held by the communities in Cambodia.

See page 73



2.2 What existing international policies identify traditional knowledge and its importance in risk reduction?

Within development circles and government policies, the importance of culture in development (and thus in DRR) is being discussed and acknowledged much more than in previous decades. Traditional knowledge, has been a part of this discussion.

Traditional knowledge is best leveraged in DRR when it goes together with a wide range of existing policies and recommendations, a sort of large “corpus” or normative texts, which combine sector-specific and cross-cutting themes. These include policies on sustainable development, human rights, climate change, DRR and, of course, culture and heritage.



Human Rights, Sustainable Development and Climate Change policies

Multiple international policies on human rights and sustainable development express the relevance of traditional knowledge for DRR. These include the *Universal Declaration of Human Rights* (1948), the *International Covenant on Economic, Social and Cultural Rights* (1966), the *United Nations Declaration on the Rights of Indigenous Peoples* (2007) and, more recently, the *2030 Agenda for Sustainable Development* (2015).

All these instruments identify full inclusion, respect and equity as critical elements for the quality of life and wellbeing of individuals and groups. The safeguarding, promotion and accessibility of culture and heritage are recognised as fundamental societal goals in their own right.

Traditional knowledge is created and practiced by people, as part of their daily existence and within their cultural diversity. Using it to reduce disaster risks, therefore, is a way to foster engagement, acknowledge rights, promote cultural participation and ultimately to empower local communities and indigenous groups. Integrating culture is essential for the complete inclusion, respect and representation within sustainable development policies and programmes.

Within the normative texts and policies of human rights, a special place is held for cultural rights (article 27 of the *Universal Declaration of Human Rights* and article 15 of the *International Covenant*). Although a single definition of cultural rights is not provided, these are deemed to "protect the rights for each person, individually and in community with others, as well as groups of people, to develop and express their humanity, their worldview and the meanings they give to their existence and their development through, inter alia, values, beliefs, convictions, languages, knowledge and the arts, institutions and ways of life. They are also considered as protecting access to cultural heritage and resources that allow such identification and development processes to take place." The connection between all these things and traditional knowledge is apparent. It is important to safeguard and promote traditional knowledge as a critical resource for people. This is especially so when people are facing an exceptional and traumatic situation, such as a disaster.

The *United Nations Declaration on the Rights of Indigenous Peoples*, in particular, emphasises the importance for Indigenous Peoples to maintain their traditional ways of life and, notably in its Article 31, their right to "maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions..." (emphasis added), as well as to protect the associated intellectual property of such knowledge.

Please refer to chapter 6.2 to access links to the policy documents cited.

The *2030 Agenda for Sustainable Development*, adopted in 2015, acknowledges the integral role of culture across many of the Sustainable Development Goals, with heritage directly addressed in Goal 11, notably because of its importance in fostering inclusive, safe, resilient and sustainable cities and human settlements. In its publication "Culture/2030 Indicators", UNESCO explains the multiple linkages between culture and most of the 17 Sustainable Development Goals. Traditional knowledge is especially (but not exclusively) relevant to goals associated with "environment and resilience" (including DRR).

The year 2015 also saw adoption of the *Paris Agreement under the United Nations Framework Convention on Climate Change*. Climate change, of course, is a key driving factor in the growing number of disasters worldwide, notably those associated with extreme meteorological events. The Paris Agreement contains an important reference to traditional knowledge, as follows:

Art. 7, paragraph 5 - Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.





DRR and Cultural policies

DRR and international cultural policies both contain reference to culture and traditional knowledge. On the one hand, these cultural assets contain an intrinsic historical and artistic value, since they are precious testimonies of our past, which need to be protected. On the other hand, culture – in its many forms – contributes significantly to the spiritual wellbeing, capacity and resilience of individuals and communities. It may therefore help to reduce disaster risks.

International DRR policies, notably the Sendai Framework for Disaster Risk Reduction (SFDRR) adopted in 2015, have integrated consideration for culture (and heritage), placing it side by side with other major societal concerns (e.g. economic, social, health and environmental) that require protection from disaster. Traditional knowledge is mentioned explicitly in two provisions of the SFDRR:

Section 24 (i): *To ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans, and programs of specific sectors, with a cross-sectoral approach, which should be tailored to localities and to the context;*

36 (a) (v): *Indigenous peoples, through their experience and traditional knowledge, provide an important contribution to the development and implementation of plans and mechanisms, including for early warning.*

Besides expressing concern for culture, the SFDRR acknowledges the need to apply a culturally-sensitive approach to DRR across all sectors.

Although still regarded as inadequate by some, these advances come from a renewed understanding of the multiple ways in which “culture” may affect how societies perceive and prepare for disaster risks, and how they respond to actual disasters. Issued by the International Federation of the Red Cross Societies (IFRC), the 2014 *World Disaster Report* made an important contribution through compelling analysis of numerous case studies to explain the vital importance of putting culture at the centre of DRR planning and implementation.

This new understanding of the importance of culture in DRR also led to the addition in 2013 of a specific chapter on culture (including intangible cultural heritage and hence traditional knowledge) in the Post-Disaster Needs Assessment (PDNA), a government-led process to assess the effects of disasters and therefore plan for recovery. An inter-agency product, the PDNA is supported by the UN system, together with the World Bank and European Union.

It is important to stress that all regions of the world, and all UN Member States, are strongly recommended to implement the Sendai Framework for DRR, including its provisions on culture and heritage. Some have already made progress, but much remains to be done to move from “words to action” in this new area of concern for the DRR community.

Following the Sendai Framework, and beyond the limited scope of the various individual Conventions, UNESCO's General Conference adopted an important policy document in 2017 on the protection of culture and the promotion of cultural pluralism in emergencies related to natural and human-induced disasters. The document encompasses all types of heritage as well as creativity in general. Developed as an "Addendum" to a Strategy already adopted in 2015 by UNESCO's Member States, it initially focused on armed conflict. The document defines specific provisions for the assistance to Member States with implementation of the cultural dimension of the Sendai Framework, across its four priority areas of action.

Among UNESCO's international legal standards, the above-mentioned 1972 World Heritage Convention is undoubtedly the one which has produced the largest number of technical guidance and policy documents. A *Strategy for Reducing Disaster Risks at World Heritage Properties*, for example, was adopted in 2007 by the World Heritage Committee (the governing body of the 1972 Convention). It laid out the policy implications of the 2005 *Hyogo Framework for Action*, the Sendai Framework's predecessor, for the tangible heritage sector. A resource manual on *Managing Disaster Risks for World Heritage* was later published in 2010 (under review at the time of writing), and a number of resources developed to assist Member States with implementation of the 2007 Strategy. In 2018, an important *Recommendation on Recovery and Reconstruction of Cultural Heritage* was adopted in Warsaw. It refers to traditional knowledge as a key consideration when planning and implementing post disaster recovery initiatives.

As concerns intangible cultural heritage (which covers traditional knowledge of course), the 2003 *Convention for the Safeguarding of the Intangible Cultural Heritage* sets out, in Chapter VI of its *Operational Directives*, the principles and measures to be implemented by State Parties at the national level. These harness both the contribution of intangible cultural heritage (ICH) for DRR and community-based resilience to natural disasters, and mitigate the impact of natural disasters on ICH practices and their transmission.

A concern for disasters caused by natural and human-caused hazards is also expressed, in general terms, within many of UNESCO's cultural Conventions, including the 1954 Hague *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, the 1972 *Convention Concerning the Protection of the World Natural and Cultural Heritage* and, more relevant for traditional knowledge, the 2003 *Convention on the Safeguarding of Intangible Cultural Heritage*. These international legal instruments have all developed over the years specific provisions and recommendations on the issue of disasters. Another important policy document that should be noted is UNESCO's 2001 *Universal Declaration on Cultural Diversity*, which affirms the importance of:

Annex II, paragraph 14) - *Respecting and protecting traditional knowledge, in particular that of indigenous peoples; recognising the contribution of traditional knowledge, particularly with regard to environmental protection and the management of natural resources, and fostering synergies between modern science and local knowledge.*

Under priority two (Strengthening disaster risk governance of the culture sector to manage disaster risk), the *Addendum* affirms that:

Local communities are key to an effective management of disaster risks and are bearers of relevant intangible cultural heritage (ICH) knowledge and practices for DRR and for coping with emergencies (e.g. vernacular building techniques, indigenous early warning systems). There is a need, therefore, to fully integrate communities who are bearers of such ICH knowledge into the overall governance and policy-making processes for DRR planning, mitigation, and recovery at the national and local levels.

The integration of an "addendum" on disasters should not surprise us in a strategy initially focused on armed conflict. Within the culture sector, policies and guidelines related to disaster risk are often similar to recommendations for emergencies associated with armed conflict or social unrest. A well maintained cultural heritage, which is grounded in strong traditional knowledge, helps to build a resilience that can support communities in all kinds of traumatic situations and help them to bounce back and recover. It could be argued that a key component of resilience is precisely the ability of humans to reassess their priorities and values in the face of irreversible losses and to adapt "culturally" to a new and unpredictable scenario.

Finally, beyond policies within the perimeter of its cultural sector, UNESCO has promoted the establishment of several other cross-cutting policies relevant to DRR, drawing on its wider mandate (Education, Sciences, Social Sciences, Culture and Communication). These include a *UNESCO Strategy for Action on Climate Change* (2017) and a *UNESCO Policy on Engaging with Indigenous Peoples* (2018). The latter contain a dedicated section on DRR. All these comprehensive UNESCO policy documents make extensive reference to traditional knowledge (sometimes called "local and indigenous knowledge").





Conclusions

In conclusion, awareness is growing within international and human development circles, especially DRR, that traditional knowledge is a precious resource to be protected both for its own sake and for its possible contribution to resilience and recovery.

Taken together, these policy documents provide a strong foundation, with which to leverage traditional knowledge in DRR. UNESCO's wide array of normative texts and recommendations, in particular, help promote the integration of culture, including traditional knowledge, into DRR and other development policies and programmes.

A key bottleneck so far has been the limited awareness that cultural issues have relevance and potential for DRR. What DRR policy makers and managers need, at this stage, is clear practical guidance – supported by compelling examples and tools – to help them move from words to action.

03

How can we use traditional knowledge for Disaster Risk Reduction?



3.1 Why we need to move beyond documenting and packaging traditional knowledge?



We often tend to focus on the content of traditional knowledge. For instance, how do flora and fauna behave when they are used by local communities to forecast heavy rains in a given geographical setting? Or what local construction methods and materials are used to build earthquake-resilient structures. Indeed, a majority of scientific and grey literature on traditional knowledge in disaster risk reduction focuses primarily on the "documentation" of local/indigenous/traditional knowledge. This risks the oversimplification of traditional knowledge and, in the long term, scepticism about the use of traditional knowledge for disaster risk reduction. It is crucially important to understand that traditional knowledge is shaped by religious, social, economic, and political realities at local level (Langill 1999). It is therefore not possible simply to document it and "package" it for further use. Local knowledge cannot be detached from its social, political and cultural context (Briggs, The use of indigenous knowledge in development: problems and challenges 2005). The context and place-specific nature of traditional knowledge is one of its unique key strengths.

Any approach that aims simply to document, "package", and "upscale" local knowledge risks the loss of this important specificity (Briggs, 2013). It also risks romanticising traditional knowledge. Traditional knowledge has different value when it is taken from its local context. It may lose its meaning once removed from its societal context, and from within its spatial and temporal boundaries (Dekens, 2007).

Failure to consider the context of traditional knowledge, such as its social, political, and cultural determinants, risks clouding the fact that not everyone within a given community has the same local knowledge. Access to this knowledge may differ according to age and gender. Within indigenous communities, there is often a hierarchy regarding access to certain knowledge or cultural practices. This failure can also lead to an uncritical approach to traditional knowledge. Research in Namibia (Hooli 2015) shows that oversimplifying the reality of traditional knowledge might mean communities are perceived as resilient because they have traditional knowledge. In reality,

their traditional knowledge is side-lined by systemic factors and processes that create disaster vulnerability in the first place, such as poverty and political oppression. These are beyond the control of those with traditional knowledge, such as local communities.

Going beyond this documentation means a deeper engagement with the process of local knowledge. How is knowledge created in the first place? What are its expansive culturally specific definitions? How it is shared, used, disseminated, and modified? It implies recognition of the institutional barriers to application of this knowledge for disaster prevention. For example, infrastructure policies can acknowledge that for some communities, such as those along Alaska's coasts, "infrastructure" is not just man-made, it also includes the natural environment itself. Sea, ice and permafrost are all essential infrastructure for livelihood and survival (Kawerak 2020).

These approaches allow for a more realistic consideration of traditional knowledge and its agency within DRR. Unfortunately, many development agendas still advocate approach traditional knowledge in a superficial manner without consideration of the context (Smith 2011).

Case Study 3

Stone Walling Practice in the Cordillera Region, northern Philippines.

See page 78

3.2 How can we avoid the often false dichotomy of traditional vs. scientific knowledge?

As discussed above, traditional forms of knowledge, whether indigenous or not, reflect diverse and unique interpretations of the world. They are grounded in very specific geographical and cultural contexts. Therefore, this knowledge can hardly be compared across time and place. Attempts to force the integration of different forms of knowledge, including traditional and scientific, have often proven to be pointless and futile. In Gujarat, the circular form of traditional vernacular structures called 'Bhungas' had proven to be earthquake resistant and climatically sustainable, but efforts to combine them with contemporary concrete blocks following the 2001 earthquake were not sustainable in the long run (Jigyasu, 2002). The past decades have shown that in many cases, successful DRR requires the consideration of traditional knowledge. Modern and traditional knowledge cannot replace each other completely. Rather, they should be considered in a way that considers co-production and hybrid knowledge.

In the aftermath of the 2010 Haiti Earthquake, "traditional construction systems often demonstrated better resilience to earthquakes than buildings constructed with modern materials" (Audefroy 2011). In his research, Joel Audefroy notes the "erosion of traditional knowledge and the pressure on those with traditional building skills to work with modern materials and techniques" (Audefroy 2011) (Refer Case Study 4). For these reasons, Audefroy stresses the need for a balanced approach that incorporates a better understanding of traditional knowledge with the application of modern techniques and materials. This combination can "help rehabilitate traditional structures and thus combine safety with preservation of rich architectural heritage."



