

**CLIMATE
CHANGE
SERIES**

PART 2

DISASTER RISK
REDUCTION

PREDICT
PREVENT
PREPARE
PROTECT

**REDUCE
RISK AND
RAISE
RESILIENCE**





disaster risk reduction

“ The promotion of a culture of prevention, including through the mobilization of adequate resources for disaster risk reduction, is an investment for the future with substantial returns. ”

—World Conference on
Disaster Reduction, General
Considerations, Hyogo Framework for Action
2005-2015

Myanmar: One year after Cyclone Nargis

Photo: Khaing Min Htoo

REDUCE RISK

RAISE RESILIENCE

When World Vision first met nine-year-old Nway in the wake of Cyclone Nargis as she stumbled around the ruins of her cyclone-ravished school (page 7), she carried a blank look on her face – every member of her family had been killed. One year on, Nway (in green T-shirt on left) can again smile at the future. ⁽¹⁾ Nway was with her aunt when the cyclone struck. The pair squeezed into the village headman's house along with 100 other people. After hours of lashing rain and 240km/h winds, night turned to day and revealed flattened rice crops, flooded roadways, houses reduced to rubble and an unprecedented death toll. In Nway's village, located hours by boat from the nearest town, 120 people out of a population of 430 had lost their lives. Nway recalls: "When I walked to my Aunt's house that day I passed lots of dead bodies. I wanted to help, but I was too scared. I only helped clean up my Auntie's yard." With a death toll of more than 140,000 people, Cyclone Nargis entered the history books as one of the deadliest cyclones of all times. Few disasters have engendered so many calls for better "disaster preparedness." While disaster events cannot always be prevented, their risk can be significantly reduced. This publication explores why a warming world makes reducing risk and raising resilience increasingly indispensable.

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Climate Change Series

Around the globe World Vision is witnessing first hand the devastating impact of climate change on poor communities. Governments, non-governmental organisations and communities are grappling to adapt to new threats and their impacts. We have much to learn. In this series of publications, World Vision is seeking to identify concrete responses to climate change both at the programming and policy levels.

LIST OF ACRONYMS

ADP – Area Development Programme
ANCP – AusAID-NGO Cooperation Agreement
BADC – Bangladesh Agriculture Development Cooperation
CERDM – Community Emergency Response and Disaster Mitigation
CRMP – Coastal Resources Management Plan
CRWG – Community Resilience Working Group
DRR – Disaster Risk Reduction
EM-DAT – Emergency Events Data Base
GDP – Gross Domestic Product
GNI – Gross National Income
HFA – Hyogo Framework for Action
KPI – Key Performance Indicator
LAC – Latin America and Caribbean
NGO – Non-Government Organisation
ODA – Official Development Assistance
UNDP – United Nations Development Programme
UNISDR – United Nations International Strategy for Disaster Reduction
All amounts shown in \$ are U.S. dollars unless otherwise indicated

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CYCLONE NARGIS

FROM ABOVE

Photo: NASA Terra Satellite, Pixel size: 250m

Cyclone Nargis: This image from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite shows Tropical Cyclone Nargis on 1 May 2008, one day before making landfall in Myanmar.

Executive Summary

Cyclone Nargis struck Myanmar on the evening of 2 May 2008. It affected 2.4 million people across the Irrawaddy Delta. More than 140,000 people died, and the Irrawaddy Delta, a fertile rice farming region often referred to as Asia's rice bowl, suffered severe damage. The storm surge accompanying cyclone Nargis travelled some 35km inland, flooding 14,400 square kilometres, an area one third the size of Switzerland.

Disaster Risk Reduction: Disasters occur when hazards and vulnerabilities combine. In the simplest of terms, "disaster risk" is the assessed level of threat facing a vulnerable community through exposure to hazards. Communities can be vulnerable in numerous ways (e.g. physically, socially, economically or environmentally) as they face exposure to numerous hazards (e.g. earthquakes, volcanoes, storms, etc). This assessed level of threat, or "disaster risk," can be expressed as a simple equation with three variables:

Disaster Risk = (hazards x vulnerabilities) / capacity
Consequently, disaster risk can be reduced either by decreasing the hazards and/or vulnerabilities or by increasing the capacities (or both). Over recent decades, climate change has emerged as a new driver of disaster risk by increasing both hazards and vulnerabilities. This trend requires a stronger commitment to raising capacity. The poorest countries are likely to suffer the greatest human cost from

disasters. In 2008, Djibouti, Tajikistan, Somalia and Eritrea had the highest number of victims per 100,000 inhabitants. Property damage from natural disasters has also been progressively rising. Losses (in constant prices) rose from \$75.5 billion in the 1960s to \$659.9 billion in the 1990s. The scale of the probable impact of climate change on disaster risk reduction (DRR) means that the DRR community may need to broaden its focus beyond its traditional activities of relief and capacity building, to include advocacy for climate change mitigation and sustainable, pro-poor and low carbon growth. As an international child-focused human development organisation with more than 50 years experience in disaster relief and poverty reduction, World Vision believes a range of actions are necessary to achieve and sustain long-term improvements in DRR capacity both at the grassroots community and macro policy making levels. This short publication explores ways and means.

CYCLONE NARGIS

FROM BELOW



Photo: Wah Eh Htoo

Irrawaddy Delta, Myanmar: Cyclone Nargis obliterates Nway's school

Introduction

“Climate change is altering the face of disaster risk, not only through increased weather-related risks and sea-level and temperature rise, but also through increases in societal vulnerabilities from stresses on water availability, agriculture and ecosystems. Disaster risk reduction and climate change mitigation and adaptation share a common space of concern: reducing the vulnerability of communities and achieving sustainable development.”
(United Nations International Strategy for Disaster Reduction, UNISDR) ⁽²⁾

Rising Risks, Risking Lives: Disaster risk is the product of vulnerable communities being exposed to hazards. The more vulnerable the community – physically, socially, economically or environmentally – the greater the injury, death, property damage or other disruption from the event. When considering disaster risk, there are two perennial facts: natural disasters have always occurred, and the poor suffer most from them. We now need to add a new fact for the 21st century: climate change due to human caused global warming is increasing the frequency and severity of natural disasters, both the rapid onset kind such as storms and floods, and slower onset calamities such as heatwaves, droughts and rising sea levels. As the United Nations International Strategy for Disaster Reduction (UNISDR) has observed (quote above), ⁽²⁾ reduced vulnerability and sustainable development lie at the heart of DRR.

The interaction of climate change with natural disasters is elevating disaster risk from a regional to a global problem of increasing complexity.

