Early Warning as a Human Right

Building resilience to climate-related hazards

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

UNEP

Executive Summary

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Contents

Glossary

Adaptation: Adjustment in natural or human systems to a new or changing environment, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

Climate: Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate change: The UN Framework Convention on Climate Change defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Disaster: Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

Disaster risk reduction: The conceptual framework of elements intended to minimize vulnerability to disasters throughout a society, to avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

Drought: The phenomenon that exists when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems.

Early warning: The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare an effective response.

Early warning system: The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss.

Floods: Usually classified into three types: river flood, flash flood and storm surge. River floods result from intense and/or persistent rain over large areas. Flash floods are mostly local events resulting from intense rainfall over a small area in a short period of time. Storm surge floods occur when floodwater from the ocean or large lakes is pushed on to land by winds or storms.

Livelihood: The resources used and the activities undertaken in order to live. Livelihoods are usually determined by the entitlements and assets to which people have access. Such assets can be categorized as human, social, natural, physical, or financial.

Hazard: A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Resilience: The capacity of a system, community or society potentially exposed to hazards to adapt by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.

Risk: The potential for consequences where something of human value (including humans themselves) is at stake and where the outcome is uncertain.13 Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the consequences if these events occur. This report assesses climate-related risks.

Traditional knowledge: The knowledge, innovations, and practices of both indigenous and local communities around the world that are deeply grounded in history and experience. Traditional knowledge is dynamic and adapts to cultural and environmental change, and also incorporates other forms of knowledge and viewpoints. Traditional knowledge is generally transmitted orally from generation to generation. It is often used as a synonym for indigenous knowledge, local knowledge, or traditional ecological knowledge.

Vulnerability: An intrinsic feature of people at risk. It is a function of exposure, sensitivity to impacts of the specific unit exposed (such as a watershed, island, household, village, city or country), and the ability or inability to cope or adapt. It is multi-dimensional, multi-disciplinary, multi-sectorial and dynamic. The exposure is to hazards such as drought, conflict or extreme price fluctuations, and also to underlying socio-economic, institutional and environmental conditions.

Human Rights-Based Approach: A human rights based approach is about empowering people to know and claim their rights and increasing the ability and accountability of individuals and institutions who are responsible for respecting, protecting and fulfilling rights.

Abbreviations

Abbreviation	Term in full
CBO	Community Based Organization
CDKN	Climate and Development Knowledge Network
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EWS	Early Warning System
FbF	Forecast based Finance
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
HFA	Hyogo Framework for Action
HRBA	Human Rights Based Approach
IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
LPP	Livelihood Protection Policy
MCII	Munich Climate Insurance Initiative
MNO	Mobile Network Operator
NDMA	National Drought Management Authority
NGO	Non-Governmental Organization
ODI	Overseas Development Institute
UN	United Nations
UNDG	United Nations Development Group
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNISDR	United Nations International Strategy for Disaster Reduction
WHO	World Health Organization

Foreword

This year is critical for progress on three global challenges: sustainable development, disaster risk reduction and climate change. In March, national governments finalized the Sendai Framework for Disaster Risk Reduction 2015-2030. In September, nations will commit to the Sustainable Development Goals. Finally, in December, a new agreement on climate will hopefully be reached during the Convention of the Parties (COP 21) of the United Nations Framework Convention on Climate Change.

These three global challenges are interrelated. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change concludes that precipitation patterns are changing, sea levels are rising, and the frequency and intensity of temperature extremes are increasing. Extreme events can result in significant human and financial loss, jeopardizing development gains and entrenching poverty in areas with limited social safety nets. As expressed in the Sendai Framework, "It is urgent and critical to anticipate, plan for and reduce disaster risk in order to more effectively protect persons, communities and countries, their livelihoods, health, cultural heritage, socioeconomic assets and ecosystems, and thus strengthen their resilience."

To achieve resilience, governments and citizens must be empowered to take action. Early warning systems can be used to share information about climate-related hazards, helping individuals and communities anticipate risks in advance. In so doing, early warnings can reduce the loss of lives and property when hazards approach.

This highlights links between early warning of climate related hazards and human rights. It is now well understood that climate change adversely affects a broad range of human rights. A safe, clean, healthy and sustainable environment is indispensable to the full enjoyment of human rights, including rights to life, health, food, water and housing, among many others. Human rights and a human rights based approach can also be used as a tool for solutions, ensuring that needs of the vulnerable are considered in planning and service providers are held to account.

