



## Hazard-Specific Disaster Risk Reduction Implementation Guide

U.S. Agency for International Development  
Office of U.S. Foreign Disaster Assistance



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# USAID/OFDA HAZARD-SPECIFIC DISASTER RISK REDUCTION SHEETS

## INTRODUCTION

The following hazard-specific disaster risk reduction (DRR) sheets are intended to guide analysis of which USAID/OFDA sectors and sub-sectors may be most relevant to reducing risk related to an identified hazard in the program location. As set out in USAID/OFDA's DRR conceptual framework and strategy, the broad context of the area exposed to a given hazard, and the capacities that exist within that area, will also guide the development of appropriate DRR programs. By tying its DRR work to these hazards, USAID/OFDA is working well within its mandate to save lives, alleviate suffering, and reduce the economic impact of disasters.

While DRR activities can help vulnerable communities become better prepared to cope with the hazards around them, it is larger-scale economic and development activities that will be critical for building resilience, even to recurring crises, over the long term. Each of the following hazard sheets looks not only at potential DRR interventions, but highlights linkages with other actors to build resilience. Therefore, the DRR activities that are discussed in the following sheets are much more likely to be effective when they are layered, integrated, and sequenced with other resilience-building activities, particularly longer-term development. As part of a multi-sectoral approach, rigorous gender and protection mainstreaming helps ensure that programs address the special/unique needs within target populations.

Proposed activities should either reduce the risk, frequency, or severity of a specific, recurrent shock or shocks, or increase the resilience of men, women, and children to withstand the impact of that shock over time, and to more quickly recover. USAID/OFDA DRR programs must fall into at least one of the following core areas: 1) prioritizing and strengthening early warning, preparedness, mitigation, and prevention; 2) integrating preparedness and mitigation with disaster response, early recovery, and transition to foster resilience; and 3) supporting diversified, resilient livelihood strategies.

As with USAID/OFDA's broader Global DRR Strategy, it is important to emphasize that these sheets are meant as guidance to be tailored and adapted to the unique context of each situation. They are intended to help staff think through some of the issues commonly associated with different hazards, outline the rationale for DRR programs, and indicate the sectors and types of activities typically involved, before making a decision about whether or what types of DRR programs might be appropriate.

## DRR INTEGRATION INTO RESPONSE, EARLY RECOVERY, OR TRANSITION

As suggested in the Global DRR Strategy, DRR programs will never be able to meet the enormous global need to reduce the risks posed by shocks or hazards, nor produce a resilient society on their own. Therefore, one of the Strategy's main themes is to promote the integration of DRR much more comprehensively across the development and humanitarian programs. To facilitate better programmatic integration, the sheets also include 'Resilience' boxes to highlight potential linkages with other actors, demonstrating how DRR can often be a component of larger response, early recovery, transition, or development programs.

## MULTI-HAZARD PROGRAMS

Programs that address multiple hazards or the policy dimension of DRR are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. These



programs may include activities on local, national, regional, or global levels to mitigate the impacts of natural hazards. They may also include activities that help populations prepare for, prevent, or plan for disasters. USAID/OFDA works with all levels of government, international and regional organizations, NGOs, local communities, and the private sector to foster linkages across sectors and across organizations. By improving understanding and implementation of hazard management, USAID/OFDA helps reduce people's vulnerability to potential disasters.

- Building Community Awareness/Mobilization includes public awareness campaigns, dissemination of policies and plans to communities, and sensitization of communities to disaster risk
- Capacity Building and Training includes training on DRR and capacity building at all levels related to effective disaster preparedness and response
- Global Advocacy and Engagement includes support for international entities for raising awareness related to DRR, and support for improving disaster response and preparedness at the international level
- Integration/Enhancement within Education Systems and Research includes research related to DRR, capacity building of academic institutions, incorporation of DRR components into curricula and trainings at all educational levels
- Policy and Planning includes development of risk reduction strategies and policies at national, local, or community levels
- Public-Private Partnerships includes promoting and facilitating private sector investments in DRR, as well as building relationships with the private sector related to risk reduction

Programs that aim to coordinate or better organize and manage disaster risk information may also be included under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors:

- Coordination
- Information Management

USAID/OFDA supports coordination with the government of the country concerned, with international NGO coordinating bodies, local NGOs, the private sector, and with and by U.N. coordinating agencies. Examples of information management activities may include web-based or other systems to assist analysis of historical data, preparedness of disaster-related data, disaster risk reduction information-sharing across organizations, or information to raise awareness of specific disaster risks.

## CONFLICT

In situations where there is conflict, whether active or potential, a careful conflict analysis, using relevant expertise within USAID, will also be necessary to determine if DRR programs would be appropriate. Like other contextual issues, careful analysis is necessary to understand whether DRR programs would be advisable, and if so what types would be most effective, and what impact they might have on the conflict. In all cases, the need to “do no harm” must be balanced against need and vulnerability, taking care to minimize any potential unintended consequences. It is important to emphasize that the objective of DRR programs is not to reduce the risk of conflict, but rather how to take conflict into account when considering DRR interventions.

# CYCLONE/HURRICANE/TYPHOON

Associated Secondary Hazards: Wind, Flood, Flash Flood, Storm Surge, Landslide, Epidemic



Cyclones are severe weather systems characterized by high winds and heavy rains. In the North Atlantic and East Pacific they are usually called hurricanes; in the West Pacific they are called typhoons. They have the ability to cause widespread damage to houses, roads, crops, and livelihoods related to wind damage, storm surge, flooding and flash flooding, and landslides, all depending

on an area's geography and topography. Without proper sanitation in affected areas, disease outbreaks are possible. Meteorological organizations routinely monitor these weather systems and storm tracks, enabling the use of early warning information to assist disaster risk reduction efforts.

The following OFDA sectors and sub-sectors are the ones most likely to be funded with respect to stand-alone, cyclone/hurricane/typhoon-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of cyclones. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

## EXAMPLES:

In Bangladesh, OFDA funded the construction of storm shelters with flood- and wind-resistant design elements to protect people from risk of storm surge. When weather permits, these same shelters are used for development purposes, such as education. FFP funded improvements to market access roads and river embankments. The Mission made investments in natural resource management and sustainable livelihoods in and around protected areas to preserve fragile ecosystems, which are vital for the protection of inland areas in the event of a cyclone. In Mozambique, OFDA and the USAID Mission funded different elements of the end-to-end cyclone early warning system.

## Agriculture and Food Security (Fisheries, Livestock, Seed System Security, Improving Agricultural Production/ Food Security)

The main issues of concern are salinization of coastal agriculture lands, damage to crops already in the field, damage to and siltation of irrigation infrastructure, and loss of seed, grain, and feed due to flooding or damaged storage systems. Abundant moisture associated with cyclones may create favorable ecological conditions for some pests to further breed and cause significant damage to crops/pasture. (In 2011 and 2013, almost towards the end of the rainy season, cyclones Bengiza and Haruna brought unusually abundant moisture to the southwestern part of Madagascar where the Malagasy locust breeding starts. The moisture associated with these two cyclones enabled the locust to go through another breeding cycle causing locust populations

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, education, agriculture, health systems, economic growth, housing, and poverty alleviation.

Tools in the toolbox include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, Pandemic Influenza and other Emerging Threats, and P.L. 480 Title II).

to further increase and threaten crops and pasture.) In addition, poorly constructed and managed pesticide storage facilities can crumble or fail to withstand the force of cyclones. The consequences can be catastrophic if humans and the environment are exposed to toxic pesticides, severely affecting both their health and safety. DRR programs for agriculture and food security are normally integrated into response, and can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of the cyclone on future crops (including fish ponds). Stand-alone DRR programs must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Illustrative interventions in this area include the following:

- Promotion of saline-resistant crop varieties for agricultural areas in coastal regions;
- Introduction of agriculture techniques to maximize growing season options (e.g., short cycle crops);
- Seed/feed storage;
- Support for fisheries livelihoods;
- Developing and supporting community-based locust/pest monitoring, forecasting and early warning;
- Capacity strengthening through training and by providing necessary tools to launch preventive pest control interventions;
- Education regarding the construction of pesticide storage facilities according to the UNFAO standards and other applicable standards, e.g., selection of suitable and safer locations away from human dwellings, aquatic, and other sensitive habits); use of durable and robust construction materials; and adherence to good store management practices, e.g., regular monitoring and storage maintenance.

## Economic Recovery and Market Systems (Livelihoods Restoration, Market System Rehabilitation, Microfinance)

Cyclones, leading to floods and landslides, can quickly wipe out livelihoods in both rural and urban areas. Rebuilding those livelihoods, and reinforcing them to prevent repeated destruction in the future, is a critical area of work. DRR programs within this sector are normally integrated into response and recovery, such as rehabilitating market infrastructure with hazard-resistant design features. Stand-alone DRR programs must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Illustrative interventions in this area include the following:

- Market assessment (in a participatory manner that benefits the entire humanitarian and economic recovery community) as a baseline and to predict likely disaster damage, to guide DRR or future disaster-response programming (e.g. identifying critical infrastructure or services, and likely disaster scenarios);
- Livelihood restoration and market system rehabilitation programs to specifically reduce the risk to key livelihoods and markets from cyclones (e.g. transportation routes, flood-resistant storage, watershed-related livelihoods); and
- Microfinance programs to facilitate recovery and encourage investment in risk reduction at the household or small business level, or integrated within response activities and designed to be implemented feasibly within OFDA's one-year program funding period.

## Health (Health Systems and Clinical Support)

Due to the impacts of cyclones on public health, epidemics can result and can be considered a possible sub-hazard. DRR programs in this sector can be either stand-alone (such as contingency planning, capacity building, or early warning), or can be integrated into response and recovery programs. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling;
- Health education focusing on community health workers, first responders, and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts; and
- Coordination with other public and private stakeholders with an effort towards resilience to evaluate structural needs for primary healthcare facilities in preparation for such emergencies.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Hydrometeorological Hazards)

Cyclones and associated hazards are hydrometeorological in nature. DRR programs that address this hazard may be either stand-alone (such as capacity building, preparedness, or early warning), or may be integrated into response and recovery programs. Please note that hydrometeorological structural measures that are intended to control hazards, such as levees, dams, and sea walls, are not preferred as DRR options for cyclones and its secondary hazards due to ineffectiveness and adverse impacts. Interventions that protect people at risk from floods and storm surge, such as storm shelters and wind- or flood-resistant home design, are supported as described below in the Shelter and Settlements section. Illustrative interventions in this area include the following:

- Capacity building on preparedness and early warning of cyclones and secondary hazards at community, local, national, regional, or international levels;
- Cyclone and associated hazard early warning systems encompassing an end-to-end approach including hazard monitoring, forecasting, tools for decision makers, dissemination of warnings to stakeholders in partnership with authorized national and local entities;
- Natural and environmentally appropriate measures such as watershed or coastal management activities;
- Development of guidelines, plans, laws, rules, regulations, policies, or strategies for hydrometeorological risk reduction;

- Community-based activities to reduce impacts of cyclones and secondary hazards; and
- Establishment of hydrometeorological networks to aid nationally authorized agencies depending on the purpose and scale of the program, location, proposed technology, and local capacity to operate and maintain these systems.