Disaster risk is increasingly of global concern and its impact and actions in one region can have an impact on risks in another, and vice versa. This, compounded by increasing vulnerabilities related to changing demographic, technological and socio-economic conditions, unplanned urbanisation, development within high-risk zones, under-development, environmental degradation, climate variability, climate change, geological hazards, competition for scarce resources, and the impact of epidemics such as HIV/AIDS, points to a future where disasters could increasingly threaten the world's economy, and its population and the sustainable development of developing countries. ⁽³⁾

The expanding geographical reach of natural disasters, coupled with the daunting complexity of climate change, raises numerous questions for those involved with disaster risk reduction (DRR). Important areas of uncertainty have been highlighted by the Global Environmental Change and Human Security Project. ⁽⁴⁾ Questions include

- How do factors such as gender, age, class, education, culture, traditions, and living conditions influence climate risk and vulnerability?
- How will climate change influence the capacity of individuals, communities, businesses, governments, and NGOs to respond to multiple and interacting stressors?
- How will gradual changes in climate affect people's vulnerability to disasters and erode their resilience and livelihoods?
- How do responses to climate change, including disaster risk reduction strategies aimed at reducing vulnerability, affect the diversity of needs and values that contribute to human well-being?
- Whose security is most threatened by climate change and why?
- What categories of action and which investments appear to be the most effective for promoting adaptation and risk reduction?

Global Responses: Answering these questions requires coordinated action. Progress towards unifying international DRR efforts came with the adoption by 168 governments of the Hyogo Framework for Action (HFA). The HFA is an international outline for DRR arising out of the World Conference on Disaster Reduction held in Hyogo, Japan in January 2005. Its five key priorities for action are

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels.

More recently, the Bali Action Plan ⁽⁵⁾ included international cooperation on urgent climate change adaptation in developing countries as one of its four building blocks. DRR strategies and risk transfer mechanisms, including insurance, were identified as elements of a new climate change treaty. ⁽⁶⁾ And acknowledging that adaptation is essential for all countries, the Parties to the UN Framework Convention on Climate Change also agreed to work on the scientific, technical, and socioeconomic aspects of climate change adaptation through the Nairobi Work Programme. This Programme promotes integration of climate risk assessment, management and DRR strategies into national policies and programmes. ⁽⁷⁾

World Vision is committed to implementing the HFA in its own development work, as well as advocating for effective DRR measures at all levels. ⁽⁸⁾ But as climate-related disasters are increasing, pressure is mounting for governments and humanitarian agencies to move faster in mainstreaming DRR into their development programming activities.

The remainder of this report looks at critical issues for DRR, including challenges resulting from the changing face of disasters in a warming world, and the opportunity for World Vision to use its experience to play a significant role in expanding international humanitarian efforts needed to help the most vulnerable, particularly children, recover from natural disasters and increase their resilience to future climate-induced setbacks. We will see how climate change drives disasters in many ways. The next chapter looks at predictions for the future.

CYCLICAL CYCLONES



Photo: Amio Ascension

After Cyclone Alia, Bangladesh: Sabina and her family members Ahid Hasan (4), daughter Shahina Sultana (12), husband Ajar Morol (50), and son Jahid Hasan (14), in front of their destroyed house in Khalishabunia, 360km south of Dhaka (from left to right).

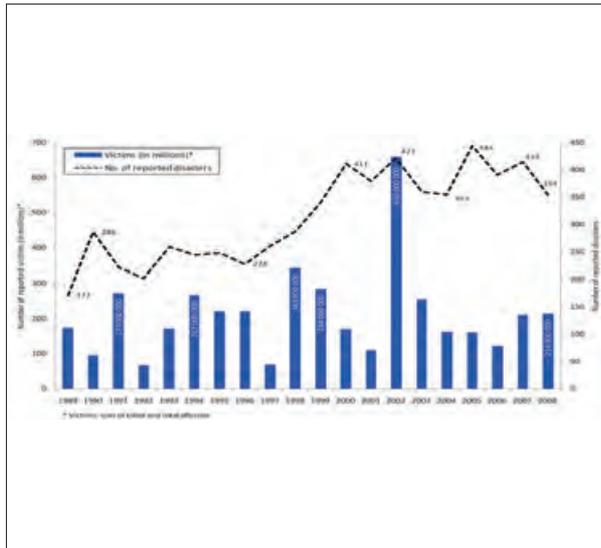
Climate Change And Disasters: Swifter, Higher, Stronger

DRR – Definition: “Actions taken to ‘systematically identify and reduce the vulnerabilities to the various hazards faced, whether related and/or unrelated to climate change. The measures needed, be they termed ‘disaster risk reduction’ or ‘adaptation,’ are in many cases the same. They include protection of environmental resources, land use planning and zoning, building codes and their enforcement, risk assessments and early warning systems, public awareness and education programmes, and most importantly sustained political commitment, policies, budgets and administrative systems to drive and support an effective risk reduction agenda.”
(United Nations International Strategy for Disaster Reduction, UNISDR) ⁽⁹⁾

Climate Change Challenges: Global warming is predicted to drive disasters in a complex range of ways. Some effects will be direct, others indirect. Some events rapid onset, others slow onset. Most change will come through natural forces, some through influencing human actions. If the DRR community is to have any lasting success in managing, stabilising and limiting disaster risk in the 21st century, it will need to consider *all* ways in which climate change influences the type, intensity and frequency of disaster risk. An important challenge facing DRR advocates is that the link between global warming and the increasing number of intense climatic events is highly complex. Hence forecasting the pattern of future extreme events – types, number and locations – is extremely difficult. An idea of the scale of

natural disasters and trends in disasters over time can be gained from data collected by the UNISDR and the International Emergency Events Data Base (EM-DAT). Five broad categories are identified ⁽¹⁰⁾ – *geophysical or geological* disasters (i.e. originating from solid earth); *meteorological* events (i.e. caused by short-lived atmospheric processes); *hydrological* disasters (i.e. wind-induced water disasters); ⁽¹¹⁾ *climatological* catastrophes (i.e. due to long-lived intra-seasonal to multi-decadal processes); and *biological* disasters (i.e. due to exposure to germs and toxic substances). While there is considerable variation year to year in the intensity of disasters (as measured by the number of victims), aggregate data for the past two decades suggests a steady rise in their frequency (see chart 1 overleaf).

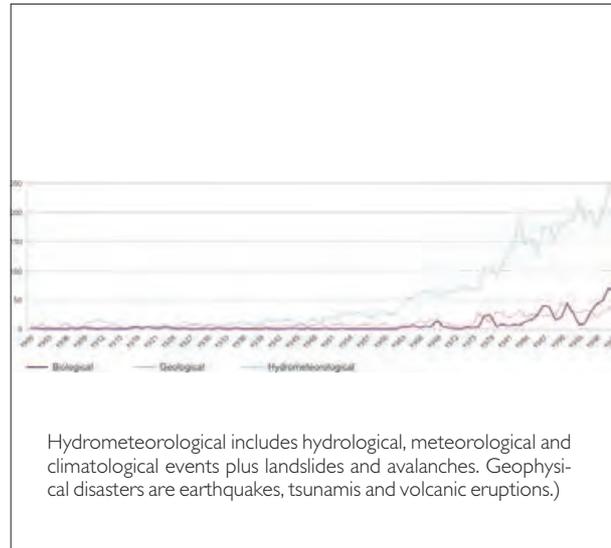
Chart 1: Disaster Trends (Short-Term)



Number and Victims of Natural Disasters (1989-2008)

Dotted Line: Number of reported disasters
 Blue Bar Chart: Victims (in millions); Source: ISDR, available:
http://www.emdat.be/Documents/Publications/ADSR_2008.pdf

