



4 Building resilience

“Adaptation is more than a destination; it is a journey, dynamic and continuous, and non-linear. In many countries, populations are coping with climate change, but they are not adapting.”

—Sumaya Zakieldeen, Sudanese Environmental Conservation Society¹

Farmers in Malawi used to be able to predict the coming of the rains, but no longer. So Mazoe Gondwe, the food provider for her family, diversifies production by dividing her plot of land among rain-fed and irrigated crops, hoping for the best.

“But irrigation is back-breaking and can take four hours a day,” she told a reporter in late December 2008. Invited by a European non-governmental organization to tell her story at the 14th Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Poznań, Poland, Ms. Gondwe said she needed better irrigation technology to cut the time she spends watering crops. Improved storage facilities and better seed varieties, she added, would be welcome as well.

“As a local farmer, I know what I need and I know what works,” she said. “I grew up in the area and I know how the system is changing.”²

Unfortunately for Ms. Gondwe—and for the rest of us—the climate system will keep changing. Four decades from now, average temperatures in Malawi probably will have risen by at least a full degree Celsius, and agricultural yields will have fallen significantly. Meanwhile, Malawi’s population is projected to grow from today’s 15 million to as many as 41.5 million in 2050.³

The adaptation imperative

Unless some counterbalancing force beyond any current scientific understanding intervenes, the built-in momen-

tum of the climate system means that temperatures are likely to rise for decades. The world needs to prepare now for a warming world, even if we cannot predict with any confidence how fast it will heat up—or when and where the heating will end. And while no scientist can assure us that any particular extreme weather event

20 EXTREME WEATHER, POOR RESPONSES

According to a report published in 2009 by Oxfam International, the year 2007 “saw floods in 23 African and 11 Asian countries that were the worst in decades. Two hurricanes and heavy rains hit much of Central America; almost half the state of Tabasco in Mexico was flooded. As the United Nations Emergency Relief Coordinator John Holmes put it: ‘...all these events on their own didn’t have massive death tolls, but if you add [them] together you get a mega-disaster.’ But 2008 offered no let-up in the barrage of climatic disasters, as Cyclone Nargis devastated large parts of Myanmar, and a particularly destructive Atlantic hurricane season caused hundreds of deaths and massive economic damage across Cuba, the Dominican Republic, Haiti, and the United States. In many cases, failures in environmental management increased the impact of these climate hazards. In India, the 2008 rains caused serious flooding, not because they were particularly heavy, but because of the failure of poorly maintained dams and river banks. A breach in the Kosi river embankment in August 2008 led to one of the worst floods in the history of Bihar, the poorest state in India.”⁴

◀ Two women negotiate flood water in the Moroccan town of Souk Larbaa.

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Figure 4.1: Impact of climate change and the Millennium Development Goals

Millennium Development Goal	Potential impacts of climate change
Goal 1 Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> ▪ Damage to livelihood assets, including homes, water supply, health and infrastructure, can undermine peoples' ability to earn a living; ▪ Reduction of crop yields affects food security; ▪ Changes in natural systems and resources, infrastructure and labour productivity may reduce income opportunities and affect economic growth; ▪ Social tensions over resource use can lead to conflict, destabilising lives and livelihoods and forcing communities to migrate.
Goal 2 Achieve universal primary education	<ul style="list-style-type: none"> ▪ Loss of livelihood assets and natural disasters reduce opportunities for full time education, more children (especially girls) are likely to be taken out of school to help fetch water, earn an income or care for ill family members; ▪ Malnourishment and illness reduces school attendance and the ability of children to learn when they are in class; ▪ Displacement and migration can reduce access to education.
Goal 3 Promote gender equality and empower women	<ul style="list-style-type: none"> ▪ Exacerbation of gender inequality as women depend more on the natural environment for their livelihoods, including agricultural production. This may lead to increasingly poor health and less time to engage in decision making and earning additional income; ▪ Women and girls are typically the ones to care for the home and fetch water, fodder, firewood, and often food. During times of climate stress, they must cope with fewer resources and a greater workload; ▪ Female headed households with few assets are particularly affected by climate related disasters.
Goal 4 Reduce child mortality	<ul style="list-style-type: none"> ▪ Deaths and illness due to heatwaves, floods, droughts and hurricanes; ▪ Children and pregnant women are particularly susceptible to vector-borne diseases (e.g., malaria and dengue fever) and water-borne diseases (e.g., cholera and dysentery) which may increase and/or spread to new areas; ▪ Reduced water and food security negatively affect child health.
Goal 5 Improve maternal health	<ul style="list-style-type: none"> ▪ Reduction in the quality and quantity of drinking water has negative effects on maternal health; ▪ Food insecurity leads to increased malnutrition; ▪ Floods and droughts spread water-borne illness, impacting maternal health.
Goal 6 Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> ▪ Water stress and warmer conditions increase vulnerability to disease; ▪ Households affected by AIDS have lower livelihood assets, and malnutrition accelerates the negative effects of the disease.
Goal 7 Ensure environmental sustainability	<ul style="list-style-type: none"> ▪ Alterations and possible irreversible damage in the quality and productivity of ecosystems and natural resources; ▪ Decrease in biodiversity and worsening of existing environmental degradation; ▪ Alterations in ecosystem-human interfaces and interactions lead to loss of biodiversity and loss of basic support systems for the livelihood of many people, particularly in Africa.
Goal 8 Develop a global partnership for development	<ul style="list-style-type: none"> ▪ Climate change is a global issue and a global challenge: responses require global cooperation, especially to help developing countries adapt to the adverse effects of climate change; ▪ International relations may be strained by climate impacts.