With this in mind, the report evaluates ways to ensure delivery of effective early warnings to people in the most vulnerable situations. To develop the report, UNEP went directly to communities in Burkina Faso, Ghana and Kenya. In household interviews and focus group discussions, women, disabled individuals, the elderly and youth, in both rural and urban areas, shared their concerns about climate change and identified ways to better design early warning systems. The results were combined with stakeholder meetings and comprehensive literature reviews to ensure the views of expert practitioners and scholars were also taken into account.

Even though significant gaps remain in the countries' early warning efforts, various opportunities exist for improvement. These are mainly found in the combination of people's increased access to multiple communication channels, such as mobile phones and media, and the use of low-technology warning channels aligned with local communities' characteristics and capabilities, such as flag systems. To heighten the effectiveness of early warning responses, the report presents frameworks containing best practices.

The findings in this report aim to provide policymakers with a better understanding of the needs of early warning users and can be used in building community-based, multi-hazard early warning systems. It is our hope these systems will be developed through participatory processes, as called for in the Sendai Framework.

Achim Steiner
UN Under-Secretary-General,
UNEP Executive Director

Executive Summary

Key messages:

Climate change can affect the enjoyment of a broad range of human rights.

Early warning systems (EWS) can improve resilience of households to climate related hazards, by providing information for early action. However, to be effective, early warning systems must themselves incorporate aspects of resilient systems: diversity, flexibility, local relevance, learning, acceptance of change, consideration of justice and equity.

Every individual has the right to information about climate related hazards. Indeed, access to information is not simply a liberty right but a welfare right. Early warning is necessary for the enjoyment of basic human rights including the right to life.

The success of early warning is not based solely on technical or meteorological systems, but is dependent on social systems. Marginalized or impoverished individuals or groups may not receive or be able to respond to warnings. Addressing factors that increase vulnerability, such as poverty, inequality and lack of education, can help improve outcomes of warning systems. Early warning must therefore not be considered a service provided solely by meteorological agencies. Development practitioners must also contribute. Achieving development goals is critical for warning success.

A Human-Rights Based Approach can be used to help improve early warning systems. HRBA can help ensure early warning systems focus on the needs of the most vulnerable. HRBA also can provide mechanisms with which to hold warning providers to account. For example, citizen Report Cards or Community Score Cards could be examined as tools to enhance transparency and offer rights holders with means to hold duty bearers to account, helping ensure the creation of people-centered early warning system.

To ensure early warning results in early action, it is critical that communities have developed relevant and effective response plans, and that they have access to finance mechanisms that allows them to engage in this response after a warning is received. Forecast based finance is a new tool, currently being piloted in several countries, which may help ensure early action. However, thresholds for action need to be identified and tested for different hazards and sectors.

At the 2010 UN climate talks, the 16th session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC), governments committed to "**a maximum temperature rise of 2 degrees Celsius** above pre-industrial levels." Five years later with the 21st Conference of the Parties of the UNFCC approaching, governments are working to finalize intended nationally determined contributions (INDCS), which will outline cuts to greenhouse gases. Significant emissions gaps remain (UNEP, 2014a).

Regardless of the outcome, the earth's climate is already changing. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change land and ocean surface temperatures have already increased by nearly 1°C since 1901 (0.89°C global average) mainly as a result of anthropogenic activities[1]. Between 2016 and 2035 further warming of 0.3 to 0.7°C is likely (IPCC 2013)[2]. The frequency and intensity of extreme events, such as heat waves and precipitation has been altered (IPCC, 2014). With adaptation gaps increasingly apparently (see UNEP, 2014b), there is an urgent need to build resilience to climate related hazards!

Early warning systems (EWS) can be used to help communities and households anticipate climate related hazards and take early action. By filling gaps in knowledge about climate related hazards, they offer an adaptation tool. In March 2015, governments around the world agreed to the Sendai Framework on Disaster Risk Reduction. In doing so, they committed to "substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030". They also promised to "Invest in, develop, maintain and strengthen people centred multi-hazard, multi-sectoral

1 Contributions from natural forcing and internal variability are both likely in the range of -0.1°C to 0.1°C (IPCC 2013).

2 Note this represents a global mean. Inland and high latitude changes may be much higher.

ES Figure 1. Word cloud of early warning response needs based on 1003 answers from community surveys. Larger words were mentioned more often by respondents.

forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard monitoring telecommunications systems."