Chart 2: Disaster Trends (Long-Term)



Number of Natural Disasters (EM-DAT, 1900-2005)

Purple Line: Biological Disasters, Pink Line: Geological Disasters
 Blue Line: Hydrometeorological Disasters; Source: ISDR;
<http://unisdr.org/disaster-statistics/occurrence-trends-century.htm>

Taking a longer view, the upwards movement in the frequency of disasters, particularly those caused by extreme weather, is more dramatic (see chart 2). Evidence is accumulating that this rise in weather-related disasters from the middle of the 20th century is consistent with our growing understanding of climate change and how it contributes to severe weather events. In a report prepared for the European Parliament, Jason Anderson and Camilla Bausch (12) conclude that

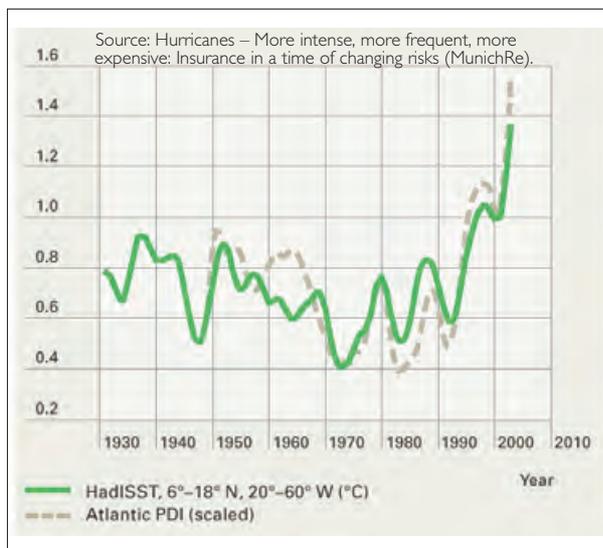
- there is strong evidence that mean temperatures are rising, that extreme events such as the 2003 heatwaves in Europe 'are simply inconsistent with

natural cycles,' and that there is a greater chance of similar extreme heat events than was previously thought

- rainfall is heavier and drought more pervasive, but increased flooding globally is harder to demonstrate because of inadequate data
- data on severe windstorms does not indicate any worsening, but hurricanes are becoming more intense

Evidence from a variety of other sources underscores the increasing frequency and severity of extreme weather events. For example

Chart 3: Hotter And Stronger



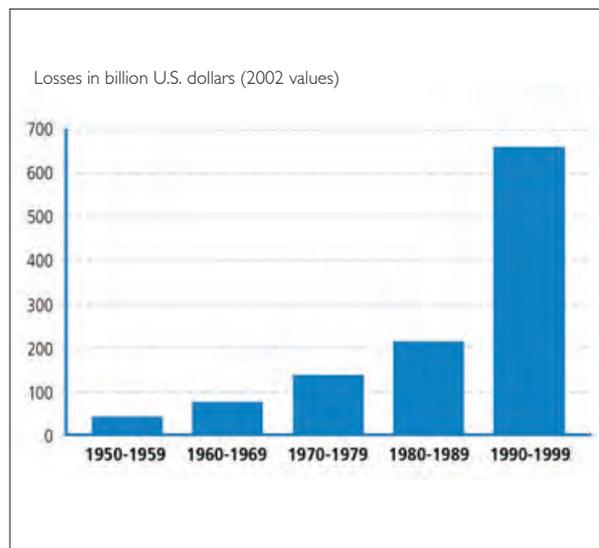
Sea Surface Temperature* and Cyclone Intensity**

* Hadley Centre Dataset (HadISST)

** Atlantic Power Dissipation Index (PDI); Source: Munich Re
http://www.munichre.com/publications/302-04891_en.pdf

- Since the 1960s, droughts typically occurred in Uganda every 5-10 years. Between 1991 and 2000, there were seven droughts. ⁽¹³⁾
- The destructive impact of hurricanes in both the Atlantic and the Pacific has increased. Over the past 30 years, the wind speed and duration of tropical cyclones has increased by 70%. ⁽¹⁴⁾
- The destructiveness of tropical storms from 1958-2001 has increased by 60%. ⁽¹⁵⁾
- As chart 3 suggests, there is a correlation between rising sea surface temperatures and the intensity of cyclones. ⁽¹⁶⁾

Chart 4: Onwards And Upwards



Economic Disaster Losses (1950-2000)

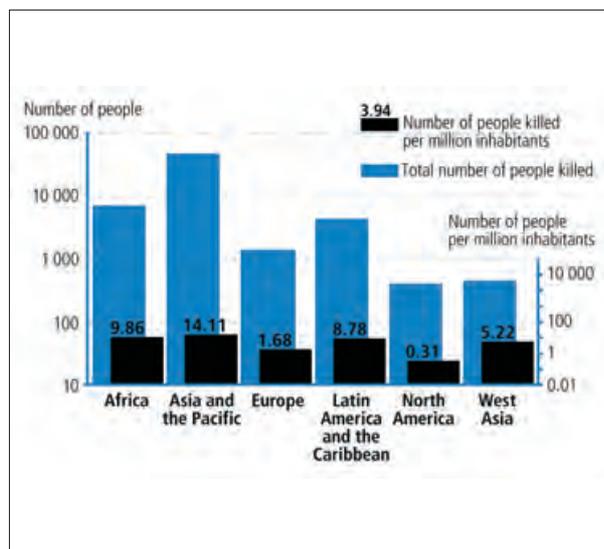
Root Source: Munich Re. Cited in: UNDP Reducing Disaster Risk: A challenge for Development (2004), pp.13-14.

http://undp.org/cpr/dsred/documents/publications/rdr/english/rdr_english.pdf

- In a survey of literature on the extent and causes of more intense hurricanes, Christopher Bals concludes: 'The balance of evidence has been shifted. Strong arguments now point in [the] direction of a hypothesis, which had few supporters even two years ago: that global warming has an increasing effect on the planet's most devastating storms.' ⁽¹⁷⁾

Another recent study examined the relationship between hurricanes in the North Atlantic, Caribbean Sea and Gulf of Mexico between 1965 and 2005 and concludes:

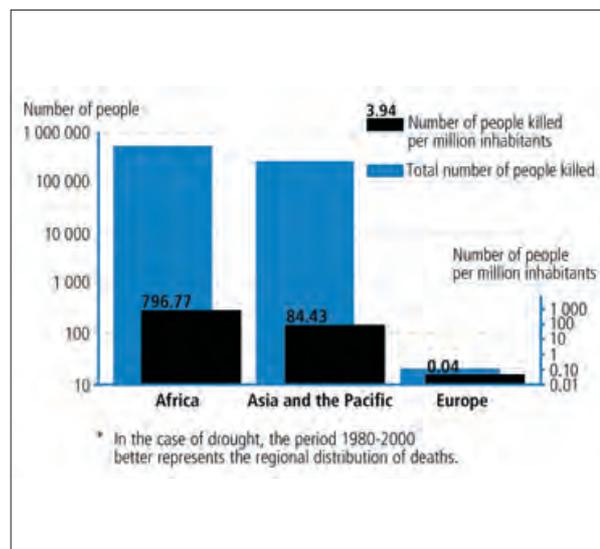
Chart 5: Floods (1990-1999)