Source: United Nations Framework Convention on Climate Change. 2007. Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries. Bonn: United Nations Framework Convention on Climate Change Secretariat. United Nations Development Programme. 2009. Climate Change Affects All the MDGs. At undp.org/climatechange/about.htm.

is the direct result of human-induced climate change, the pattern of such events suggests a trend and resembles what scientists are expecting for the coming decades. Because the atmosphere has already changed, any weather we experience today has some element, however indiscernible, of human influence.

The “central” range of likely temperature increases in the coming century—2 degrees or 4.5 degrees Celsius—is worrisome enough.⁵ More troubling still is the possibility of truly catastrophic temperature increases and climate impacts, especially if Governments do not act decisively and soon to limit emissions. The sea level could rise over the long term by one metre and perhaps significantly more, swamping portions of cities located close to current sea levels along seacoasts and tidal rivers. A 2007 study showed that low-elevation coastal zones—those that are less than 10 metres above sea level—are home to 13 per cent of the world’s urban population.⁶ Among the world’s large cities at risk are Dhaka, Jakarta, Mumbai, New York, Shanghai and Tokyo.⁷ Region-wide heat waves unlike any that human beings have ever known could bake cities already turned into “urban heat islands” by massed pavement and concrete. Considering the setbacks to health, development and human life itself that such changes imply, Governments and societies need urgently to

plan now for how civilization can withstand such changes and survive.

Until recently the science of climate change has been mostly that: science. We are only beginning to think about the human impacts and the full implications of the various scenarios of climate change promulgated by the Intergovernmental Panel on Climate Change and other scientific bodies. One message, however, emerges from history and recent experience: when conditions are harsh and resources scarce, the poor and groups marginalized by more than poverty—women, the young, the elderly, indigenous peoples and other minorities—are most vulnerable. They are also least often supported and often excluded from participating in societies’ collective responses to adversity.

The United Nations and the world’s Governments have prioritized a set of goals to be achieved by 2015—the Millennium Development Goals, or MDGs—that, if achieved, would contribute significantly to climate resilience. In an illustration of cycles of causality that can be either virtuous or vicious, however, the MDGs themselves are undermined by early impacts of climate change as well as by population dynamics and consumption patterns. Integration of the MDGs with concerns about climate change, and with efforts to improve access to reproduc-

21 REPRODUCTIVE HEALTH, POPULATION AND THE MILLENNIUM DEVELOPMENT GOALS

Each of the MDGs has demographic components or implications related to the human scale of the problems to be addressed and, in many cases, the steps that can be taken to resolve them. The goals cannot be achieved, former United Nations Secretary-General Kofi Annan noted in 2002, “if questions of population and reproductive health are not squarely addressed. And that means stronger efforts to promote women’s rights, and greater investment in education and health, including reproductive health and family planning.”⁸

In brief, when women can manage the size of their families and the timing

of their own childbearing, they are more likely to move toward gender equality, and gender equality itself supports their capacity to manage their reproduction (MDG 3). The use of voluntary family planning directly decreases child mortality (MDG 4) and improves maternal health (MDG 5). The slower population growth that results from access to reproductive health contributes to the eradication of hunger (MDG 1) and makes it less likely that sheer numbers will undermine improvement in school enrollment and the quality of education (MDG 2). Prevention of sexually transmitted infections is a core com-

ponent of reproductive health, directly contributing to efforts to reduce HIV transmission, while family planning can help HIV-positive women decide for themselves when and whether to bear children, hence reducing mother-to-child transmission (MDG 6).

From the standpoint of MDG 7 on ensuring environmental sustainability, slower population growth operates on multiple fronts—easing increases in water shortages; slowing loss of forests, fisheries and biodiversity; and helping to brake the rise of greenhouse-gas emissions and to build the resilience of countries as they adapt to climate change.

tive health and to achieve gender equality, is all the more vital because progress toward most of the MDGs has been slow. MDG 5—to improve maternal health—is especially behind schedule, with maternal mortality at the same high rate today as two decades ago.⁹

Not all that changes is climate

It is no accident that the developed countries are considered most able to adapt to the impacts of climate change. Societies' *resilience*—the assets, capacity and flexibility that enable them to withstand and adapt to rapid change of all kinds without significant loss of life, health and well-being—in many ways resembles the economic and social endpoint toward which development itself points. This resemblance has actually complicated climate negotiations, with some non-governmental organizations and developing-country Governments worrying that new financing for climate-change adaptation might simply result in reductions in development assistance, trading a shift in nomenclature for real increases in financial flows. “Additionality” for such funds—that they supplement rather than replace development assistance—is a key requirement for equity in any final climate agreement.

The uncertainty about what is climate-change adaptation and what is development is mirrored in

the uncertainty about which changes are the impact of climate change and which are environmental phenomena that might well occur even if greenhouse gases had no effect on climate or ecosystems. The distinction is especially important because the United Nations Framework Convention on Climate Change requires those countries most responsible for causing climate change to take the greatest responsibility, subject to their capacity, for addressing the impacts of the problem. Those countries most responsible for the accumulation of excess greenhouse gases in the atmosphere will probably be least devastated by the impacts of climate change, and vice versa.

Given the imbalance between causes and effects and their origins in wealthier and poorer countries, a major objective of an equitable climate agreement to supplement the United Nations Framework Convention on Climate Change and the Kyoto Protocol is to establish new and additional funding mechanisms to help developing nations address the burden placed on them by climate change.