## Shelter and Settlements (Camp Design and Management, Emergency/Transitional Shelter, Shelter Hazard Mitigation)

The Shelter and Settlements sector is focused on reducing the impact that storms and associated landslides have on infrastructure and housing. In vulnerable communities, stand-alone DRR interventions will mitigate or prevent storm damage, and prepare communities to live with the risks associated with those events. In addition, DRR is incorporated into emergency response paving the way to the recovery of the disaster-affected communities. Illustrative interventions in this area include the following:

- Promotion of flood- and wind-resistant shelter designs;
- Training of authorities, laborers, contractors, and humanitarian organizations in hazard-prone settlements to understand and incorporate DRR into response and development activities;
- Promotion of watershed-based settlements approaches to address multiple hazard risks in a comprehensive manner;
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels (e.g., “neighborhood approach” and “emergency master planning” in Haiti) that features identification and reduction of risks in hazard-prone settlements.

## Protection (Protection Coordination, Advocacy and Information)

Since cyclones and associated flooding and landslides can result in significant damage to houses, displacement is a common result of these storms. DRR programs specifically aimed at protection can prepare communities in advance of the storms to understand and address issues related to vulnerability in the wake of a severe storm. Training, capacity building, and strategic planning can all be stand-alone DRR programs that address protection issues prior to a disaster. DRR interventions can also be integrated into response, but these programs are less common for this sector. Illustrative interventions in this area include the following:

- Protection preparedness to ensure safety of vulnerable populations during the event, such as evacuation assistance for children, older people, and persons with disabilities
- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent family separation, special needs of vulnerable groups, importance of assuring safety for women and girls)
- Training for humanitarian organizations to assess and respond to protection risks in a disaster setting



## Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Water, Sanitation, and Hygiene (Water Supply Infrastructure, Sanitation Infrastructure, Environmental Health, Hygiene Promotion)

Cyclones and associated flooding can wreak havoc on water and sanitation systems, damaging infrastructure and contributing to widespread contamination of drinking water supplies and the environment. When water and sanitation systems are compromised, disease epidemics can result. For this sector, stand-alone DRR programs must be strongly justified and based on the risk of the target area/population being affected by this hazard. Empowering households to prepare for cyclones and associated hazards along with promoting environmental health precautions once the disaster has occurred are critical aims. Illustrative interventions include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Identification of non-hazardous debris disposal sites before the event occurs, as debris can rapidly overwhelm solid waste disposal sites, posing environmental and fire hazards. Identifying sites and acquiring permission to use the sites are important steps to complete before the disaster occurs;
- Strengthening major sewage outfalls to prevent damage from wave action;
- Protecting water sources to prevent contamination with surface water runoff. This may include raising well heads in coastal flood zones at both open wells and boreholes; and
- Capacity building on environmental health protection at community, local, national, and/or regional levels.

# DROUGHT

## Associated Secondary Hazards: Epidemic (Human and Livestock), Pest Infestation, Wildfire



Droughts themselves cannot be prevented, but while they are potentially devastating, they do not have to lead to a disaster.

Contrary to floods and other sudden onset hydrometeorological disasters, droughts tend to progress slowly, and may linger for months or years. The magnitude of a drought and its impacts are closely related

to the timing of the onset of the precipitation shortage, its intensity, and the duration of the event. Depending on the magnitude and timing of the drought, the impacts may vary significantly. In many cases, they can have devastating effects on the economic and nutritional status of vulnerable populations.

Meteorological droughts are defined as a deficit in precipitation from the long-term average, so they are very specific to each region. An agricultural drought occurs when there is insufficient or poorly timed rainfall which adversely affects normal crop growth and maturation. Hydrological droughts usually occur when surface and subsurface water supplies are below normal, and are defined on a watershed or river basin scale. These droughts usually lag behind meteorological and agricultural droughts, since it takes longer for deficits in rainfall to show up in various components of the hydrological system (e.g., groundwater, reservoirs, etc.). Socio-economic droughts occur when the demand for water supplies exceed the supply, due to weather-related water shortages. One or more of these drought types can result from a deficit in precipitation, but the effects of absent or poorly timed rain on crop productivity are potentially the most devastating. In some cases, seasonal rainfall values may be “normal” in a meteorological sense, but can still result in crop failure – the classic “green drought.”

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, economic recovery, health, nutrition, and water and sanitation. Drought can often cause migration, requiring close coordination with other actors on internally displaced persons or refugee programs.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, and P.L. 480 Title II).

### EXAMPLES:

In Malawi, the OFDA-funded Water for Irrigation and Life Advancement program was fully integrated into the larger Wellness and Agriculture for Life Advancement Program funded by USAID/Malawi and the Office of Food for Peace. The programs helped communities change their agricultural practices and better manage their livelihoods. USAID’s “joint planning cells” in the Sahel and the Horn of Africa offer many other examples. In Senegal, the focus on climate-smart agriculture, health and nutrition, micro-credit and savings, local governance, disaster preparation, conflict mitigation, improved access to markets, and more effective methods of irrigation have helped build resilience in chronically stressed communities.

Early interventions can lower loss and hasten recovery, so DRR programs that are focused on drought monitoring, early warning, and appropriate decision-making can have a significant effect on reducing the negative impacts of this hazard. In addition, communities can implement a variety of risk reduction and adaptation measures to mitigate the effects of drought and persist through an extended dry period.

The following OFDA sectors and sub-sectors are the ones most likely to be funded with respect to stand-alone, drought-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make

communities as resilient as possible to the impacts of droughts. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

## **Agriculture and Food Security (Fisheries, Livestock, Pests and Pesticides, Seed System Security, Improving Agricultural Production/Food Security, Irrigation)**

The agriculture and food security sector may be severely impacted by drought, depending on the timing and duration of the drought, as well as the phase of plant growth or time of the planting cycle when the drought hits. As a result, farmers may experience reduction of grain, seed quality and quantity, livestock feed, growth and reproduction of livestock, and aquaculture production, in addition to an overall reduction in their own household food security. Livestock may experience severe hardship, both from lack of water and lack of feed. In some cases, weakened animals and fish may be subject to increased risk of disease and death. During drought, pests that normally feed on natural vegetation or other plants congregate on any vegetation or crops that may be available, including those already hit by severe moisture deficiency. This contributes to farmers having difficulty harvesting drought-hit crops for animal feed, firewood, or any other purpose. DRR programs for drought-prone areas may either be stand-alone, or may be integrated into response. These programs can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of drought on productivity. Illustrative interventions in this area include the following:

- Training programs to improve grazing lands and herd management;
- Vaccination and parasite control programs to improve animal health and reduce animal mortality;
- Support to initiate disease and pest surveillance;
- Training programs to improve agricultural practices to address specific acute shocks that may be exacerbated by drought (e.g., emergency fish pond management, increased incidence of anthrax, pest attacks, cassava mosaic disease, striga, etc.);
- Seed System Security Assessments for areas of recurrent drought and for assessments that are multi-stakeholder and of use to the humanitarian community at large (not just a specific partner);
- Conservation agriculture;
- Drought mitigation measures such as rock lines and water catchments (done with community participation);
- Testing and training related to new drought-tolerant or short-cycle varieties; and
- Activities to enhance water availability for agriculture, irrigation, aquaculture, or water infiltration/retention activities.

## **Economic Recovery and Market Systems (Livelihoods Restoration, Microfinance)**

Droughts can easily destroy the livelihoods of entire populations, particularly in rural areas. Loss of crops and livestock, particularly over multiple seasons, can destitute farmers, and recovery, if possible, can take decades. Rebuilding those livelihoods, and reinforcing them to prevent

repeated destruction in the future, is a critical area of work. Drought-related DRR programs within this sector are normally integrated into response and recovery programs, and stand-alone DRR measures in this sector for drought are likely to be limited and linked closely to Agriculture and Food Security interventions. Community ‘buy-in’ and participation are essential to ensure the sustainability of standalone DRR measures. For this reason, volunteer efforts are highly preferred over cash-for-work (CFW) for stand-alone DRR for drought mitigation measures. Likely illustrative interventions in this sector include the following:

- Livelihoods restoration in the form of small grants or in-kind assistance to support Agriculture and Food Security measures described in the previous section; and
- Microfinance programs to encourage savings and investment in risk reduction at the household or microenterprise level, such as community savings groups (VSLA and similar), in conjunction with Agriculture and Food Security or other sector activities.

## Health (Health Systems and Clinical Support)

Due to the impacts of drought on public health, epidemics can result and be considered a possible sub-hazard. DRR programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling; and
- Health education focusing on community health workers and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Hydrometeorological Hazards)

Droughts are recurring hydrometeorological events that are part of natural climate variability. Droughts may cross national boundaries and have cascading impacts. DRR programs that address this hazard may be either stand-alone (such as capacity building, preparedness or early warning), or may be integrated into response and recovery programs. Illustrative interventions in this area include the following:

- Capacity building on preparedness and drought monitoring and early warning at community, local, national, regional, or international levels;
- Development and implementation of drought plans and integrated drought management at local, national, and regional levels; and
- Small-scale water resource management activities depending on the location, hydrometeorological characteristics, project scale, and local capacity to maintain the activities.



## Nutrition (Infant and Young Child Feeding and Behavior Change, Management of Moderate Acute Malnutrition, Nutrition Systems)

The impacts of drought on nutrition are profound. With the loss of crops and livestock, availability of food decreases significantly. Consumption of contaminated water may spread disease and cause diarrhea and vomiting, particularly among children. DRR programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Illustrative examples of programs in this area include:

- Improve overall community nutrition practices and strengthen nutrition systems;
- Capacity building of national staff for the treatment of malnutrition, particular in the context of moderate acute malnutrition; and
- Nutrition surveillance and regular surveys and in high-risk countries to indicate deteriorating nutritional status and activate early interventions.

## Protection (Protection Coordination, Advocacy and Information)

Droughts can exacerbate protection risks that already exist in a community. Individuals or families may turn to negative coping strategies, including early marriage, sexual exploitation, or child labor, as a means of survival. Mainstreaming of protection into DRR programs by other sectors is therefore an important protection tool in drought situations. Programs such as livelihoods restoration or microfinance can reduce drought-related protection risks, including the need to resort to negative coping strategies. However, these interventions can also introduce new threats and vulnerabilities if protection is not sufficiently considered. Since the impacts of drought can also be life-threatening, displacement of some members of a family in search of water, food, or feed is common, and impacts all members of a household. DRR programs specifically aimed at protection can prepare communities prior to a severe drought to understand and address issues related to vulnerability as the drought progresses. Illustrative interventions in this area include the following:

- Training for humanitarian organizations to identify and mitigate protection risks associated with DRR programs, promote prevention through incorporation of protection into DRR program design and beneficiary selection processes, and monitor for the protection aspects of a program during implementation;
- Education for community-members about the harm of negative coping strategies, and information about available assistance programs;
- Protection preparedness to ensure safety of vulnerable populations, such as assistance for children, older people, and persons with disabilities;
- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent family separation, special needs of vulnerable groups, importance of assuring safety for women and girls); and
- Training for humanitarian organizations to assess and respond to protection risks in a disaster.

