# Population and Climate Change Adaptation





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In collaboration with Population Action International

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# Foreword

In the coming years, the global community will build on the commitments defined at the different Conferences of the Parties to the United Nations Framework Convention on Climate Change to adapt to the current and future negative impacts of greenhouse gas emissions. It is impossible to understand and reduce vulnerability to these impacts without taking population dynamics into account. From acute, climate-related events like storms and floods to long-term shifts in weather patterns and sea level patterns, the impacts only become clear through an understanding of who is at risk, what the risks are to people rather than just to places and how these risks vary within and across populations. Vulnerability is unevenly distributed between men and women and between the young, the middle aged and the elderly. Failure by national governments and international agencies to recognize and support the population elements in adaptation programs and planning, including mobility and migration, for the poorest and most vulnerable households could result in forms of migration more damaging for both the migrants and the receiving communities.

In an effort to elucidate the ways in which population dynamics (growth, composition and distribution) interact with climate change and impact the well-being of people and the planet, in 2009 and 2010 the United Nations Population Fund (UNFPA) brought together leading analysts to centralize initial thinking and practical approaches to addressing these dynamics. The outcomes of the 2009 meeting are captured in a compilation, *Population Dynamics and Climate Change*, which examines these relationships and vulnerabilities from the perspective of climate mitigation and adaptation in various key elements. These elements include: why and how population and climate change interact; the specificity of impacts in urban settings; vulnerabilities for different populations groups such as children, women, the elderly and the poor; and programmatic interventions including research, policies, programs, and advocacy. The outcomes of the 2010 meeting, which focused exclusively on population dynamics and climate change adaptation, will be published in a forthcoming volume.

This current manual, a collaboration between UNFPA and Population Action International, builds on UNFPA's continuing work in this arena, and provides a comprehensive overview of population and climate change adaptation in the form of training materials. The target audiences are policymakers, practitioners and advocates who are seeking a practical, hands-on, understanding of the ways that population and climate change interact so that they can apply that understanding to their work in meaningful ways. The information is presented across a series of training exercises and cross referenced and supported by the United Nations' training platform, UN CC: Learn. This manual for training module 2 builds on the materials covered in introductory manual 1, and examines population and climate change adaptation in seven parts.

**Parts 1-5** introduce training participants to the multiple facets of **population dynamics and climate change adaptation** by examining key concepts of exposure, vulnerability, risk, adaptive capacity and resilience. These concepts are explored in the context of population growth, urbanization, migration, population aging, fertility, and reproductive health.

**Part 6** presents **opportunities for integration** through an examination of international and national policy dialogues, adaptation planning and programs, and planning in other sectors. This part also outlines examples of how population data and analysis can strengthen adaptation policies, plans and programs.

**Part 7** provides a comprehensive, annotated compilation of tools and resources that can serve as a detailed reference for policymakers, planners and practitioners seeking to better integrate data and analysis of population dynamics into climate change response strategies.



# Introduction

It is impossible to understand and reduce vulnerability without taking population dynamics into account. From acute, climate-related events like storms and floods to long-term shifts in weather patterns and sea levels, the impacts only become clear through an understanding of who is at risk, what the risks are to people rather than just to places and how these risks vary within and across populations.

- Introduction to Population Dynamics and Climate Change, 2009<sup>1</sup>

The concepts of exposure, vulnerability, risk, and resilience—particularly when considering how population and climate change interact—are not static. Population dynamics greatly influence how people are affected by and respond to climate change. As the size, composition, location and mobility of populations change, so does the extent of their exposure to climate risks, their vulnerabilities, and capacity for resilience. Analyzing the links between population and vulnerability is a requisite for crafting effective adaptation planning and programming.

In much of the literature to date detailing climate change vulnerability, there is a tendency to list and label certain people and populations as vulnerable—e.g., the poor, women, indigenous peoples, the elderly—while the actual mechanisms that drive vulnerability among these groups are rarely addressed. For example, restricted access to financial resources, lack of influence in political and decision-making processes, social marginalization and other such inequalities found among and within populations are often the true underpinnings of what makes people vulnerable. Only when those mechanisms are distinguished, analyzed and targeted can vulnerability be reduced, and resilience and adaptive capacity be built.

Population data and projections significantly improve the understanding of vulnerability and risk related to climate change, as they help to describe more precisely who, when, where, why and how climate change impacts will most adversely affect. By explicitly addressing potential trajectories of population size, composition, mobility and location, integrating population dynamics and trends into adaptation planning and programming allows for the creation of proactive, dynamic and appropriate long-term responses to climate change that are more accurately targeted towards those people most at-risk.

#### Poverty







#### Adaptation:

The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

#### Exposure:

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

#### Vulnerability:

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

#### Risk:

The combination of the probability of an event and its negative consequences.

#### Resilience:

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Source: United Nations International Strategy for Disaster Reduction, http://www.unisdr.org/we/inform/terminology

# **Population Growth and Climate Change Adaptation**

A large share of the population in developing countries is already vulnerable and living in marginalized areas that are susceptible to climate variation and extreme weather events. Population growth is occurring most rapidly in the developing world, increasing the scale of vulnerability to the projected impacts of climate change.

— Hardee and Mutunga 2009²

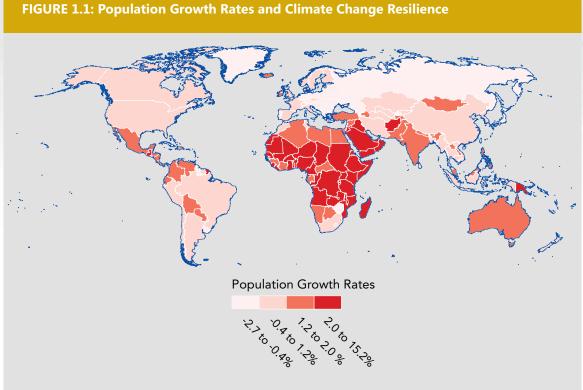
Vulnerability to climate change is socially differentiated, and this differentiation is greatly accentuated by poverty. Factors that underpin poverty - inequitable access to socio-economic resources and services, limited assets, lack of safe housing and secure livelihoods—are also frequently the underpinnings of vulnerability. Though they have contributed little in the way of climate change, people living in poverty will likely be the most directly affected by yet least capable of adapting to its impacts. In many cases, those populations expected to be most adversely impacted are also experiencing high levels of population growth (see Figure 1.1).