Responsibility for our actions as nations and individuals matters. But trying to assess blame in each case for interconnected environmental, social and economic problems can turn into a limitless distraction from

22 CLIMATE CHANGE OR ENVIRONMENTAL DECLINE?

The distinction between the effects of climate change and symptoms of environmental decline may be blurred.

There has always been natural variability in weather. Droughts, storms and heat waves, for example, have occurred with some regularity in many parts of the world over the millennia.

But because of climate change, many of these common weather events are occurring more frequently and with greater severity. Climate change is also melting the polar ice caps, causing sea levels to rise, and bringing protracted drought to parts of the world where dry periods are uncommon.

Recent climate change is primarily the result of the ever-increasing amount of greenhouse gases thrust into the atmosphere, and most of these emissions stem from the burning of fossil fuels. Another major contributor has been deforestation. With fewer and fewer forests, the earth's capacity to absorb excess carbon from the atmosphere is diminished.

Some environmental problems may be mistaken for climate change. For example, farm land sometimes becomes unusable because of salinization that is occasionally the result of rising seas. But salinization of soil is more likely to be the result of irriga-

tion systems that draw the earth's natural salt to the surface. Drying lakes and rivers may be the result of drought, but they may also be the result of excessive use of water for agriculture, industry and people living in nearby metropolises.

Loss of biodiversity is an environmental problem that is in some cases related to climate change, but in other cases is the effect of changing land-use patterns, the demise of forests or pollution. Climate change warms and acidifies the earth's seas, contributing to the death of marine life. But overfishing and pollution also play a role in decline of fish populations in many areas.

the essential task: rapidly evolving effective cooperative and cross-cultural responses to the predicaments of a populous, inequitable, gender-divided and generally human-stressed world.

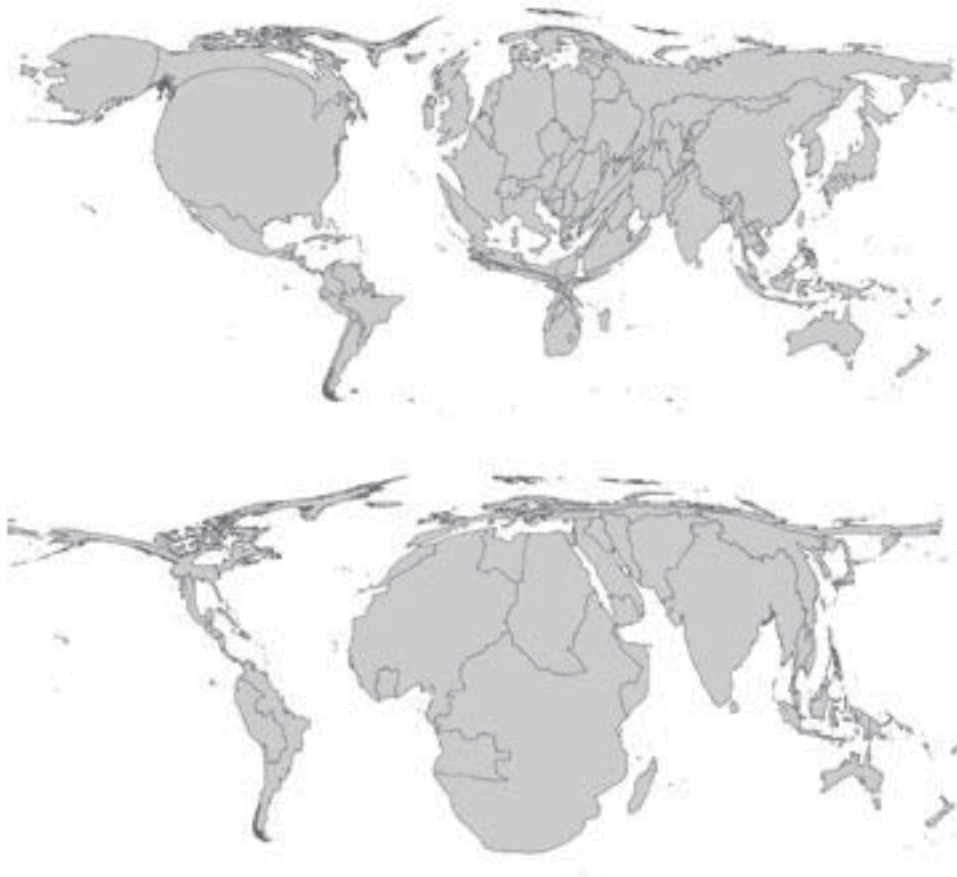
Consideration of population and its interactions with development and the environment is important to the process, not just because of population's long-term contribution to the scale of greenhouse-gas emissions, but because population dynamics interact with and contribute to many of the same environmental changes often seen as impacts of climate change. Areas with high rates of population growth are likely to face particular challenges in overcoming food insecurity, Intergovernmental

Panel on Climate Change authors have noted, while changes in climate “will add to the dual challenge of meeting food (cereal) demand while at the same time protecting natural resources and improving environmental quality in these regions.”¹⁰

The availability of renewable fresh water (critical to achievement of MDG 1) is one area that is acutely sensitive to population size and growth, as well to levels of economic development. Researchers with the United Nations Department of Economic and Social Affairs recently examined projected trends in rainfall and population density in Africa between 2000 and 2050 and concluded that demographic change will likely matter

Figure 4.2: The unequal burden

While the developed countries have contributed the most to human-induced climate change up to now (upper world map scaled to fossil-fuel carbon-dioxide emissions in 2002), people in poor countries—most dramatically in Africa—already are much more likely to die as a result of the climate change that occurred up to 2000 (lower world map scaled by the World Health Organization's regional estimates of per capita mortality from late 20th century climate change).