For the following reasons, the co-existence of traditional and scientific knowledge is emphasised by many in disaster risk reduction (Mercer, Kelman, et al., 2009) (Balay-As, Marlowe and Gaillard 2018) (Hiwasaki, Luna, et al., Process for integrating local and indigenous knowledge with science for hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities 2014):

- Unprecedented global environmental change means that local communities are experiencing disaster events, the magnitude of which are outside the communities' lived experience (Kelman, Mercer and Gaillard 2012), and by inference, their traditional knowledge.
- Traditional knowledge contributes to scientific understanding by providing localised information such as on-the-ground verification of the science (Walshe and Nunn 2012).
- Traditional knowledge makes scientific knowledge appropriate to the local context.
- Integration maximises the DRR potential, by allowing for the exchange, (Mercer, Kelman, et al., 2009) of knowledge in order that the weaknesses of one knowledge system can be addressed by the strengths of the other. For instance, the limited accessibility of engineering knowledge about the disaster resilient behaviour of traditional structures can be explained by using traditional communication systems such as folklore, songs etc (Wisner, Gaillard and Kelman 2011)

Co-existence of scientific and traditional knowledge in a multi-stakeholder environment, such as disaster risk reduction, means that these different forms of knowledge must be tangible and available to everyone. This allows informed decisions based on individual and collective priorities. Fostering the co-existence of different forms of knowledge in disaster risk reduction, a field historically dominated by scientific knowledge (Gaillard 2022), requires that traditional knowledge is also recognised, understood, and used.



3.3 How does traditional knowledge contribute to disaster resilience?



Throughout history, communities have been exposed to a variety of hazards, such as seismic or hydro-meteorological events or epidemics, and this has resulted in the continuous modification and adaptation of their living environments. Many cities were formed in harmony with the local topography, but inhabitants adapted these cities to make them safer from the local hazards. For example, the inhabitants of Mesopotamia built "local networks of irrigation ditches and canals and embanked dwelling places, making use of timber and bitumen for shoring and waterproofing" to avoid the desert extremes. Similarly, the inhabitants of today's Netherlands have adapted to their watery environment by building dikes, damming and reclaiming tidal marshes to mitigate the floods (Kostof 1991, 56). In settlements prone to natural hazards, trial and adaptation have led to the development of a variety of local construction styles based on local materials. For instance, in Japan, the traditional architectural craftsmanship, used in

timber-framed structures, includes Japanese cypress bark for roofing, to enhance the resilience of buildings to earthquakes and typhoons (The Japan Times 2020). The Pacific Islanders learned to remove traditional roofs "as a storm approached, because they were constructed with that purpose in mind, and used as shelter on the ground" (Campbell 1984, 2006; Kelman et. al. 2011). Accordingly, "in Samoa, traditional dwellings with raised floors and minimal permanent sidewalls offered the least resistance to and most structural security from storms and floods" (Kelman et. al. 2011; Blake 1993; Duly 1979; Rapoport 1969). This traditional knowledge has evolved over time, adapting to the given social, economic and environmental challenges and opportunities. In the traditional Bhungas of Gujarat, for example, which have resisted earthquakes, newer materials have been tested, such as wire mesh and cheaper timber as bamboo becomes more scarce (Jigyasu 2002).

According to the 2003 Earthquake Reconnaissance Report (EERI 2003), the traditional first- and second-generation buildings performed better during the 2003 earthquake in Boumerdes, Algeria, than the comparatively newer institutional and large-scaled apartment buildings (EERI 2003; Gencer 2008). Similarly, the traditional 'pol' houses of Ahmedabad World Heritage City in India proved very resilient during the 2001 Bhuj Earthquake. Other traditional spaces, such as the interconnected courtyards in the historic town of Patan, Nepal, and the Sufi shrine of Nizamuddin Auliya in Delhi, India have



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served as refuges and hubs for collective religious and social networks respectively. They have been vital during emergencies (Jigyasu 2016). Even today, 'incremental' social housing projects in Latin America and Africa have demonstrated the philosophy of adaptability, innovation and flexibility. This design initiative has allowed adaptation to the diverse needs of communities and individuals. Flexible, responsive and affordable, they are turning out to be a success story. (Wakely and Riley 2011; Bah, Faye, Geh 18).

Case study 4

Traditional wooden building techniques of Japan.

See page 80

3.4 How can traditional knowledge help in coping with trauma and displacement?

In disasters, indigenous peoples and local communities often experience trauma. The experience is made more overwhelming by the fact that basic information from multiple sources - covering perhaps safety, health and sanitation, or even relocation – is often in a format or language that is hard to access. It might draw on diverse processes or technologies that may be unfamiliar. Individuals and groups are frequently asked to adjust to the majority non-Indigenous culture. Under such circumstances, communities are particularly vulnerable to negative outcomes. These can be countered by ensuring that preparations exist for inclusive, culturally and linguistically appropriate communication strategies, support in accessing assistive technologies, and liaison people in place to help navigate bureaucratic process.³



³ This was a commissioned concept paper for the November 2007 Consensus Building Meeting for the Cultural Competence for Disaster Preparedness and Crisis Response (CCDPCR) project. Funding for the paper and the CCDPCR project was provided by the Office of Minority Health, Office of Public Health and Sciences, U.S. Department of Health and Human Services. (<https://thinkculturalhealth.hhs.gov/education/disaster-personnel>)

Traditional knowledge allows for more meaningful dialogue and includes reciprocity or interdependence as a value. It encourages the acknowledgement of the indigenous peoples as host. It also allows the recognition of networks and frameworks of responsibility that go beyond individual nation-state boundaries (McNevin and Missbach 2018). Furthermore, indigenous peoples themselves can and do host displaced people, for example, in the aftermath of the 2011 Christchurch, New Zealand, earthquakes (Lambert 2014) and the 2015 Fort McMurray fire in Alberta, Canada (Fontaine 2016). There are also cases where displaced indigenous and local people host others who are displaced, for example in urban environments and also in camps (Fiddian Qasmiyah 2020). At the start of the 2011 Syrian conflict, Syrian refugees chose to reside in the generations-old Palestinian Burj el-Barajneh camp in Beirut, Lebanon (MCEVERS 2012).

Traditional knowledge can also help to deal with the trauma of displacement and to cope with conditions that are protracted and without a political resolution in sight. It helps to preserve both the body's physical needs and the human within. It builds lives beyond victimhood, but does not negate the victimisation. 'Sumud' – literally steadfastness – is one example of such a strategy developed by refugees during protracted displacements. It encompasses the ability to suffer yet persist, to find ways of living differently within conditions that are beyond one's capacity to change (Feldman 2015). Humanitarian and other initiatives can do more damage, if they do not value

such coping mechanisms, which are as powerful and relevant as those deemed scientific and professional. Health pluralism (Tribe 2007) and 'complementary therapies', which may include the use of herbal medicines and massage, for example, are often part of wider programmes to support refugees and others who have experienced torture or other traumatic events. See, for example, Foundation House in Victoria Australia whose mission is to advance the health, wellbeing and human rights of people from refugee backgrounds who have experienced torture or other traumatic events (https://foundationhouse.org.au/specialised-programs/#collapse_9).⁴

Displaced people bring their own coping strategies for trauma, but also draw on traditional knowledge systems for organising their everyday lives and relationships. This is despite their dispersal and being outside their usual community structures. The ability to survive a protracted displacement and to maintain a sense of community can sometimes depend precisely on such 'informal' forms of governance. The 'Maashouk' gatherings of Palestinian refugees in Lebanon are one example (Nasser, Stel, Rassi 2016). There are also ways that those who have been displaced can find forms of habitation as Nasser (2016) indicates, how coping strategies used by Syrian refugees in Lebanon were essentially built on a range of adaptive informal institutions that are outside the regulatory frameworks of government such as the WiA on Disaster Displacement (UNDRR 2019).

⁴ There are also further examples from Sri Lanka, in the combination of Civil War and Tsunami: Rachel Tribe, Health Pluralism: A More Appropriate Alternative to Western Models of Therapy in the Context of the Civil Conflict and Natural Disaster in Sri Lanka?, Journal of Refugee Studies, Volume 20, Issue 1, March 2007, Pages 21–36, <https://doi-org.uoelibrary.idm.oclc.org/10.1093/jrs/fel031>

04

Challenges for traditional knowledge and its application for DRR



4.1 Why has traditional knowledge not mainstreamed in the existing / recognised policies and practices for DRR at the national level?

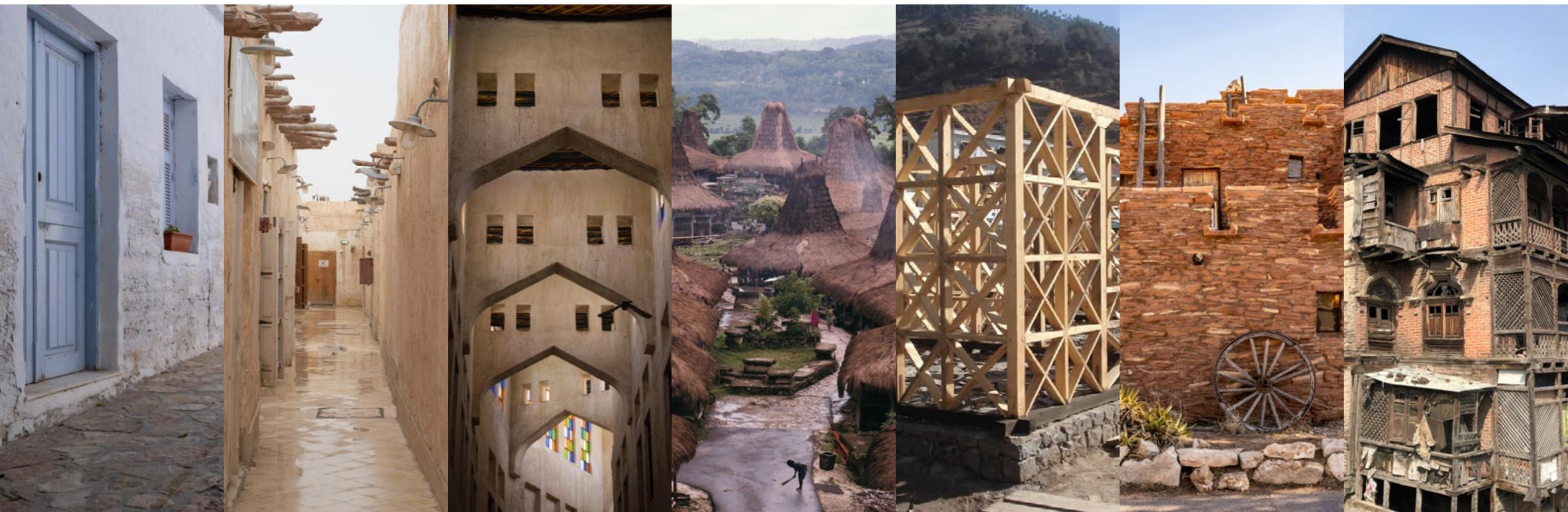
Including traditional knowledge in DRR policies and practices is often inhibited by the very inherent characteristics of traditional knowledge, including its local-based context or heterogenous nature. Research among stakeholders external to communities in Malawi found that these factors make inclusion of traditional knowledge challenging. Full engagement with traditional knowledge requires time and resources which are simply not available when disaster risk reduction is implemented at local

level. Current systems generally prioritise information and knowledge which can easily be 'upscaled' and 'mainstreamed'. This is not the case with traditional knowledge.

According to the World Bank (WB) and the GFDRR (2015), for example, "majority of the building codes in developing countries fail to recognise locally available building materials or prevalent forms of vernacular construction," which may account for

a large share of residential construction in those countries. According to Blondet and Villa Garcia (WB and GFDRR 2015), in some countries, such as El Salvador and Argentina, "building codes explicitly prohibit adobe construction in urban areas". This further leads to the lack of opportunities for the betterment of such construction techniques and materials and makes it "difficult to access finance and insurance for traditional building types" (WB and GFDRR 2015, 40). In the case of the dhajji dewari, a traditional form of timber and masonry infill construction common in Northern Pakistan and India, "failure to address vernacular technologies in building codes has been an impediment to the understanding and improvement of those building traditions." (WB and GFDRR 2015). Joe da Silva points out that in the aftermath of Pakistan's 2005 earthquake "as no code of practice and formal recognition existed for this form of construction, donors were initially reluctant to support the construction of the self-built dhajji dewari" (WB and the GFDRR 2015).

Around the world, lingering colonialism and racism are further reasons why traditional knowledge is not recognised or "mainstreamed" to the appropriate extent (Scott 2020). One could also argue that 'mainstream' DRR has a 'problem' with the very ontology and epistemology of traditional knowledge, which is still largely disregarded in favour of technical approaches, and expert, scientific, or 'Western' knowledge (Coles and Quintero-Angel 2017). For instance, literature gives us excellent examples of rich traditional knowledge on early warning systems for various hazards, but these are often considered anecdotal at best. Early warning systems, considered 'robust', 'effective', and 'efficient', are usually based on the latest science. Even where efforts are made to understand local/traditional/indigenous early warning systems, the approach is usually to explain and confirm these early warning systems with their 'scientific' counterparts. Traditional knowledge is perceived as something to be confirmed by scientific knowledge. And this is part of the reason why this knowledge has not been mainstreamed into existing DRR policies and practices.





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4.2 How do socio-economic factors impact the use of traditional knowledge for DRR?

There is an undeniable relation between traditional knowledge and power relations at local levels. Knowledge of certain community groups, mainly local elites, can be privileged over the knowledge of other individuals and groups within a community, often those who are already vulnerable and marginalised. Not everyone within a particular settlement has the same access to traditional knowledge. The existence of traditional knowledge regarding an aspect of risk reduction and management does not mean that everybody will have access to it. Experiences in Malawi (Robert, et al. 2019) show that awareness of the benefits of early evacuation or construction of more robust housing does not equate to the financial capacity for doing so. It is therefore imperative to consider these power relations and deeper socio-economic aspects when engaging with local communities in disaster risk reduction.