By the end of 2011, world population will exceed 7 billion people. Future population growth will depend in large part on changes in fertility, and United Nations demographers estimate that by 2050 the world's population will grow to between 8.1 billion (low fertility projection) and 10.6 billion (high fertility projection). The medium fertility projection of 9.3 billion people in 2050 assumes that fertility rates will stabilize near 2.1 children per woman, which would require significant declines in fertility rates in many countries.<sup>3</sup> The majority of future population growth will occur in developing regions, most notably in the least developed countries (LDCs), where total population is projected to double by 2050.<sup>4</sup> Overlapping issues of population and poverty increase the scale of potential climate risk and vulnerability, creating greater challenges for adaptation.<sup>5</sup>

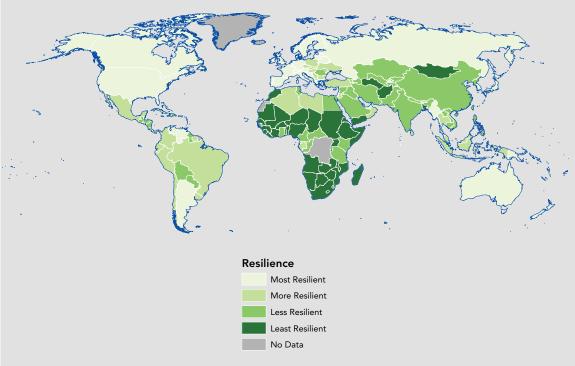
Therefore, it is increasingly important that climate adaptation planners utilize socioeconomic and demographic data to identify precisely where populations are changing most rapidly, with particular attention paid to where concentrations of poverty exist or are emerging.

### **Natural Resources**

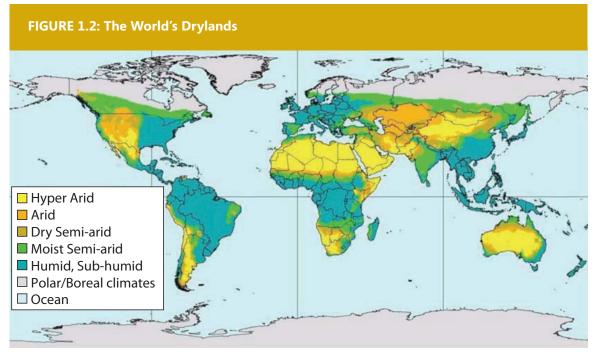
Rapid population growth can increase pressure on the same natural resources that are most likely to be affected by a changing climate, intensifying the adverse impacts of climate change on the resources that people depend on most. Additionally, population growth that occurs in conjunction with a rapidly changing climate results in more people being exposed to climate-related



**Source:** United Nations, Department of Economics and Social Affairs, Population Division. 2011. *World Population Prospects: The 2010 Revision*. New York: United Nations.



Source: Malone, E L and A Brenkert. 2009. "Vulnerability, sensitivity, and coping/adaptive capacity worldwide." In Ruth, M and M Ibarraran (Eds.) The Distributional Effects of Climate Change: Social and Economic Implications. Dordrecht: Elsevier Science, pp. 8-45. DRAFT



Source: Commission on Climate Change and Development, 2008; as reprinted in Population Dynamics and Climate Change, UNFPA and IIED, 2009

declines in natural resource availability.

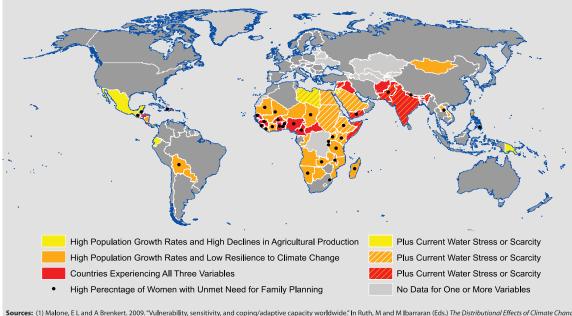
A key example of the nexus between population, climate change and limited or scarce natural resources is that of *water*. Water shortages are already apparent in many parts of the world considered drylands, which are home to some 2 billion people worldwide. Drylands are characterized as ecosystems that experience low, unpredictable and erratic precipitation, much of which tends to occur in limited but intense rainfall events.<sup>6</sup> Some dryland areas depend mainly on seasonal glacial runoff to feed rivers, streams and lakes. Up to 93% of those living in drylands live in developing countries, and nearly half (45%) reside in urban areas (see Figure 1.2).<sup>7</sup>

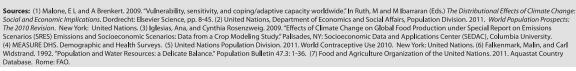
The amount of water considered sufficient for individual well-being and larger sustainable development goals is 2,000 cubic meters per person per year; people living in dryland ecosystems have only an estimated 1,300 cubic meters of water available per person per year.<sup>8</sup> In the face of climate change, dryland precipitation patterns are likely to become more unpredictable and glacial runoff is likely to steadily decrease, resulting in increased levels of water stress for people living in drylands around the world. Water stress manifests itself in many ways for both urban and rural inhabitants, directly affecting water supplies used for drinking, household needs, agriculture, and, in some cases, hydropower.<sup>9</sup>

Populations are growing in dryland regions due both to natural population increase and migration, as people move from one area to another in search of greater livelihood opportunities. Population growth in areas already facing degradation due to climate change will result in more people becoming exposed to climate hazards such as water

## BOX Population and Climate Change Hotspots

Areas where rapid population growth combines with high projected agricultural declines and low resilience to climate change are considered "hotspots" of population and climate change. A population and climate change mapping project by Population Action International identifies 26 countries that are experiencing all three of these challenges; in most cases, people living in these countries already face high poverty rates, low education levels, lack of access to health services and heightened gender inequality. In addition, several of the 26 countries are also confronting water stress or scarcity as well as high unmet needs for family planning. While the project's national level focus masks sub-national trends, it serves as a helpful starting point in examining the important relationships between population growth, agriculture and climate change.





scarcity and shortages. At the same time, these larger populations will place increased demand on an already sensitive natural resource supply.

In addition to playing an important role in climate change mitigation by absorbing storing carbon dioxide, *forests* can help to stabilize landscapes and prevent erosion. However, deforestation is occurring rapidly, particularly in developing regions, with both local and global drivers affecting the pace and scale. At the local level, many people living in developing countries remain dependent on wood and charcoal as primary energy sources. On the larger scale, external forces such as the consumption and production patterns



of those living in developed regions help drive large-scale deforestation. In tandem with these economic, political, and ecological processes, population growth is an important underlying cause of deforestation,<sup>10</sup> as a larger world population will require more land for food production and timber resources, putting additional pressure on the world's forests.