Total Regional Mortality, Floods (1990-1999)

Root Source: EM-DATInternational Disaster Database. Cited in: UNDP Reducing Disaster Risk: A challenge for Development (2004) p.14 http://undp.org/cpr/disred/documents/publications/rdr/english/rdr_english.pdf

Chart 6: Droughts (1980-2000)



Total Regional Mortality, Droughts (1980-2000)

Root Source: EM-DATInternational Disaster Database. Cited in: UNDP Reducing Disaster Risk: A challenge for Development (2004) p.14 http://undp.org/cpr/disred/documents/publications/rdr/english/rdr_english.pdf

Our results indicate that the sensitivity of tropical Atlantic hurricane activity to August-September sea surface temperature over the period we consider is such that a 0.5°C increase in sea surface temperature is associated with a 40% increase in hurricane frequency and activity. The results also indicate that local sea surface warming was responsible for 40% of the increase in hurricane activity relative to the 1950-2000 average between 1996 and 2005. (18)

Disasters are certainly becoming increasingly costly in terms of lives lost and destruction caused. Between 1995 and 2004, disasters affected an estimated 2.5 billion peo-

ple, claiming 890,000 lives, and costing \$570 billion. (19a) As chart 4 (page 11) shows, economic losses (in constant prices) from natural disasters rose from an average of \$75.5 billion in the 1960s to \$659.9 billion in the 1990s. Also, while the death toll from disasters, especially drought and large-scale flooding generally decreased during the past century, there is evidence that this trend is reversing, probably reflecting rising populations, and more people living in hazardous, often coastal, areas. (19b)

Disasters are not confined to developing countries, but the poorest often pay the highest human cost. While the majority of financial losses listed in the previous paragraph

were sustained in the industrialised world (reflecting higher value infrastructure and insurance levels), the poor often bear huge costs from lost lives and livelihoods. ⁽²⁰⁾ So, for example, while most disasters in 2008 occurred in China, the U.S., the Philippines and Indonesia, it was Djibouti, Tajikistan, Somalia and Eritrea that had the highest number of victims per 100,000 inhabitants. ⁽²¹⁾ The disproportional human impact on the poor is also evident from the effects of droughts and floods (see charts 5 and 6 on page 12). Observable trends in developing countries are likely to exacerbate current impacts. With 90% of global population growth taking place in developing countries, existing vulnerabilities are likely to increase. As the World Bank notes: 'the greatest potential for disasters exists in the one hundred most populous cities' – 80% of the world's largest cities are in developing countries. ⁽²²⁾ And by no means least, natural disasters jeopardize achieving the Millennium Development Goals. ⁽²³⁾



Photo: World Vision Vietnam

Flooded Rail Tracks in Vietnam: The destruction of assets and livelihoods can unwind years of development gains.

Case Study I: Vietnam – Reducing Storm And Flood Vulnerability

Context

Vietnam has a long history of dealing with natural disasters. On average there are six to eight typhoons each year, and flooding occurs frequently in river deltas and across large tracts of low-lying land. ⁽²⁴⁾ The rural poor are particularly exposed to natural disasters because they have limited resources to protect themselves from extreme weather events, and they rely on the natural environment for their primary source of income. Vulnerability to disasters is a critical factor in the persistence of chronic poverty in the central regions of Vietnam.

Climate Change

Over the past 15 years, Vietnam has made significant progress in alleviating poverty and moving towards achieving the Millennium Development Goals. However, climate change now poses a threat to these gains, and endangers the livelihoods of some of Vietnam's most vulnerable communities. According to World Bank projections, its long coastline and densely populated river deltas have placed Vietnam among the top five countries most affected by rising sea levels. ⁽²⁵⁾ In 1998, saltwater intrusion caused severe salinisation up to 15km inland. ⁽²⁶⁾ If sea levels rise by one metre by 2100, up to 22 million Vietnamese people will be displaced, and the country risks losing 10 percent of its GDP. ⁽²⁷⁾ Other impacts of climate change are already being observed; summers are becoming hotter, with average temperatures increasing 0.1 - 0.3°C per decade. Heavy rain, droughts and floods are becoming more frequent, particularly in the central coastal provinces. ⁽²⁸⁾ In 1996 and 2001 alone, extreme flooding in Vietnam's Red River Delta, Mekong Delta, and Central Region caused damage to millions of houses, thousands of classrooms and hundreds of hospitals, as well as damaging over 400,000ha of

rice-growing land. Total damage was estimated at \$680 million. ⁽²⁹⁾ The human cost of climate change is likely to be severe. In the extreme floods of 1996 and 2001, over 1,600 people were reported to have died. ⁽³⁰⁾ Diseases such as dengue fever, malaria and avian flu are all likely to spread. ⁽³¹⁾ The poor are far more likely to live in areas vulnerable to flooding, and generally do not live in robust, disaster-resistant housing. Loss of employment opportunities, or even a small decline in income due to natural disasters has adverse consequences for nutrition, health and education. Acknowledging the country's vulnerability, the Vietnamese government announced in December 2008 that \$143 million would be spent from 2009-2015 to address climate change. Moreover, the Government's Comprehensive Poverty Reduction and Growth Strategy recognises the link between poverty and vulnerability to natural disasters, and aims to 'halve the number of people falling back into poverty due to calamities... by 2010.' ⁽³²⁾

World Vision's Work

Reflecting Vietnam's exposure to natural disasters and vulnerability to climate change, World Vision is working in Quang Ngai province to strengthen community resilience to natural disasters through planning and preparedness, and by diversifying income sources. The province of Quang Ngai is annually affected by flooding, and frequently by typhoons. During the wet season, Quang Ngai also experiences considerable salt water inundation. In Duc Pho and Mo Duc, the two districts of Quang Ngai province where World Vision is active, 94% of the population is considered rural, with rice paddies the predominant feature of the landscape. Ninety percent of households rely on agriculture (predominantly rice) and aquaculture (fish) for their principle income. In the district of Mo Duc, there has been a significant decrease in rice production in the last decade because the winter crop has often been reduced or ruined by flooding. ⁽³³⁾ Mo Duc is also short of productive agricultural land, such that the average planted area per family is only 0.5ha, compared to the national average

of 0.8ha. Households consume up to 80% of the rice they produce, which greatly limits accumulation of savings. World Vision Vietnam's project for reducing storm and flood vulnerability targets 10 communes in the Mo Duc and Duc Pho districts where agriculture and aquaculture activities are particularly at risk during the typhoon season. DRR plans have made the communes more resilient. School-based disaster preparedness programmes have engaged with children who are most at risk when natural disasters hit. An important aspect of the project is the promotion of alternative income sources to minimise the impact on lost livelihoods or fishing equipment in extreme weather events. Community members are being assisted to engage in activities such as animal husbandry, fish sauce production, fish farming, mushroom production, broom making, vegetable cultivation and the establishment of other small businesses. A revolving fund has been established to provide funds for household flood-preparedness. Foundations have been raised, beams fortified, roofing tied down or replaced, and walls strengthened to make houses more resistant to the impact of storms and floods. The project is also upgrading basic community infrastructure, providing motor boats, life buoys, electricity generators and early warning systems for targeted communities.