## **Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)**

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## **Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)**

The Shelter and Settlements sector is focused on reducing the impact that droughts and associated water scarcity have on people and their settlements. In vulnerable communities, stand-alone DRR interventions will reduce water scarcity impacts, and prepare communities to conserve water resources. In addition, DRR can be incorporated into emergency response, paving the way to the recovery of the disaster-affected communities. Illustrative interventions in this area include the following:

- Promotion of household water conservation techniques and devices (e.g., cisterns, roof catchments);
- Training of authorities, laborers, contractors, and humanitarian organizations to understand and incorporate water conservation into shelter and settlements response and development activities;
- Promotion of watershed-based settlements approaches to address multiple hazard risks in a comprehensive manner;
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels.

## **Water, Sanitation, and Hygiene (Water Supply Infrastructure, Hygiene Promotion)**

Drought can destabilize water supplies and lead to use of unsafe water sources and poor hygiene practices, as well as poor choices related to the use of available water. When water access is compromised, disease epidemics can result. In this sector, DRR programs are normally integrated into response. Stand-alone DRR programs are possible, but must be strongly justified and based on the risk of the target area/population being affected by this hazard. Illustrative DRR interventions in this area include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Protecting water sources to prevent contamination, including separation from livestock water facilities;
- Capacity building on maintaining protected water supplies at community, local, and/or regional levels;

- Projects using natural geologic features to sustainably increase water storage and reduce runoff, such as sand dams, rock catchments, check dams, and subsurface dams. (Please note that environmental impact analysis will be required for these projects); and
- Capacity building with local government on integrated water resource management (IWRM) and promotion of water conservation practices.

# EARTHQUAKE

## ASSOCIATED SECONDARY HAZARDS: LANDSLIDE, FIRE (URBAN), TSUNAMI, EPIDEMIC



Earthquakes, as well as the tsunamis, fires, and landslides that can occur in their wake, can devastate communities in a matter of seconds—destroying homes and infrastructure; disrupting water, food, and electricity supplies; and damaging local economies. Earthquake response and recovery are prime opportunities for incorporating disaster risk reduction components into programming. According

to a recent study, about 403 million people live in cities that face significant seismic hazard. In addition, up to 65% of the world's large cities today may be subject to seismic shaking. Although earthquakes cannot be predicted or prevented, proper mitigation and preparedness efforts can minimize casualties and economic impact. OFDA supports earthquake disaster risk reduction (DRR) programs that identify needs within existing systems and increase resilience through targeted capacity building activities.

The following OFDA sectors and sub-sectors are most likely to be funded with respect to stand-alone, earthquake-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of earthquakes and associated hazards. OFDA promotes the use of the Neighborhood Approach as one such multi-sectoral intervention; it is informed by community-based decision-making reflective of the social, economic, and physical features of the delineated area. While shelter-led, the approach is settlement focused and shifts attention towards a synergistic and complementary focus on the entire community in a defined area. For more information on the Neighborhood Approach, see the resources section of this document.

### Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: livelihoods, incident command system, improved monitoring, infrastructure development, economic recovery, health, and water and sanitation. Earthquakes can often lead to separation or loss of family members, requiring close coordination with other actors on internally displaced persons or refugee programs.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, USAID Forward Initiatives, and, in some cases, P.L. 480 Title II).

#### Examples:

Many parts of the USG are working in Nepal to support national capacity to prevent, mitigate, and respond to disasters and a future expected large earthquake, under an improved coordination mechanism to facilitate integrated, whole-of-government, DRR assistance in Nepal under a holistic 5-year DRR Strategy. In Haiti, OFDA has been working with humanitarian and development partners to improve Haiti's seismic network (with USGS), build capacity within the government to monitor seismic activity, to support the National System for Risk and Disaster Management (with UNDP and GoH Department of Civil Protection, and to implement community DRR initiatives (through a variety of NGOs).

In general, earthquake DRR programs are most cost-effective in highly-populated urban areas, though rural populations can also be susceptible to tsunamis and landslides that may result from an earthquake. Specific design elements will depend on the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.



## Economic Recovery and Market Systems (Livelihoods Restoration, Market System Rehabilitation, Microfinance)

Earthquakes can rapidly destroy or impact the livelihoods of entire populations, particularly in urban locations, as well as critical market infrastructure upon which many markets and large populations depend. Restoration of these livelihoods, including the structures they are often housed in, can take years. On a positive note, market-integrated approaches to hazard reduction, if done in partnership with local government and private sector actors, can be very cost-efficient in avoiding future damage. Earthquake-related DRR programs within this sector are normally integrated into response and recovery programs, but OFDA will also consider stand-alone DRR measures in this sector for earthquakes. These must be closely integrated with the Shelter & Settlements sector to ensure technical rigor. Community 'buy-in' and participation, as well as the participation of the local private sector and government, are essential to ensure the sustainability of standalone DRR measures. For this reason, co-investment approaches (e.g. access to loans; voluntary labor; partial fees for training; partial cost coverage by private or public sector) are highly preferred over full-subsidy approaches (such as grants; free trainings; or cash for work). Likely illustrative interventions in this sector include the following:

- Livelihoods restoration or microfinance programs, in the form of small grants or access to loans and savings, to encourage individuals and microenterprises to invest in risk reduction (e.g. retrofitting);
- Livelihoods restoration programs to provide specialized training to workers (e.g. construction workers; masons; carpenters) on hazard mitigation, coupled with demand promotion (for example certification; and
- Market system rehabilitation programs, with strong local government and/or private sector contributions, and informed by analysis of likely major risks and critical market systems, to mitigate earthquake hazards for major market infrastructure (marketplace buildings; roads; bridges; etc).

## Health (Health Systems and Clinical Support)

Earthquakes can impact public health in several ways. The most direct impact is related to collapse of structures and resultant injuries, which may lead to an overload of the existing health system. During the response and recovery period, epidemics may result and should be considered a possible sub-hazard. DRR programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling;
- Health education focusing on community health workers and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts;
- Coordination with other public and private stakeholders with an effort towards resilience to evaluate structural needs for primary healthcare facilities in preparation for such emergencies, aligned with the shelter and settlements sector;

- Promotion of earthquake awareness among health workers; and
- Capacity building within health care services to provide appropriate, holistic psychosocial or mental health services to earthquake-affected populations.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Geological Hazards)

While earthquakes cannot be prevented, there are many DRR activities that can be implemented in an earthquake-prone region that can prepare communities for earthquakes and/or mitigate their impacts. Proper mitigation and preparedness efforts can minimize the effects of resulting disasters, potentially saving lives and reducing the economic effects of earthquakes. Both stand-alone DRR programs related to earthquakes as well as interventions integrated into response and recovery programs will be considered in this sector. Illustrative interventions in this area include the following:

- Capacity building for local scientists and agencies on seismic hazards and risks at community, local, national, regional, or international levels;
- Technical assistance to strengthen national or local monitoring networks;
- Public awareness and education on seismic hazards to help prepare at-risk communities for earthquakes;
- Early warning systems that utilize an end-to-end system ranging from the identification of a hazard to the dissemination of information to at-risk communities; and
- Earthquake hazard assessments that address the probability of an earthquake occurring during a specific long-term time frame.

Depending on the location, magnitude, and type of earthquake, a tsunami may be generated. For additional information on DRR programs related to tsunamis, please see the Tsunami Hazard Sheet included in this packet.

## Protection (Protection Coordination, Advocacy and Information)

Earthquakes can have severe and sudden impacts on families, and can add significantly to the protection risks that may already exist in a community. Not only can the earthquakes themselves be life-threatening, but they may also cause separation or loss of family members. DRR programs specifically aimed at protection can prepare communities prior to an earthquake to understand and address issues related to vulnerability before the earthquake happens. Illustrative interventions in this area include the following:

- Training for humanitarian organizations to identify and mitigate protection risks associated with the disaster;
- Protection preparedness to ensure safety of vulnerable populations, including disabled persons or injured survivors in high-risk areas, and training families on measures to prevent family separation; and

- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent and respond family separation, addressing special needs of vulnerable groups, importance of assuring safety for women and girls).

## **Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)**

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors, in particular Building Community Awareness/Mobilization and Integration/Enhancement within Education Systems and Research. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## **Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)**

The Shelter and Settlements sector is the most immediately and obviously affected sector after an earthquake. The loss of homes, businesses, and infrastructure can have a profound impact on nearly every other sector, from livelihoods, to health systems, to protection. For this reason, stand-alone DRR programs in this sector are encouraged in hazard-prone areas with highly vulnerable populations, and activities that reduce risk and vulnerability can be incorporated into emergency response activities in any area vulnerable to earthquakes, as well as any resulting hazards (e.g., landslides and tsunamis). Illustrative interventions in this area include the following:

- Promotion of earthquake-resistant structures commensurate with the seismic hazard;
- Hazard-based sites and settlements planning;
- Training support to promote adoption of structural measures to resist hazard and sub-hazards;
- Technical assistance and rapid capacity building targeting local building and zoning authorities;
- Public awareness and capacity building activities so that populations learn to live with contextual earthquake risk; and
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels.

## **Water, Sanitation, and Hygiene (Water Supply Infrastructure, Hygiene Promotion)**

Earthquakes can destroy water and sanitation infrastructure, resulting in a destabilization of water supplies. This can potentially lead to the use of unsafe water sources and poor hygiene practices. When hygiene practices are compromised, disease epidemics can result. In this sector, DRR programs are normally integrated into response. Stand-alone DRR programs are possible, but must be strongly justified and based on the risk of the target area/population being affected by this hazard. Illustrative DRR interventions in this area include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be

made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;

- Capacity building on maintaining protected water supplies at community, local, and/or regional levels;
- Establish and enforce building codes for earthquake resilient bulk hazardous materials storage
- Improving public knowledge of emergency water storage after an earthquake event (school education, public messaging, mass texting);
- Improving public knowledge of culturally appropriate emergency human waste and solid waste disposal after an earthquake event (school education, public messaging, mass texting);
- Supporting emergency response planning and exercises for municipal water treatment, sewage treatment and electrical generation facilities staff and management;
- Identification and ensuring access to of alternate emergency water sources, sewage disposal and solid waste disposal sites;
- Identification of and ensuring access to emergency debris disposal sites; and
- Identification and developing an emergency control plan for potential disease vectors that could emerge as a result of earthquake event. This plan should be a component of the overall public health earthquake emergency response plan.



# EPIDEMIC

## ASSOCIATED SECONDARY HAZARDS: PANDEMIC



Disaster risk reduction addresses not only natural hazards like earthquakes and droughts but also dangers like disease epidemics. Prevention of and early response to outbreaks are critical to saving lives and reducing the economic toll these disasters take.