Source: Patz, J. and others. 2007. "Climate Change and Global Health: Quantifying a Growing Ethical Crisis." *Ecohealth* 4:397-405; World Health Organization. 2008. Protecting Health from Climate Change: World Health Day 2008. Geneva: World Health Organization.



▲ A Bangladeshi woman plants gourds on the roof of her home. The rooftop garden provides food during floods, when waters destroy field crops.

© GMB Akash/Panos Pictures

more than climate change in determining future water availability. Moreover, they noted, slowing population growth can directly contribute to adaptation. “In Southern Africa,” the researchers noted, “demographic stagnation [i.e. slow or no population growth], is likely to mitigate significantly the impact of climate change.”¹¹

Such conclusions do not suggest any nullification of developed countries’ obligations under the United Nations Framework Convention on Climate Change. These obligations include reducing their own greenhouse-gas emissions and providing needed financing and technology transfer to developing countries that are additional to existing development assistance. Similarly, any demographic contributions to social resilience do not suggest any departure from the rights-based approach to population on which the world’s nations agreed at the International Conference on Population and Development (ICPD). What they do suggest is the need for a more holistic view, which includes access to reproductive health and gender equality, not only for the long-term reduction of greenhouse-gas emissions but also for the capacity of all nations to adapt to climate change. Even experts sometimes fail to distinguish between the

effects of climate change, global in its origins, and environmental degradation, which may be more the product of local human demand, arising from economic development and population growth.

At the level of communities and the people who live in them, however, the distinction is frequently understood and expressed. Rural women—closer than men to natural resources in direct proportion to their poverty—are often well aware that the actions of their own community or even their own actions can cause local environmental degradation.¹² In Dakar in 2008, women participating in a workshop on climate change and gender from Senegal and Ghana remarked on visible environmental damage stemming from overfishing, illegal net use and, in one case, the collection of seashells by women for microfinance livelihood projects. The participants assessed these points positively, as opportunities for self-education and building awareness of the environmental implications of everyday behaviour.¹³ Gender equality and access to reproductive health are central to building and sustaining societies’ resilience to the stresses of a warming world. Standing shoulder-to-shoulder with men in all spheres of life and having freedom and power to make reproductive

decisions increase women's resilience and help unleash social and economic potential. Equal rights and opportunities for women also usually result in smaller families, thus contributing to long-term population stabilization.

Social and cultural aspects of vulnerability and adaptation

Marginalization of and discrimination against women and the lack of attention to the ways gender inequality hampers development, health, equity and overall human well-being all undermine countries' resilience to climate change. Resilience is most likely to bloom and grow in societies in which all people can go to school, access health services, enjoy equal protection of law, and participate fully in directing their own lives and the destinies of their communities and nations. Often, as well, resilience has its own roots in culture, as in the many cases of traditions of generosity to those in need and cooperative work in the face of calamity.

By their numbers and the inequality of gender relations worldwide, women are most at a disadvantage in navigating and surviving the sorts of stresses—from chronic food insecurity and water scarcity to natural disasters and violent conflict—likely to increase as the planet heats up. While women represent half the world's adult population, by general consensus they constitute a much larger proportion of its poor. Differential gender poverty is not yet fully understood, but there appear to be several factors driving it. In most societies, women work less often for pay than men and receive, on average, less pay for comparable work. In addition, many women in marriages or other unions with men who have low incomes experience “secondary poverty”: their partners devote high proportions of their limited income to personal expenditures such as alcohol, drugs and gambling rather than on the family. Finally, single-parent households are far more likely to be headed by women than by men, and the majority of these female-headed households tend to

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be poor. In Bangladesh, for example, as many as three in 10 households are headed by females, and 95 per cent of these female-headed households are below the poverty line.¹⁴ The impacts of women's higher poverty rates and social expectations about their behaviour are especially obvious in the recent history of the onset and aftermath of natural disasters. While many disasters are unrelated to climate change (See Box 4: What do tsunamis have to do with climate change?), the behaviour patterns and outcomes that these disasters manifest may predict patterns and outcomes likely to emerge from climate change to come—unless, that is, we act immediately to create new patterns of inclusion, equity and gender equality.

Women die in greater numbers in disasters than men, and they tend to die at younger ages, but there are few reliable data to document these phenomena, largely because there has so far been little focus by the international community on the gender impact of natural disasters. Localized case studies associated with a devastating 1991 cyclone in Bangladesh, the 2003 European heat wave, and the 2004 Asian tsunami nonetheless affirm the greater vulnerability of women. Sampling data from natural disasters in 141 countries between 1981 and 2002, economists Eric Neumayer and Thomas Plümper confirmed that “natural disasters (and their subsequent impact) on average kill more women than men or kill women at an earlier age than men.” Moreover, the researchers found that the more severe the disaster and the lower the socioeconomic status of the population affected, the greater the gap between women's and men's death rates in such disasters as cyclones, earthquakes and tsunamis.