The foundations for effective disaster risk management in indigenous communities are rooted in their cultural belief systems and worldviews. However, few indigenous communities exist which can practice natural hazard risk reduction based on their cultural belief systems. Risk reduction strategies often require freedoms that are unavailable to many marginalised indigenous communities.

In certain contexts, social and cultural practices can exclude parts of the community, as exemplified by the research findings (Acharya and Prakash 2019) in India's Gandak River basin. Socio-cultural practices there mean that women can often not access local markets, where flood early warning information is available. Flood forecasts in local communities can be highly gendered. Other case studies, for example from the eastern Terai of Nepal, show how traditional knowledge can be monopolised by local elites. These elites have significant influence on what traditional knowledge is revealed and made available to stakeholders working with communities.

Predominant perceptions that link the use of modern materials to social status also impact the use of traditional knowledge. The village of Baliau sits on the volcanic island of Manam in Papua New Guinea, for example, where field research (Jessica Mercer et al. 2009) revealed that villagers' housing had become "more vulnerable to environmental hazards due to the use of modern materials – which are used by many villagers because such materials represent wealth and higher social status"

(Kelman et. al. 2012). Houses in Baliau are traditionally built with steeply-sloping roofs to reduce the potential for collapse and fire due to volcanic ash. Local materials, such as iron sheeting, assist in stiffening the roofs through augmenting wind resistance. Although it reduces fire risk, however, volcanic ash does not slide off as easily, a situation which leads to possible collapse (*ibid*).

Many knowledge systems are contested, linked to the increasing demands of modernisation, globalisation, and urbanisation. In various contexts from rural communities to larger urban areas, a sudden transformation has been observed from traditional settlement to modern construction techniques and materials. Rohit Jigyasu (2002) argues that there has been an "increasing vulnerability to earthquakes of Bungamati village in the Kathmandu valley in Nepal, following the transformation processes in traditional rural communities in buildings, land-use and ownership patterns, occupational structure, cultural practices, and governance systems"

Case Study 5

The Role of Culture and Tradition in International Aid- An analysis of the Typhoon Maysak Reconstruction Project in Chuuk, FSM.

See page 82

4.3. What are the challenges for updating traditional knowledge in response to the changing environmental context?

Adaptability is often considered to be one of the strongest features of traditional knowledge, and yet the increasing loss of traditional knowledge systems is blamed at least partly on their failure to cope with modern times. One limitation of this knowledge is its capacity during extreme events, which are high magnitude but low frequency. Such events are outside the lived experiences of local people (Twigg 2015). Linked to this, the applicability of local knowledge in the light of climate change has been widely discussed. Some argue (Makondo and S.G.Thomas 2018) that climate has always been changing. But these arguments do not consider the rate and variability of change as well as its associated impacts. In Kenya, local drought forecasting indicators, which are used by pastoralists, are becoming less reliable as a result of climate change and variability (Kagunyu, Wandibba and Wanjohi 2016).

Case study 6

Local knowledge of water management and cultural landscape in Spain.

See page 84



4.4 How can lack of community engagement negatively impact the use of traditional knowledge?

Traditional knowledge is often treated as an aspiration – in meetings, conferences, needs assessments, and more – for a broader and deeper discussion that should and would happen at some time, but never gets to be realised. This lack of implementation suggests that deliberative bodies had given reasonable consideration to the necessity to respect indigenous peoples, their experience and their needs. But they had not defined what that experience is, what those needs are or how, specifically, they should be met. Most often, when meeting reports or assessment findings do not reflect the indigenous delegates' input, this is because either an insufficient number of Indigenous delegates have assembled, or not enough time has been given to discuss the diverse indigenous perspectives (they are not homogenous). In addition, meetings lack adequate interpretation and translation resources, so they do not accurately represent the many and varied needs of the communities about whom the meetings were convened, and for whom the assessments were commissioned. There are also "logistical" challenges with involving indigenous (and "local" – "other") voices in the process. In order to 'integrate' or 'include' traditional knowledge in DRR, community participation is imperative, and there is both a strong rationale and a policy support for community participation. Unfortunately, community participation often stays as an aspiration and a "box -ticking" exercise, while approaches on the ground remain top-down, detached from local contexts and unsustainable in the long term. For instance, the 2019 Views from The Frontline Report by the Global Network of Civil Society Organisations for Disaster Reduction (GNDR 2019) based on interviews with nearly 100,000 people in 43 of the world's most disaster-prone countries, found that only 16 percent of people at risk feel included in decisions on how to reduce their own risk.⁵

It has also been observed in several reconstruction programmes that other than the affected community, no other stakeholders are involved in the design processes. As a result, the main knowledge holders which in most cases are the affected community members themselves are often left in a marginalised position despite the urge of involving them in the process. Moreover, while some meetings often take place with the affected communities, the actual decision-making procedures often happen amongst stakeholders holding power – such as the government, multilateral agency or corporate donor offices- where they can claim to represent voices of the community.

The above-mentioned shortcomings have been observed during the reconstruction efforts in Gujarat following the 2001 earthquake, which have been generally appreciated for their exemplary 'owner driven reconstruction'. However, the use of traditional technologies has been only very exclusive and remained at the level of showcase projects, for which the intermediary agencies received praise, while the contribution of traditional knowledge holders was marginalised. Moreover, there were some winners and some losers in this process depending on their social and economic status, along the lines discussed in section 4.2.

⁵ Also refer to Exploration of Indigenous Practices and Knowledge Concerning Natural Hazards and Risk Reduction, John Scott, 2017 https://assets.irinnews.org/s3fs-public/new_zealand_maori_drr_august_2020.pdf



4.5 How does the displacement of indigenous peoples and local communities affect their knowledge?

The history of colonisation is a history of displacing indigenous peoples from their lands and waters, their settlements and food systems, and their cultures and knowledge. This knowledge is location-specific, meaning that any relocation from community and environmental relationalities is also a cognitive and cultural dislocation. For Indigenous communities, displacement is a disaster.

Displacement has numerous causes, most notably conditions that threaten lives and livelihoods resulting from oppressive and exclusionary policies, violence and conflict. Recent reports show that climate disasters is the main cause of internal displacement in most regions, and that contrary to common belief such displacement is not short term but increasingly protracted. (IDMC, GRID 2021; UN A/75/207, 21 July 2020).

Displacement limits the ability of elders and knowledge holders to maintain the living databases that comprise their knowledge systems and inform sustainable livelihoods.

The temporal aspects of indigenous dislocation are poorly understood. For many displaced peoples, there is often an immediate dislocation from many - if not all - important social and cultural ties. These manifest as the loss of shelter and employment. The disruption or demise of education, food insecurity, and limited health services compound the vulnerability of displaced populations to violence and abuse (Goldman 2007). Displacements in this context can now be interpreted as a subset of wider Indigenous movements driven by imperialism and colonialism, where communities are marginalised from decisions, *inter alia*, on settlement location, planning, and development. In this definition, displacement leads to a significant dismantling of social, cultural, and economic supports that a community has previously relied on to survive and flourish.

Forced displacement is also related to the prevention of voluntary mobility – whether seasonally or in response to changed conditions – resulting from state practices of bordering and emplacement. There is a recognition within traditional knowledge that mobility is part of sustainable living and the life cycle, not just seasonally but also over lifetimes and generations. The issue of constrained territorial jurisdictions prevents adaptability and flexibility. More problematically, it also criminalises mobile practices. The inability to move can lead to disaster in terms of inaccessibility to traditional sources of food and sustenance. Examples of disruption to such cycles of mobility, which can lead to further displacements through relocation are notable in the context of the Sámi and other peoples of the Northern climatic regions (Labba 2020).



Conversely the adaptable mobile strategies of traditional knowledge holders allow for tackling calamities including animal diseases brought on as a result of climate change, as in the case of reindeer herding (Riseth, Tømmervik and Tryland 2020). For Inuit, the previously predictable sea ice conditions have deteriorated as global warming has increased, and knowledge keepers are struggling with the pace of environmental change (Newton 1995). When discussing climate change, Inuit researcher Watt-Cloutier (2015) uses the Inuit term ‘uggianaqtuuq’, which describes “a friend who is behaving unexpectedly, or in an unfamiliar way” (cited in Scott, 2019). For these communities, the rate of change is dismantling the environmental foundations of their indigenous knowledge, placing them at risk of ecological and cultural displacement.

Displacement cannot always be prevented during conflict and disaster. But even if moving is necessary, it need not result in conditions of displacement and refugeeness. Some communities trying to prevent the dispersion and placelessness include those severely affected by climate change and extreme erosion, as in the case of coastal Alaska. Some communities have no choice but to move their villages, as the Yup’ik, community of Newtok and the Inupiaq community of Shishmaref (Kigiqtaamiut): “Waves batter our villages, massive coastal flooding penetrates the soil that holds the permafrost, and the combination results in destabilisation.” (REVKIN 2021). While relocation may be a last resort, it need not become displacement. The historical context of forced relocations of indigenous peoples emphasises the need for relocation frameworks that protect self-determination and proactive efforts on the part of federal, state, and local governments to alleviate institutional barriers (Jantarasami n.d.).

Case Study 7

Case of controlled fires practiced by communities all around the Globe.

[See page 86](#)

Case Study 8

Two communities in Alaska climate induced relocation – preventing displacement.

[See page 88](#)

Case Study 9

Post-Earthquake Lessons from Traditional Construction in Haiti.

[See page 90](#)

Case Study 10

Seismic Performance of Traditional Urban Architecture in Morocco.

[See page 92](#)

05

Approaches and enabling
conditions to identify and apply
traditional knowledge for DRR



The utilisation of traditional knowledge in DRR will involve individuals and organisations to interact with communities who are holders of the knowledge. Those who are unaware of, or do not share the particular traditional knowledge, must make the effort to understand, recognise and trust the unique nature and dimensions of such knowledge, and the ways it should be considered in a multi-stakeholder environment. In consequence, no single approach or tool is applicable everywhere across all forms of knowledge. In this section we outline some of the conditions by which such opening can occur.

5.1 What are the approaches for identifying existing traditional knowledge and their bearers/representatives?



The most effective, though perhaps not the most convenient, way to identify existing traditional knowledge is to let local and indigenous peoples speak for themselves. There must be “seats at the table” – in a variety of fora – at which Indigenous and other community representatives can participate in open discussion to directly share and receive knowledge.

External researchers can also play an important role in bringing to light the traditional knowledge belonging to local and indigenous communities by employing various conventional methodologies and tools. These include interviews, questionnaires, life histories, audio-visual recording and documentation and others. However, it is crucial that efforts are made to engage the knowledge bearers in the design of these methodologies and tools. Additionally, their appropriate consent should be taken in advance and the results shared with them after their validation. Besides these, unconventional methods that are in line with the local sensitivities and employ traditional communication systems should be encouraged to further gain the trust of the knowledge holders. For example, in the case of the indigenous ‘Kankanaey’ people in the Philippines, the evening bonfire served as a traditional space for solidarity and dialogue. It was in this space that the tribe addressed different concerns, took decisions and also passed knowledge from one generation to another making it an exclusive affair. Over the recent past, the same space has become more inclusive and has been used as a medium for outsiders to interact with the tribe to construct knowledge and frame solutions to cater to future disasters (Balay, 2021).

Hence, practitioners should encourage the use of approaches and methodologies that are grounded in their geographical and cultural contexts as it is only through these approaches and methodologies that they will be able to reflect local worldviews wherein the traditional knowledge sits. For example, any form of mapping that is based on a positivist understanding of the world inevitably imposes a lopsided view of space. It forces traditional interpretations of such space into an inappropriate canvas that reinforces unequal power relations between those who hold traditional knowledge and those who primarily rely on Western scientific knowledge.

5.2 What enabling conditions include the representation of local and indigenous communities at all levels?

Inclusion is a political process that entails sharing power with those whose voice is usually unheard or neglected in policies and actions geared towards reducing the risk of disasters as articulated in the Sendai Framework. Sharing power means that indigenous people and other unheard and/or neglected voices have the power to make informed decisions with regards to different hazards that may affect their everyday lives and livelihoods. These informed decisions should be made on the basis of all forms of knowledge available and co-existing, including traditional knowledge.

Knowledge is always mediated by people's unique identities and position within society. For instance, the report "Missing Voices" (Practical Action 2019), where disasters were seen from the perspective of marginalised gender groups in Nepal and Peru, shows an attempt to address their limitations, concerns and willingness to contribute to the cause. The study showed how factors such as societal discrimination due to an individual's gender identity, sexuality, marital status, physical ability, ethnicity, religious affiliation or income not only lead them towards marginalisation but often exclusion in risk communication and post disaster aid. As such, policies and actions designed to foster traditional knowledge in disaster risk reduction must recognise the hybrid and intersectional dimension of traditional knowledge. Traditional knowledge inherently intersects with gender identity, age, physical ability and class, and thus mirrors unequal power relations. Both the diversity of traditional knowledge and associated power relations amongst those who hold this form of knowledge have to be accounted for in any policy and actions on disaster risk reduction.

In practice, recognising the hybrid and intersectional nature of traditional knowledge in disaster risk reduction means that it cannot be represented by a single voice. Hence, voices to be heard and considered have to be as diverse as possible.

They have to reflect broader power relations amongst those who hold traditional knowledge. This also means that time and resources must be allocated for the inclusion of diverse voices. In some societies, this may mean listening to both elders, whose prestige is attached to their greater knowledge, as well as to youth who may be seen as apprentices and who may not hold as much knowledge.

In such contexts, the inclusion may be conflictual. Those who hold more knowledge may be reluctant to give up some of their prestige by sharing their knowledge with others. Fostering inclusion and making different forms of knowledge co-exist is therefore a complex process, which, once again, requires recognition of the unique concerns and needs of people at the centre of the action for DRR.