Since 2013, the United Nations Environment Programme's (UNEP) Climate Change Early Warning Project (CLIM-WARN), supported by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, has sought to identify how to design multi-hazard early warning systems and how to better communicate risks of hazards to the most vulnerable. Consultations have been held with policy makers, academic experts, non-governmental organizations and vulnerable communities in three countries: Burkina Faso, Ghana and Kenya. The report, *Early Warning as a Human Right: Building Resilience to Climate-Related Hazards*, highlights the results of household surveys, focus group discussions, expert stakeholder meetings and literature reviews.

Participants in Focus group discussions in Burkina Faso © Z. Zommers

ES1 What climate related hazards are important to communities?

Floods and droughts are prevalent in Burkina Faso, Ghana and Kenya. Other hazards mentioned by communities include disease outbreaks, the spread of crop pests, windstorms (Ghana, Kenya), bushfires (Ghana, Burkina Faso), and landslides (Kenya). While sites within a country face different hazards, all face multiple hazards. This highlights the critical need for multi-hazard warning systems. Diverse socio-economic indicators result in different vulnerability profiles in different regions of each of the countries. Warning systems are thus challenged to provide a standard service, but ensure warnings are appropriate to local conditions and needs.

While large disasters, such as the 2012 famine in the Horn of Africa, recieve the most media attention and humanitarian response, community members consider small scale and low impact hazards the most damaging. Extensive risk is traditionally under-reported and is rarely captured in global risk modeling (UNISDR, 2015). Yet over time small-scale events erode livelihoods and assets, jeopardizing long-term development gains. Early warning systems must not only identify large-scale hazards but must also cover extensive risks and exposure.

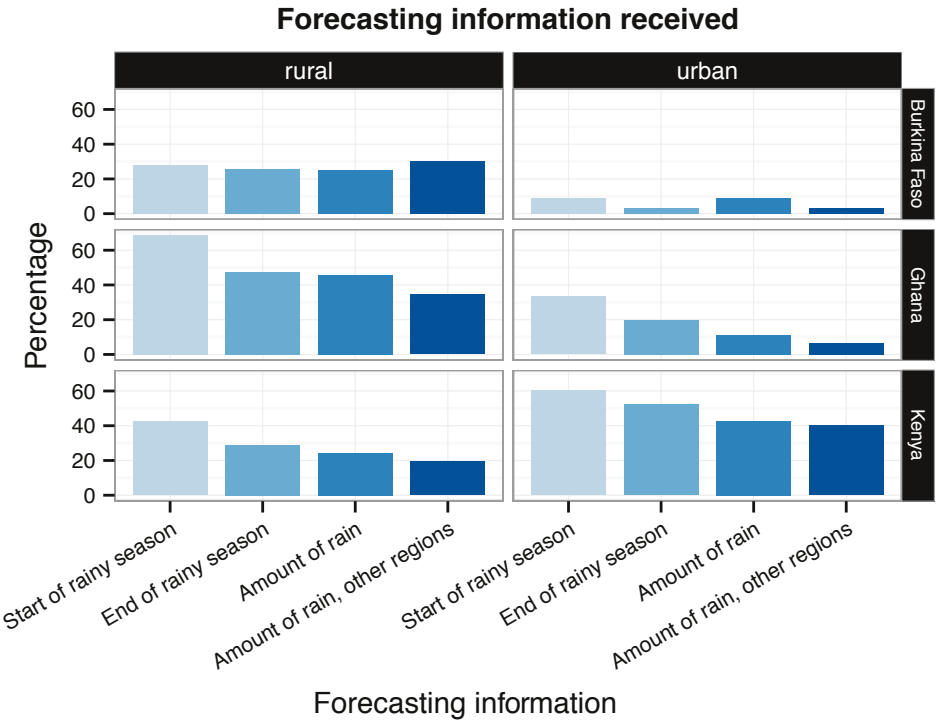
ES2 What is the status of existing EWS in the study countries?