### Agricultural Production/ Food Security

In addition to increasing water stress, growing populations in many developing countries will likely face challenges related to declining agricultural productivity. Rising temperatures are expected to adversely impact agricultural production in places like the tropics and subtropics, where traditional crops are already being pushed to grow in temperatures near the top of their tolerable ranges.<sup>11</sup> In the face of increasingly challenging agricultural growing conditions, population growth is likely to increase the number of people exposed to climate-related food shortages.

Here, too, the growing demands of expanding

populations add pressure to climate-sensitive resources. Analyzing projected population growth data alongside estimates of agricultural production losses and expected increases in crop prices due to said loses suggests that by 2080, an additional 90 to 125 million people living in developing countries will be at risk of hunger.<sup>12</sup> An understanding of population growth trends in areas that are vulnerable to agricultural production losses can highlight areas of potential food insecurity, and such information can help to inform more effective adaptation plans and programs (see Box 1.1).

Population pressures also affect the amount of arable land available per person. In Kenya, the 2008 Demographic and Health survey revealed that already more than two-thirds of households that own agricultural land report that their land is inadequate to support their family. Thus by dividing up farmland among increasing numbers of people and reducing the amount of land available per person, population growth is also making agricultural systems more sensitive to climate change stress.



# Urbanization and Climate Change Adaptation

Climate change and its ramifications on urban processes cover a wide spectrum. Climate-related natural disasters are increasing in frequency and magnitude. Their consequences will depend on a number of factors, including the resilience and vulnerability of people and places.

- State of World Population 2007<sup>13</sup>

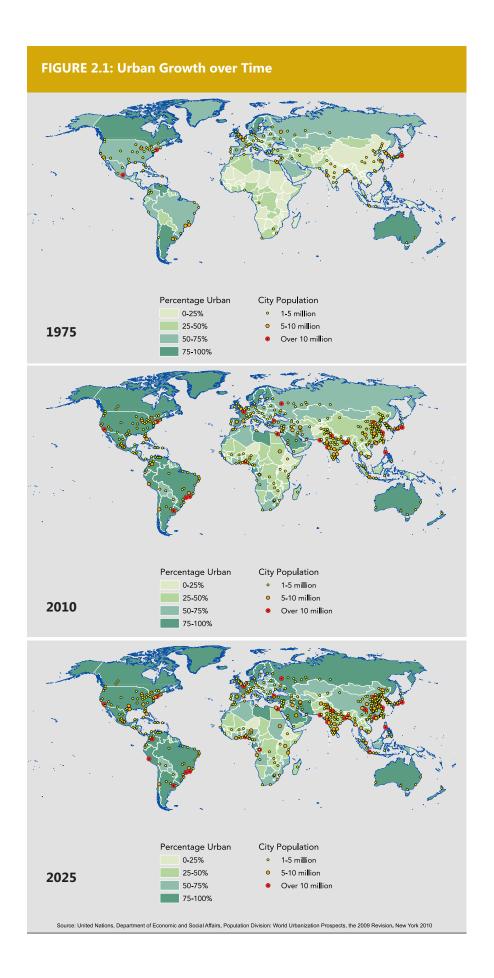
Rapid urban growth is one of today's most important demographic trends. Half of the world's population now lives in urban areas, and 90% or more of future population growth will occur in urban centers.<sup>14</sup> Nearly 95% of that urban growth will be concentrated in developing nations, most notably in Asia and Africa<sup>15</sup> (see Figure 2.1). Therefore, as Martine (2009) states, "*Population growth issues are thus primarily urban issues*" (emphasis original).<sup>16</sup>

As people move into urban areas in search of greater livelihood opportunities, they are decreasing their economic vulnerability. Yet, in doing so, they may be increasing their vulnerability to the adverse effects of climate change, as various aspects of urbanization, such as settlement location, density, and the availability of appropriate infrastructure and housing stock, influence the levels of exposure and risk experienced by urban residents. Additionally, rapid urban growth can outpace the ability of governments to create plans for and build resilient cities, leading to increasingly vulnerable city inhabitants.<sup>17</sup>

## Urban Growth and Risk in Vulnerable Areas

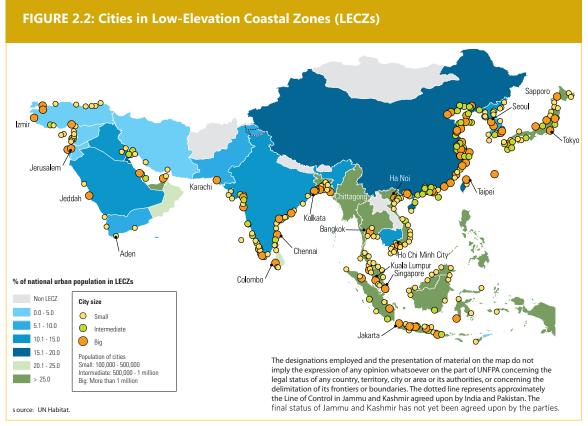
Vulnerability and risk are closely tied to people's exposure to the potential effects and hazards of climate change. Exposure is related to both the physical and social contexts within which people live, and can be assessed by considering what places are exposed and where, as well as who is exposed, in what ways, and why.<sup>18</sup> Analyzing exposure requires an understanding of how people operate in and move across geography and the built environment, which is captured only when population dynamics are analyzed.<sup>19</sup>

Low elevation coastal zones (LECZs) are a key example of how population and geography issues combine to affect exposure. LECZs are characterized as coastal areas within 10 meters of sea level, which are naturally prone to flooding.<sup>20</sup> Development in LECZs increases the likelihood of flooding, as conversion and use of coastal wetlands and marshes for human settlement purposes often decreases the natural ability of the land to absorb excess rain- and storm-water.<sup>21</sup> This has implications for how climate change will



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affect large numbers of people: though they comprise only 2% of the world's total land area, LECZs are home to an estimated 10% of the world's total population, and 13% of urban populations.<sup>22</sup> Many of the world's largest and most densely populated cities, including Dhaka, Jakarta, Mumbai, New York, Shanghai and Tokyo, are located in LECZs, as are many of the medium to large urban centers in developing countries<sup>23</sup> (see Figure 2.2). This equates to large populations being exposed and susceptible to damages related to rising sea levels and extreme weather events.