This situation raises an ethical and axiological issue that should be at the core of any disaster risk reduction initiative. Whose values and priorities should be considered in policies and actions to reduce disaster risk? One may indeed argue that encouraging the sharing of traditional knowledge with people who do not hold this knowledge in the first place, as well as beyond the realm of its local and cultural relevance, contradicts the very injunction to respect traditional knowledge. Encouraging the sharing and co-existence of different forms of knowledge may indeed undermine local social norms and cultural values to the benefit of Western standards and expectations.

This classic humanitarian dilemma can only be addressed by a fair dialogue between all parties. Dialogue, as emphasised before, must be based on the recognition of otherness and trust in others. It is about making options clear and accessible. It is clear that approaches from outside are options intended to co-exist with other solutions.



5.3 How should external stakeholders be more inclusive with approaches to community members for reflection on traditional knowledge and its evolution? How can they understand their perspective on risk reduction?

Various approaches have been employed (and often ‘re-discovered’) in recent years, which have strengthened the opportunities for indigenous peoples and other communities to reflect on their knowledge, and hence to further understand their perspectives on risk reduction. These approaches are usually bottom-up and built around participation. Components cover institutional arrangements, leadership, knowledge, and accountability. In Chad, for example, a participatory three-dimensional modelling (P3DM) method was used with the support of the Indigenous Peoples of Africa Coordinating Committee (IPACC), Technical Centre for Agricultural and Rural Cooperation (CTA) along with the local herders, scientists, representatives from the United Nations Educational, Scientific and Cultural Organisation, World Meteorological Organisation, and the government. P3DM is a community-based method to map landscapes using traditional knowledge of the surrounding environment. In this method, the community mapped natural features, such as ridges and plateaus, helping to gather data for the production of an intricate 3D landscape model. They thereby helped all land users, including farmers and pastoralists in better land use planning. In the entire initiative, 60 M’Bororo men and women were involved, together with more than 300 children, men and women, representing the interests of 250,000 nomadic herders in the region (CTA 2018).

The fundamental ideas behind such approaches include well-known principles of situated learning offered by Paulo Freire (FREIRE 2005) as a way to reflect on consciousness, generativity and shared objectives. These ideas can thus be framed around five underlying principles of Freire’s ontological call (Suzina and Tufte, 2020; Freire, P. (1970; 2007).

Dialogue

Open ended communication that allows all stakeholders to have a deeper understanding of the context.



Humility recognises that every person is knowledgeable and allows the process of unlearning to become aware (and critical) of existing structures, meaning DRR strategies in this case.



Empathy recognises that all stakeholders are on the same page on the physical, emotional, social and institutional front and allows them to deal with situations, in epistemology and ontology, in contextualised ways.



Love is a model of development based on collective ties and interconnections, including all human and non-human beings. Love teaches practitioners how to connect local solutions with global problems. It teaches them to understand the connections between ecologies and societies, while engaging with historical legacies and practicing courage and solidarity.



Hope is the key rule for achieving change towards a more resilient society. It allows the possibilities that traditional knowledge could produce. It mobilises the communities and individuals who would benefit from this knowledge.



5.4 How can we ensure a holistic implementation of traditional knowledge in DRR practices?

The following considerations should be considered while integrating traditional knowledge for DRR practices:

1. Put in place a local body for the organisation and coordination of disaster risk communication. It should be based on the participation of citizen groups and civil society including the most vulnerable and marginalised.
2. Conduct studies to develop up-to-date data on hazards and vulnerabilities. Identify gaps in existing traditional and scientific knowledge in risk reduction strategies and understand how they can be filled by one another.
3. Develop dialogue amongst experts and local communities at all stages by building local alliances and respecting the institutions and organisations of indigenous peoples when promoting coordination.
4. Prepare risk assessments as per studies conducted and use these as the basis for development plans, policies and decision making.
5. Once agreed by all stakeholders, have all information and the plans for the locality's resilience readily available to the public using traditional means of communication; including non-traditional and cultural concerns in risk assessments.
6. Develop capacity building programmes at all levels to build resilience within the community as per lessons learnt from the studies conducted.



5.5 In terms of DRR, how can we achieve better outcomes for indigenous peoples?

Suggest DRR strategies that are inclusive of Indigenous communities and their governance structures.

Consider traditional knowledge to position any supporting agencies in the role of facilitator that is helping with the process of recovery.

When incorporating traditional knowledge, consider solutions not as product but as process. Ensure that owners have space to use their own creativity and initiative.

Include indigenous knowledge holders in discourse on climate policy and DRR, especially in light of the root causes of displacement triggered by climate disasters, as such knowledge holders are uniquely positioned. This contributes to prevention and limits the impact of climate change and ensuing disasters. It addresses the relocation and movement of people should it be necessary. It enhances possibilities for return, where it is possible.

Recognise the fact that spaces also have indigenous relevance. Urban/rural DRR also needs to include indigenous perspectives (United Nations International Strategy for Disaster Reduction 2012).

Draw on traditional knowledge and resources to lobby the international community to prevent the continuation of such unacceptable living conditions as endured by people in protracted displacement.



Case Study 12

Traditional Knowledge in times of COVID 19.

See page 76

5.6 What indicators are used to evaluate the effective implementation of traditional knowledge? How do we know they will achieve the targets set by global disaster reduction policies such as the Sendai Framework for DRR?

Various indicators may be developed at regional and national levels to evaluate the use of traditional knowledge for the achievement of targets set by global disaster reduction policies. These include:

REGIONAL LEVEL

- | | |
|----------|---|
| 1 | Number of community members represented in decision-making process for DRR strategies, ensuring wide representation from every strata and social sector in the community; |
| 2 | Number of community members to benefit from traditional methods (financially and in times of crisis), ensuring widespread use by multiple social sectors; |
| 3 | Number of capacity building activities and attendance by social sectors; |
| 4 | Number of agencies investing to develop DRR strategies; |
| 5 | Comparative study of direct economic loss due to disasters (hazard events) before and after implementation of traditional methods for DRR strategies; |

NATIONAL LEVEL

- | | |
|----------|---|
| 1 | Number of countries reporting use of traditional knowledge in DRR activities; |
| 2 | Number of countries with integrated approach to probabilistic risk assessment profiles and early warning systems; |
| 3 | Number of countries that incorporate traditional knowledge in DRR policies; |
| 4 | Number of countries that involve communities in decision making processes; |
| 5 | Number of representatives from local and indigenous communities at policy and practical levels; |

06

Annexure



6.1 CASE STUDIES



Case Study 1

Knowledge of spatial and temporal patterns of floods, droughts, and rainfall within local communities in Cambodia.

Case Study sourced from Natasha Pauli, et al. (Secondary Source)

The Mekong river is one of the world's largest rivers with a basin covering an area of 795,000 km². Communities along the river have been exposed to different environmental conditions, which have often resulted in droughts and floods. Living in sensitive ecosystems, and with 60 percent of the population dependent on water related livelihoods, these communities have been observing weather patterns for many years. They have developed local knowledge of the spatial and temporal patterns of flooding and agricultural activities. These have adapted over the years to not only foresee impending disasters but also to build resilience and reduce risk. However, climate change and shifting upstream land use have reduced their ability to predict risk over the years, exposing farmers to an increasing number of threats in the last few years. Communities largely depend on data from the government's meteorological department, but a study has been conducted to understand how traditional knowledge can support scientific data to generate better understanding of environmental patterns.

The data helped researchers to analyse the movements of water as water levels rise. It showed the different spatial impacts from the Mekong's seasonal flooding. It also showed that many of the communities' agricultural decisions were based on

weather patterns. The communities had their own set of indicators, with which to predict the weather and therefore to decide on what to harvest. These decisions were linked to observations such as the shadow of the water, stroking the lemongrass leaves and observing animal behaviours. These are outlined in fig 1.

The data helped the researchers to identify additional pressure points over space and time and to enable better preparedness for weather related hazards. While the scientific studies provided real-time and verifiable data based on tangible evidence, the traditional knowledge made the analysis more relevant to the communities themselves. The data also helped to show how different crop types and varieties may be adapted to fit better within the local seasonal calendars and to contribute better to the regional economy.

This comprehensive and composite analysis improved understanding of how local knowledge, which is often no longer suited to the current environmental conditions, can enhance measured data to develop a more location-relevant narrative. This limits the impact to sensitive areas of generic solutions for risk reduction, which are often alien and inappropriate.

(Pauli, et al. 2021)

FIG 1:

Traditional methods used by villagers in Prek Prasob District to predict flooding

Method	Description and details
Observing the shadow of the water (មេរីលស្តុរម្រទោលទឹក, merl sror moul teuk)	<p>There are three components: the clarity of the water, the speed of the water flow, and the sound of the water speed.</p> <p>Clarity: When flowing water contains large quantities of silt, vegetation debris, and rubbish, strong floods may be coming.</p> <p>Speed: Water that leads to flooding flows faster than normal. People monitor and measure the height of the water and the speed of the flow each day to predict floods.</p> <p>Sound: When floods are imminent the water makes a sound that is not observed during normal flows. One community leader estimates the arrival of floods by listening to the sounds of the water សុខ តិចាប់ សបនុលម៉ឺក ទឹក, sdab santheuk teuk)</p>
Stroking lemongrass leaves (ចុងក្រុងស្អែលីកគុណន៍, chbot sleuk krey)	<p>A well-known ancestral flood prediction technique used by a few elders.</p> <p>Folds on the lemongrass leaves indicate flood magnitude and longevity. One elder who reads the lemongrass leaves would take bets (based on a pre-agreed volume of rice) on the level of the flood with other villagers.</p> <p>Several elders expressed reduced confidence that the method will work with climate change and dam construction.</p> <p>The patterns of growth in bamboo shoots can also be used to predict the size of the flood, but this knowledge is not widely known.</p>
Observing Animal Behavior	<p>Villagers observe where the watercock, សាន្តវិជ្ជ, khлом, <i>Gallicrex cinerea</i>) builds. If the khлом move their nests to the top of trees, this is an indication prepare for incoming floods</p> <p>A type of monitor lizard, (តុនកូន, tror kourt) is believed to bear a tell-tale mark on its tail when a big flood is imminent</p> <p>Villagers observe the behavior of the tree-nesting giant ants (សុខចោចយកុង, sror mouch yaks). If the giant ants move their nest higher on taller trees before flooding periods, this is an indication that the incoming flood will be very high.</p>



Case Study 2

Government Officials, NGOs, and Consultants on why traditional knowledge is useful for their DRR work.

Case Study provided by Robert Šakić Troglić, et al. (Contributor)

This study uses a real-life community-based flood risk management case study from Malawi. It explores how external stakeholders, such as governments, NGOs, and consultants who work with knowledge holders truly use and perceive traditional knowledge in their disaster risk reduction efforts. The Lower Shire Valley comprising of the Chikwawa and Nsanje districts were the study's main areas of geographic focus. They are most prone to flooding in Malawi.

The study was based on the needs of external stakeholders (local and national government, national and international NGOs, and flood risk consultants) to understand their perspective on:

- i) Extent of traditional knowledge used;
- ii) Perceived benefits and limitations of traditional knowledge;
- iii) Barriers and opportunities for wider mobilization of traditional knowledge in community-based flood risk management.

The study showed that the external stakeholders were aware of traditional knowledge (TK) within the communities, but their understanding of that knowledge is limited to the basic principles. Although previous studies have shown traditional knowledge to be more encompassing and to include various social, political and environmental factors, the external stakeholders still consider it to be an unchanging and static concept. For them, the utility of traditional knowledge is heavily influenced by environmental change both in terms of reliability (increased frequency and magnitude of flooding due to climate change) and in terms of reduced access to local indicators (loss of trees due to environmental degradation). Given that

communities are heavily impacted by flooding, the traditional knowledge has become less interesting to the external stakeholders, who prefer scientific approaches and modern day technology. Although the external agents have limited understanding of traditional knowledge, the study also demonstrates the increased interest to know more. International and national policies on DRR increasingly emphasise community participation and the engagement of traditional knowledge. The study also highlights some benefits and limitations in the use and sharing of local knowledge between local and external communities (Fig 1,2).

Participants of the study said that, through the application of Participatory Vulnerability and Capacity Assessments (PVCAs), traditional knowledge includes information on local planning, such as village contingency and action plans. However, the lack of systematic documentation and knowledge sharing means that it remains underutilised in the development of risk-informed development at district level. External stakeholders also hope that if communities can be encouraged to use their traditional knowledge, then they will be more resilient in the absence of external assistance and simultaneously more receptive to approaches that are based on scientific knowledge (e.g. official flood warning information whose uptake in Malawi remains low).

The study also suggested that despite some understanding of the need to include local knowledge, a gap still exists between theory and practice. In other words, traditional knowledge is not used enough and this is why strong dichotomies still exist between local and scientific knowledge.

(Troglić, et al. 2021)

FIG 1:

Perceived benefits of local knowledge (based on themes emerging from the Focus Group Discussions and Key Informant Interviews)

Benefits of knowledge	Description
Acceptance of external interventions and participation	LK as a tool to foster acceptance of external interventions in the communities and as a means of ensuring participation of community members
Local insights	LK offers valuable insights into local contexts
Fostering sustainability and trust	LK as a vehicle for implementation of sustainable solutions and trust between external stakeholders and communities
Costs saving	LK provides costs savings for external stakeholders

FIG 2:

Perceived limitations of local knowledge (based on themes emerging from the Focus Group Discussions and Key Informant Interviews)

Perceived limitations of local knowledge	Description
Lack of evidence for LK	There is no available evidence for LK. Evidence includes scientific validation of LK, as well as evidence in terms of LK being validated in real time (i.e. observing effectiveness over a given period of time)
Spatial confinement of LK	Place-specific nature of LK presents a limitation because it makes it challenging to package it and upscale.
Lack of documentation of LK	LK is not documented and as such it is difficult for external stakeholders to access it.
Heterogeneity in knowledge possession and use	LK is not equally distributed within a community, not everyone is using it in the same. There is a gap in generational use and possession.
Accuracy and applicability of LK	LK questionable accuracy and reliability, it is not applicable for all levels and magnitudes of flooding, and it does not work well in unknown conditions and with increasing changes (e.g. climate change, environmental degradation).