Many respondents, particularly in urban areas, do not receive warnings. It is also noticeable that in urban areas there are fewer institutions that disseminate warnings. Perhaps hazard and climate related information is perceived as more relevant to groups in rural areas such as farmers. However, hazard risks extend to urban areas and substantial economic losses may occur here as well. **Warning system coverage needs to extend to both urban and rural areas and must provide information relevant to each different group of users.**

Nairobi © Z. Zommers

Village in Burkina Faso © Z. Zommers

Not all institutions are trusted equally. Institutions that provide official warnings may be less trusted than traditional institutions such as village elders or religious groups. Across countries in rural areas, **family, friends, community members and religious groups are generally the most important channels through which people receive early warnings, highlighting the importance of social networks for the communication of warnings.**



ES Figure 2 Percentage of respondents that received different types of information

Women in Burkina Faso © Z. Zommers

Women in Kenya © Z. Zommers

ES3 Who are the users of warnings?

The users of EWS are diverse in terms of vulnerability and coping capacity, knowledge of hazard risks, use of media, trust in institutions, hazard preparedness and response options. They have different needs. It is challenging to design an effective EWS which accounts for diversity but delivers uniform service.

Generally, people living in rural areas have a larger household size, a greater number of dependent children, lower education levels and limited diversification of livelihood sources. Such factors increase vulnerability to the impacts of climate related hazards. Households in urban areas had higher levels of education and a greater diversity of income sources. This is likely to increase their ability to bounce back from shocks.

EWS will only be effective if concerted action is taken to reduce vulnerability and underlying drivers of risk such as poverty and inequality. This requires investment in basic services and social protection mechanisms in marginalized areas.

Even within communities, vulnerability differs between households and individuals within households. The poor and those who face discrimination, especially multiple and intersecting forms of discrimination, and those who lack social safety nets are the most affected by hazards. Women have less education, are more likely to be illiterate, and are less likely to engage in wage labour. The IPCC's Fifth Assessment Report underscored that existing gender inequalities, manifested for example in women's limited access to financial resources or wage labour, land, education, health care and other basic rights, prevent women from coping and adapting to climate change impacts. The disabled and elderly are also vulnerable. In the study, they reported problems accessing warnings. Reasons included: information is provided in an unsuitable format for individuals with impairments, inability to access information points due to limited mobility, lack of proper representation in community committees, and low confidence or trust in existing institutions. Individuals that receive warnings were generally better connected to information providers, with links to multiple institutions. To ensure all indiviudals recieve messages warnings must be sent through multiple sources and trusted channels in several different formats.

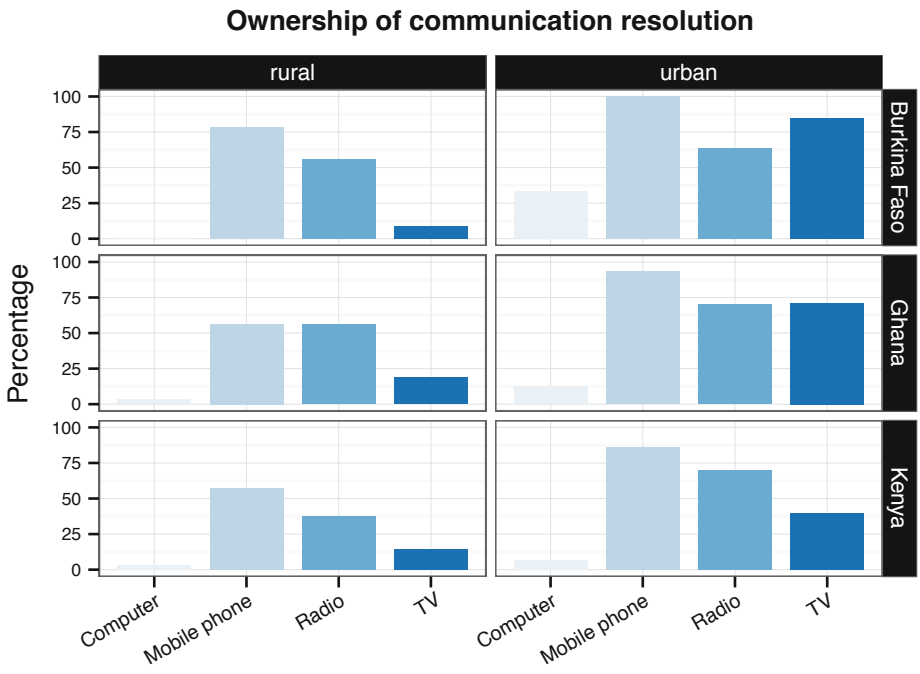
ES4 How should early warning be communicated?