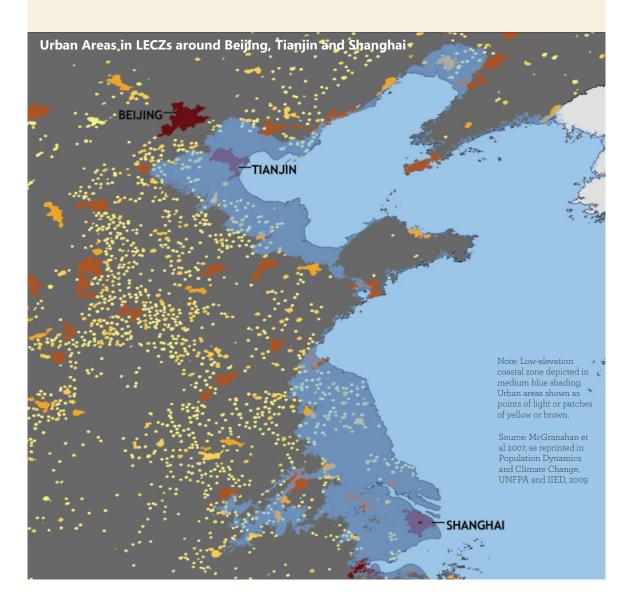


Source: State of World Population 2009, UNFPA

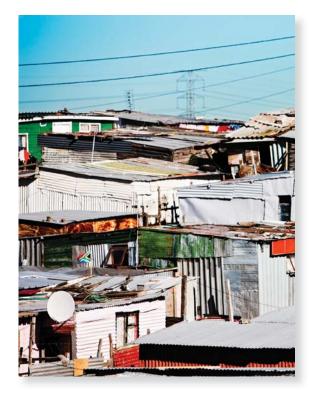
# BOX<br/>2.1The Importance of 10 Meters for Visualizing<br/>Population and Climate Data

Coastal settlements and their populations are exposed to adverse climate change effects and hazards such as extreme weather events, storm surge and sea level rise. While sea level is not likely to rise anywhere near 10 meters within the foreseeable future, the increased exposure experienced by populations within LECZs serves as an important proxy for analyzing the relationships between population dynamics, geography and climate change at a finer scale.

Demographic trends and data play a key role in assessing how climate change will affect those living in LECZs, as they help to locate where people live in relation to potential climate hazards and, therefore, help to better assess the resulting vulnerabilities. Pinpointing vulnerable populations provides the opportunity for proactive adaptation measures and more targeted disaster risk reduction efforts in hazard prone areas.



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Perhaps most importantly, LECZs are projected to experience particularly high levels of population growth in coming decades, potentially placing even more people at risk of exposure to the hazards of climate impacts.<sup>24</sup> Spatial distribution and settlement patterns of people living in LECZs are key factors in the exposure levels of growing populations, none of which is static: risk associated with climate change will shift over time as more and more people move in, out and around more or less exposed areas.<sup>25</sup>

### Poverty, Vulnerability and Urban Density

When well planned and executed, urban density is, in many ways, beneficial for sustainable development and climate change mitigation efforts. When urban density is an outcome of poor planning and lack of regulation, however, it can exacerbate a number of climate change vulnerabilities and risks. Due to the concentration of people, resources and activities within limited space, even minor climate change effects or events can impact a large number of people and bring to bear major consequences on local economies.<sup>26</sup>

In many developing countries, there is a correlation between very high urban density and low-income residents.<sup>27</sup> Currently, low income residents comprise 40 percent of city populations in developing countries, and account for an even larger percentage of new urban growth.<sup>28</sup> Yet, the land and housing needs of the urban poor are often neglected, resulting in serious implications for urban poverty rates and urban environmental sustainability, both of which directly impact the quality of life of the city as a whole.

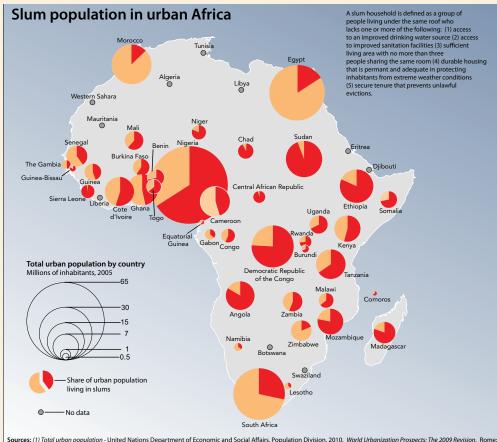
Left with few other options, the urban poor may be driven to settle on already densely populated, ecologically sensitive and geographically hazardous locations.<sup>29</sup> For instance, residence taken up on deforested, steep slopes can affect a city's watershed as well as increase the risk of landslides, while occupation of wetlands and urban floodplains magnifies both the probability of and exposure to flooding.

Frequently coupled with infrastructure deficiencies such as the lack of running water, sewage systems, or solid waste management, these settlement locations and conditions result in localized, urban "hotspots" of climate risk and hazard, intensifying vulnerability of the urban poor to the effects of a changing climate.<sup>30</sup> Therefore, in urban areas, the impacts of climate change will be felt most severely by the poorest populations.<sup>31</sup>

### **BOX 2.2** Urban Slums and MDG 7

The vulnerabilities faced by urban slum residents offer a prime example of how people's exposure to climate hazards is affected by combined factors of geographic risk, poor infrastructure, poverty and population dynamics. Millennium Development Goal 7 aims to ensure environmental sustainability, and includes a target specific to improving the lives of at least 100 million slum dwellers by 2020, namely by decreasing the proportion of urban populations living in slums. Such an achievement would, in theory, help to decrease the levels of climate risk faced by the large number of the urban poor living in slums.

However, progress on this goal is slow, and the actual number of people living in urban slums continues to increase. In light of growing urban slum populations, it may prove more effective in certain areas to promote proactive upgrading and climate-resilient development within settlements rather than reactive attempts to move people from such areas. For instance, providing adequate or improved housing and other infrastructure as well as increased economic opportunities can help to mitigate the levels of exposure and risk experienced by urban slum residents.



Sources: (1) Total urban population - United Nations Department of Economic and Social Affairs, Population Division. 2010. World Urbanization Prospects: The 2009 Revision. Rome United Nations. (2) Proportion of urban population living in slums - United Nations Department of Economic and Social Affairs, Statistics Division. Millenium Development Goals Indicators. 2011. New York: United Nations.