Achievements

- **DRR plans are available in 41 hamlets.** They detail activities such as well covering, caring for vulnerable family members (e.g. pregnant women or the elderly), and identifying safe locations and escape routes
- **572 teachers and 5,740 students** have received disaster risk reduction training in school-based interventions.
- **100 Hamlet Facilitators** and 10 Commune Rescue Teams and have received training in first aid and DRR planning. They have been tasked to pass on their skills and knowledge to people in other vulnerable areas.

- **8 Commune Rescue Teams** were provided with motor boats, lifejackets, lifebuoys, first aid kits, tents and other emergency equipment. This equipment was crucial to the teams' response in 2006 when Typhoon Xangsane struck.
- **To date, 2583 families have been assisted** through loans to diversify and increase their incomes. The revolving fund, managed by the Vietnam Women's Union in cooperation with World Vision Vietnam, provided funds to 1,000 households in 50 hamlets to reinforce dwellings. The loan repayment rate was 90% (in 2009).
- **41 villages have built infrastructure** capable of withstanding storms and floods. These include day-care centres, medical stations, concrete bridges and rural roads. Kindergartens, health centres and schools have been able to stay open during the flood and storm season, and are also used as evacuation and temporary shelters during heavy floods. One participant from Duc Minh commented "After the house was repaired, my children and I feel very safe and happy. We do not worry whenever a storm or flood comes."

Still Much To Do

In Quang Ngai, World Vision's project for reducing flood and storm vulnerability has simultaneously helped alleviate poverty and strengthen local capacity to adapt to a rapidly changing climate. While progress on integrating household and hamlet DRR plans has been satisfactory up to the commune level, the process remains yet to be extended up to the district and provincial levels. This presents numerous challenges. Meanwhile the incidence and intensity of natural disasters in central Vietnam continue to present real and immediate threats to human development work. Bracing poor communities to face these threats and helping them prepare for less predictable weather patterns is therefore central to the work of World Vision.



World Vision-sponsored disaster simulation



Training for disaster response in Vietnam:

With the likelihood of extreme weather events increasing, the role of Commune Rescue Teams will be increasingly important.

MANGROVE MATTERS



Photo: Andrew Goodwin, World Vision Philippines

Case Study 2: Coastal Management in the Philippines

Working with community and project partners in the Philippines, World Vision rehabilitates mangroves to help protect corals by reducing the amount of silt drawn out with the tides. Mangroves also play an important role as cost-effective reinforcements against storm surges, tsunami and sea level rise, for communities that cannot afford expensive infrastructural protection.

Right Here, Right Now: For the Philippines, climate change is not a distant threat – it is an ever-present reality. The wet season, which usually begins in March, has recently been delayed until as late as May, resulting in lower agricultural production and deteriorating food security for rural communities. ⁽³⁴⁾ While the Philippines is naturally prone to typhoons, there has been a four-fold increase in their frequency from 1990-2003. Recorded floods and storms have also risen sharply due to increasingly erratic and intense rainfall. These changes to precipitation patterns recurrently lead to large-scale natural disasters that kill people and livestock, cause landslides, damage crops, contaminate fishing grounds, destroy infrastructure and increase soil erosion. Since 1979, ocean acidification has contributed significantly to coral bleaching, an indication that reefs are under increasing stress. The year 1997-98 saw mass coral bleaching across reefs in Southeast Asia, re-

sulting in the loss of up to 46% of live coral cover in Filipino coastal waters. ⁽³⁵⁾ Rising sea levels are already evident in major coastal cities in the Philippines, ⁽³⁶⁾ and seawater intrusion into groundwater resources has occurred in the northern part of Luzon. Elsewhere in the Philippines, for example in southern La Union, higher sea levels have accelerated erosion of the coastline to the point where communities have had to evacuate and relocate. ⁽³⁷⁾ In the Philippines, mangroves play a critical role in the protection of coastlines from storms, erosion and floods. They also purify water and are important feeding sites for many fish species. But more than 70% of the Philippines' mangrove forests have been cut down for firewood or housing materials, or for conversion into fish ponds. ⁽³⁸⁾ Ongoing deforestation depletes fish stocks and threatens livelihoods by degrading the quantity and quality of seafood products of affected coastal areas.

World Vision's Response

In 2002-2003, World Vision joined forces with local authorities and targeted communities to introduce environmental interventions in Tabogon, Cebu and Lamon Bay, Luzon. World Vision worked with local government and community leaders in Tabogon to develop the 2007-2010 Coastal Resource Management Plan (CRMP). Activities included educating local community members about watershed management and fishing rights, and training volunteer 'fish wardens' regarding the enforcement of these regulations. The project also provided locals with opportunities to reduce their economic dependence on fishing by diversifying their income sources to include sustainable oyster and seaweed farming, construction, garment-making and even eco-tourism. For the much larger project in Lamon Bay (200km² compared to Tabogon's 10km²), the same local-level response would not have been feasible. Lamon Bay had also experienced more widespread destruction than Tabogon because of dynamite and cyanide fishing, and commercial fishing had to be licensed and monitored rather than simply banned. Successful engagement in Lamon Bay thus required more thorough collaboration with local authorities in supporting their enforcement of national laws. The rehabilitation plan for Lamon Bay included the laying of artificial reefs to assist in the resumption of the natural breeding cycle of many fish species in the area. Significant work was also done in mangrove reforestation. An independent EU-funded assessment of Lamon Bay, conducted four years after the CRMP project began, found that self-reported fish catches had already increased to around 10-15kgs per day (up from 0-1 kg in 2002). Recent anecdotal evidence from fisherfolk suggests that natural coral regrowth is significant, and that illegal fishing practices are no longer rampant. More than 25,000 mangrove seedlings have been planted across 40 hectares of Lamon Bay, protecting the coast from erosion and providing important carbon sequestration services. ⁽³⁹⁾ A nursery has been established as the source of tree seedlings, and more than 1,000 gemelina and Acacia trees have been planted.



Photo: Andrew Goodwin, World Vision Philippines

■ Lamon Bay, Philippines:

World Vision-sponsored mangrove rehabilitation project.



Photo: World Vision Myanmar

Case Study 3: Bangladesh – Cyclone Sidr

World Vision's national staff responded to the disaster in the immediate hours after Cyclone Nargis occurred, providing food, shelter materials, safe drinking water and child protection activities. More than 338,000 people in Yangon and the Irrawaddy Delta received assistance. But with climate change, extreme storms like Nargis are likely to become more common. Bangladesh offers a useful example.