Why are women more vulnerable? No doubt some vulnerability stems from biological differences. A proportion of women in any population will be pregnant, for example, and less able to tolerate the exertion required to escape or survive disasters. Men's greater upper-body muscular mass, on average, may confer advantages in such circumstances. But most of women's heightened vulnerability, Neumayer and Plümper concluded, stemmed not

from biology but from society. “Our results show,” they wrote, “that it is the socially constructed gender-specific vulnerability of females built into everyday socioeconomic patterns that lead to the relatively higher female disaster mortality rates compared to men.”¹⁵

The accounts of recent disasters, such as the 2004 tsunami, are filled with examples. Many women perished because they were in their homes, unaware of the fateful oncoming wave, while the crest buoyed the boats of their fisherman husbands, who survived. Some women were weighed down by their *saris* and drowned. And still others had never been encouraged to learn to swim despite living all their lives next to water. Girls drowned because they never learned to climb trees as their brothers had. One girl was released into a tidal surge by her father because he could not hold on both to her and to her brother, and, as he said later, the “son has to carry on the family line.”¹⁶

The social vulnerability of women scarcely recedes with the floodwaters. The tensions associated with dealing with catastrophe often exacerbate the risk of gender-based violence that was already present before disaster struck.¹⁷ Around the world, with most Government offices staffed by men and the entrenched assumption that households

have male heads, women often miss out on recovery payments and other assistance. With weaker social networks in the world outside their homes, information essential to survival may pass right by them.

While such post-disaster gendered exclusion has proliferated, awareness of the needs of women has improved among many governmental agencies and non-governmental organizations. At the grass roots, women have simply stepped forward in some cases to insist on participating in disaster management and reconstruction planning. As early as a disastrous 1992 flood in the Sarghoda district of Pakistan, women helped design new housing for their families and became joint owners of the resulting homes, promoting their empowerment. After a 1999 cyclone in Orissa, India, most relief efforts were channeled through women, who received relief supplies, loans and house-building grants, with documented improvement in self-esteem and social status.¹⁸

Non-governmental organizations have documented inspiring models of women and men working against stereotype. Widower fathers in the wake of disasters sometimes become active caretakers of their children and even move their homes to be close to the children’s

23 AFTER DISASTER, HYGIENE KITS AND COUNSELLING ON SEXUAL VIOLENCE

In the year that followed the deadly tsunami of 2004, UNFPA offices in Indonesia, Sri Lanka, Maldives and Thailand coordinated with other United Nations agencies to help in post-disaster reconstruction. UNFPA staff made sure the reproductive and maternal health needs of women and adolescents were not lost amidst the rebuilding and that recovery plans included steps to prevent sexual violence.

In tsunami-affected provinces of Indonesia, primary health centres gained ambulances and instruments for emergency obstetric care, a particular need for pregnant women in communities made even more remote by the aftermath of disaster. Working with the Indonesian Psychologists Association, UNFPA facili-

tated outreach at community centres and trained counsellors in how to respond to gender-based and sexual violence.

Throughout the affected region, UNFPA distributed hundreds of thousands of personal hygiene kits containing—in addition to such basic items as soap, toilet paper, toothbrushes and sanitary napkins—condoms for the prevention of HIV and other sexually transmitted infection as well as unwanted pregnancy. Other reproductive health equipment and supplies used in the post-tsunami response included emergency contraception, safe delivery materials and drugs for the treatment of sexually transmitted diseases.²⁰

Over the past decade UNFPA has developed an emergency-response

capacity to deliver essential reproductive health services to those recovering from disasters or living in refugee camps. Such interventions produce long-term benefits for affected populations. One study found that reproductive health indicators such as maternal and infant mortality rates and levels of contraceptive prevalence were higher among refugee populations in Africa than among surrounding populations.²¹ There may be a lesson here applicable to the changes expected in a warming world. With sufficient funding and political commitment, such interventions could be universal rather than targeted, helping populations around the world reduce their vulnerability to the impacts of climate change.

schools. Some compensation programmes reward men financially for abstaining from alcohol during post-disaster recovery, successfully easing women's secondary poverty and their vulnerability to spousal abuse.¹⁹

Climate change and conflict

An emerging fear within the United Nations and among Governments is the possibility that climate change will add to the factors already spurring violent civil conflicts in weaker states around the world. (These are variously categorized in research literature as “fragile” or “failed” states, defined as those whose Governments are unable to guarantee security outside of capital cities, and sometimes not even there.) Such states comprise 9 per cent of world population but more than a quarter of the world's poor, exacerbating the likelihood and impact of both gender discrimination and inadequate access to reproductive health.²²

Although the links between environmental deterioration and civil conflict are debated, security experts agree that scarcities of fresh water and fertile cropland can exacerbate pre-existing tensions. Under the influence of weak economies, inequities of wealth and power, and ineffective Governments, these can break into violence, often fissuring along ethnic lines. The prospect of population movements in response to sea-level rises may increase the risk of conflict. The conflict in the Darfur region of Sudan may be one example of violence worsened by the impacts of climate change. Visiting the region in 2007, United Nations Secretary-General Ban Ki-moon called attention to a pattern of declining rainfall in recent years, arguing that climate change was already exacerbating desertification and contributing to tension in the region.²³ The women of Darfur have paid a high price for the violence that has surrounded their villages: rape, other forms of sexual violence, with the risks increasing as they forage for water and fuelwood in this resource-poor region.