# **Climate Migration, Vulnerability and Mobility**

Policy makers need to take a holistic approach to tackling adverse impacts of climate change that addresses both the drivers of migration in origin areas (e.g., livelihood security, environmental hazards, conflict, demographic pressures, gender inequality) and the pull factors in destinations (e.g., demand for labor, again of the population).

– "Displacement and Migration" side event at COP16, Cancun, 2010<sup>33</sup>

In the context of the urban poor it is important, however, to understand that density itself is not the root cause of vulnerability; it is, rather, the combination of increased exposure related to living on geographically risky land, an absence of suitable infrastructure, and the inequitable access to resources and services faced by lowincome groups interacting with density, which results in a heightened level of vulnerability.<sup>32</sup>

People have moved away from their homelands in search of more opportunity and better conditions for millennia, influenced to migrate by a mix of social, economic, political and environmental factors. There is little doubt that the adverse and destabilizing effects of climate change will influence and add to the likelihood of human migration.

Because decisions to migrate are typically based on multiple causal factors, it is difficult to predict with any precision how climate change will add to the numbers of people deciding to migrate. In some instances, severe climate events, such as floods, droughts and sea level rise, will suddenly and forcibly displace entire populations from their homes; in other cases, gradual changes in climate patterns, such as rising temperatures and shifting rainfall patterns, will affect people's livelihoods, gradually driving them to seek opportunity elsewhere. Such migration can happen in ways that reduce exposure to climate risks and improve human well-being, therefore contributing to effective adaptation to climate change. Alternatively, climate

### BOX 3.1 Managing Climate-induced Population Movements in Nepal

Repeated flooding in eastern and western Nepal in August 2008 affected more than 250,000 people, many of whom were living in poverty and had already endured floods and landslides a year earlier.

Floods and landslides are seasonal disasters in Nepal and are linked to the clearing of the forests, particularly in hilly areas. Climate change is expected to further exacerbate the frequency and intensity of flooding, as rains spread westward across the country and melting snow and glaciers cause already-swollen rivers to overflow their banks in the rainy season.

Nepal ranks among countries with a low "human development index," with over 80 per cent of the population surviving on less than \$2 per day.

Gender is one of the factors influencing vulnerability to natural disasters in Nepal. As more and more males migrate from mountainous regions and rural areas to newly developed cities, more and more women are becoming heads of households, remaining in areas prone to flooding and are therefore most vulnerable to climate-related disasters.

In eastern Nepal in 2008, a retaining wall along the Koshi River collapsed, washing away whole villages in the Sunsari and Saptari districts and affecting about 70,000 people. The force of the water was so strong that the river's course changed almost completely, blocking access to some flooded areas and stranding tens of thousands of people in makeshift camps. In response to the catastrophe, the International Organization for Migration led the coordination of the international humanitarian response of the United Nations, the Red Cross and Red Crescent, non-governmental organizations and other actors to assist the Government of Nepal in addressing urgent humanitarian needs while laying the foundation for more durable solutions and building national capacities for disaster-risk reduction, paving the way for safe, voluntary and orderly returns.

Source: State of World Population 2009, UNFPA

change-driven migration in the form of abrupt or poorly planned human displacement can exacerbate or create new vulnerabilities and development challenges (see Box 3.1).

Rapid, mass migration due to climate change has the potential to increase the incidence of social, political and economic instability. Large numbers of people moving from one place to another will put pressure on receiving community's resources, services and infrastructure, some of which may be limited to begin with, and could lead to tension and conflict between migrants and residents of the receiving community.

Climate-induced migration is not, however, a simple cause and effect process. Among



the factors affecting migration decisions are individual or group perceptions of potential climate risks and alternatives to movement.<sup>34</sup> Though climate migrants are often labeled as a vulnerable group, it can also be seen that they are, in fact, reducing their vulnerability and exposure to climate change impacts through their mobility. Often, those who are able to reduce their vulnerability are individuals within a population with access to human, social and economic resources. In this case, climate-driven migration is actually a contextually appropriate method of coping with and adapting to a changing climate.

Just as important as those who do move are those who do not, as not everyone faced with the effects of climate change will have the desire or ability to move. Because of the resources that migration requires, for poorer populations, as well as women, children and the elderly, migration simply may not be an option. In many cases, this lack of mobility results in increased exposure and vulnerability to climate impacts. For example, people unable to move away from coastal areas adversely impacted by sea level rise and extreme weather events will face continually growing risk as climate change progresses.

Patterns of migration are also important for adaptation planning. How, where and when people move affects both sending and receiving communities. In studies of past natural disasters, displaced populations often opt for short-term migration; and people driven to migrate more gradually tend to go short-distances.<sup>35</sup> Such responses shed light on how populations are likely to respond to

# BOX Temporary Migration Programme Benefits Environmentally Vulnerable Communities in Columbia

Many areas of Colombia are vulnerable to seasonal environmental risks, including water scarcities, floods and soil erosion. In February 2009, for example, the Mira River overflowed its banks, affecting more than 30,000 people.

Environmental vulnerabilities aggravated by climate change are also exacerbated by poverty. These factors, along with conflict and security issues, drive internal and international population movements. An estimated 3.3 million Colombians have moved to other countries, and their remittances to Colombia totaled \$4.6 billion in 2007 alone.

Recognizing the potential contribution of migration to development and adaptation to climate change, Colombia established a programme in 2006 that facilitates temporary, seasonal migration to Spain. Originally, the programme aimed to help households whose livelihoods were lost after a volcano erupted in the Galeras region. Since then, how-ever, the programme has been expanded to include people in rural communities where crops and land are vulnerable to floods and other natural disasters.

In Spain, migrants earn an income, mostly through agricultural work, which helps them cover family health-care costs, children's education and housing, and enables women and men to invest in projects for the benefit of their home communities. Migrants also acquire new skills, which can help them diversify their incomes when they return to Colombia.

The programme, supported by the European Union, allows Colombians to increase their resilience to environmental challenges and offers them an alternative to permanent relocation. The recurring six-month placements provide ample time for ecologically fragile land to recover so that marketable crops may again be grown on them.

Source: State of World Population 2009, UNFPA

#### future climate changes.

Another key pattern of population movement is circular migration. Some circular migration is based on long-existing climate patterns, such as migrant workers who move seasonally to earn income based on employment opportunities tied to traditional harvest times or other weather-related activities. Circular migrants of this kind are particularly sensitive to climate change that may significantly alter weather patterns.