Case Study 3

Traditional water conservation through stone walling in the Philippines.

Case Study sourced from Wilfredo Vidal Alangui (Secondary Source)

Known collectively as Igorot, the indigenous peoples of the Cordillera in the northern Philippines are well known for their use of extensive rice terraces on the slopes of mountains and rugged terrains. Communities in Nepal, Vietnam, Indonesia, and China also make use of rice terraces. But the centuries-old Cordillera rice terraces have been described as among “the most intensive and efficient in the world” (Bodner, 1986, p. 1). Rice terracing agriculture weaves through the economic survival of the mountainous communities. It also reflects the Igorot’s cultural life, political and social organization, and cognitive system (Florendo and Cardenas, 2001). It integrates technical and agricultural principles with social and cultural knowledge.

Stone walling is one of the most vital elements of this rice terracing agriculture. A soil and water conservation technology, they are used to build the rice terraces on sloping upland landscapes (Brett, 1985). They built not only to prevent erosion but also to hold the rice paddies, impound water and in many cases, to increase the area of rice paddies.

Building a stone wall (Photo by WV Alangui)



A newly built stone wall (Photo by WV Alangui)



Building this stone wall requires highly technical knowledge. Everything, from stone selection, backfilling, and positioning of individual stone, must be carefully considered during construction (Alangui, 2010, 2018).

This indigenous technology has been developed and practiced for centuries by upland communities. Apart from holding rice terraces and soil stabilisation in the mountainous areas of the Cordillera region, they have also adapted to add supporting houses, irrigation canals, roads, and areas that regularly erode due to typhoons (Alangui, 2010, 2018).

More recently, stone walling has become widely used in urban and other areas outside of the Cordillera region, albeit with some modifications. Modern-day stonewalling involves the use of cement as an added element to bind the stones together. It has therefore been widely used in modern constructions to prevent erosion and soil destabilisation in both rural and urban areas.

Other indigenous peoples from mountainous regions, such as Nepal and Peru, also have well-established traditions of using stone walls and terraces for agriculture, irrigation, and slope management.

(Alangui 2018)

Case Study 4

Traditional wooden building techniques of Japan.

Case Study provided by Eisuke Nishikawa (Contributor)

Early part in the modern era, various western technologies from Western Europe flooded into Japan. This led to a collision between the traditional wooden building techniques, which Japan had cultivated for a long time, and the modern building techniques which came from Western Europe. Attempts were made to understand traditional wooden buildings from a scientific point of view and to apply this new knowledge to the development of earthquake-resistant structures. These attempts were activated by the earthquakes in that period which damaged modern buildings.

Writing in 1915 in the "Architecture Journal", Yoshikuni Okuma introduced seismic rooms, which had been built before the modern era. In case of

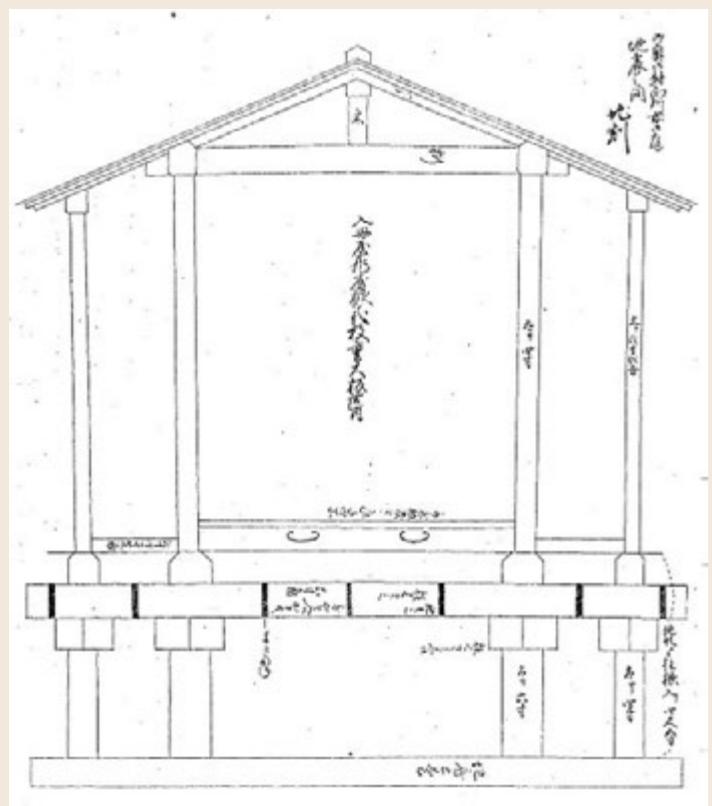
an earthquake, the seismic room was the refuge in a palace. The article explained that seismic rooms were built with earthfast pillars, that beams connected pillars underground, and that a shingle roof and low floor reduced weight and lowered the centre of gravity (Fig.1).

Published in 1930, Kenzaburo Majima's book "Earthquake and building construction", explained the earthquake resistance in traditional wooden buildings. For buildings with thick columns where the head and foot are not fixed, such as buildings of shrines and temples, the inclination of columns has a seismic isolation effect in the event of large earthquakes. He suggested that for thin columns the same effect could be achieved by installing a steel cap and shoe at the head and foot of the columns (Fig.2). He also said that bracings or shear walls at the lowest level should not be used.

In the late 1930's and first half of the 1940's, Shizuo Ban experimented with earthquake resistance in the Kondo (main hall) of Horyuji temple to protect its wall paintings from earthquake. Experiments were done with columns and bracket complexes, as well as on the frame structure, to see how increasing deformation affected the resistance force of thick columns where the head and foot were not fixed. Based on these experiments, he concluded that there was no danger of collapse for the Kondo of Horyuji temple, due to the presence of the long natural period and high damping.

In a speech at the Second World Conference on Earthquake Engineering held in Japan in 1960, Ryo Tanahashi introduced the earthquake resistance of traditional Japanese wooden structures to experts from all over the world. He said that factors for the high seismic resistance of wooden pagodas, included the high damping capacity linked to plastic deformation of the bracket complexes, the longer natural period compared to seismic waves, and the large potential energy due to the high horizontal resistance and deformation capacity.

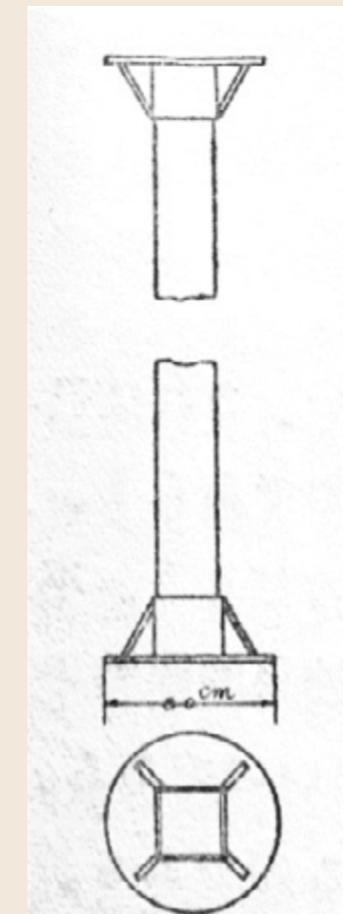
FIG 1.



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FIG 2.



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Case Study 5

The Role of Culture and Tradition in International Aid- An analysis of the Typhoon Maysak Reconstruction Project in Chuuk, FSM.

Case Study Provided by Taylor Hayda (Contributor)

Linked to its geostrategic location and increasing risks from climate change, the Pacific region has become one of the most aid-dependent regions in the world. Pacific Island Countries and Territories (PICTs) are considered highly vulnerable to the risks of climate change. But this description of vulnerability ignores the strength of Pacific Island cultures and the traditional ways in which they have been adapting to their changing environments for more than three millennia. PICT populations rely on adaptive fishing and farming practices to reduce climate hazard vulnerability and increase food security. Communities maintain traditional agriculture techniques such as growing drought and salt-resistant crops, planting trees around gardens, using palm fronds to shade their crops during droughts, and composting with traditional materials such as seaweed to make the soil more fertile (Mcleod et al., 2019). In response to decreasing coral health and declining fish and seagrass bed populations, communities across the pacific rely on traditional fishery management systems. Historically Pacific Islanders built villages around their local knowledge of tides, wind directions, waves, and storms (Mercer et al., 2007). Architecture differs between the islands, since each unique location requires a building type adapted to the local environment. In areas where floods are prone, islanders have adapted stilt techniques so that they can continue to live on their land during high tides and seasonal floods. For many PICTs, the frequency of typhoons dictates building styles. Protection from high winds and storms is achieved through unique building styles and planting local trees along the shore (Sethi et al., 2011).

On March 29, 2015, super Typhoon Maysak slammed into the small island state of Chuuk in the Federated States of Micronesia (FSM). Maysak caused heavy winds, torrential rain, and mass destruction over more than half a million square kilometres of ocean. It hit public services, infrastructure, homes, livelihoods, and sources of food and water. Between 60 to 80 percent

of houses were severely damaged, according to initial assessments, with approximately 830 houses completely destroyed. Some 6,760 people were displaced (USAID, 2015) and as much as 90 percent of the crops were damaged, leaving the community largely reliant on subsistence farming and with few alternative food sources.

In response, the Typhoon Maysak Reconstruction Project (TMRP), a multi-year relief and reconstruction project funded by the United States Agency for International Development (USAID) was implemented by the International Organization for Migration (IOM) in coordination with the FSM National and State Governments.

A masters' thesis by Taylor Hayda (2021) at the International University of Catalonia (IUC) explored how PICTs and international aid organisations can collaborate on solutions to integrate traditional knowledge and coping mechanisms with international aid. The thesis surveyed TMRP local beneficiaries and international staff to evaluate the success of TMRP in terms of meeting community needs and providing culturally relevant solutions for recovery. The surveys identified stark differences of opinion between TMRP international staff and local beneficiaries. International staff scored TMRP community participation an 8.9 out of 10 and cultural integration an 8 out of 10 whereas local beneficiaries scored them 3 out of 10 and 2.5 out of 10 respectively. TMRP staff members ranked the importance of integrating local culture and traditional recovery techniques into international aid response an 8.7 out of 10. However, these same staff members came from many different global cultures. They ranked their knowledge of Chuukese culture a 3.3 out of 10 at the start of their jobs.

Assumptions were made that traditional houses in the affected region were not designed to withstand storms. They were designed to be easily

replaced. This made the integration of culture into aid projects even more complex. The new TMRP homes were engineered to withstand small typhoons and made with metal roofing, imported timber, and various expensive metal fasteners. No locals were included in the design process and unfortunately, the house was unsuitable for many large families.

Further surveys suggested that affected populations were increasingly interested to become more self-reliant through education. This would empower locals and local culture to be more resilient against future hazards.

The study concluded that by adapting to the local context and cultural identity, international aid will be able to provide more efficient and culturally relevant projects, which better match the needs of at-risk populations. The research showed that by implementing community-led approaches, supporting bottom-up initiatives and education, and empowering locals in leadership roles, international aid can move beyond rigid reconstruction. Instead, it can enable and strengthen community resilience to natural hazards through traditional knowledge and traditional coping mechanisms.



Case Study 6

Local knowledge of water management and cultural landscape (Spain).

Case Study sourced from García-del-Amo, et al. (Secondary Source)

The Sierra Nevada is the highest mountain region in the southeast of the Iberian Peninsula and one of the most important biodiversity hotspots of Europe and the Mediterranean basin. Characterised by the historical co-evolution of local communities and ecosystems, it has a complex "cultural landscape". For centuries, the mountainous communities of the Sierra Nevada intervened in these terrains, using diverse water infrastructures such as acequias de careo, partidores, aliviaderos, and cimbras, minas or qanats. These channel, guide, and harvest the water, which runs down the mountain slopes. These complex water management systems have sculpted the area into a unique landscape, contributing much to Sierra Nevada's biodiversity and making it habitable. These traditional water management networks help aquifer recharge, reduce soil erosion, and help to distribute melting waters across the mountain slopes. They generate ecological corridors and a variety of micro-habitats in the middle of an arid Mediterranean region. They enable the development of agriculture and livestock.

Irrigation communities in the area observe its biophysical attributes such as water evapotranspiration and soil characteristics, and organise collective action amongst themselves. This includes water distribution, as well as the maintenance and restoration of water channels. In the 20th century, the Sierra Nevada faced many changes, including rural exodus, changing land use, agricultural modernisation, and the establishment of strict conservation areas. Market pressures increased, agricultural practices "modernised", drip irrigation adopted, and water distribution was mechanised. Climate change through rising temperatures and reduced rain and snowfall directly impacted ecosystems and livelihoods. Together, these changes threaten the continued functioning of traditional water management systems and therefore the area's ecological and social stability. Local capacity for collective action has been drastically reduced, norms have been lost within self-governing local institutions. Far from being ethereal, local knowledge systems are embodied within cultural landscape and social norms. They are all part of a complex social-ecological system.

(García-del-Amo, et al. 2022)

A) Acequia de careo without water to carry out repair works. B) Members of Bérrchules' irrigation community clearing an acequia de careo. C) Aliviadero on the side. D) Aliviadero overflow and flow limiter. E) Partidor of acequia de careo of the Poqueira ravine. F) Water catchment for an acequia de careo. G) Acequia de careo of Bérrchules.



Case Study 7

Controlled fires practiced by communities all around the Globe.

Case Study sourced from multiple authors (Secondary Source)

Fire has always been an important tool in the lives of traditional communities, who understand very well the pros and cons. These include regeneration of the forest cycle but loss of the same biodiversity that served as the primary resource for all their activities. These reasons explained why communities around the world devised traditional methods to break controlled fires. They healed the natural habitat, and created buffer zones or fire breaks to prevent the spread of unforeseen bush fires to villages or other parts of the forest.