In part because of the uncertainties of both how climate change will unfold and how much of current

conflict relates to climate or environmental change, some experts have urged caution about attributing too strong a connection between climate change and conflict.²⁴ But the point still holds: conflict and its ancillary impacts are among those impacts of climate change to which we should apply the precautionary principle and anticipate even if we cannot predict. Given a long history of disproportionate suffering by women and children, the

intersection of gender equality, population and the impacts of climate change deserve further research on these linkages and targeted constructive interventions in areas increasingly prone to violent civil conflict.

Rising seas and the challenge of urbanization

Among the more prominent population dynamics of our era is urbanization, the increase in the proportion of a population living in cities. Once portrayed as all but hopeless cases of overcrowding and ungovernability, even the largest of the world's cities have come to be seen more recently as centres of creativity and innovation, with the poorest inhabitants often the most innovative—in part, perhaps, because of the necessity of surviving in makeshift housing with poor municipal services, as described in UNFPA's *State of World Population 2007: Unleashing the Potential of Urban Growth*.

In the face of ongoing climate change, such innovation will be increasingly needed. Already one in 10 people lives in a coastal city within a few metres of existing sea levels. Estimates of the population at serious risk of displacement from a metre or two in sea-level rise vary from 384 million to 643 million.²⁵ Almost all net future population growth is projected to occur in or to gravitate toward cities, implying more than a doubling of urban population and an even greater increase in the number of slum-dwellers by the middle of the century. Under such circumstances, impoverished populations tend to be forced to settle on the only land available—sloping hazardously or barely above normal water level—leaving the poor perpetually

Given a long history of disproportionate suffering by women and children, the intersection of gender equality, population and the impacts of climate change deserve further research on these linkages and targeted constructive interventions in areas increasingly prone to violent civil conflict.

vulnerable to torrential downpours, sliding soils, and flooding. Most of the world's biggest cities sit on or near seacoasts or at the mouths of major rivers, amplifying the likelihood that rising waters will become a damaging fact of life as the century progresses. To varying degrees, cities are beginning to anticipate the likely impacts of climate change, applying geographic information systems and similar technologies to their long-range planning.

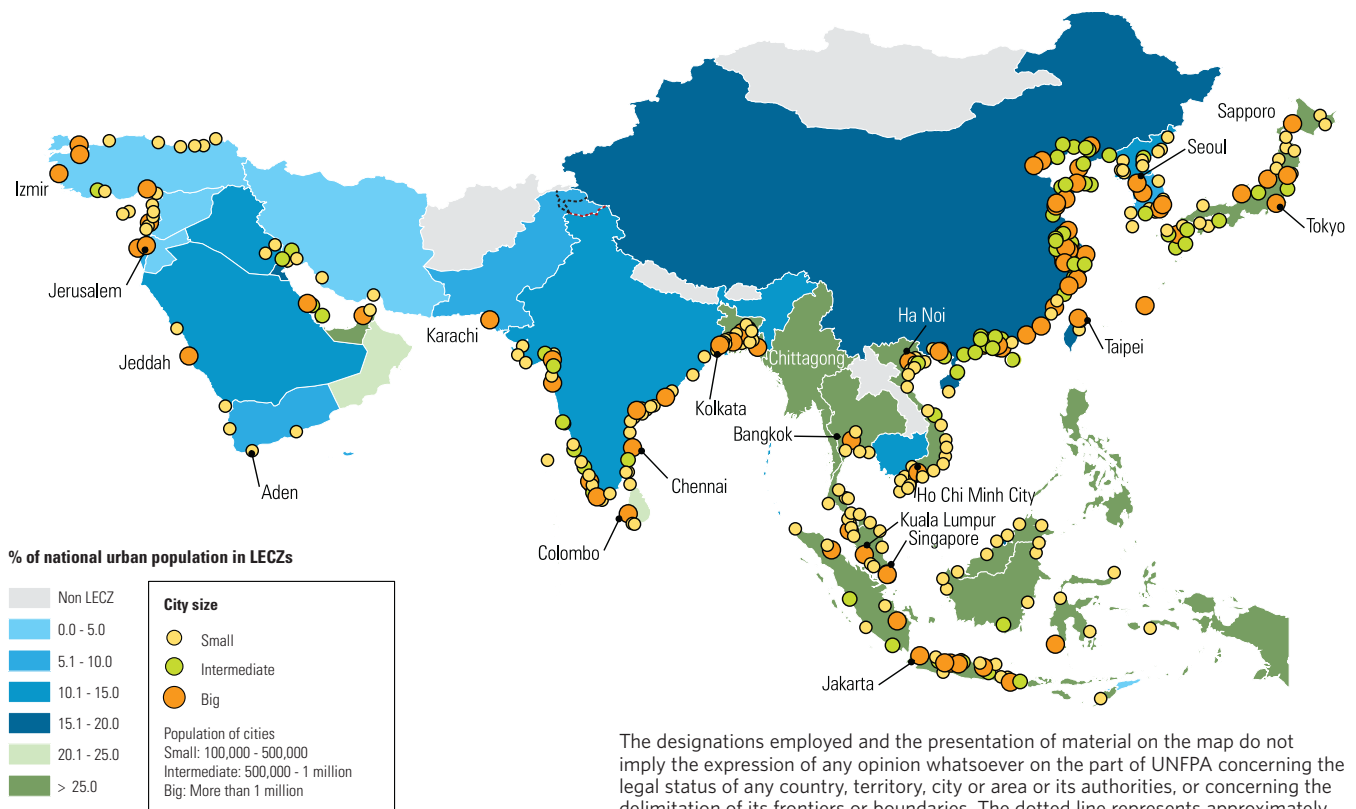
The spread of disease

Poor health status can also discriminate against women, who are now more likely than men worldwide to be infected by HIV and are disproportionately affected by malaria. Indeed, malaria—among the infectious diseases considered mostly likely to become more prevalent with global warming, given the likely expansion of temperatures conducive to mosquitoes—is now the biggest killer of pregnant women in sub-Saharan Africa.²⁶ Dengue fever and various tick-borne diseases are also considered likely either to increase generally or at least shift in prevalence

among regions, as temperatures rise and rainfall patterns change. Research cited in the Intergovernmental Panel on Climate Change's *Fourth Assessment Report* projects diarrheal disease, a scourge among the children of the world's poor, to increase by up to 5 per cent from current levels as early as 2020. As the primary caretakers of children, women will feel the burden of these additions to existing infectious disease.