Circular migration can also occur in response to climate change. When environmental degradation and climactic changes affect



Climate change may contribute to the emerging vulnerability of places and groups that were previously not considered vulnerable. Elderly populations provide an example of an emerging vulnerability to climate change that cuts across the North-South divide.

– O'Brien and Leichenko 2007<sup>36</sup>

Dramatic shifts in the age structures of populations around the world are shaping vulnerabilities and adaptive capacities now and will continue to do so for several decades to come. In particular, populations made up of significant numbers of either younger or older people are likely to face unique challenges in coping with and adapting to climate change. Total dependency ratios, defined as "the ratio of the sum of the population aged 0-14 and that aged 65+ to the population aged 15-64,"<sup>37</sup> are useful indicators for assessing the potential ways in which age structure may affect the vulnerabilities and resilience of dependent individuals as well as the families, communities, governments and other support systems.

Currently, dependency ratios are highest amongst the least developed countries: it is estimated that, for every 100 people of working age (15 - 64), there are 77 dependents, a vast majority of which is comprised of young people ages 14 years and younger.<sup>38</sup> Conversely, looking ahead to 2050, it is the more developed regions of the world that are projected to have the highest dependency ratios, though this shift will represent a larger proportion of people ages 65 years and older.<sup>39</sup> There are, however, major implications for adaptation policy and planning in both cases, highlighting the importance of taking both current and future age structures into consideration.

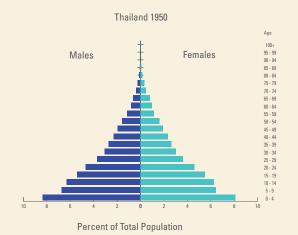
Representing over 1.8 billion people today, children ages 14 years and younger constitute a significant proportion of the world's population.<sup>40</sup> More than 85% of these children live in developing countries,<sup>41</sup> where they are more likely to be adversely affected by the effects of climate change. Additionally, many of the health risks faced by children in the developing world, such as malaria, diarrhea, and malnutrition, are expected to worsen with climate change.<sup>42</sup> Children are also prone to being more sensitive to the types of extreme weather events and natural hazards that are likely to increase with climate change, such as heavy flooding and cyclones.43 These sensitivities make children and their families more vulnerable. In order to effectively build adaptive capacity among populations with large proportions of children, adaptation efforts must address the specific needs of children and include them in policy frameworks and programming.

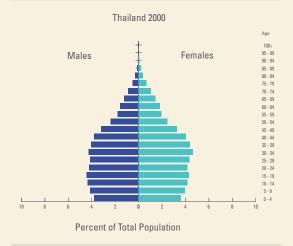
### **BOX 4.1** Thailand's Changing Age Structure

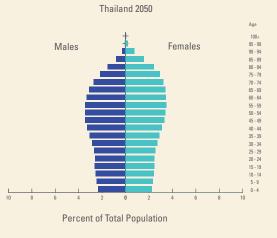
The population pyramids at right demonstrate how Thailand's age structure has changed over time. As fertility declines, the proportion of the population in older age groups is growing, with implications for housing, education, health care infrastructure, and other social and economic issues.

In the coming decades, the proportion of the population that is elderly will grow significantly in many countries. This change will have implications for the vulnerability of societies, and for the response measures that can be put into place to reduce vulnerability and strengthen capacity to adapt to climate change. Climate change adaptation plans, including disaster risk reduction and response, will be more effective when such changes in age structure are taken into account.

Source: United Nations, Department of Economics and Social Affairs, Population Division. 2011. World Population Prospects: The 2010 Revision. New York: United Nations.







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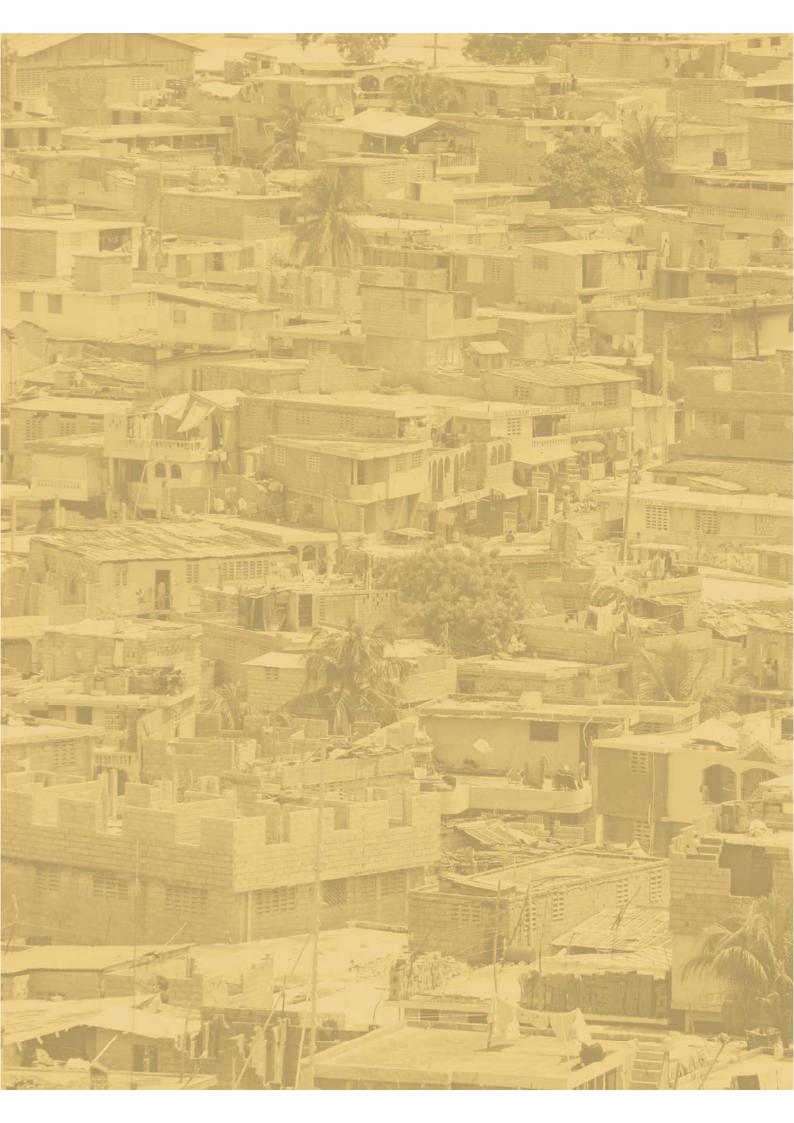
In addition to children, it is also important to consider the relationship between youth, climate change, and adaptive capacity. Ages 15 to 24 years old, youth comprise an additional 1.2 billion people worldwide, about 1 billion of whom live in developing countries.<sup>44</sup> As youth move into the working age population, the availability of remunerative employment and livelihood opportunities will play a key role in their ability to access resources to respond to climate change. The lack of livelihood opportunities leads to the risk of living in poverty, thereby limiting the ability of youth to acquire the necessary knowledge, skills, and means needed to prepare for and adapt to climate change.<sup>45</sup> The adaptive capacities of youth affect the overall resilience of the communities and nations in which they live. Youth must, therefore, be given active roles in formulating adaptation responses.