Radios are prevalent in both urban and rural areas in the three case study countries, and use of the mobile phone is increasing. In urban areas sampled, ownership of mobile phones was above 90 per cent, while in rural areas the rate was between 55 and 80 per cent. Mobile phones are the fastest growing communications technology around the world. Growth is especially high in developing countries (World Bank, 2014). As such, this communication channel can play an important role in warning systems. However, gaps in coverage, limited ownership of phones or ability to read messages, and problems financing SMS distribution limit current suitability. In order to increase the certainty that a household will receive the warning, early warning messages should be disseminated through multiple communication means. Messages have to be sent in many different formats, though many different channels, and address different information needs.

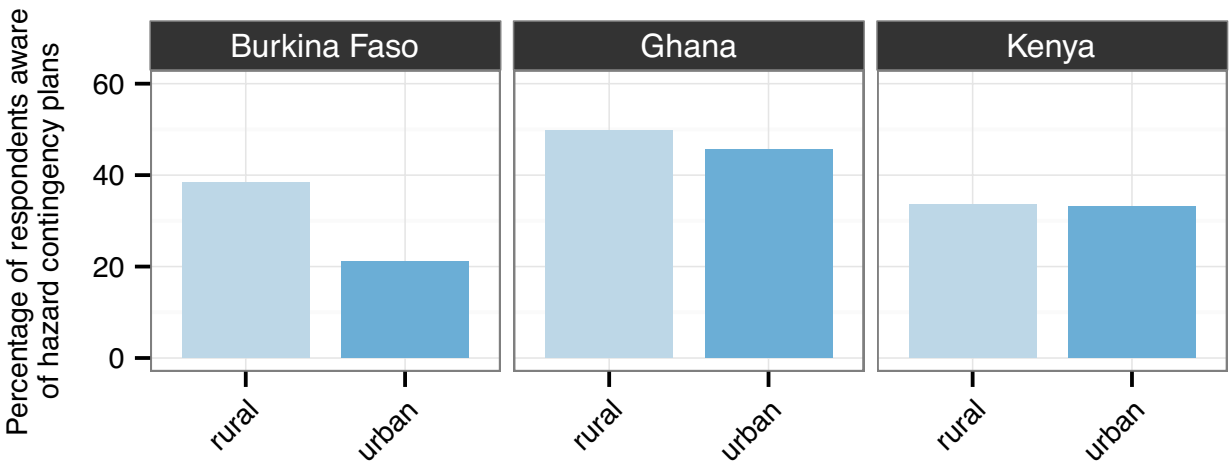
ES5 How can early warning lead to early action?

After warnings have been communicated early action needs to be initiated by recipients in order to minimize loss (UNISDR, 2014). Response options may focus on ensuring safety from sudden onset hazards (evacuation; shelter; protection of property; closure of infrastructure; and having an emergency team on standby) to building long-term resilience (changing agricultural and environmental management practices; introducing water conservation techniques; building climate proof infrastructure; purchasing insurance). Survey respondents generally had little awareness of response plans or options. **Communities requested training or education to improve knowledge of appropriate actions. Warning messages could also include specific instructions for protecting life and property.**

It is critical to build and strengthen the capabilities required to respond. Lack of funding often hinders response. **To ensure early action, financing needs to be made available. Expansion of risk transfer mechanisms, at the individual or sovereign (country) level, may improve resilience to hazards.**



ES Figure 3 Percentage of respondents owning communication devices. Urban areas have a greater access to different modes of communication. In Burkina Faso about one third of respondents indicated computer ownership, compared to around 12 per cent in Ghana and just three per cent in Kenya. This may not be representative and may be explained by the selection of the research sites.