Disaster Destruction: On 15 November 2007, Cyclone Sidr struck Bangladesh. A massive storm surge killed 3,447 people and destroyed houses, crops, roads and infrastructure. The damage reached macroeconomic dimensions:

- 539,744 houses completely destroyed and 885,280 partially damaged
- 237,782 ha of farmland completely destroyed, and 595,612 ha partially damaged
- 1,157,939 livestock perished
- 4,065,316 trees (many of them fruit-bearing) lost
- 2,240 schools destroyed and 11,490 damaged
- 1,523 km of road destroyed and 4,048 km partially damaged
- 1,687 bridges and 1,406 km of embankment damaged or destroyed

Country Context: Bangladesh is historically vulnerable to the impact of cyclones. The Bay of Bengal is both the greatest river delta in the world and one of the most flood-prone regions worldwide. One third of Bangladesh floods annually during the monsoon season, but extreme floods cover up to two thirds. Much of the country lies below 10m above sea level, with many areas below three metres. As such Bangladesh is vulnerable both to inland freshwater floods from its gigantic rivers (Brahmaputra, Ganges and Meghna) spilling over, and to coastal erosion and saltwater inundation. Dykes built to protect the coastline against storm-related surges help hold back the rising sea (though not salinity), but can also hamper freshwater floods draining into the Bay of Bengal. So protection from saltwater flooding actually increases vulnerability to freshwater floods. ⁽⁴⁰⁾ Factor in climate change and more floods and cyclones, and the net result will be very serious.

World Vision's Response

Even as Cyclone Sidr approached, World Vision Bangladesh began mobilising communities in World Vision's 43 Area Development Programmes (ADPs), and helped 30,000 people in coastal areas likely to be hit by Sidr evacuate to cyclone shelters. In the immediate aftermath of the cyclone, World Vision Bangladesh:

- Provided more than 47,000 families with emergency food and blankets
- Distributed corrugated iron sheets for temporary shelters to around 13,000 families
- Provided short term employment for more than 1,000 families through cash-for-work schemes
- Set up nine child-friendly spaces for some 400 children
- Provided purified water to 7,750 families

Following the cyclone, World Vision met with other relief agencies and government representatives in Dhaka to co-ordinate the response. While World Vision was able to quickly distribute relief in communities where ADPs were already established, identifying the neediest people in other areas (to avoid duplicating the work of other agencies) took more time. Crop and livestock losses created immediate food shortages and longer-term pressures on livelihoods. With 40-70% of rice and vegetable crops in affected areas destroyed, World Vision partnered with the Bangladesh Agriculture Development Cooperation (BADC) and the Department of Agricultural Extension to procure and distribute high-yielding, disease-resistant seeds. Depending on local conditions, recipients could now grow both rice and a range of vegetables and protein-rich dhal. Agricultural implements were distributed, with an emphasis on marginalised tenant farmers. World Vision's Cash-For-Work schemes employed farmers whose livelihoods had been destroyed, providing them with an immediate source of income while helping repair infrastructure.

Livestock losses had a severe impact in Morrelganj and Bhandaria. World Vision distributed immunised cows, oxen, goats and chickens to vulnerable households there so affected communities could supplement their diets and earn extra income. Mango, blackberry, jackfruit, olive and palm saplings distributed by World Vision Bangladesh allowed people to grow income-generating fruit while improving soil quality and reducing erosion.

In Morrelganj and Bhandaria alone, almost 10,000 ha of fish and shrimp ponds were damaged, and more than 1,800 fishing boats or nets were lost, damaged or destroyed. World Vision collaborated with farmers and fishers on the specifications of boat designs and net gauges so that relief packages would be appropriate to the fish species and conditions of the targeted areas. The Cyclone Sidr Response Program also took the opportunity to introduce mixed fish farm inputs, reducing vulnerability compared to monoculture farms.

The complete destruction of, or damage to, school buildings during the cyclone disrupted the education of 130,000 students. In the aftermath of the disaster, some classes continued in damaged school buildings, temporary shelters or the open air but this was unsustainable. As a child-focused organisation, World Vision viewed the repair and reconstruction of school buildings as a high priority, not only because education is an important developmental goal in itself, but also because the routine of attending school is an important part of children's psychological recovery after the trauma of a disaster on the scale of Sidr.

Disaster Risk Reduction

While Cyclone Sidr was a calamity for hundreds of thousands of people in Bangladesh, there is clear evidence that DRR strategies saved lives. In 1970, Bangladesh's worst cyclone disaster claimed half a million lives. ⁽⁴¹⁾ In 1991, a tropical storm roughly the same size and scale as Sidr killed 143,000 people. ⁽⁴²⁾ In the 15 years between this tragedy

and Cyclone Sidr, the Bangladeshi government and relief and development agencies worked to install early warning systems, shelters for people vulnerable to natural disasters, and community preparedness plans. On the eve of Cyclone Sidr, 650,000 people evacuated their homes and sought shelter in safe places. Most of the 3,447 people who died in Cyclone Sidr were fishers or coastal dwellers who drowned. While the scale of this tragedy should not be downplayed, previously implemented DRR programmes ensured that loss of life and livestock were minimal compared to the impacts of earlier disaster events.

World Vision has organised 1,260 volunteers from 126 villages to participate in DRR training sessions on risk mapping, community vulnerability and capacity assessments, early warning systems and signals, evacuation practices and disaster simulations. The broader community was then invited to sessions led by the volunteers where lessons learned were disseminated. World Vision Bangladesh encouraged regular contact between community-based disaster management volunteers and local government committees, to ensure ongoing cooperation and collaboration between community leaders and local government representatives.

The Future

Bangladesh still faces substantial DRR challenges. It is home to 150 million people, and has been named by the World Bank as one of the countries most at risk as a result of climate change. (43) Already Bangladesh is experiencing the effects of rising sea levels and the resultant salinity problems, flooding due to tidal surges and erratic rainfall, temperature fluctuations that affect crop production, and less predictable cyclone and tornado seasons. Through its 43 ADPs in Bangladesh, World Vision assists more than half a million people in adapting to changes in their natural environment, and to be better prepared for severe weather events. But with disasters on the scale of Cyclone Sidr likely to become more frequent, and the UNDP predicting that

sea level rise could displace 25 million Bangladeshis, (44) DRR has to remain a critical part of development agencies' work in the Bay of Bengal and beyond.

The developed economies also must do more to support the adaptation efforts of countries like Bangladesh. Over the past 30 years the government of Bangladesh has invested more than \$10 billion to increase disaster resilience and reduce vulnerability, but the increasing pressure from climate change threatens to undo its work. The direct annual cost to the Bangladeshi economy of natural disasters over the past 10 years is estimated to be between 0.5% and 1% of GDP, and this figure is expected to grow in the coming years. Bangladesh is asking the international community for \$5 billion over the next five years to implement its Climate Change Strategy and Action Plan. Given the scale of the challenges ahead, such a request does not seem unreasonable. (45)



Photo: Amio Ascension

■ **Bhandaria, Bangladesh:** Following Cyclone Sidr, DRR workshops instruct and train community volunteers.

DRR-DESIGNED DEVELOPMENT



Katwe Community Development Programme, Uganda: Bukomero Junior Primary School lies 180 km northwest of the capital Kampala. It has an anti-AIDS club that educates students by putting on educational plays, reciting poems, singing songs and playing games. There is growing recognition that DRR needs to be designed into development programming.