The health impacts of climate change are particularly uncertain, however. Panel authors assign lower confidence levels to predictions of health impacts than they do to those of sea level rise or more intense storms. One reason is that health and disease respond to so many human factors: nutritional status, the safety of water supplies and sanitation, the quality and extent of health facilities, and the balance of preventive and curative services they offer. Among the largest factors in the spread of infectious diseases such as H1N1, or swine flu, are the rising density of human populations and the ease of air travel in a globalized economy.

Figure 4.3: Cities at low-elevation coastal zones (LECZs)



Source: UN Habitat.

The designations employed and the presentation of material on the map do not imply the expression of any opinion whatsoever on the part of UNFPA concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Health concerns stem not only from the impacts of climate change but its causes as well. Pollution from the same fossil fuels that cause climate change may damage reproduction itself. The Government of China, for example, recently acknowledged increases in birth defects related to pollution, especially the surging combustion of coal powering the country's strong economic growth.²⁷ A world that shifts from carbon-based to renewable energy sources will undoubtedly experience improved public health.

The rising insecurity of food

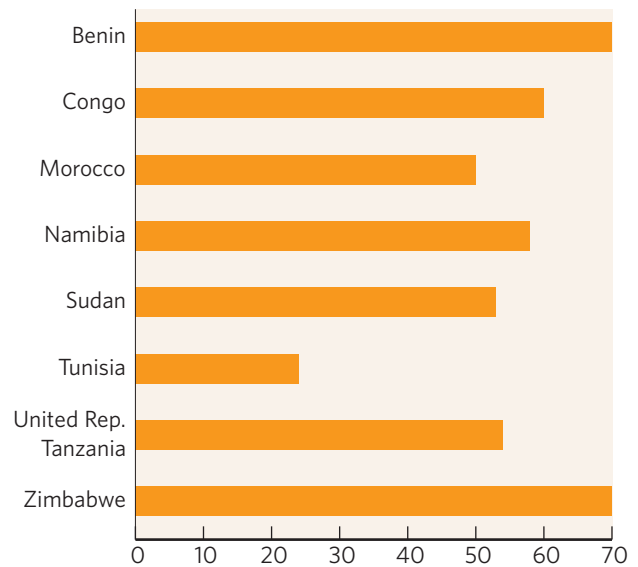
Agriculture may be the arena where the well-being of women and their relative invisibility in official statistics are most at odds with the need to build social resilience to climate change. Women produce far more of the world's food than they are given credit for—especially in developing countries—and even today the gap is wide between the resources available to women farmers and their contribution to global food security. Moreover, women farmers are far less likely to own the land they cultivate. Worldwide, according to the International Center for Research on Women, less than 15 per cent of land is

24 HIV, AIDS AND CLIMATE CHANGE

The future course of HIV and AIDS will hinge upon societies' capacities to adapt to increases not only in infectious diseases but also food and water shortages, more intense storms, and other climate-change impacts.²⁸ The success and extent of HIV prevention and AIDS treatment can thus contribute to social resilience against the more diverse threats on the way.

UNAIDS—the Joint United Nations Programme on HIV/AIDS—and the United Nations Environment Programme recently considered how society's approach to the pandemic is likely to influence adaptation to climate change. The two organizations identified main areas of concern: global and regional food security, the distribution of infectious diseases, the influence of governance on conflict and poverty, and the disproportionate impact of HIV and AIDS on young and poor women. Of particular concern was the possibility that climate change could reduce income from such natural resource-intensive activities as farming and fishing, possibly driving some women into sex work and thereby increasing HIV infection rates.

Figure 4.4: The percentage of agricultural work carried out by women in selected countries



Source: United Nations Environment Programme/GRID Arendal, 2008. Website: <http://maps.grida.no/go/graphic/the-percentage-of-agricultural-work-carried-out-by-women-compared-with-the-percentage-of-female-exte>, accessed 27 July 2009.

owned by women. The world is learning how precarious food security can be even when the impacts of climate change are only beginning to be seen. The prospects for food production are especially worrisome in southern Africa, where the most recent Intergovernmental Panel on Climate Change's assessment projects devastating losses in yields, especially for small farmers, absent effective adaptation efforts.²⁹

In food as in health, the connections between women's lives, economic development, population and climate run in multiple directions. Among the biggest impacts of climate change on agriculture so far has been the sudden replacement of food crops with crops such as sugarcane and sweet corn, to produce bio-fuels as developed-country Governments mandated partial replacement of petroleum-based vehicle fuels with bio-fuels. At the same time, the forces of economic and demographic growth and global trade have led to a significant increase in the scale of food production, with agribusinesses frequently replacing independent farmers, many of them women. This has been accentuated as most developing countries have invested in the production of cash crops and irrigated farming at the expense of subsistence farming on