Today, fire is a significant hazard in many regions (Meng et al., 2015). The increasing number and size of these fires have been linked to the exclusion of indigenous peoples from the territories where they had practised fire management for millennia. Their deliberate environmental management had reduced fuel loads, provided easier passage, and cultivated ecological mosaics (Kehoe 2020, Eisenberg et al. 2019, Binnema and Niemi 2006). Evidence exists of such practices in Tanzania where people used preventive measures to control forest fires and also developed indigenous response mechanisms to mitigate the impact of uncontrolled fires. Such mechanisms included shouting in certain tones to alert the communities, a division of roles between men and women to curb the fire, and lighting counter fires to create fire breaks (Salaam 2013). With the help of archaeological, ethnographic, and tree-ring data, evidence of similar fire management practices have also been retrieved from the borderlands of USA and Canada. The conclusion of this study led investigators to consider the restoration of traditional fire norms, adding them to the landscape as a key component of ecological and cultural revitalisation (Altschul and Kintigh 2019).

In the aftermath of the 2019-20 Australian wildfires, indigenous burning practices were acknowledged to be an important solution for the risks not just of fire but also of pests. Traditional First Australian fire management would "enhance the health of land and its people" (Drake, 2020, p. 47). Even today cultural burning is believed to help rebalance and rejuvenate the landscape, allowing new plants to grow in their respective habitats. At the beginning of 2020, deadly bushfires were believed to have happened after authorities ignored cultural practices and cleared out sacred groves without consulting local communities (Abujbara 2020).

Over the years, different forest protection policies, including restrictions on the involvement of indigenous communities, have meant inconsistent interaction between these communities and the forest. But recent incidents of forest fires have led different countries to take another look at their traditional fire management systems. They have consulted with traditional custodians of the forests to build a more regional approach towards forest management, building guidelines based on existing knowledge and practices. This will help to protect and revitalise the forests. It will also encourage communities to share and transfer their traditional knowledge to future generations.



Case Study 8

Two communities in Alaska climate induced relocation – preventing displacement.



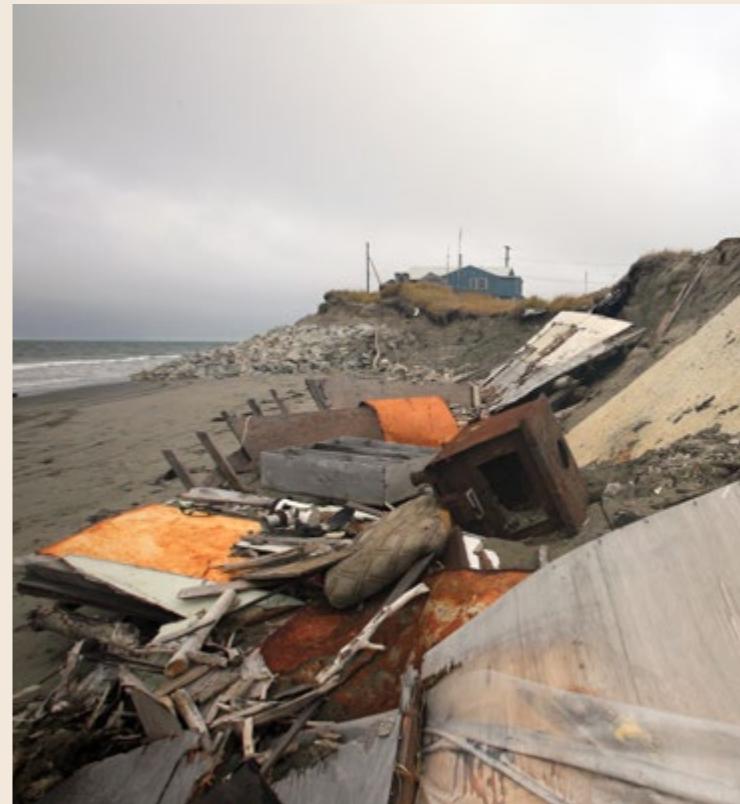
© Katie Orlinsky

Monica Kasayuli dries herring in Yup'ik Newtok, on Alaska Coast before moving to Mertarvik

Case Study sourced from Craig Welch (Secondary Source)

The Community of Newtok is experiencing severe erosion combined with rapidly melting sea ice and permafrost. But it took decades to relocate across the river to Mertarvik, some 10 miles (16 kilometres) away. There, new homes and infrastructure are being constructed so that the whole village can move together.

The community in Shishmaref wanted to remain a discrete, rural village, relocating within traditional subsistence territory so that existing human-ecological relationships could continue in familiar and habitual ways (Marino, E. and H. Lazarus, 2015). Decades of federal studies and assessments have taken place, but no move. A feasibility report of Ear Mountain is expected in Fall 2021. In the meantime, the shoreline ice is shrinking. This implies earlier hunting and gathering and reliance on imported, processed food, which risks increasing precarity and dependence (Revkin, 2021).



Some state and federal entities see voluntary buyout programmes as the most promising funding options to facilitate relocations, for example to urban sites. But these are ill-suited because they focus on individual households instead of community-wide relocations (L. Jantarasami et al., 2018).

Annauk Olin of Shishmaref says indigenous peoples face obstacles when they want to redesign and rebuild their own communities. For example, the Federal Emergency Management Agency does not qualify erosion as a natural hazard eligible for funding because, by definition, it's a gradual process (Annauk Olin, 2021). Indigenous knowledge incorporates change and adaptation, including mobility and even spending time in cities, but that is not the same as shifting people's sense of home and belonging.

Even when relocation or migration is the chosen adaptive strategy, it is a process that prioritises communal values, such as cultural heritage, collective goods and sympathises with the fragile balance between nature and society. In this way it allows the preservation of unity, as well as the coherence of villages, community, and culture. It prevents relocation from becoming displacement. A meaningful engagement with indigenous knowledge and communities requires that obstacles to adaptation are removed, such as (L. Jantarasami et al., 2018):

- limited capacity to implement adaptation strategies
- limited access to traditional territory and resources
- limitations of existing policies, programmes, and funding mechanisms



Case Study 9

Post-Earthquake Lessons from Traditional Construction in Haiti.

Case Study sourced from Joel F Audefroy (Secondary Source)

In her paper on the post-earthquake lessons of traditional construction in Haiti, Joel Audefroy explores the loss of traditional knowledge and how this affected the structures during the January 2010 earthquake in Haiti.

When the 12 January 2010 Mw7.0 earthquake hit, it devastated a large part of the capital, Port-au-Prince, killing 200,000 people and another leaving 1.2 million people homeless. According to investigators, "some vernacular structures built of wattle and daub" also "failed to resist the earthquake due to the poor quality of materials used. An absence of reinforcements in the wooden structures of wattle and daub walls (a wooden structure filled with stone and bound together with a mix of lime and earth), called 'clissage' in Haiti, also weakened the structure of walls and their resistance to lateral forces." On the other hand, "an inspection of regions around Port-au-Prince revealed several examples of good quality traditional constructions that were not affected by the earthquake." Investigations revealed that "structures that used the wattle and daub technique responded much better to the telluric movements than the modern structures. Another traditional construction system consisted of wooden homes with the traditional twin-sloped roof, and walls formed by horizontal and wooden boards, often found in the Las Cahobas region. In this system, the roofs are generally made of corrugate sheets that do not add weight to the construction; on the other hand, they offer little resistance to hurricanes, which is important to respond to the tropical climate conditions of the Caribbean."

Aufrey notes "that the wooden homes in Port-au-Prince have long resisted hurricanes and earthquakes, given that such homes built in the early 20th century" may still be found today. On the other hand, recent decades have seen the production of traditional housing drop, linked to economic factors that shift the selection of construction materials away from wood, which has become more expensive and less quality. Subjective perceptions mean that use has also shifted away from traditional materials to "modern materials". These latter are considered the best solution for housing constructions, even though some of the modern materials' specifications are not applicable in certain tropical areas.

Audefroy recommends the integration of modern and traditional materials and technologies for optimum impacts, including low cost, climate effects, social adaptability, cultural compatibility and to improve the resistance of vernacular structures. On the other hand, Audefroy says this requires recognition of the value of traditional knowledge. New masons should be made familiar with traditional construction, including the process of experimentation, innovation, and adaptation to "recover the scientific aspects of traditional knowledge and the traditional" aspects of scientific knowledge".

(Audefroy 2011)



Case Study 10

Seismic Performance of Traditional Urban Architecture in Morocco.

Case Study sourced from El Harrouni (Secondary Source)

For centuries, the medinas in Morocco have been prone to destruction from seismic hazards. As Harrouni et. al. (2017) explain, these events usually led to the adoption of specific new construction techniques, such as "using longitudinal ties made of wood within masonry walls, arches to transfer horizontal seismic loads to the floors, contrasting arches and 'sabat', discharging arches and framed openings, buttresses, reinforced basement and the rebuilt arched chaining among others." Many of these methods are still in use in medinas today. They have proven their efficiency over centuries.



Morocco established technical regulations for earthquake-resistant adobe buildings, but these building regulations ignored traditional aseismic technologies. The regulations minimise their value, leading to the loss of technical expertise and the abandoning of techniques which might still be applied today.

According to El Harrouni and colleagues, "the paraseismic measurements applicable to the old frame for the cultural heritage explain the good resistance of the buildings to the earthquakes, and that the practice of an adequate reinforcement intervention can be ensured by:

- Developing a sound culture of protection by incorporating local seismic cultures through universities and official authorities;
- Developing an intervention methodology for the protection of historic buildings, monuments and sites based on science;
- Producing an exhaustive catalogue of traditional preventive techniques;
- Diffusing knowledge acquired by training of qualified workers in the field of conservation; and
- Concentrating on cost-effective and social impacts of the preservation actions.

(El Harrouni et. all 2017)

Case Study 11

Sustainable Construction Methods using bamboo adopted in Bihar, India.

Case Study provided by Sandeep Virmani and Vivek Rawal (Contributors)

The river Kosi flows through the flat lands of North Bihar. When Kusaha Dam was breached in 2008, the river converged towards its old course and significantly damaged more than 150,000 houses. As part of a government rehabilitation programme, the communities of Orlaha and Purani, Bihar reconstructed a number of houses under the Owner Driven Reconstruction Collaborative (ODRC). They aimed to bring together the wisdom of people with the analytical skills of planning professionals in a participatory planning process.

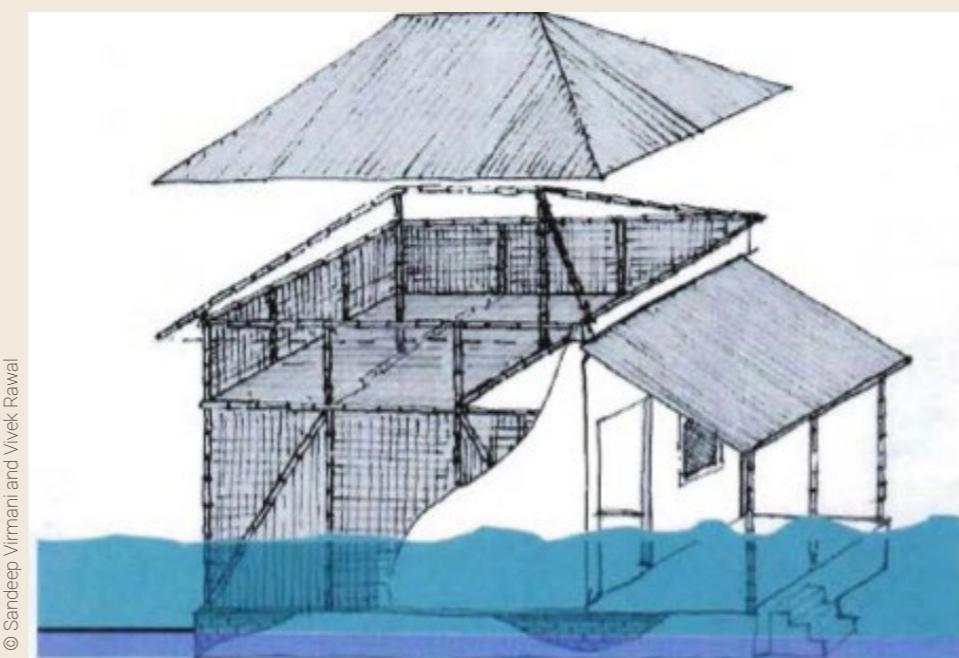
Bihar's communities have used different knowledge systems over the years, developing a sustainable and resilient lifestyle. The use of bamboo as a construction material has played a very important role. The ODRC enabled the community to evolve its contextual solutions and to improve their housing with something that is more durable and requires less maintenance. Designs were developed, taking into consideration the following factors:

1. It took advantage of bamboo's tensile properties by using it for a well-connected frame to withstand the lateral thrust of earthquakes.
2. The connectivity of the plinth to the wall through the roof would prevent the house from uprooting during a storm.
3. The level of the plinths was set higher than the average annual flood level to reduce damage during extreme conditions.
4. An attic space or the first storey was designed for the residents to take shelter during floods and save their belongings until the waters receded.
5. The use of wattle and daub between bamboo frames was suggested as a way to counter the pressure of flood waters on the buildings. This made the buildings less rigid and reduced the risk that the roof would collapse.



The process also led to new capacity and knowledge, since it encouraged community members to learn how to use the Dabia, a traditional knife to shape bamboos. They also had to understand which bamboo types were most suitable for different parts of the house. They also had to find creative ways to treat the bamboo and ensure its durability.

This reconstruction process required the mobilisation of communities, and this process helped bring the community together and to develop resilience for future hazards. Quality of life improved and infrastructure was made safer, aligning in a harmonious way with nature. (Virmani and Rawal 2012)



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Case Study 12

Traditional Knowledge in times of COVID 19.

Case Study provided by Ricardo Manzano, Isaleimi Valencia, and Yarineldi Valencia (Contributors)

COVID 19 has proven to be deadly for indigenous communities, who suffer both vulnerability to infectious diseases and limited— or lack of — access to information, medical aid and other factors. They face poor government planning, discrimination and disregard. However, all around the globe, the need to survive means that communities have always adapted to such situations. The outbreak of COVID 19 encouraged several communities to cope with the spread of this virus through the use of indigenous practices. Several studies show that similar approaches have been taken by different communities around the world.