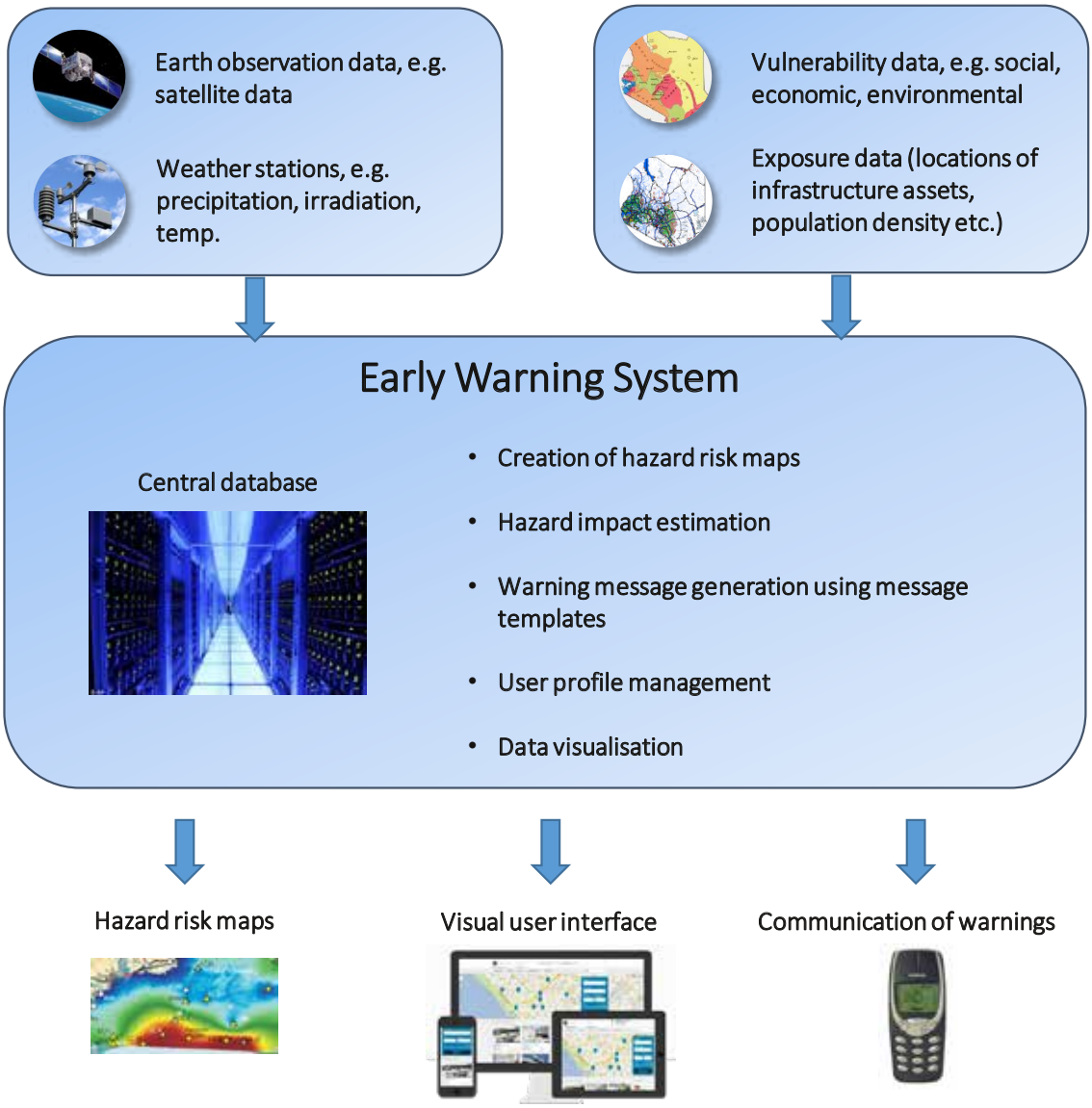
ES Figure 4 Awareness of contingency plans

Risk transfer mechanisms include risk insurance (crop insurance, weather related index based insurance, national hazard insurance), reinsurance instruments, and catastrophic insurance pools. **African Risk Capacity is an example of an initiative that could be expanded to help ensure improved response to climate related hazards.** Social protection measures, including social safety nets, social insurance or market interventions such as minimum wage, can also protect the most vulnerable from shocks.

At the same time, EWS will only be effective if concerted action is taken to reduce vulnerability. This requires investment in basic services such as education. Drivers that curtail resilience to hazards include poverty, inequality and rising pressure on land, water, and biodiversity. As expressed in the Sendai Framework for Disaster Risk Reduction, "More dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change, weak institutional arrangements, non-risk-informed policies, lack of regulation and incentives for private DRR investment, complex supply chains, limited availability of technology, unsustainable uses of natural resources, declining ecosystems, pandemics and epidemics." Improved development outcomes will enable households to both prepare for and respond to hazards. Reduced losses from hazards will then further enable economic growth and contribute to development gains. EWS must be integrated within the broader domain of development, and not considered solely a service of meteorological agencies.

ES6 What are the steps forward?