OFDA has supported risk reduction efforts to combat a number of human diseases, such as cholera and pandemic influenza, as well as animal diseases. These animal diseases may impact livelihoods, but may also be zoonotic, causing diseases in both humans and livestock. OFDA has both responded to and worked to reduce risk associated with diseases such as Rift Valley Fever, and Emerging Pandemic Threats, such as Influenza sub-types.

The following OFDA sectors and sub-sectors are the ones most likely to be funded with respect to stand-alone, epidemic-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of epidemics. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

### Examples:

From 2004-2008, OFDA participated in an inter-agency effort to combat the threat of Avian Influenza. OFDA supported the U.N. World Health Organization's efforts to contain the disease in affected countries, including through the purchase of personal protective equipment. OFDA worked closely with USAID's Bureau of Global Health and the U.S. Department of Health and Human Services, U.S. Department of Agriculture, U.S. Department of State, and U.S. Department of Defense.

### Agriculture and Food Security (Fisheries, Livestock, Seed System Security, Improving Agricultural Production/ Food Security)

When disease descends upon farms, animals and people can become sick, which can lead to shortages of food both for humans and farm animals. Animal disease can be economically devastating for livestock owners, especially when cross-border trade of animals is halted. By working together with many international, national, and local groups, USAID is investing in monitoring, early warning, and early action to recognize and to control animal disease. DRR programs for agriculture and food security can also be integrated into response, and can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of disease organisms and pests. Illustrative interventions in this area include the following:

### Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, economic recovery, health, nutrition, and water and sanitation.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, Pandemic Influenza and other Emerging Threats, and P.L. 480 Title II).

- Vaccination (including ring vaccination) to contain a specific disease and avoid spread;
- When necessary, capacity building and training related to slaughter of animals to improve hygiene and to avoid both spread of disease among animals, and transmission to humans;
- Training for disease recognition and reporting;
- Training in treatment of disease in animals; and
- Training in management of pasture and fodder to prevent disease spread through soil microorganisms as well as to improve fodder quality and quantity.

## Health (Health Systems and Clinical Support)

Due to the impacts of disease on public health systems, epidemics can quickly overwhelm resources. DRR programs in this sector can be either stand-alone (such as contingency planning, capacity building, or early warning), or can be integrated into response and recovery programs. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential with host governments and the World Health Organization;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling;
- Health education focusing on community health workers, first responders, and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts; and
- Coordination with other public and private stakeholders with an effort towards resilience to evaluate structural needs for primary healthcare facilities in preparation for such emergencies.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Shelter and Settlements (Camp Design and Management, Emergency/Transitional Shelter, Shelter Hazard Mitigation)

A public health response to epidemic/pandemic events could entail resort to Shelter and Settlements sector interventions to protect, or even quarantine, at-risk populations from exposure and infection. Responses could include support to camp development and management activities, hosting support, or other forms of shelter and settlements assistance, again in coordination with adopted public health strategies and protocols.

## Water, Sanitation, and Hygiene (Water Supply Infrastructure, Sanitation Infrastructure, Environmental Health, Hygiene Promotion)

Epidemics can be caused by widespread contamination of drinking water supplies and the environment, poor hygiene practices, and/or by damage to sewage disposal facilities. Lack of clean water combined with poor human excreta management and poor hygiene practices raises the risks of WASH-related diseases, and epidemics can result. Lack of clean water combined with human sewage raises the risk of waterborne diseases, and epidemics can result. For this sector, stand-alone DRR programs must be strongly justified and based on the risk of the target area/population being affected by this hazard. Empowering households and promoting environmental health precautions once the epidemic has occurred are critical aims. Illustrative interventions include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Protecting water sources to prevent contamination;
- Preparedness training with community, local, national, and/or regional levels to develop coordination, planning, and technical environmental health (WASH) response capacity; and
- Particularly in urban areas, identifying critical drainage corridors/canals and strengthening local governance around managing and keeping these facilities in good working order.

# FLOOD

## ASSOCIATED SECONDARY HAZARDS: LANDSLIDE, MUDFLOW, EPIDEMIC



A flood is an inundation of an area not normally submerged. Understanding the types and causes of floods is important in taking measures to mitigate the impacts of flood hazards. Flooding can be classified as river, coastal, flash, or urban. Flooding of low-lying coastal areas, estuaries, and deltas is usually caused by coastal storm surges resulting from severe cyclonic systems, tidal waves, or tsunamis.

Excessive precipitation and/or obstruction of river flow are the most common causes of flooding along the rivers. Landslides can block the river flow leading to upstream flooding by ponding water behind the debris dam. Erosion or overtopping of debris dam due to an increase in water level behind the obstruction can cause catastrophic flooding in the downstream areas. Heavy rainfall due to tropical storms, spring rains, monsoon, snowmelt, or a combination of snowmelt and rainfall are common causes of slow onset river flooding. River floods can extend widely over areas along the river and can last for several days, and sometimes months. Since river floods rise slowly, people in the affected areas usually have enough lead-time to move to safer ground.

### Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, education, agriculture, health systems, economic growth, housing, and poverty alleviation.

Tools in the toolbox include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, Pandemic Influenza and other Emerging Threats, and P.L. 480 Title II).

#### Examples:

The town Mabitac, Philippines, floods at least six times per year. In 2011, USAID began supporting efforts to help communities to manage waste, clean up the rivers, canals, and other waterways, and create flood contingency plans. In partnership with the U.S. Forest Services, the town improved emergency management practices in partnership and trained and equipped first responders, including a highly specialized rescue team.

Flash floods are the main cause of weather-related deaths in many countries due to their rapid-onset characteristics, limited warning procedures and emergency actions, the high velocity of water flows, and the associated debris flows. The speed and power of flash floods can roll boulders, tear out trees, destroy buildings and bridges, scour out new channels, and trigger catastrophic landslides. Flash floods are commonly caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area, or heavy rains from hurricanes and tropical storms. Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam, debris dams, or reservoirs.

Extensive flat areas may be flooded by heavy rainfall ponding on the surface where ground surface is baked hard or becomes crusted. Local rainfall flooding is common in arid and semi-arid environments.

Urban floods are usually caused by water spilling over riverbanks, surface ponding of excessive rainfall, or flash floods. Urban flooding may also occur because of inefficient design capacity of storm water drains and obstruction of the drainage system by solid waste



or buildings. In addition, use of wadis/arroyos and natural drainage channels for roads and settlements during non-flood season increases vulnerability to urban flooding. The extent of settlement in steep slopes causes soil erosion and makes settlements more susceptible to landslides. The use of storm water drains as sewers increases the risk of health hazards when the storm sewers overflow on the streets during flooding.

The primary effects of flooding include loss of life, damage to agricultural lands, buildings, and infrastructures including bridges, water and sewer systems, roads, reservoirs, and canals. Infrastructure damage may also include damage to power lines or interruptions in power generation, which then can lead to cascading impact on multiple sectors, particularly if that loss of power continues for a long period of time.

An integrated approach to flood mitigation considers positive, as well as the adverse impacts of floods, the adoption of multi-functional and multi-beneficial solutions, and represents all the stakeholders within the watershed. Flood risk can be reduced by moving away from floodplain or other flood-prone areas; however, people have traditionally lived and worked by rivers, coastal areas, and lakes because of the fertile land and easy travel and access to water for agriculture, transportation, commerce, and industry. The economic impacts of flood losses, versus the efficient use of flood prone areas, the adverse impacts on the environment, and other natural resources should be taken into consideration in DRR activities.

The following OFDA sectors and sub-sectors are most likely to be funded with respect to stand-alone, flood risk reduction. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of floods. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

### **Agriculture and Food Security (Fisheries, Livestock, Seed System Security, Improving Agricultural Production/ Food Security)**

When floodwaters inundate farm land, the land is unworkable during that time, preventing crops from being planted or harvested. This can lead to shortages of food both for humans and farm animals. Entire harvests for a country can be lost in extreme flood circumstances. Livestock and pets can be stranded by rising flood waters. Depending on the flooding event, agricultural land may also undergo some degree of salinization, which may impact crop production for some time, until the salt can be leached from the soil with additional rainfall or until salt-tolerant crop varieties can be promoted. Flooding can also affect or destroy agricultural inputs, including pesticides by damaging storage facilities and causing pesticide spills, which can in turn contaminate the environment, pollute water sources, and affect human health and safety of their assets. DRR programs for agriculture and food security are normally integrated into response, and can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of the flood on future crops (including fish ponds). Stand-alone DRR programs must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Illustrative interventions in this area include the following:

- Promotion of flood-resistant or saline-resistant crop varieties for agricultural areas;
- Introduction of agriculture techniques to maximize growing season options (e.g., short cycle crops);
- Seed/feed storage;
- Implementing UN FAO standards for pesticide storage and handling, including constructing flood-resistant, pesticide storage facilities on higher ground; using durable containers; placing high-volume metal and plastic containers on pellets with no more than two layers; and providing rigorous training on pesticide safety, handling, and use; etc.;
- Developing and implementing safe and effective spill containment strategies to minimize or avoid pesticide pollution from spillages; and
- Support for fisheries livelihoods.

## Economic Recovery and Market Systems (Livelihoods Restoration, Market System Rehabilitation, Microfinance)

Floods can quickly damage or even wipe out livelihood assets and market infrastructure in both rural and urban areas. Rebuilding livelihoods, and reinforcing them to prevent repeated destruction in the future, is a critical area of work. DRR programs within this sector are normally integrated into response and recovery, such as rehabilitating market infrastructure with hazard-resistant design features. Stand-alone DRR programs must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Additionally, interventions that benefit entire market systems or larger businesses should have a significant contribution from private or public sector actors, rather than being wholly donor funded. Interventions to support agricultural or fisheries-based livelihoods and market systems should be closely linked to the Agriculture & Food Security sector. Illustrative interventions in this area include the following:

- Market assessments of critical market systems (in a participatory manner that benefits the entire humanitarian and economic recovery community) as a baseline and to predict likely disaster damage, to guide DRR or future disaster-response programming (e.g., identifying critical infrastructure or services, and likely disaster scenarios);
- Livelihood restoration and market system rehabilitation programs to specifically reduce the risk to key livelihoods and markets from floods (e.g., transportation routes, flood-resistant storage, watershed-related livelihoods); and
- Access to microfinance to encourage investment in risk reduction at the household or small business level. Please note subsector requirements for Microfinance; OFDA generally will not fund any loan capital or MFI operating costs.