▲ *Bangladeshi women now earn a living from salt-water fishing in areas that have become permanently flooded as a result of rising seas.*
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rain-fed lands. Finally, farmers the world over are facing new and stiff competition for finite freshwater supplies from growing urban areas and the water needs of industry. Shifts in precipitation patterns can only exacerbate stresses on the world's food supply that would be worrisome enough without additional and hard-to-predict threats from climate change.³⁰

A world that takes seriously the need to rid the atmosphere of excess carbon dioxide, however, is likely to rediscover the value of farmers who work directly with their soil and crops on land they own and can keep. The world's farmers will need to transform themselves from net emitters of greenhouse gases to net absorbers of carbon dioxide to slow and perhaps reverse the rise of concentrations in the atmosphere. That process will require different agricultural production systems based on boosting the carbon content of soils while reducing the need for chemical fertilizers. Women as well as men who own and improve their own land and food production as climate changes can become the models of the resilience humanity needs. This can be one part of the broader social transition toward health and equality and the envi-

ronmental transition towards sustainable use of resources and balance with the global atmosphere and climate.

Women and resilience

Ultimately, the elements likely to make societies resilient to climate change are probably the same ones that lead to equitable development, full exercise of human rights, social and environmental justice, and an environmentally sustainable world.

Women are doubly limited in their efforts to contribute fully to the societies in which they live. Without adequate social support, reproductive and family roles can limit women's participation in economic, civic and political life. In the Kyrgyz Republic, one-quarter of all women surveyed said their domestic work made it impossible for them to work outside the home. A negligible proportion of men cited such reasons for not working. In rural sub-Saharan Africa, women typically spend from two to six hours per week carrying water from a source within 400 metres of their household.³¹ It is not surprising that economic and broader social opportunities are limited under such circumstances.

On top of these constraints, socially conditioned gender roles—the roles of women and men—place limits on what women may pursue and achieve. In a world whose changing climate must be simultaneously combated and adapted to, shackles on half the world's population are unsupportable. A positive develop-

ment amidst these constraints is that many women are moving forward despite these constraints. They are modelling new ways of operating in society and relating to one another in ways that could make a difference—not just to climate but to sustainable social relations and a sustainable environment overall.

25 INDIGENOUS WOMEN ADAPTING TO CLIMATE CHANGE

Indigenous peoples—especially indigenous women—remain under-represented in global talks on climate change. But they have a vital contribution to make, says Victoria Tauli-Corpuz. The sustainable, low-carbon lifestyle? Indigenous peoples have lived it for millennia. “Many of the solutions that are being discussed now have always been a way of life for our ancestors and present generations,” says Tauli-Corpuz.

A member of the Kankana-ey Igorat peoples of the Philippines, Victoria Tauli-Corpuz is chairperson of the United Nations Permanent Forum on Indigenous Issues and founder and director of Tebtebba, an indigenous people's policy research centre. Tauli-Corpuz fought for—and, ultimately, helped win—the United Nations Declaration on the Rights of Indigenous Peoples, which was adopted by the General Assembly in 2007.

Raised in a village in the Cordillera region of the Philippines, Tauli-Corpuz came to Manila on a scholarship in the early 1970s and soon became involved in demonstrations against the Vietnam War. She returned home to find that her ancestral lands were threatened by a huge hydroelectric dam project. “We had to organize ourselves to protest the dam project,” she says. “So, that's how I started, and I never stopped.”

Now Tauli-Corpuz is turning to the issue of climate change, which she sees, fundamentally, as an issue of social justice. Reducing greenhouse-gas emissions is only half the battle; the other half, often neglected, is about promot-

ing sustainable, equitable development. Here, indigenous women can play a central role, as they often have responsibility for—and valuable knowledge about—sustainable agriculture, forestry, watershed management and more.

Indigenous women are also taking an active role in *adapting* to climate change—by developing crops that are flood- and drought-resistant, protecting water resources, and taking care of those sickened by water- and vector-borne diseases that are more prevalent in a warming world.

Different responsibilities mean that indigenous women—and women generally—are affected by climate change in different ways than men. It's important to understand those differential impacts, says Tauli-Corpuz, because, “if you are not aware of them, the solutions you bring about might not necessarily solve the problems of women.”

Tauli-Corpuz learned much about the problems women face while work-

ing in indigenous communities in the Philippines. Trained as a nurse, she saw that reproductive health is a critical component of women's well-being. In indigenous communities where infant and child mortality rates are high, women will often have many children to ensure that some survive. Also, where many hands are needed for subsistence farming, indigenous women face great pressure to bear many children. In some cases, women who attempt to control their own fertility are subjected to domestic violence. At the other end of the spectrum, indigenous women in some countries have faced forced sterilization at the hands of the Government. That's why Tauli-Corpuz has long advocated for appropriate family planning services for indigenous women. “It is a problem if you lack family planning services,” she says, “and it is also a problem if they are not the right services.”

Tauli-Corpuz believes that reproductive health care is crucial for women, and she believes that it is important to stabilize population. But she disagrees with those who see population growth as a major cause of climate change. “I don't think that's really the main thing,” she says. “The main thing is really the lifestyles—the economic development model that's being pushed.” Moreover, “if you think population is the problem, and undertake centralized ways of controlling population growth, we will be in an even greater mess.” Ultimately, says Tauli-Corpuz, “women have to be the ones to decide how many children they have.”

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