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These practices include:

1. **Isolation:** Community closures have been widely used in the Cordillera, Philippines, where the practice called ubaya/tengaw. Declared during the agricultural cycle, everyone stays home. Community members protect each other and avoid interaction with outside people. A knotted piece of a branch or leaf is placed at the entrance of the community to signify the same and was respected by all. In Colombia's Cauca region, indigenous communities also isolate their territories. They used checkpoints and guards to prevent outsiders from entering. Isolation has also been used by indigenous peoples such as the Karen and other groups in Thailand, the Orang Asli, and in the Amazon people residing in urban areas, who decided to stay in forests to avoid infection and to access natural resources.
2. **Humanitarian Support:** In times of emergency, including pandemic, members of the community support one another and look out for the ones in need. Instead of buying supplies from the market, they produced more food in their own house gardens. They encourage items such as the sweet potato which last longer and also they send extra food to the ones in need or the ones who cannot grow their own food. In Cauca, Colombia, communities began a barter system to exchange the items that they have produced and to avoid contact with people from the cities. In the Philippines, communities practiced and enforced the principle of "ayyew", meaning not to waste anything. They also let go of food packs distributed by the government, so that the more dependent people could access them.

(Degawan 2020)

(Manzano, Valencia and Valencia 2021)

6.2 Policy References

Glossary of References

Sl. No	Reference Document	Reference Link	
1	<i>Universal Declaration of Human Rights (1948)</i>	https://www.un.org/en/udhrbook/pdf/udhr_booklet_en_web.pdf	
2	<i>International Covenant on Economic, Social and Cultural Rights (1966)</i>	https://www.ohchr.org/en/professionalinterest/pages/cescr.aspx	
3	<i>United Nations Declaration on the Rights of Indigenous Peoples (2007)</i>	https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf	
4	<i>2030 Agenda for Sustainable Development</i>	https://sustainabledevelopment.un.org/post2015/transformingourworld	
5	<i>International standards</i> <i>UN Human Rights: Office of the High Commissioner</i>	https://www.ohchr.org/en/issues/culturalrights/pages/internationalstandards.aspx	
6	<i>Culture/2030 Indicators</i>	https://unesdoc.unesco.org/ark:/48223/pf0000371562	
7	<i>Sendai Framework for Disaster Risk Reduction (SFDRR)</i>	https://www.preventionweb.net/files/43291_sendaiframeworkfordrrn.pdf	
8	<i>Hyogo Framework for Action (HFA)</i>	https://www.preventionweb.net/sendai-framework/hyogo/	
9	<i>2014 World Disaster Report</i>	https://www.ifrc.org/Global/Documents/Secretariat/201410/WDR%202014.pdf	
10	<i>Post Disaster Needs Assessment, Vol A</i>	http://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/PDNA%20Volume%20A%20FINAL%2012th%20Review_March%202015.pdf	
11	<i>1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict</i>	http://www.unesco.org/new/en/culture/themes/armed-conflict-and-heritage/convention-and-protocols/1954-hague-convention/	
12	<i>1972 Convention Concerning the Protection of the World Natural and Cultural Heritage</i>	https://whc.unesco.org/archive/convention-en.pdf	
13	<i>2003 Convention on the Safeguarding of Intangible Cultural Heritage</i>	https://ich.unesco.org/en/convention	
14	<i>UNESCO 2001 Universal Declaration on Cultural Diversity</i>	http://orcp.hustojo.com/unesco-universal-declaration-on-cultural-diversity-2001/#:~:text=In%20November%202001%2C%20UNESCO%20issued,the%20development%20of%20intercultural%20exchanges.	
15	<i>Strategy for Reducing Disaster Risks at World Heritage Properties</i>	https://whc.unesco.org/archive/2007/whc07-31com-72e.pdf	
16	<i>Managing Disaster Risks for World Heritage</i>	https://whc.unesco.org/document/104522	
17	<i>2007 Strategy- Reducing Disaster Risk at World Heritage Properties</i>	https://whc.unesco.org/en/disaster-risk-reduction/	
18	<i>Recommendation on Recovery and Reconstruction of Cultural Heritage adopted in Warsaw in 2018</i>	https://whc.unesco.org/en/news/1826	
19	<i>2003 Convention for the Safeguarding of Intangible Cultural Heritage - Operational Directives</i>	http://www.unesco.org/culture/ich/en/Directives/6.GA/170	
20	<i>Policy Document adopted by the UNESCO's General Conference in 2017 on the protection of culture and the promotion of cultural pluralism in emergencies associated with disasters caused by natural and human-induced hazards.</i>	https://unesdoc.unesco.org/ark:/48223/pf0000259805	
21	<i>Reinforcement of UNESCO's action for the protection of culture and the promotion of cultural pluralism in the event of armed conflict</i>	https://unesdoc.unesco.org/ark:/48223/pf0000235186	
22	<i>UNESCO Strategy for Action on Climate Change, 2017</i>	https://unesdoc.unesco.org/ark:/48223/pf0000259255	
23	<i>UNESCO Policy on Engaging with Indigenous Peoples 2018</i>	https://unesdoc.unesco.org/ark:/48223/pf0000262748	

REFERENCES

- Abujbara, Amira. 2020. Could Aboriginal fire practices help combat Australian wildfires? Aljazeera.<https://www.aljazeera.com/features/2020/9/10/could-aboriginal-fire-practices-help-combat-australian-wildfires>.
- Acharya, Amitangshu, and Anjal Prakash. 2019. "When the river talks to its people: Local knowledge-based flood forecasting in Gandak River basin, India." *Environmental Development* 31: 55-67. <https://www.sciencedirect.com/science/article/pii/S2211464518301738>.
- Alangui, Wilfredo Vidal. 2018. "Building stone walls- A case study from the Philippines." In *Numeracy as Social Practice*, 19. Routledge. https://www.academia.edu/29454003/Stone_Walls_and_Water_Flows_Interrogating_Cultural_Practice_and_Mathematics.
- Allen, Katrina M. 2006. "Community-based disaster preparedness and climate adaptation: local capacity-building in the Philippines." Wiley Online Library. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9523.2006.00308.x>.
- AUDEFROY, JOEL F. 2011. "Haiti: post-earthquake lessons learned from traditional construction." *Environment & Urbanization* 447-462
- Bah E.M., Faye I., Geh Z.F. (2018) 'Slum Upgrading and Housing Alternatives for the Poor.' In: *Housing Market Dynamics in Africa*. Palgrave Macmillan, London. https://doi.org/10.1057/978-1-37-59792-2_6
- Bakewell, Oliver. 2014. 'Encampment and Self-Settlement'. In *The Oxford Handbook of Refugee and Forced Migration Studies*. Oxford, 127-138.
- Balay, Marjorie. 2021. Using Traditional Knowledge for Disaster Risk Reduction: From Words into Action <https://www.youtube.com/watch?v=LK8-MMqbkPQ>.
- Balay-As, Marjorie, Jay Marlowe, and J C Gaillard. 2018. "Deconstructing the binary between indigenous and scientific knowledge in disaster risk reduction: Approaches to high impact weather hazards." *International Journal of Disaster Risk Reduction* 30 (A): 18-24. <https://www.sciencedirect.com/science/article/pii/S2211464518301333>.
- Binnema, Theodore, and Melanie Niemi. 2006. "Let the Line be Drawn Now': Wilderness, Conservation, and the Exclusion of Aboriginal People from Banff National Park in Canada." *Environmental History* 11 (4):724-750. doi: 10.1093/envhis/11.4.724.
- Briggs, John. 2013. "Indigenous knowledge: A false dawn for development theory and practice." Sage. <https://journals.sagepub.com/doi/10.1177/1464993413486549>.
- Briggs, John. 2005. "The use of indigenous knowledge in development: problems and challenges." Sage. <https://journals.sagepub.com/doi/10.1191/1464993405ps105oa>.
- Carrasco, Sandra and O'Brien, David, 2021. 'Revisit: Quinta Monroy by Elemental', *Architectural Review* 4 January 2021. doi: <https://www.architectural-review.com/buildings/housing/revisit-quinta-monroy-by-elemental>
- Coles, Ashley R., and Mauricio Quintero-Angel. 2017. "From silence to resilience: prospects and limitations for incorporating non-expert knowledge into hazard management." *Environmental Hazards* 17 (2): 128-145. <https://www.tandfonline.com/doi/full/10.1080/17477891.2017.1382319>.
- CTA. 2018. "Climate Change and Conflict in Chad - Using P3DM to secure peace." <https://www.cta.int/en/climate/all/article/climate-change-and-conflict-in-chad-using-p3dm-to-secure-peace-sid073658965-487b-4a81-99ff-a86b349e26ef>.
- Degawan, Minnie. 2020. KASIYANNA: Particular Challenges of Indigenous Peoples in Facing COVID19. news article, Culture and Survival. <https://www.culturalsurvival.org/news/kasiyanna-particular-challenges-indigenous-peoples-facing-covid19>.
- Dekens, J. 2007. "Local Knowledge for Disaster Preparedness: A literature Review." AGRIS (International Centre for Integrated Mountain Development (ICIMOD)). <https://agris.fao.org/agris-search/search.do?recordID=QZ2013000064>.
- Dekens, J. 2007. "Local Knowledge for Disaster Preparedness: A literature Review." AGRIS (International Centre for Integrated Mountain Development (ICIMOD)). <https://agris.fao.org/agris-search/search.do?recordID=QZ2013000064>.
- Drake, Campbell. 2020. "Cultural burning and the interstices of two vernacular cultural forms." *Reframing the Vernacular: Politics, Semiotics, and Representation* (Springer International Publishing). <https://www.springerprofessional.de/en/cultural-burning-and-the-interstices-of-two-vernacular-cultural-/17327516>.
- Dube, Ernest, and Edson Munsaka. 2018. "The contribution of indigenous knowledge to disaster risk reduction activities in Zimbabwe: A big call to practitioners." *Journal of Disaster Risk Studies* 10. <https://jamba.org.za/index.php/jamba/article/view/493>.
- El Harrouni, et. al. 2017. "Seismic Performance of Traditional Urban Architecture in Morocco." *International journal of Heritage Architecture* 42-59
- Eisenberg, Cristina, Christopher L. Anderson, Adam Collingwood, Robert Sissons, Christopher J. Dunn, Garrett W. Meigs, Dave E. Hibbs, Scott Murphy, Sierra Dakin Kuiper, Julian SpearChief-Morris, Leroy Little Bear, Barb Johnston, and Curtis B. Edson. 2019. "Out of the Ashes: Ecological Resilience to Extreme Wildfire, Prescribed Burns, and Indigenous Burning in Ecosystems." *Frontiers in Ecology and Evolution* 7 (436). doi: 10.3389/fevo.2019.00436.
- Feldman, Ilana. 2015. 'Looking for Humanitarian Purpose: Endurance and the Value of Lives in a Palestinian Refugee Camp.' *Public Culture* 27.3: 427 – 47.
- Fiddian-Qasmiyah, Elena 2016. 'Refugee-refugee relations in contexts of overlapping displacement', *International Journal of Urban and Regional Research*. doi: <https://www.ijurr.org/spotlight-on/the-urban-refugee-crisis-reflections-on-cities-citizenship-and-the-displaced/refugee-refugee-relations-in-contexts-of-overlapping-displacement/>
- Fiddian-Qasmiyah, Elena 2020. Refuge in a Moving World: Tracing refugee and migrant journeys across disciplines. University College London.
- Fontaine, Tim. 2016. "Indigenous communities take in Fort McMurray fire evacuees, scramble to find members." CBC News, accessed Sept 7. <http://www.cbc.ca/news/aboriginal/indigenous-communities-fort-mcmurray-evacuees-1.3566938>.
- FREIRE, PAULO. 2005. PEDAGOGY of the OPPRESSED. continuum chrome-extension://efaidnbmnnibpcajpcgclefindmkaj/<https://envs.ucsc.edu/internships/internship-readings/freire-pedagogy-of-the-oppressed.pdf>.
- Gaillard, J C. 2022. The Invention of Disaster-Power and Knowledge in Discourses on Hazard and Vulnerability. Routledge. <https://www.routledge.com/The-Invention-of-Disaster-Power-and-Knowledge-in-Discourses-on-Hazard-and/Gaillard/p/book/9781138805620>.
- García-del-Amo, David, Cristina Gálvez-García, Irene Iniesta-Arandia, Javier Moreno-Ortiz, and Victoria Reyes-García. 2022. "Local Ecological Knowledge and the Sustainable Co-Management of Sierra Nevada's Social-Ecological System." *The Landscape of the Sierra Nevada* (Springer International Publishing). <https://www.springerprofessional.de/en/local-ecological-knowledge-and-the-sustainable-co-management-of-/23145236>.
- GNDR. 2019. "Views from frontline report 2019." <https://www.gndr.org/programmes/views-from-the-frontline.html>.
- Goldman, Robert K. 2007. "Internal Displacement: The Guiding Principles on Internal Displacement-Normative Status, and the Need for Effective Domestic Implementation." *ISIL Year Book of International Humanitarian and Refugee Law* 7:265-278.
- Hiwasaki, Lisa, Emmanuel Luna, Syamsidik, and Rajib Shaw. 2014. "Process for integrating local and indigenous knowledge with science for hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities." 10: 15-27. <https://www.sciencedirect.com/science/article/pii/S2211464514000612>.
- Hiwasaki, Lisa, Emmanuel Luna, Syamsidik, and Rajib Shaw. 2014. "Process for integrating local and indigenous knowledge with science for hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities." *International Journal of Disaster Risk Reduction* 10 (A): 15-27. <https://www.sciencedirect.com/science/article/pii/S2211464514000612>.
- Hooli, Lauri Johannes. 2015. "Resilience of the poorest: coping strategies and indigenous knowledge of living with the floods in Northern Namibia." *Reg Environ Change* 16: 695–707. <https://link.springer.com/article/10.1007/s10113-015-0782-5>.
- IDMC, GRID 2021: Internal Displacement Monitoring Centre, 2021. Global Report on Internal Displacement: Internal Displacement in a Changing Climate. doi: <https://www.internal-displacement.org/global-report/grid2021/>
- Jantarasami, L.C., R. Novak, R. Delgado, E. Marino, S. McNeely, C. Narducci, J. Raymond-Yakoubian, L. Singletary, and K. Powys Whyte. n.d. "Tribes and Indigenous Peoples." Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment (U.S. Global Change Research Program, Washington, DC, USA) 2: 572–603. <https://nca2018.globalchange.gov/chapter/15/>.
- Jigyasu, Rohit. 2016. "Reducing Disaster Risks to Urban Cultural Heritage: Global Challenges and Opportunities." *Journal of Heritage Management* 59-67.
- Jigyasu, Rohit. 2002. "Using traditional knowledge to reduce disaster vulnerability of earthquake prone rural settlements in India and Nepal." (Norwegian University of Science and Technology, Trondheim.).
- Kagunyu, Anastasia, Simiyu Wandibba, and Joseph G. Wanjohi. 2016. "The use of indigenous climate forecasting methods by the pastoralists of Northern Kenya." *Pastoralism* 6 (7). <https://link.springer.com/article/10.1186/s13570-016-0054-0>.
- Kawerak. 2020. "A consortium of 20 tribes to NNA (Navigating the NEW aRCTIC pROGRAM)." <http://kotz.org/wp-content/uploads/2021/02/2020-03-19-NNA-Letter-Final.pdf>.
- Kehoe, Alana. 2020. "Fanning the Flames of Disaster: The Role Colonialism Plays in the Impact of Wildfire on Indigenous People in Northern Alberta." PhD, University of Western Ontario.
- Kelman, Ilan, Jessica Mercer, and JC Gaillard. 2012. "Indigenous knowledge and disaster risk reduction." *Geography* 97 (1). <https://www.tandfonline.com/doi/abs/10.1080/00167487.2012.12094332>.
- Labba, Elin Anna 2020. Herrarna satte oss hit. Om tvångsförflyttningarna i Sverige (The masters put us here. About the forced relocations in Sweden.) (Stockholm: Norstedts).
- Lambert, S. 2014. "Indigenous Peoples and urban disaster: Māori responses to the 2010-12 Christchurch earthquakes." *Australasian Journal of Disaster and Trauma Studies* 18 (1):39-48. doi: http://www.massey.ac.nz/~trauma/issues/2014-1/AJDTs_18-1_Lambert.pdf.