## Health (Health Systems and Clinical Support)

Due to the impacts of floods on public health, epidemics can result and can be considered a possible sub-hazard. DRR programs in this sector can be either stand-alone (such as contingency planning, capacity building, or early warning), or can be integrated into response and recovery programs. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling;

- Health education focusing on community health workers, first responders, and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts; and
- Coordination with other public and private stakeholders with an effort towards resilience to evaluate structural needs for primary healthcare facilities in preparation for such emergencies.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Hydrometeorological Hazards)

Floods and associated hazards are hydrometeorological in nature. DRR programs that address this hazard may be either stand-alone (such as capacity building, preparedness, or early warning), or may be integrated into response and recovery programs. Please note that hydrometeorological structural measures that are intended to control hazards, such as levees, dams, and sea walls, are not preferred as DRR options for floods and its secondary hazards due to ineffectiveness and adverse impacts. Illustrative interventions in this area include the following:

- Capacity building on preparedness and early warning of floods and secondary hazards at community, local, national, regional, basin, or international levels;
- Flood and associated hazard early warning systems encompassing an end-to-end approach including hazard monitoring, forecasting, tools for decision makers, dissemination of warnings to stakeholders in partnership with authorized national and local entities;
- Natural and environmentally appropriate measures such as watershed or coastal management activities;
- Development of guidelines, plans, laws, rules, regulations, policies, or strategies for flood risk reduction;
- Analysis for various flood scenarios for potential dam break and other human induced floods and assistance on inspection and maintenance of dams/levees in case of significant impact
- Transboundary river forecasting, management and mitigation activities
- Community-based activities to reduce impacts of floods and secondary hazards; and
- Establishment of hydrometeorological networks to aid nationally authorized agencies depending on the purpose and scale of the program, location, proposed technology, and local capacity to operate and maintain these systems.

## Shelter and Settlements (Camp Design and Management, Emergency/Transitional Shelter, Shelter Hazard Mitigation)

The Shelter and Settlements sector is focused on reducing the impact that floods and related conditions (e.g., landslides, mudflows, etc.) have on infrastructure, services, life-line facilities, and housing, i.e., prominent elements of all settlements. In vulnerable

communities, stand-alone DRR interventions will mitigate flood damage, and prepare communities to live with the risks associated with those events. In addition, DRR is often incorporated into emergency response, paving the way to the recovery of the disaster-affected communities. Illustrative interventions in this area include the following:

- Promotion of flood-resistant shelter designs;
- Training of authorities, laborers, contractors, and humanitarian organizations in hazard-prone settlements to understand and incorporate DRR into response and development activities;
- Promotion of watershed-based settlements approaches to address multiple hazard risks in a comprehensive manner;
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels (e.g., “neighborhood approach” and “emergency master planning” in Haiti) that features identification and reduction of risks in hazard-prone settlements.

### Protection (Protection Coordination, Advocacy and Information)

Since flooding can result in significant damage to houses, displacement is a common result. DRR programs specifically aimed at protection can prepare communities in advance of flooding events to understand and address issues related to vulnerability. Training, capacity building, and strategic planning can all be stand-alone DRR programs that address protection issues prior to a disaster. DRR interventions can also be integrated into response, but these programs are less common for this sector. Illustrative interventions in this area include the following:

- Protection preparedness to ensure safety of vulnerable populations during the event, such as evacuation assistance for children, older people, and persons with disabilities
- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent family separation, special needs of vulnerable groups, importance of assuring safety for women and girls)
- Training for humanitarian organizations to assess and respond to protection risks in a disaster

### Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

### Water, Sanitation, and Hygiene (Water Supply Infrastructure, Sanitation Infrastructure, Environmental Health, Hygiene Promotion)

Floods can wreak havoc on water and sanitation systems, damaging infrastructure and contributing to widespread contamination of drinking water supplies and the environment. Floods may also cause the loss of sewage disposal facilities. Lack of clean water combined with human sewage in the flood waters raises the risk of waterborne

diseases, and epidemics can result. For this sector, stand-alone DRR programs must be strongly justified and based on the risk of the target area/population being affected by this hazard. Empowering households to prepare for floods and associated hazards along with promoting environmental health precautions once the disaster has occurred are critical aims. Illustrative interventions include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Identification of non-hazardous debris disposal sites before the event occurs, as debris can rapidly overwhelm solid waste disposal sites, posing environmental and fire hazards. Identifying sites and acquiring permission to use the sites are important steps to complete before the disaster occurs;
- Strengthening major sewage outfalls to prevent damage from flooding;
- Protecting water sources to prevent contamination with floodwaters. This may include identifying the 50 or 100 year flood elevation mark (historical flood levels) and raising existing well heads in flood zones and/or relocating wells outside of flood zones for both open wells and boreholes;
- Preparedness training with community, local, national, and/or regional levels to develop coordination, planning, and technical environmental health (WASH) response capacity; and
- Particularly in urban areas, identifying critical drainage corridors/canals and strengthening local governance around managing and keeping these facilities clear of trash and blockages.

# INFESTATION

## ASSOCIATED SECONDARY HAZARDS: EPIDEMIC



Infestations can mean disaster for millions of people whose livelihoods depend on farming. With the right conditions, pests can multiply and quickly devour or otherwise ruin crops and pasture land, leaving people and animals without enough food to eat. Farmers can see a year's worth of work and sometimes sole means of supporting their families destroyed in

moments. Farmer's food security, food quality, and seed security can all be negatively impacted by post-harvest losses due to pest infestations. Pest infestations can also lead to outbreaks of diseases in humans and animals.

Infestations can be caused by a variety of insects. Some common types include locusts, grasshoppers and African Armyworm (adults as well as larvae/hoppers). Grain-eating birds (e.g., Quelea birds), rodents; and plant diseases (e.g., wheat rust, yellow stripe rust, etc.) also damage or spoil crops and produce. In some cases, parasitic plants such as Striga can invade a crop and significantly reduce productivity to the point of a near-zero harvest. Armyworms are one of the most devastating emergency transboundary outbreak pests and are known to affect cereals and pasture in several dozen countries across Africa, Asia, North and South America, etc. Preventing and controlling these pests can significantly improve food security and livelihoods of the most vulnerable rural populations and communities. An infestation of a grain-storage unit can be particularly devastating, since the farmer's entire production for a given season can be quickly lost.

### Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, economic recovery, health, nutrition, and water and sanitation.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, and P.L. 480 Title II).

#### Examples:

USAID supports scientists in locust-affected countries by sponsoring their efforts to assess the extent of locust infestations and the severity of damage and providing technical expertise on safer and effective control interventions. USAID helps regional and national authorities coordinate and share information on monitoring, assessment, and interventions against a variety of emergency transboundary outbreak pests. These efforts help improve the ability of crop protection staff and local communities to effectively prevent and respond to the threats these pests pose to crops and pasture. USAID/OFDA is currently funding community-based armyworm monitoring, forecasting and early warning through a 10 member-country strong NGO. The program is aimed at strengthening the capacity to identify, monitor, forecast, alert and respond to armyworm infestations.

Understanding the kind of pests/diseases, life stages of the pests and the host plant/crop, intensity of infestations, the severity and nature of damage field and storage pests and disease cause as well as the presence or absence of intervention actions is essential. Infestations can greatly impact food security and livelihoods of vulnerable populations and communities. Pest infestations have forced families to trade children for a sack of grain, break up families, cause resource-based conflict among farmers and pastoralists and ultimately displace local communities.



The following OFDA sectors and sub-sectors are the ones most likely to be funded with respect to stand-alone, infestation-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of pest infestations and disease outbreaks. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels, including appropriate technical and material resources, to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

## **Agriculture and Food Security (Fisheries, Livestock, Seed System Security, Improving Agricultural Production/ Food Security)**

When pests descend on farm land, they can consume or severely damage or destroy the crops in a matter of hours. This can lead to shortages of food both for humans and farm animals. Entire harvests for a country can be lost in extreme infestation circumstances. Just as the weather can be forecast, USAID contends that favorable pest conditions can be forecast. By working together with many international, national, and local groups, USAID is investing in monitoring, early warning, and early action to control pests and prevent them from causing massive damage to the livelihoods of vulnerable communities. DRR programs for agriculture and food security can also be integrated into response, and can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of the pests. Illustrative interventions in this area include the following:

- Providing training on pest and disease identification, surveillance, monitoring and reporting as well as safer control interventions;
- Pesticides are USAID Restricted Goods. If pesticides are to be used, it is imperative to know how to procure, distribute, transport, handle, store, use and/or dispose them. When natural pesticides are proposed, properly identify the types of the pesticides and methodologies to prepare, use, store and dispose them. Identify any potential harmful effect of their use and describe the steps to take to mitigate any such adverse effects and ensure safety of the beneficiaries, their assets and the environment.
- Training on post-harvest handling and storage of seed and grain. OFDA has supported a number of activities to pilot and take to scale household level seed/ grain storage methods. OFDA can support household level storage solutions, and is particularly interested in those programs which include low cost models or market based farmer procurement of models. Training on seed selection, and post-harvest handling and storage may also be integrated as part of a DRR strategy to reduce losses to infestation.

## **Humanitarian Coordination and Information Management (Coordination, Information Management)**

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

# LANDSLIDE

## ASSOCIATED SECONDARY HAZARDS: DEBRIS AND MUD FLOW, FLOOD, TSUNAMI



The term landslide implies the movement of a mass of rock, debris or earth down a slope. Landslides can be initiated in slopes already on the brink of movement by rainfall, snowmelt, stream/ocean wave erosion, changes in water levels and ground water, earthquakes, volcanic activity, wildfires, disturbances by human activities or any combination of these factors. Slope material

that becomes saturated with water may lead to a debris flow or mud flow. Mud and debris flows have potential to rip up and move trees, houses, and cars, thus causing loss of lives and significant damage to infrastructure along its path.

Landslides can move slowly or extremely fast, as is the case with debris flows. Debris flows can be triggered by heavy rainfall over a long period, a short burst of intense rainfall, or other factors. They can travel down a slope extremely fast, at speeds up to 200 miles per hour. Wildfires may lead to hydrophobic soils in slopes that are particularly susceptible to debris flows.

The following OFDA sectors and sub-sectors are most likely to be funded with respect to stand-alone, landslide-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of landslides and associated hazards.

### Examples:

OFDA has supported the work of the U.S. Geological Survey to assess landslide hazards in the Federated States of Micronesia and create maps depicting areas most at risk to assist people evacuating from landslide-prone areas as storms approach. In August 2012, USGS completed an initial assessment of the landslide mapping and planning program and subsequently shared data with the FSM Department of Resources and Development, the U.S. National Oceanic and Atmospheric Administration (NOAA), and the Hawaii Geographic Information Coordinating Council for use in map making and further dissemination of geographic information system data.

In general, landslide-related DRR programs are most cost-effective in highly-populated urban areas, though rural populations can also be susceptible to landslides that may result from excessive rainfall, flooding, or earthquakes. Specific design elements will depend on the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

## Economic Recovery and Market Systems (Market System Rehabilitation)

The destruction of businesses, marketplaces, and infrastructure by a landslide, particularly in an urban area, can have a profound effect on the local economy. DRR programs within this sector are normally integrated into response and recovery. Stand-alone DRR programs are likely to be very limited, and closely linked to the Shelter and Settlements sector. These

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: livelihoods, incident command system, improved monitoring, infrastructure development, economic recovery, health, and water and sanitation.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, USAID Forward Initiatives, and, in some cases, P.L. 480 Title II).

must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Additionally, interventions that benefit entire market systems or larger businesses should have a significant contribution from private or public sector actors, rather than being wholly donor funded. Illustrative interventions in this area include the following:

- Public awareness, capacity building, and (as appropriate) structural measures or planning to help communities, the local private sector, and critical market infrastructure prepare for and mitigate against the risk of landslides.