In the same way young people face unique challenge related to climate change, so do older people, and, worldwide, aging populations are growing: the percentage of people 65 years old and above is projected to nearly double between 2010 and 2050, from 7.6% to 16.2%.<sup>46</sup> Developing countries will experience the most significant amount of population aging in the coming decades: the number of people aged 65+ will more than triple from 327 million in 2010 to 1.2 billion in 2050.<sup>47</sup>

The challenges often faced by older people in everyday life, including deteriorating health, lack of social inclusion and networks, mobility issues, and low income, are also frequently contributing factors to climate change vulnerability.<sup>48</sup> Changing social, economic and cultural safety nets, such as reforms in health care and welfare, and shifting family structures often directly affect the well-being of the elderly as well. Consequently, aging populations may be more severely impacted by the adverse effects of climate change, including extreme weather events and natural disasters.

For example, heat wave events often disproportionately affect elderly populations. Mortality statistics from the 2003 heat wave in Paris show a 70% increase in the excess total mortality of 75—94 year olds, compared with only a 20% increase for those aged 45—74.<sup>49</sup> While the heat played a role in spurring this disaster, the changing roles of the institutional systems and familial support that often underpin the safety and well-being of older people influenced survival as well.

How older people perceive the rapidly changing world around them also affects their adaptive capacities. Lack of knowledge of how to respond to and cope with exposure to new shocks and stressors such as extreme temperatures renders many older people unprepared and, thus, more at-risk. In the 1995 Chicago heat wave, subpopulations of the elderly expressed reluctance to leave their homes based on neighborhood safety concerns as well as poor infrastructure.<sup>50</sup> Specifically engaging aging populations in awareness-raising and capacity building efforts in order to reduce risk related to climate shocks and disasters is a necessary part of adaptation programming.



# Fertility, Reproductive Health, and Adaptive Capacity

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.

- State of World Population 2009<sup>51</sup>



As outlined in the previous section, rapid population growth can result in heightened climate change vulnerability, through the increase in numbers of people exposed to climate risk, as well as the compounding of pressures on scarce or limited natural resources. Beyond the demographic implications, however, the high fertility rates and lack of access to reproductive health care that frequently underlie rapid population growth also hold implications for people's ability to cope with and adapt to climate change.

## Women, Childbearing, and Climate Change

The relationship between fertility, reproductive health, and adaptive capacity can be highlighted through an examination of women's experience with climate change. In many parts of the world, women are disproportionately affected by climate change and face social and cultural disadvantages in surviving and adapting to climate stresses.<sup>52</sup> Among the many gender constructions that increase women's vulnerability are their traditional roles as child bearers and family caregivers.

Women in the developing world have large families and often start childbearing at a young age. Among the 49 least developed countries, the **total fertility** *rate* remains very high at an average of 4.5 children per woman.<sup>53</sup> High levels of fertility are due to a combination of low usage of family planning (29%) among women of childbearing age, early onset of childbearing, and fertility preferences.

### **BOX 5.1** Reproductive Health Defined

As defined in the report from the 1994 International Conference on Population and Development, reproductive health "is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes. Reproductive health therefore implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this last condition are the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health-care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant."

Source: Report of the International Conference on Population and Development, available at http://www.un.org/popin/icpd/conference/offeng/poa.html

While the 1994 International Conference on Population and Development (ICPD) resulted in global agreement on the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, access to and use of family planning services continues to vary widely between and within populations. Worldwide, 215 million women have an unmet need for family planning, meaning they are sexually active and don't want to become pregnant but are not using any form of contraception. Unmet need for family planning is particularly high in Africa, where one in five married women of childbearing age have an unmet need.<sup>54</sup> Data on fertility, family planning/contraceptive use, unmet need for family planning, and other factors are regularly collected for many countries through Demographic and Health Surveys.

At a local scale, high fertility is one of the factors that can contribute to growing pressure on limited natural resources such as water, forest resources, and farmland. As climate change further strains these resources, community members may see smaller family size as a factor that can reduce their own vulnerability, as documented in a case study in Ethiopia (see Box 5.2).

Furthermore, ongoing unmet need for family planning results in early childbearing, high fertility and short birth intervals. Such outcomes are directly connected to development outcomes that are critical for adaptive capacity.

For example, early childbearing, high fertility, and short birth intervals are associated with **poor maternal and child health**,<sup>55</sup> which directly impede women's and thus households' ability to participate and invest

## Linking Population, Fertility and Family Planning with Adaptation to Climate Change: Views from Ethiopia

A case study from Ethiopia explores links between high fertility, population growth, and adaptive capacity at the community level, and reveals that people relate fertility and reproductive health to a change in vulnerability. People made the connection between unmet need for family planning, local population growth, land shortages, deforestation and agricultural adaptive capacity. As one young woman in the study put it, "... if a family has limited children, he will have enough land for his kids and hence we can protect the forests....In earlier years we had a lot of fallow lands, but now as a result of population growth we don't have adequate fallow land. Therefore, limiting number of children will help us to cope with the change in climate.

Source: Kidanu, A., Rovin, K. and Hardee, K. 2009. Linking Population, Fertility and Family Planning to Resilience and Adaptation to Climate Change: Views from Ethiopia. Final Study Report. Addis Ababa, Miz-Hasab and Washington, DC: Population Action International.

in adapting to climate change. Lack of access to reproductive health and family planning services is also correlated with maternal death and disability. If unmet need for family planning were met, an additional 90,000 women's lives would be saved.<sup>56</sup> These are 90,000 women, caregivers, and essential providers of a family's food and water who would otherwise not be alive to help their children, families, and communities adapt to climate change and its impacts on their lives.