- Lambert, S, and John C. Scott. 2019. "International Disaster Risk Reduction Strategies and Indigenous Peoples." *International Indigenous Policy Journal* 10 (2).
- Langill, Steve. 1999. Indigenous Knowledge A Resource Kit for Sustainable Development Researchers in Dryland Africa. People, Land and Water Program Initiative, IDRC. chrome-extension://efaidnbmnnibpcajpcgkclefindmkaj/<https://idrc-dspacedirect.org/bitstream/handle/10625/32058/114518.pdf?sequence=1&isAllowed=y>.
- Lin, Pei-Shan Sonia, and Kai-Min Chang. 2020. "Metamorphosis from local knowledge to involuted disaster knowledge for disaster governance in a landslide-prone tribal community in Taiwan." *International Journal of Disaster Risk Reduction* 42. <https://www.sciencedirect.com/science/article/pii/S2212420919300901>.
- Makondo, Cuthbert Casey, and David S.G.Thomas. 2018. "Climate change adaptation: Linking indigenous knowledge with western science for effective adaptation." *Environmental Science & Policy* 88: 83-91. <https://www.sciencedirect.com/science/article/abs/pii/S1462901118300418>.
- MANZANO, RICARDO, ISALEIMI QUIGUAPUMBO VALENCIA, and YARINELDI QUIGUAPUMBO VALENCIA. 2021. ANCESTRAL STRATEGIES OF INDIGENOUS COMMUNITIES TO DEAL WITH COVID-19 and its affects. Regional Indigenous Council of Cauca.
- MCEVERS, KELLY. 2012. Syrian Refugees Move Into Lebanon's Crowded Camps. Web Article, NPR. <https://www.npr.org/2012/09/06/160692086/syrian-refugees-move-into-lebanons-crowded-camps?t=1641375318373>.
- McNevin, Anne, and Antje Missbach. 2018. "Hospitality as a Horizon of Aspiration (or, What the International Refugee Regime Can Learn from Acehnese Fishermen)." *Journal of Refugee Studies* 31 (3):292-313. doi: 10.1093/jrs/fey014.
- Mercer, Jessica, Ilan Kelman, Lorin Taranis, and Sandie Suchet-Pearson. 2009. "Framework for integrating indigenous and scientific knowledge for disaster risk reduction." DI. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-7717.2009.01126.x>.
- Mercer, Jessica, Ilan Kelman, Lorin Taranis, and Sandie Suchet-Pearson. 2009. "Framework for integrating indigenous and scientific knowledge for disaster risk reduction." DI 34 (1): 214-239. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-7717.2009.01126.x>.
- Newton, John. 1995. "An assessment of coping with environmental hazards in northern Aboriginal communities." *Canadian Geographer / Le Géographe canadien* 39 (2):112-120. doi: 10.1111/j.1541-0064.1995.tb00406.x.
- Orlove, Ben, Neil Dawson, and Pasang Sherpa. 2021. "Intangible cultural heritage, diverse knowledge systems and climate change." International Co-sponsored Meeting on Culture, Heritage and Climate Change.
- Pasotti, Jacopo. 2014. Smong: The Tsunami Story: Ten years after the Indian Ocean Tsunami, local knowledge and resilience before, during, and after a tsunami emergency. <https://jacopopasotti.medium.com/the-smong-story-feaeb6a45e10>.
- Pauli, Natasha, Mark Williams, Savuti Henningsen, Kevin Davies, Chanchhaya Chhorn, Floris van Ogtrop, Sochanny Hak, Bryan Boruff, and Andreas Neef. 2021. "'Listening to the Sounds of the Water": Bringing Together Local Knowledge and Biophysical Data to Understand Climate-Related Hazard Dynamics." *Int J Disaster Risk Sci* 326-338.
- Practical Action. 2019. MISSING VOICES: Experiences of marginalized gender groups in disaster in Nepal and Peru. Practical Action. <https://reliefweb.int/sites/reliefweb.int/files/resources/Missing%20Voices.pdf>.
- Refugee Hosts. 2020. "The displacement virus is much stronger than the coronavirus': Reflections from Burj el-Barajneh and Baq'a Camps in Lebanon and Jordan." Refugee Hosts. <https://refugeehosts.org/>; with examples: <https://refugeehosts.org/2020/05/12/the-displacement-virus-is-much-stronger-than-the-coronavirus-reflections-from-burj-el-barajneh-and-baqaa-camps-in-lebanon-and-jordan/>.
- REVKIN, ANDREW. 2021. Tidal Communities Make Their Case for Shaping Resilient Coastal Futures. Columbia Climate School. <https://news.climate.columbia.edu/2021/03/29/tidal-communities-resilience/>.
- Ribeiro, Beatriz; Oelze, Fernando; Lopes, Orlando S. 2017. 'A Narrative of Resistance: A Brief History of the Dandara Community, Brazil'. In E. Isayev and E. Jewell (eds), Displacement and the Humanities. Special Issue of *Humanities* 6, no. 3: 70. <https://doi.org/10.3390/h6030070>
- Riseth, J.Å.; Tømmervik, H.; Tryland, M. 2020. 'Spreading or Gathering? Can Traditional Knowledge Be a Resource to Tackle Reindeer Diseases Associated with Climate Change?' *International Journal of Environmental Research and Public Health*, 17, 6002. <https://www.mdpi.com/1660-4601/17/16/6002>.
- Robert, Šakić Trogrlić, Grant B. Wright, Melanie J. Duncan, Marc J.C. van den Homberg, Adebayo J. Adeloye, Faidess D. Mwale, and Joyce Mwafulirwa. 2019. "Characterising Local Knowledge across the Flood Risk Management Cycle: A Case Study of Southern Malawi." *Sustainability* 11 (6). <https://doi.org/10.3390/su11061681>.
- Salaam, Dar es. 2013. Indigenous Knowledge, Practices and Customary Norms of Fire Management In Tanzania - A Study in Nine Villages.
- Salazar, Alex and Jigyasu, Rohit. 2010. 'A Decade of Lessons from Marathwada: Earthquake Vulnerability, Politics and Participatory Housing.' In *Recovering from Earthquakes Response, Reconstruction and Impact Mitigation in India*. Shirish Patel and Aromar Revi (eds). Routledge: Abingdon and New Delhi, 79-117.
- Scott, John Carver. 2020. Indigenous Knowledge and Disaster Risk Reduction. Center for Public Service Communications. United States of Americ. <https://revistaelectronica.icmbio.gov.br/BioBR/article/view/1691/1234>.
- Setten, Gunhild, and Haakon Lein. 2019. "We draw on what we know anyway": The meaning and role of local knowledge in natural hazard management." *International Journal of Disaster Risk Reduction* 38. <https://www.sciencedirect.com/science/article/abs/pii/S2212420918311919#!>
- Singer, Judey and Admas, Jenny. 2010. ' The Place of Complementary Therapies in an Integrated Model of Refugee Health Care: Counsellors' and Refugee Clients' Perspectives' In *Journal of Refugee Studies* Vol. 24, No. 2: doi:10.1093/jrs/fer001
- Smith, Thomas Aneurin. 2011. "Local Knowledge in Development." *Geography Compass* 5 (8): 595-609. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1749-8198.2011.00443.x>.
- Suzina, Ana Cristina, and Thomas Tufte. 2020. "Freire's vision of development and social change: Past experiences, present challenges and perspectives for the future." *International Communication Gazette* 82 (5): 411-424. <https://journals.sagepub.com/doi/full/10.1177/1748048520943692>.
- The Japan Times. 2020. "Building on tradition: Japanese architectural craftsmanship recognized by UNESCO." <https://www.japantimes.co.jp/news/2020/12/18/national/japanese-architectural-craft-unesco-intangible-heritage>.
- Tribe, Rachel. 2007. "Health Pluralism: A More Appropriate Alternative to Western Models of Therapy in the Context of the Civil Conflict and Natural Disaster in Sri Lanka?" *Journal of Refugee Studies* 21-36. <https://doi.org.uoelibrary.idm.oclc.org/10.1093/jrs/fel031>.
- Trogrlić, Robert Šakić, Melanie Duncan, Grant Wright, Marcvan den Homberg, Adebayo Adeloye, Faidess Mwale, and Colin McQuistan. 2021. "External stakeholders' attitudes towards and engagement with local knowledge in disaster risk reduction: are we only paying lip service?" *International Journal of Disaster Risk Reduction* 58. <https://www.sciencedirect.com/science/article/abs/pii/S221242092100162X>.
- Trogrlić, Robert Šakić, Melanie Duncan, Grant Wright, Marcvanden Homberg, Adebayo Adeloye, Faidess Mwale, and Colin McQuistan. 2021. "External stakeholders' attitudes towards and engagement with local knowledge in disaster risk reduction: are we only paying lip service?" 58. <https://www.sciencedirect.com/science/article/pii/S221242092100162X?via%3Dihub>.
- Trogrlić, Robert Šakić, Melanie Duncan, Grant Wright, Marcvan den Homberg, Adebayo Adeloye, Faidess Mwale, and Colin McQuistan. 2021. "External stakeholders' attitudes towards and engagement with local knowledge in disaster risk reduction: are we only paying lip service?" International Journal of Disaster Risk Reduction.
- Twigg, John. 2015. DISASTER RISK REDUCTION: GOOD PRACTICE REVIEW 9. Prevention Web. <https://www.preventionweb.net/publication/disaster-risk-reduction-good-practice-review-9>.
- UNDRR. 2019. WiA on Disaster Displacement. UNDRR.
- United Nations International Strategy for Disaster Reduction. 2012. How to make cities more resilient: a handbook for Local Government leaders. Geneva: United Nations.
- UN A/75/207: United Nations. 2020. Report on internal displacement in the context of the slow-onset adverse effects of climate change. By Cecilia Jimenez-Damary. 21 July 2020. Geneva: United Nations. <https://undocs.org/A/75/207>
- Upadhyay, N., 2015. 'Community Involvement in Post Disaster CulturalRegeneration – Case of Marathwada, India'. In *Community Involvement in Heritage*, Van Balen, K. and Vandesande, A. (eds.), Garant Publishers, Antwerp, 131-40.
- Virmani, Sandeep, and Vivek Rawal. 2012. "Sustainable Construction- Story of Orlaha and Purani in Bihar." *Architecture+Design*, March.
- Wakely, Patrick, and Elizabeth Riley. 2011. The Case for Incremental Housing, Cities Alliance Policy Research and Working Papers Series No. 1, Cities Alliance, Washington, DC.
- Walshe, Rory A., and Patrick D. Nunn. 2012. "Integration of indigenous knowledge and disaster risk reduction: A case study from Baie Martelli, Pentecost Island, Vanuatu." *International Journal of Disaster Risk Science* 3: 185–194. <https://link.springer.com/article/10.1007/s13753-012-0019-x>.
- Welch, Craig. 2019. Climate change has finally caught up to this Alaska village. National Geography. <https://www.nationalgeographic.com/science/article/climate-change-finally-caught-up-to-this-alaska-village>.
- Wisner, Ben, JC Gaillard, and Ilan Kelman. 2011. Handbook of Hazards and Disaster Risk Reduction. Routledge. <https://www.routledge.com/Handbook-of-Hazards-and-Disaster-Risk-Reduction/Wisner-Gaillard-Kelman/p/book/9780415523257>.
- Yassin Nasser, Stel Nora and Rima Rassi. 2016. 'Organized Chaos: Informal Institution Building among Palestinian Refugees in the Maashouk Gathering in South Lebanon', *Journal of Refugee Studies* Vol. 29, No. 3. doi: 10.1093/jrs/few016
- Yassin Nasser, 2016. ' The Informal Adaptive Mechanisms among Syrian Refugees and Marginalised Host Communities in Lebanon'. In *The Long-term Challenges of Forced Migration: Perspectives from Lebanon, Jordan and Iraq*. (LSE Middle East Centre Collected Papers | Volume 6 September 2016.

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