## Health (Health Systems and Clinical Support)

Landslides can impact public health in several ways. The most direct impact is related to collapse of structures and resultant injuries, which may lead to an overload of the existing health system. Programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Illustrative interventions in this area include the following:

- Development of and planning disease surveillance and early warning systems focusing on diseases of epidemic potential;
- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling;
- Health education focusing on community health workers and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts;
- Coordination with other public and private stakeholders with an effort towards resilience to evaluate structural needs for primary healthcare facilities in preparation for such emergencies, aligned with the shelter and settlements sector;
- Promotion of landslide awareness among health workers; and
- Capacity building within health care services to provide appropriate, holistic psychosocial or mental health services to landslide-affected populations.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Geological Hazards, Hydrometeorological Hazards)

Many DRR activities can be implemented to minimize activities the impact of landslides, potentially saving lives and reducing the economic effects of landslides. Both stand-alone DRR programs related to landslides as well as interventions integrated into response and recovery programs will be considered in this sector. Illustrative interventions in this area include the following:

- Capacity building for local scientists and agencies on hazards and risks at community, local, national, regional, or international levels;

- Technical assistance to strengthen national or local monitoring networks;
- Public awareness and education on hazards to help prepare at-risk communities;
- Early warning systems that utilize an end-to-end system ranging from the identification of a hazard to the dissemination of information to at-risk communities; and
- Community-based watershed and land use management activities to reduce landslide risks.

## **Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)**

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## **Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)**

The Shelter and Settlements sector is the most immediately and obviously affected sector after a landslide. The loss of homes, businesses, and infrastructure can have a profound impact on nearly every other sector, from livelihoods, to health systems, to protection. For this reason, stand-alone DRR programs in this sector are encouraged in hazard-prone areas with highly vulnerable populations, and activities that reduce risk and vulnerability can be incorporated into emergency response activities in any area vulnerable to landslides.

Illustrative interventions in this area include the following:

- Hazard-based sites and settlements planning;
- Training support to promote adoption of structural measures to resist hazard and sub-hazards;
- Technical assistance and rapid capacity building targeting local building and zoning authorities;
- Public awareness and capacity building activities so that populations learn to live with contextual landslide risk; and
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels.

## **Water, Sanitation, and Hygiene (Water Supply Infrastructure, Hygiene Promotion)**

Landslides can destroy water and sanitation infrastructure, resulting in a destabilization of water supplies. This can potentially lead to the use of unsafe water sources and poor hygiene practices. When hygiene practices are compromised, disease epidemics can result. In this sector, DRR programs are normally integrated into response. Stand-alone DRR programs are possible, but must be strongly justified and based on the risk of the target area/population being affected by this hazard. Illustrative DRR interventions in this area include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta

disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;

- Capacity building on maintaining protected water supplies at community, local, and/or regional levels;
- Improving public knowledge of emergency water storage after a landslide event. (school education, public messaging, mass texting);
- Improving public knowledge of culturally appropriate emergency human waste and solid waste disposal after a landslide event (school education, public messaging, mass texting);
- Supporting emergency response planning and exercises for municipal water treatment, sewage treatment and electrical generation facilities staff and management;
- Identification and ensuring access to of alternate emergency water sources, sewage disposal and solid waste disposal sites;
- Preparedness training with community, local, national, and/or regional levels to develop coordination, planning, and technical environmental health (WASH) response capacity;
- Capacity mapping of existing resources, public and private, available for response if urban area is likely to be affected;
- Identification of and ensuring access to emergency debris disposal sites; and
- Identification and developing an emergency control plan for potential disease vectors that could emerge as a result of a landslide. This plan should be a component of the overall public health emergency response plan.



# TSUNAMI

## ASSOCIATED SECONDARY HAZARDS: FLOOD



Tsunamis are a series of ocean waves generated by large undersea disturbances, commonly caused by earthquakes, volcanic eruptions, or landslides. These waves can increase sea level by as much as a few inches to many feet, causing massive damage to coastal communities and infrastructure, inundating low-level islands, and leaving behind saline soils and water sources.

In the deep ocean, tsunamis can be small, but as they approach the coast, wave height can increase rapidly creating destructive waves. Tsunamis can strike any ocean shoreline up to many hours past the initial undersea activity. For this reason, the tsunami threat can continue for many hours as the waters move onto land, recede, and return. Sometimes the second or third waves can be more devastating than the first. A tsunami can occur during any season of the year and at any time.

When tsunami waves reach shallow water, they rise to form massive moving water called “run-up.” The run-up of water may rise to many feet high and can rush onto shore striking the coast with tremendous, destructive force.

The following OFDA sectors and sub-sectors are the ones most likely to be funded with respect to stand-alone, tsunami-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of tsunamis. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

### Examples:

OFDA has supported the development of the Early Warning System for Tsunamis and other Coastal Threats to the Caribbean and Adjacent Regions, working with the U.N. Education, Science and Cultural Organization Intergovernmental Coordination Group and its 26 member countries.

## Agriculture and Food Security (Fisheries, Livestock, Seed System Security, Improving Agricultural Production/ Food Security)

The main issues of concern are salinization of coastal agriculture lands, damage to crops already in the field, damage to and siltation of irrigation infrastructure, and loss of seed, grain, and feed due to flooding or damaged storage systems. Fisher folk can be devastated by loss of equipment, mangrove habitat / fish habitat, and marketing infrastructure. DRR programs for agriculture and food security are normally integrated into response, and can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of the tsunami on future crops (including fish ponds). Stand-alone DRR programs must be

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, economic recovery, health, nutrition, and water and sanitation.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, and P.L. 480 Title II).

strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Illustrative interventions in this area include the following:

- Promotion of saline-resistant crop varieties for agricultural areas in coastal regions;
- Introduction of agriculture techniques to maximize growing season options (e.g., short cycle crops);
- Seed/feed storage; and
- Support for fisheries livelihoods in the form of equipment, market infrastructure and habitat restoration.

## **Economic Recovery and Market Systems (Livelihoods Restoration, Market System Rehabilitation, Microfinance)**

Tsunamis can quickly damage or even wipe out livelihood assets and market infrastructure in both rural and urban areas. Rebuilding livelihoods, and reinforcing them to prevent repeated destruction in the future, is a critical area of work. DRR programs within this sector are normally integrated into response and recovery, such as rehabilitating market infrastructure with hazard-resistant design features. Stand-alone DRR programs are likely to be limited, and closely linked to the Natural and Technological Risks or the Agriculture and Food Security sectors. These must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Additionally, interventions that benefit entire market systems or larger businesses should have a significant contribution from private or public sector actors, rather than being wholly donor funded. Illustrative interventions in this area include the following:

- Market assessments of critical market systems in high tsunami risk areas (in a participatory manner that benefits the entire humanitarian and economic recovery community) as a baseline and to predict likely disaster damage, to guide DRR or future disaster-response programming (e.g., identifying critical infrastructure or services, and likely disaster scenarios);
- Livelihood restoration and market system rehabilitation programs to specifically reduce the risk to key livelihoods and markets from tsunamis (e.g., transportation routes, storage), or that raise awareness among individuals and the local private sector on safeguarding critical assets; and
- Access to microfinance to encourage investment in risk reduction at the household or small business level, or to assist microfinance institutions to prepare for tsunamis in high-risk areas. Please note subsector requirements for Microfinance; OFDA generally will not fund any loan capital or MFI operating costs.

## **Humanitarian Coordination and Information Management (Coordination, Information Management)**

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## **Natural and Technological Risks (Hydrometeorological Hazards, Geological Hazards)**

Tsunami and associated hazards are both geological and hydrometeorological in nature. DRR programs that address this hazard may be either stand-alone (such as capacity

building, preparedness, or early warning), or may be integrated into response and recovery programs. Please note that hydrometeorological structural measures that are intended to control hazards, such as sea walls, are not preferred as DRR options for tsunamis and their secondary hazards due to ineffectiveness and adverse impacts. Illustrative interventions for tsunamis include the following:

- Capacity building on preparedness and early warning of tsunami and secondary hazards at community, local, national, regional, or international levels;
- Tsunami and associated hazard early warning systems encompassing an end-to-end approach including hazard monitoring, forecasting, tools for decision makers, dissemination of warnings to stakeholders in partnership with authorized national and local entities;
- Natural and environmentally appropriate measures such as coastal management activities;
- Development of guidelines, plans, laws, rules, regulations, policies, or strategies for tsunami risk reduction; and
- Community-based activities to reduce impacts of tsunami and secondary hazards.

### Protection (Protection Coordination, Advocacy and Information)

Since the impacts of tsunamis can be life-threatening, displacement of some members of a family in search of water, food, or feed is common, and impacts all members of a household. DRR programs specifically aimed at protection can prepare communities prior to a tsunami event to understand and address issues related to vulnerability. Illustrative interventions in this area include the following:

- Training for humanitarian organizations to identify and mitigate protection risks associated with DRR programs, promote prevention through incorporation of protection into DRR program design and beneficiary selection processes, and monitor for the protection aspects of a program during implementation;
- Education for community-members about the harm of negative coping strategies, and information about available assistance programs;
- Protection preparedness to ensure safety of vulnerable populations, such as assistance for children, older people, and persons with disabilities;
- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent family separation, special needs of vulnerable groups, importance of assuring safety for women and girls); and
- Training for humanitarian organizations to assess and respond to protection risks in a disaster.

### Risk Management Policy and Practice (Building Community Awareness/Mobilization, Capacity Building and Training, Global Advocacy and Engagement, Integration/Enhancement within Education Systems and Research, Policy and Planning, Public-Private Partnerships)

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Shelter and Settlements (Camp Design and Management, Emergency/Transitional Shelter, Shelter Hazard Mitigation)

The Shelter and Settlements sector is focused on reducing the impact of tsunami through capacity building (e.g., hazard-based settlements planning activities, to include integration of evacuation planning and pathways into settlements planning) and post-event response and recovery programs so that vulnerable populations can prepare and learn to live with the risks associated with tsunami. Illustrative interventions in this area include the following:

- Promotion of tsunami-resistant shelter designs;
- Training of authorities, laborers, contractors, and humanitarian organizations in hazard-prone settlements to understand and incorporate DRR into response and development activities;
- Promotion of settlements-based approaches to address multiple hazard risks in a comprehensive manner; and
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels (e.g., “neighborhood approach” and “emergency master planning” in Haiti) that features identification and reduction of risks in hazard-prone settlements.