Photo: Paul Bettings

More Necessary Than Ever: DRR in the 21st Century

“Perhaps the most effective route to take is to incorporate risk considerations in development policies and poverty reduction strategies, including ensuring that development projects themselves are disaster resilient – or at the very least do not exacerbate risks. To date, few development projects consider the possible effects of disasters or shocks in terms of people’s safety and even return on investment...” (UNISDR) ⁽⁴⁶⁾

World Vision And DRR: As the case studies indicate, DRR is not a standalone activity but a range of interventions that need to be integrated into ongoing development projects. Within World Vision there is a growing recognition that DRR is ‘the fence protecting the development work in communities.’ Yet the UNISDR has pointed to a widespread lack of recognition of both the importance of DRR in the development process, and its role in helping protect hard-won development gains from climatic and other shocks. It has consequently suggested that disaster risk considerations be firmly embedded in all development programming activities (see quote above). ⁽⁴⁶⁾ Across the global World Vision partnership, DRR is increasingly designed *into* development programming. World Vision Australia has already made disaster preparedness plans in all Australian-funded ADPs a key performance indicator (KPI). The overall objective is to reduce community vulnerability

and raise resilience. Achieving this KPI requires the combined efforts of development and relief teams in both field and funding offices. Since 2003, World Vision Australia has been funding a Community Emergency Response and Disaster Mitigation (CERDM) project in Latin America (Nicaragua and Ecuador) ⁽⁴⁷⁾ with AusAID ANCP funding. The project has already been successfully expanded to include Columbia and Guatemala. Its success has also encouraged World Vision Australia to extend its work in DRR by funding regional DRR pilot projects in Latin America (Peru and Brazil), Asia (Philippines and Indonesia), and Africa (Ethiopia, Lesotho and Ghana) with sponsorship funding. The three regional projects will continue until September 2010. [Pilot projects in Africa are based on a combination of the Hyogo Framework for Action and the World Vision Livelihoods Framework.] To achieve maximum impact, the projects collaborate closely with the national governments

and academic institutions. As part of the CERDM project in Ethiopia, World Vision Ethiopia will work closely with the Ministry of Education to find ways to introduce DRR to the existing school curriculum. Using e-discussion, important reference materials and up-to-date knowledge on DRR and children's involvement in DRR can now be shared between the Africa Regional Office, National Offices in the three countries, and the Resilience Project managers and staff. The benefits of integrating DRR into development programmes have been summarised by World Vision CERDM Project Manager for the Latin America and Caribbean (LAC) region, Maria Luisa Interiano: ⁽⁴⁸⁾

Building local preparedness capacities strengthens response to emergencies, reduces disaster risks, and helps foster confidence, dignity and resilience. A community that is prepared and able to manage the impact of disasters also gains greater insight and wherewithal to address the causes of longer-term poverty and underdevelopment. Taking into account that several countries in the region are risk-prone countries, this project and its results are an important contribution for the whole LAC region and specifically for civil society organisation networks supporting preparedness, awareness raising and early warning processes in line with Priority 5 of the Hyogo Framework for Action. These important lessons should be integrated into policies and strategies of stakeholders working to reduce disaster risks worldwide.

Asian Tsunami – An Integrated Response: Following the 26 December 2004 Tsunami, World Vision implemented an integrated recovery programme in Indonesia, Sri Lanka, India, Thailand and Myanmar (the countries hardest hit). While this disaster was not climate-induced – tsunamis are huge displacements of water caused by seismic activity – its scale and DRR implications nonetheless make it a relevant example. Key elements of the response were relief, rehabilitation, recovery and reconstruction. In the three years following the tsunami, ⁽⁴⁹⁾ World vision

- built more than 12,000 homes
- constructed 84 schools, 33 preschools 27 health clinics, bridges, canals and other infrastructure
- provided vocational training and employment opportunities for more than 40,000 people
- distributed assets including fishing boats, GPS, sewing machines, carpentry tools and computers
- provided educational support for more than 2,000 teachers and 137,000 children
- held child rights awareness sessions for more than 27,000 parents, community leaders, teachers and government officials
- established 12 community broadcast centres and ran evacuation drills and disaster management training for 10,000 people
- provided ambulances, hospital beds and other health and medical equipment
- implemented health promotions and interventions for 440,000 people
- replanted 56,000 mangroves to reclaim coastal areas and provide a buffer to storm surges

World Vision's Organisational Response: Individual climate-related disasters rarely reach this scale of destruction, but the elements of the response reinforce the need for long-term risk reduction and increased resilience as well as immediate assistance. In 2007, the World Vision partnership formed the Community Resilience Community of Practice to incorporate current thinking and DRR best practice into policy, programming and practices to reduce community vulnerability. In May 2008, World Vision International launched an advocacy position paper on DRR and urged national governments to systematically integrate DRR into national law, policy and planning processes. World Vision has formed a task force, the Community Resilience Working Group (CRWG), to coordinate its participation in the Global Platform for DRR held in Geneva in June 2009.



Dong Khut village, Cambodia: Sang Kanhna (11) is feeding chickens which her family received from a \$50 loan from the Caring And Protecting Orphans And Vulnerable Children (CPOVC) project, a development programme fostering sustainable livelihoods for orphans and vulnerable children whose families have been affected by HIV and AIDS.

Photo: Sopheak Kong

PROTECT
CHILDREN

Sustainable Growth: The Ultimate DRR Challenge

“The [disaster mitigation community] might make common cause with those who want to curb the growth in human populations, (and rejoice when growth is low or negative as in some countries?) and those who question the headlong rush to growth at any price and make common cause with the supporters of sustainable development or those who eschew high mass consumption and opt for lives of voluntary simplicity.” (Ian Burton)⁽⁵²⁾

Protecting Progress: While progress is being made in both our understanding of the changing face of disaster risk, and integrating DRR into programming on the ground, the likelihood that climate change will increase the frequency and severity of natural disasters means humanity faces difficult decisions. First, more resources will have to be found to fund DRR. There is a strong tendency to focus on disasters only when they happen. As the UNISDR has noted ‘Hazards that occur rarely or unpredictably ... suffer from a general lack of interest until a disaster occurs. This inhibits the sustained political commitment and action necessary to avoid future losses of lives and assets.’⁽⁵⁰⁾ Ensuring sustained political commitment to DRR is critical, not only to reduce losses in a more disaster-prone world, but also to prevent natural disasters unwinding progress already made in reducing poverty and suffering. Disasters destroy development, preparedness protects progress.