A variety of technology and policy tools can be employed to design effective multi-hazard warning systems, allowing standardization of information but also incorporating diversity and allowing for flexibility at the local level.



ES Figure 6 Conceptual diagram of an EWS. Weather or climate data is collected to create forecasts of events such as heat waves or droughts. This can be combined with vulnerability or exposure data to identify areas where warnings are needed. Warnings are then disseminated through a variety of means.

ES7 Technology

Technology exists to combine information about different hazards and exposure into a single user interface, which can be used by different people or agencies to distribute warnings tailored to specific needs and groups. Such a platform would provide uniform service but allow for local adaptation.

As a proof of concept, a prototype web-based EWS was created for the CLIM-WARN project. (It can be found on: http://prototype.climwarn.org/). The prototype is capable of generating the early warning messages for specific drought and flood periods in three pilot areas (Nzoia, Turkana and Kwale counties in Kenya). It demonstrates integration of different climate risks into one system and shows analysis and creation of warnings not only for hazards, but also for exposure and risk. It is based on a modular approach combining dynamic hazard modules driven by near real time gridded weather data, a vulnerability module developed from multi-layer information on exposure, sensitivity and adaptive capacity. The risk module ranks risk as a function of hazard and vulnerability. The choice of indices and data layers determining the key modules is flexible and can be adjusted to the needs of specific users, be they DRR professionals, farmers or pastoralists. In order to visualize the impact of hazards, or impacts of hazards, the prototype includes GIS layers of infrastructure, location of houses, schools and health centres that indicate possible impact of flooding. Further GIS operations can quantify these.

A communication module generates profiles from users registering their phone numbers and email addresses and can incorporate pre-defined sets of users linked to particular administrative areas and organizations. Triggers can be established for the system to send warnings to users. In the absence of structured recovery plans and specified tasks of actors, it was not possible to tune the content of the messages to recovery activities and actions that a particular actor is expected to undertake. However, once recovery plans have

been specified in further detail, corresponding messaging can be included.

In future, the prototype can be expanded to other countries, other thematic hazards and geography, consider other hazard indices and vulnerability layers. More detailed information on local circumstances and location of people and their resources will make the system more robust. Such prototypes can be embedded into existing structures of authorities mandated to issues warnings. The system should also incorporate a bottom up communication module to receive information from local people on hazards. Other means of warning dissemination should be explored including links with community radio.

ES8 Policy

Beyond technology, an innovative approach is needed to ensure that early warnings reach and benefit all that are potentially affected by disaster. Human rights, or more specifically a human rights based approach (HRBA), should be considered as a tool to increase accountability for warning and ensure warnings reach the "last mile".

The International Covenant on Civil and Political Rights affirms the right to life (Article 6(1)) and recognizes this right as fundamental and non-derogable (Article 4). The Human Rights Committee has broadly interpreted this right to impose obligations on states to take measures to protect human life, including measures to reduce infant mortality, increase life expectancy, and eliminate malnutrition and epidemics. The right to life also imposes strict duties on a State Party to prevent and safeguard against the occurrence of environmental hazards that threaten the lives of human beings. State responsibility arises regardless of whether an act or omission is deliberate, reckless, or merely negligent. Accordingly, the duty to protect the right to life entails an obligation for Parties to establish and operate adequate monitoring and early warning systems to detect environmental hazards before they threaten human lives.

Acknowledging the link between human rights and early warning can improve early warning system design and operation. Duty bearers, government agencies that issue warnings, have a clear duty to ensure that the warnings reach all who are potentially affected in a timely and understandable manner. Checks and balances can be introduced to ensure that rights are being provided, for example by introducing the provision of warning into regulatory and legal frameworks. Rights holders, community members, have a responsibility to hold duty bearers to account for the provision of warning.

Further, a HRBA can help warnings reach "the last mile" by ensuring that the following questions are asked: Who has been left behind? Why? Who has the duty or responsibility do something about it? What is needed in order to take action (knowledge, resources, organizational or individual abilities)? HRBA should be used to empower duty bearers and rights holders to know and claim their rights. This means giving communities greater opportunities to participate in shaping and monitoring early warning systems. It also means increasing the ability of governments to recognize and respect rights, for example by increasing their capacity to accurately issue warnings. Ultimately, a HRBA can help provide a people-centered approach to early warning rather than a hazard-centered approach. Further research and review should examine how it can be specifically applied to EWS.

Women in Turkana County, Kenya © Z. Zommers

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