## Water, Sanitation, and Hygiene (Water Supply Infrastructure, Sanitation Infrastructure, Environmental Health, Hygiene Promotion)

Tsunamis and associated flooding can wreak havoc on water and sanitation systems, damaging infrastructure and contributing to widespread contamination of drinking water supplies and the environment. For this sector, stand-alone DRR programs must be strongly justified and based on the risk of the target area/population being affected by this hazard. Empowering households to prepare for tsunamis and associated hazards along with promoting environmental health precautions once the disaster has occurred are critical aims. Illustrative interventions include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Identification of non-hazardous debris disposal sites before the event occurs, as debris can rapidly overwhelm solid waste disposal sites, posing environmental and fire hazards. Identifying sites and acquiring permission to use the sites are important steps to complete before the disaster occurs;
- Strengthening major sewage outfalls to prevent damage from wave action;
- Protecting water sources to prevent contamination with surface water runoff. This may include raising well heads in coastal flood zones at both open wells and boreholes; and
- Capacity building on environmental health protection at community, local, national, and/or regional levels.

# VOLCANO

## ASSOCIATED SECONDARY HAZARDS: LANDSLIDE, MUD FLOW, PYROCLASTIC FLOW, ASHFALL, FLOOD, FIRE



Volcanic eruptions are not typically the first hazard that comes to mind when discussing disaster response and disaster risk reduction (DRR). Eruptions are often regarded as rare and mysterious events that impact few people. In reality, more than 1,500 potentially active volcanoes exist on earth, with many of them located in developing countries. Fortunately, with proper monitoring, volcanic eruptions can be forecast and end-to-end systems can be established to warn at-risk communities to evacuate out of harm's way.

Although worldwide the number of people at risk from volcanoes is lower than at risk from earthquakes, the relatively long recurrence interval for volcanic hazards (up to several centuries) can lead to complacency among at-risk communities and responders, making eruptions particularly insidious.

Since 1980, volcanic activity worldwide has killed more than 29,000 people and displaced more than 1 million others. On average, approximately 10 eruptions a year cause significant damage and casualties, while major disasters occur several times a decade. The adverse impacts of volcanic eruptions fall into two basic categories: physical harm (morbidity and mortality) and damage to local, regional, and international economies.

### Examples:

The Nevado del Ruiz Volcano in Colombia erupted in 1985, producing a lahar that inundated the town of Armero and killed an estimated 23,000 people. Since then, USAID and the U.S. Geological Survey formed the Volcano Disaster Assistance Program (VDAP) and have worked with Colombian volcanologists to improve their ability to forecast eruptions and communicate the information to at-risk communities. The program's success was shown when heightened activity in 2012 resulted in evacuations, managed by the Colombians, with minimal VDAP assistance.

The direct causes of mortality derive from the impacts of such volcanic hazards as pyroclastic flows (avalanches of hot ash, volcanic rocks, and gas that speed down the flanks of volcanoes incinerating everything in their paths), tephra (erupted fragments of volcanic rock and lava, such as ash), lahars (volcanic mudflows created when ash and water mix), volcano-induced tsunamis, debris avalanches, and, to a lesser extent, lava, gas emissions, and small volcano-related earthquakes. Hazards such as lahars and ash deposits can also cause longer-term damage that can threaten infrastructure and personal safety for months or even years after eruptions end.

Volcanic eruptions can affect most humanitarian sectors. For example, eruptions can devastate agriculture systems and livestock, contaminate water sources, impact health, cripple economies, and destroy infrastructure and property. The young and elderly

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: livelihoods, incident command system, improved monitoring, infrastructure development, economic recovery, health, and water and sanitation.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, USAID Forward Initiatives, and, in some cases, P.L. 480 Title II).

are especially susceptible to the impacts of volcanic eruptions due to their typically more restricted mobility. Additionally, the impacts of volcanic disasters on affected populations can be a source of significant psycho-social stress or trauma.

OFDA supports volcano disaster risk reduction (DRR) programs that identify needs within existing systems and increase resilience through targeted capacity building activities. The following OFDA sectors and sub-sectors are most likely to be funded with respect to stand-alone, volcano-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of eruptions and associated hazards. Specific design elements will depend on the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

### **Agriculture and Food Security (Fisheries, Livestock, Improving Agricultural Productivity/Food Security)**

The main impact of volcanoes on this sector is related to volcanic ash. Ashfall can have serious detrimental effects on agricultural crops and livestock. Ashfall can destroy or reduce pasture availability, requiring supplementary feed and/or clear water for livestock. Ashfall may also affect the productivity of crops. DRR programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Likely illustrative interventions in this sector include the following:

- Training for local farmers, fishers, and livestock holders on volcanic hazards and likely impacts on crops, fisheries, and livestock, including training on what crops are more resilient to ashfall.

### **Economic Recovery and Market Systems (Livelihoods Restoration, Market System Rehabilitation, Microfinance)**

The hazards that result from volcanic eruptions, including lahars and pyroclastic flows, can rapidly destroy or impact the livelihoods of entire populations, as well as critical market infrastructure upon which many markets and large populations depend. Restoration of these livelihoods, including the structures they are often housed in, can take years. On a positive note, market-integrated approaches to hazard reduction, if done in partnership with local government and private sector actors, can be very cost-efficient in avoiding future damage. Volcano-related DRR programs within this sector are normally integrated into response and recovery programs. Standalone DRR programming in this sector for volcano risk reduction is likely to be limited and closely tied to the Natural and Technological Hazards or Risk Management Policy and Practice sectors. Likely illustrative interventions in this sector include the following:

- Livelihoods restoration programs that raise awareness among individuals and the local private sector on safeguarding critical assets, as part of public awareness and education under the Natural and Technological Hazards sector;
- Market system rehabilitation programs, with strong local government and/or private sector contributions, and informed by careful risk and market analysis of likely risks and critical market systems, to mitigate volcano-related hazards for critical market infrastructure including roads and bridges, to the extent possible;



- Microfinance programs that train microfinance institutions to prepare for volcanoes in high-risk areas, and develop appropriate post-disaster financial services.

## Health (Health Systems and Clinical Support)

Volcanoes can impact public health in several ways. The most direct impact is related to the injuries caused by lahars, landslides, pyroclastic flows and volcanic ballistics, but volcanic ash can also have serious health implications, not just on nearby populations, but on populations tens of miles downwind in the short and long term. DRR programs in this sector will generally be integrated into response and recovery programs, or will be part of a larger multi-sectoral risk reduction program to build resilience. Illustrative interventions in this area include the following:

- A concentration on contingency planning for health services and commodities with national, provincial, and/or district level health authorities and other stakeholders. This does not include stockpiling; and
- Health education focusing on community health workers and/or healthcare professionals with small scale trainings integrated with other regional preparedness efforts.

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Geological Hazards)

While eruptions cannot be prevented, many DRR activities can be implemented to mitigate their impacts. Proper mitigation and preparedness efforts can minimize the effects of potential disasters, possibly saving lives and reducing the economic effects of volcanoes. Both stand-alone DRR programs related to volcanoes, as well as interventions integrated into response and recovery programs will be considered in this sector. Illustrative interventions in this area include the following:

- Capacity building for local scientists and agencies on volcanic hazards and risks at community, local, national, regional, or international levels;
- Technical assistance to strengthen national or local monitoring networks;
- Public awareness and education on volcano-related hazards to help prepare at-risk communities;
- Early warning systems that utilize an end-to-end system ranging from the identification of a hazard to the dissemination of information to at-risk communities; and
- Volcano hazard assessments that address the probability of a volcano erupting during a specific long-term time frame.

Depending on the location and activity of the volcano, landslides and tsunami may be generated. For additional information on DRR programs related to landslides and tsunami, please see the Landslide and Tsunami Hazard Sheets included in this packet.

Volcanic eruptions may also lead to significant alteration of river system and hydrology, which may lead to flooding during the rainy season. Volcanic lakes may also break and cause flooding at downstream. Illustrative examples of DRR under this sector include:

- Evaluation of the hydrological changes in the watershed for potential flooding; and
- Dam-break scenario analysis for crater lakes after significant precipitation or melt.

Please see the Flood Hazard Sheet for other flood-related examples.

## Protection (Protection Coordination, Advocacy and Information)

Volcanoes can have severe and sudden impacts on families, and can add significantly to the protection risks that may already exist in a community. Not only can the volcanoes themselves be life-threatening, but they often result in significant damage to housing causing displacement and separation or loss of family members. DRR programs specifically aimed at protection can prepare communities prior to an eruption to understand and address issues related to vulnerability. Training, capacity building, and strategic planning can all be stand-alone DRR programs that address protection issues prior to a disaster. Illustrative interventions in this area include the following:

- Training for humanitarian organizations to identify and mitigate protection risks associated with the disaster;
- Protection preparedness to ensure safety of vulnerable populations such as women and girls and to address special needs of groups such as older persons and persons with disabilities;
- Capacity building of authorities to understand and address protection in a disaster (e.g., measures to prevent and respond family separation, addressing special needs of vulnerable groups, importance of assuring safety for women and girls).

## Risk Management Policy and Practice

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)

Depending on the magnitude of the event, loss of homes, businesses, and infrastructure can have a profound impact on nearly every other sector, from livelihoods, to health systems, to protection. For this reason, stand-alone DRR programs in this sector are encouraged in hazard-prone areas with highly vulnerable populations, and activities that reduce risk and vulnerability can be incorporated into emergency response activities in any area vulnerable to volcanoes, as well as any resulting hazards (e.g., landslides). Illustrative interventions in this area include the following:

- Hazard-based sites and settlements planning;
- Technical assistance and rapid capacity building targeting local planning, building, and public works authorities;
- Public awareness and capacity building activities so that populations learn to live with contextual volcano-associated risk; and
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels, to include, for example, the incorporation of evacuation planning and pathways in efforts to configure and reconfigure risk-prone settlements.

## Water, Sanitation, and Hygiene (Water Supply Infrastructure, Hygiene Promotion)

Not only can flowing lava destroy water and sanitation infrastructure, but rocky soils can make WASH emergency response activities very challenging. Rocky soils, typically found near volcanoes, make it difficult to install emergency sanitation facilities as it is very hard to build typical pit latrines for displaced populations. This can potentially lead to the use of unsafe water sources, inadequate excreta management, and poor hygiene practices.

When water and wastewater systems along with hygiene practices are compromised, disease outbreaks can result. In this sector, DRR programs are normally integrated into response. Stand-alone DRR programs are possible, but must be strongly justified and based on the risk of the target area/population being affected by this hazard. Illustrative DRR interventions in this area include the following:

- Hygiene promotion programs to reduce fecal-oral disease transmission. Messaging should include household water quality protection and safe water storage, safe excreta disposal, and promotion of hand-washing. Hygiene promotion may be made directly to households and/or through community-based outlets such as schools, religious organizations, and neighborhood associations;
- Protecting water sources, especially open water sources, to prevent contamination from ashfall; and
- Capacity building on maintaining protected water supplies and wastewater systems, as well as water quality monitoring, at community, local, and/or regional levels.