Prioritising Preparedness: Second, the mix of resources available for relief and DRR may need to be skewed more towards risk reduction. The strong willingness to respond to disasters will need to be balanced against the likely greater returns from interventions that improve the disaster adaptation and resilience of vulnerable populations. As the case studies and other aspects of World Vision’s work considered in this report make clear, for DRR to have a significant impact on lives and livelihoods, action needs to be taken at a number of levels. Ongoing success in DRR will involve both structural (including more and better designed infrastructure and housing) and non-structural elements (e.g. education and early warning systems). As an international development agency focusing particularly on the welfare of children, World Vision sees the following areas as critical to long-term improvements in disaster resilience and risk reduction:

- Helping children become active participants in DRR interventions
- Integrating disaster risk education into the education curriculum
- Building resilience through disaster risk management programming in World Vision funded ADPs
- Defining key indicators of resilience to selected vulnerabilities/hazards and monitoring these over time, with a focus on the inputs available to communities and households
- Building partnerships with government and non-government agencies, including partnerships for technology transfer
- Influencing structures, systems and policies, internally and externally, to improve household and community resilience to disastrous events

Developed countries need to be held to commitments to supporting mitigation, adaptation and DRR efforts in developing countries. World Vision calls for at least an additional \$150 billion per year of public financing to be directed in support of adaptation and mitigation efforts in developing countries. Funding directed to adaptation and mitigation needs to be additional to the 0.7% of Gross National Income (GNI) already pledged by donor countries before climate change emerged as a unique global challenge. Over time it will become increasingly difficult to separate official development assistance into climate and non-climate related aid, so consideration should be given to raising the ODA contribution from rich countries to 1.1% of GNI. The use of financial risk sharing mechanisms, including traditional disaster insurance, catastrophe bonds, weather or index-based derivatives, and micro-insurance, needs to be widely rolled out in developing countries, as such mechanisms can help lessen the financial and economic impacts of disasters and extreme events. ⁽⁵¹⁾ Although risk insurance mechanisms do not reduce risk per se, when implemented

alongside DRR measures, the long-term cost of adaptation can be lowered, and the ability of vulnerable communities to manage the risks of climate change improved. It is imperative that a comprehensive risk management framework be established as part of the new climate change agreement in Copenhagen. Such a framework must include financing for DRR activities at the scale required, and consider the widespread use of insurance solutions as a built-in tool for better adaptation. However, these measures may still not be sufficient. Much of the thinking about DRR's role in a warming world is centred on strategies to reduce the impact of disasters and increase resilience to future extreme weather events. Less obviously, the DRR community may need to become actively involved in the longer-term effort to mitigate climate change itself. At the beginning of this report it was stated that disaster risk is the product of vulnerable communities being exposed to hazards. The more vulnerable a community, the greater the cost in injury, death, property damage or other disruption. A significant implication of this is that the larger the world's population becomes, the more poor and vulnerable people will be exposed to hazards. This being the case, the DRR community should take a more holistic approach and bolster sustainable economic development with a view to raising resilience. This view has been well stated by Ian Burton:

The proximate causes of the increase in disaster losses have been well rehearsed. They include generic factors such as the growth in human populations, and increases in wealth and real property. These factors lie beyond the reach or domain of the disaster mitigation community ... The size and growth rate of human populations are the business of demographers and experts in human health and fertility, and the governments and agencies that they advise; increases in wealth and real property are similarly the domain of economists and the financial and investment worlds. It has not been considered the business of the disaster mitigation community to advocate the reduction of human population growth or the reduc-

tion of economic growth and increases in wealth and real property. Perhaps this should be questioned. The [disaster mitigation community] might make common cause with those who want to curb the growth in human populations, (and rejoice when growth is low or negative as in some countries?) and those who question the headlong rush to growth at any price and make common cause with the supporters of sustainable development or those who eschew high mass consumption and opt for lives of voluntary simplicity. (52)

The biggest permanent gains in reducing disaster risk will come from reducing climate-induced disasters and the number of people exposed to them, while increasing the resources available to them to cope. Sustainable growth is fundamental to achieving these ends for at least two reasons. First, making growth sustainable, low carbon and pro-poor, requires substantially reduced dependence on fossil fuels and all that this implies. Second, achieving faster economic growth has been shown to be the most effective way of slowing population growth for a complex mix of reasons, not least of which is that growth provides resources to educate women and girls, a proven method for delaying the first birth and reducing completed family size. If the link between DRR and climate change is seen in this way, it greatly widens the field of DRR beyond the traditional areas of disaster relief and mitigation to encompass the whole issue of growth, development and poverty reduction. This is a major challenge for the DRR community, and the response will take time to develop. But the scale of the threat presented by climate change means that as for so many other activities, business as usual is no longer an option for DRR. World Vision has been working with the world's poorest for more than half a century to ease the impact of disasters when they occur, and implement strategies to reduce the effect of future disaster events. This experience creates a challenge and an opportunity. For an agency such as World Vision to remain effective in DRR, it is essential that it continues to be fully engaged in under-

standing the changing face of disaster risk and how it affects programmes for sustainable development and poverty reduction. World Vision's long history of disaster relief and risk reduction work also means it is unusually well placed to contribute to the development of DRR programmes and policies better suited to a world experiencing major climate change.

World Vision's Recommendations

As an international child-focused development agency, World Vision believes a range of actions are essential to ensure long-term improvements in disaster resilience and risk reduction:

National Level:

- Help children become active participants in disaster risk reduction
- Integrate disaster risk education into the education curriculum
- Define key indicators of disaster resilience to selected vulnerabilities/hazards and monitor these over time
- Build partnerships between government and non-government agencies
- Influence structures, systems and policies internally and externally to improve household and community resilience to disastrous events.

Global Level:

- Hold developed countries to their commitments to support adaptation and mitigation efforts, including DRR in developing countries.
- Ensure developed countries provide at least an additional \$150 billion per year of public financing for adaptation and mitigation efforts in developing countries. Funding directed to adaptation and mitigation needs to be additional to the 0.7% of Gross National Income (GNI) already pledged by donor countries before climate change emerged as a unique global challenge.
- Over time, raising the official development assistance contribution from rich countries to 1.1% of Gross National Income should be considered.
- A comprehensive risk management framework, including adequate financing for DRR, must be established as part of the new climate change agreement that replaces the Kyoto Protocol.
- Further investigation is needed by both developed and developing countries of the use of financial risk sharing mechanisms, such as disaster insurance, catastrophe bonds, weather or index-based derivatives, and micro-insurance, to help lessen the financial and economic impacts of disasters and extreme events.



Tsunami Response, Banda Aceh, Indonesia:

Kids from families displaced by the tsunami playing at Gedung Sosial Centre.

Photo: Jon Warren

Endnotes

“Much remains to be done if disaster loss is not to jeopardise the achievement of the Millennium Development Goals ... The development community generally continues to view disasters as exceptional natural events that interrupt normal development and that can be managed through humanitarian actions ... Disaster risk is not inevitable, but on the contrary can be managed and reduced through appropriate development actions.” (UNDP) ⁽²³⁾

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Bokalay, Myanmar: "My hair is curly, but you can try," says World Vision's Pamela Sitko as Nway combs her hair and beautifies her. One year after Cyclone Nargis struck, Nway can smile again at the future. As the only survivor in her family (see photos and references on pages 1 and 7 in this report – and human interest story on page 83 in *Planet Prepare*)⁽⁴⁹⁾ nine-year-old Nway wants to become a doctor and "make this world a better place."

Photo: Khaing Min Htoo

■ **Climate Change Series:** Around the globe World Vision is witnessing first hand the devastating impact of climate change on poor communities. Governments, non-governmental organisations and communities are grappling to adapt to new threats and their impacts. We have much to learn. In this series of publications, World Vision is seeking to identify concrete responses to climate change both at the programming and policy levels.

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