# WILDFIRE

## ASSOCIATED SECONDARY HAZARDS: FLOOD, LANDSLIDE, DEBRIS FLOW



Wildfires are a growing hazard in many countries. Hotter, prolonged droughts in many parts of the world may increase the risk of wildfires in the future. Often, people can control factors contributing to this hazard before damage reaches the scale of a disaster. Wildfires do cause disaster, however, when they pose a threat to life, property, and forage. Fire is also a natural process; often fire suppression can lead to more severe

fires due to the buildup of vegetation that serves as fuel. The secondary effects of wildfires, including floods, erosion, landslides, debris flows, and changes in water quality, can be more disastrous than the fire itself. Wildfires, therefore, are an interesting hazard for the application of disaster risk reduction.

OFDA rarely responds to a disaster declaration for wildfire (only doing so when the fire threatens human health, lives, and livelihoods) but does fund programs to develop capacity among emergency response organizations, including firefighters. OFDA is interested in helping provide tools and information to identify and reduce wildfire risks. OFDA also funds programs that address sub-hazards of wildfires; please see the section on Landslides for more information.

The Risk Management Policy and Practice sector and the following sub-sectors are the ones most likely to be funded with respect to stand-alone, wildfire-related DRR: Building Community Awareness/Mobilization, Capacity Building and Training, Integration/Enhancement within Education Systems and Research, Policy and Planning, and Public-Private Partnerships. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

## Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, and economic recovery.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, and USAID Forward Initiatives).

### Examples:

OFDA is supporting South Africa in its efforts to increase capacity to respond to veld and forest fires, which regularly threaten natural and human-made resources. The Republic of South Africa does not have an official wildfire-response agency, so in 2004, a fire management program was initiated to address this threat: the Working on Fire Programme. Since that time, and with the support of OFDA, almost 3,000 responders from across southern Africa have been trained in wildfire response and Incident Command System (ICS) through courses taught both in South Africa and the U.S. with the technical support of the U.S. Forest Service. Southern Africa partners hope to further expand the adoption of ICS as a means of wildfire and all hazard response in the region.

## Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)

Depending on the magnitude of the event, loss of homes, businesses, and infrastructure can have a profound impact on nearly every other sector, from livelihoods, to health systems,

to protection. For this reason, stand-alone DRR programs in this sector are encouraged in hazard-prone areas with highly vulnerable populations, and activities that reduce risk and vulnerability can be incorporated into emergency response activities in any area vulnerable to wildfires, as well as any resulting hazards (e.g., landslides). Illustrative interventions in this area include the following:

- Hazard-based sites and settlements planning that incorporate natural firebreaks, where available, and selection and use of fire-retardant building materials to reduce risk;
- Technical assistance and rapid capacity building targeting local planning, building, and public works authorities;
- Public awareness and capacity building activities so that populations learn to live with wildfire risk; and
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels, to include, for example, the incorporation of evacuation planning and pathways in efforts to configure and reconfigure risk-prone settlements.

## SEVERE COLD WEATHER

ASSOCIATED SECONDARY HAZARDS: EPIDEMIC (HUMAN AND LIVESTOCK), FLOOD, LANDSLIDE, DZUD



Severe cold weather cannot be prevented, but with good preparedness, it does not have to lead to a disaster. The magnitude of impacts of severe cold weather are closely related to the onset, the intensity, and the duration of freezing temperatures, winds, and precipitation. Wind, precipitation, and extreme cold temperatures can potentially impact both humans and livestock and may lead to dzud—where livestock are unable to

find fodder through snow cover—as observed in parts of Mongolia. In addition, a rapid melt of above-normal snowpack in the spring, landslides, or ice-dam breaks can also lead to flooding, which can be sudden and severe.

The following OFDA sectors and sub-sectors are most likely to be funded with respect to stand-alone, cold weather-related DRR. Often, multi-sectoral programs are more effective, as program elements can build upon and reinforce one another to help make communities as resilient as possible to the impacts of severe cold weather. Specific design elements will depend on whether the project location is a rural or urban setting, whether active conflict is ongoing, and the overall capacity at all levels to prepare for and respond to disasters. In addition to the sub-sectors listed below, please note that all OFDA sub-sectors may be addressed in disaster-response interventions that incorporate elements of DRR, subject to normal technical qualifications.

### Linking to Resilience

Areas for collaboration with development colleagues to promote resilience include the following: climate change adaptation, agriculture and food security, livelihoods, economic recovery, health, nutrition, and water and sanitation. Extreme cold weather can often cause migration, requiring close coordination with other actors on internally displaced persons or refugee programs.

Tools include crisis modifiers, continuity of operations in development programs, and complementary funding from other accounts (e.g., Development Assistance, Feed the Future, Global Climate Change, USAID Forward Initiatives, Nutrition, and P.L. 480 Title II).

#### Examples:

In Afghanistan, more than 80 percent of farming families depend on the potato for food during winter when extreme cold and heavy snow cut homes off from town centers for up to four months. USAID and its partners are working with farmers and government agricultural extension workers in 12 villages in Ghor Province to improve potato storage practices, seed production, and planting techniques. Farmers that once lost up to 50 percent of stored potato seeds are losing just 5 percent with the improved storage pits. The potatoes stored for eating are also better quality and lasting up to two months longer.

### Agriculture and Food Security (Fisheries, Livestock, Pests and Pesticides, Seed System Security, Improving Agricultural Production/Food Security, Irrigation)

The agriculture and food security sector may be severely impacted by severe cold weather, depending on the timing and duration of the event. If cold weather begins early or lingers into planting season, this may affect the overall planting cycle, either killing young seedlings or reducing or destroying harvests. As a result, farmers may experience reduction of grain, seed quality and quantity, livestock feed, and aquaculture production, in addition to an overall reduction in their own household food security. Livestock may experience severe hardship, both from lack of water and lack of feed, and exposure to wind and severely cold temperatures, which can lead to death. In some cases, weakened animals and fish may be subject to increased risk of disease. DRR programs for areas likely to be exposed to cold



weather may either be stand-alone, or may be integrated into response. These programs can include training and capacity building, provision of inputs, and technical assistance for mitigating the impact of severe cold weather on productivity. Illustrative interventions in this area include the following:

- Training programs to address sheltering and herd management in extreme cold weather events;
- Vaccination and parasite control programs to improve animal health and reduce animal mortality;
- Testing and training related to new agricultural crops that can tolerate cold weather; and
- Activities to enhance water availability for livestock during cold weather events.

## Economic Recovery and Market Systems (Market System Rehabilitation)

The destruction of economic assets and market infrastructure by severe cold weather and its aftereffects can have a profound effect on the local economy. DRR programs within this sector are normally integrated into response and recovery. Stand-alone DRR programs are likely to be very limited, and closely linked to the Agriculture & Food Security, Natural & Technological Risks, or Shelter & Settlements, sectors. These must be strongly justified and based on the risk of the target area and vulnerability of the population affected by this hazard. Additionally, interventions that benefit entire market systems or larger businesses should have a significant contribution from private or public sector actors, rather than being wholly donor funded. Illustrative interventions in this area include the following:

- Public awareness, training and capacity building, and planning to assist communities and the local private sector to prepare for and mitigate against the risk of severe cold weather

## Humanitarian Coordination and Information Management (Coordination, Information Management)

Programs that address coordination and information management are typically categorized under the Humanitarian Coordination and Information Management Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Natural and Technological Risks (Hydrometeorological Hazards)

Cold weather is a recurring meteorological event that is part of natural climate variability. Cold weather may cross national boundaries and have cascading impacts. DRR programs that address this hazard may be either stand-alone (such as capacity building, preparedness or early warning), or may be integrated into response and recovery programs. Illustrative interventions in this area include the following:

- Capacity building on preparedness and cold weather and snow-melt monitoring and early warning at community, local, national, regional, or international levels;
- Development and implementation of cold weather emergency plans and integrated cold weather management at local, national, and regional levels;
- Monitoring river systems prone to ice jams and ice-dam breaks; and
- Monitoring potential landslides due to snowmelt.

## Risk Management Policy and Practice

Programs that address multiple hazards or the policy dimension of disaster risk reduction are typically categorized under the Risk Management Policy and Practice Sector and its respective sub-sectors. Please see the introduction earlier in this document for more information and for illustrative examples of DRR programs likely to be funded within this sector.

## Shelter and Settlements (Emergency/Transitional Shelter, Shelter Hazard Mitigation, Camp Design and Management)

The Shelter and Settlements sector is focused on reducing the impact that severe cold weather has on people and their settlements. In vulnerable communities, stand-alone DRR interventions will improve shelter quality to conserve warmth. In addition, DRR can be incorporated into emergency response, paving the way to the recovery of the disaster-affected communities. Illustrative interventions in this area include the following:

- Training of authorities, laborers, contractors, and humanitarian organizations to understand and incorporate cold weather considerations into shelter and settlements response and development activities;
- Promotion of watershed-based settlements approaches to address multiple hazard risks in a comprehensive manner;
- Support of settlements planning activities and related capacity building and awareness-raising at the neighborhood and jurisdictional levels.

## RESOURCES

- Pounds of Prevention Stories:  
<http://www.usaid.gov/what-we-do/working-crises-and-conflict/disaster-risk-reduction/resources>
- Regional USAID/OFDA Newsletters:  
<http://www.usaid.gov/what-we-do/working-crises-and-conflict/crisis-response/resources/usaids-ofda-newsletters>
- Technical Sector Quarterly Bulletins:  
<http://www.usaid.gov/what-we-do/working-crises-and-conflict/responding-times-crisis/how-we-do-it/humanitarian-sectors>
- USAID/OFDA Disaster Risk Reduction Fact Sheets  
<http://www.usaid.gov/what-we-do/working-crises-and-conflict/disaster-risk-reduction/resources>
- USAID/OFDA Disaster Risk Reduction for Resilience: A Conceptual Framework:  
[https://intranet.ofda.gov/Documents/drr/drr\\_framework.pdf](https://intranet.ofda.gov/Documents/drr/drr_framework.pdf)
- USAID/OFDA Guidelines for Proposals:  
[http://www.usaid.gov/sites/default/files/documents/1866/guidelines\\_for\\_proposals\\_2012.pdf](http://www.usaid.gov/sites/default/files/documents/1866/guidelines_for_proposals_2012.pdf)
- USAID/OFDA Humanitarian Shelter and Settlements Sector Update – May 2012 with Neighborhood Approach:  
<http://www.cidi.org/wp-content/uploads/20120500-usaid-sheltersettlements.pdf>
- USAID/OFDA Intranet DRR Resources Home Page:  
<https://intranet.ofda.gov/Pages/drr/default.aspx>
- USAID/OFDA Strategic Approach for Disaster Risk Reduction:  
[https://intranet.ofda.gov/Documents/drr/strategic\\_approach.pdf](https://intranet.ofda.gov/Documents/drr/strategic_approach.pdf)