In addition, early child bearing and high fertility are associated with girls' early departure from school and **lower** educational attainment,<sup>57</sup> and education is viewed as one of the key determinants of individuals' adaptive capacity.<sup>58</sup> High fertility also limits women's ability to participate in the labor force and **earn an income**, which also may limit adaptive capacity, as research consistently indicates that women's income is more likely than men's to be invested back in the family and their livelihoods.<sup>59</sup> Understanding how and where fertility and reproductive health needs intersect with climate change risks can strengthen assessments of vulnerability. A simple spatial assessment of these trends, such as assessing fertility and contraceptive trends in areas of high drought risk (see Box 5.3), can inform program design in important ways. The addition of reproductive health interventions in adaptation plans and programs can help to strengthen individual and household resilience and adaptive capacity, particularly in areas where fertility is high and health services remain limited in providing access to reproductive health and family planning servies.

Integrated Population-Health-Environment (PHE) projects aim to simultaneously meet the health and development needs of remote underserved communities while sustaining natural resources, environmental services, and biodiversity. A key component is the explicit focus on addressing women's unmet

#### **BOX 5.3** Reproductive Health and Climate Risk in Ethiopia

Climate-related disasters such as drought, flood, and landslides are a major source of risk, especially for the poorest and most vulnerable populations. Understanding where these risks occur in relation to each other and with growing populations will be critical

in developing adaptation and development plans that will minimize vulnerability to changing climate conditions.

In Ethiopia, for example, much of the eastern part of the country is at high risk of drought. In this part of the country, fertility rates are high and the usage of contraceptives is low, contributing to health and development challenges that can exacerbate climate change vulnerability.

#### Total Fertility Rate



Central Statistical Agency [Ethiopia] and ORC Macro. 2006. Ethiopia Demographic and Health Survey 2005. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.

Historic Drought Risk



Landslide, Drought and Flood Frequency and Distribution Datasets, 2005. Palisades, NY: Center for Hazards and Risk Research, Columbia University.

#### **Contraceptive Prevalence Rate**



Central Statistical Agency [Ethiopia] and ORC Macro. 2006. Ethiopia Demographic and Health Survey 2005. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.

need for family planning. In PHE project areas, communities have identified lack of access to family planning services as a priority due to the impact that unintended pregnancies and larger-than-desired family size have on women, their families, their communities, and the local environment.

Lessons learned from more than a decade of PHE implementation could also strengthen adaptation programming, particularly in areas experiencing rapid population growth, high fertility and high unmet need for family planning.

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# **P6Opportunities for Integration**

It is clear that population dynamics matter for climate change adaptation. And yet, population dynamics are not always effectively integrated into adaptation policy, planning and programs. This section provides examples of entry points for population dynamics in climate change adaptation, ideas for strengthening integration, resources for marshaling data and information for planning, and tips for building relationships across sectors.

## International and National Policy Dialogues

The Cancun Agreements resulting from the 2010 negotiations of the UN Framework Convention on Climate Change contain the **Cancun Adaptation Framework**, which recognizes a need for enhanced adaptation action that integrates relevant social, economic and environmental policies and action.

While issues of population growth, rapid urbanization, aging and reproductive health are not explicitly elaborated in the text, the framework calls for adaptation action that "should follow a country-driven, gendersensitive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional and indigenous knowledge, with a view to integrating adaptation into relevant social, economic and environmental policies and actions, where appropriate." The text highlights the importance of migration, encouraging

"measures to enhance understanding, coordination and cooperation with regards to climate change induced displacement, migration and planned relocation, where appropriate, at the national, regional and international levels."<sup>60</sup>

The Cancun Adaptation Framework enables the establishment and strengthening of international, regional, and national institutions to support adaptation action. It also set in motion a process for Least Developed Countries (LDCs) and other interested countries to formulate and implement **National Adaptation Plans** (NAPs). This process will enable LDCs to build upon their experience with NAPAs to identify medium- to long-term adaptation needs, and develop strategies to address those needs.

An analysis of NAPAs (in which LDCs identified immediate, short-term adaptation needs) indicated that most governments identified rapid population growth as a factor that exacerbates climate change vulnerability,

### **BOX 6.1** The Expanding Landscape of Climate Change Finance

Among the outcomes of the Copenhagen (2009) and Cancun (2010) meetings of the UN Framework Convention on Climate Change (UNFCCC) was the pledge by governments to supply US\$30 billion in "fast start" climate change financing, growing to US\$100 billion annually by 2020. Much of this funding is to be delivered under the auspices of a "Green Climate Fund." In addition to these pledges, public and private climate assistance funding outside of UNFCCC processes has expanded dramatically—UNDP estimates that there are 50 international public funds, 45 carbon markets and over 6000 private equity funds that provide climate change finance.

Regardless of the funding source, the ability to demonstrate impact through effective Monitoring, Reporting, and Verification (MRV) systems has become increasingly important among funders. The collection and assessment of population data throughout the life of the adaptation action can be an important dimension of demonstrating impact.

Source: UNDP. 2011. Human Development in a Changing Climate: A Framework for Climate Finance; UNDP. 2011. Blending Climate Finance Through National Climate Funds.

though very few NAPAs included implementation plans that directly addressed population dynamics.<sup>61</sup> While adaptation actions are diverse and wide-ranging, ultimate goals relate to minimizing threats to the wellbeing of populations, so the integration of population dynamics and data is critical.

As the content of this manual has demonstrated, population dynamics are critical in understanding who is vulnerable and why, and how vulnerability may evolve in the future. As such, the language in the Cancun Adaptation Framework provides a rationale for adaptation policymakers and planners to assess the ways in which population dynamics relate to climate change vulnerabilities and adaptive capacities, and to integrate this assessment into adaptation policies and plans. With guiding principles that call for countrydriven, gender-sensitive, participatory and transparent adaptation processes, the Cancun Adaptation Framework provides a foundation that offers entry points for the integration of population dynamics in the NAPs process and in other adaptation actions -but the integration will occur only when it is proactively offered by stakeholders engaged in the process. This can be accomplished through capacity-building with ministries of environment, natural resources, and planning who have traditionally been involved in developing climate change responses, as well as deeper engagement of sectors that have not traditionally been primarily in climate response, such as health, population, and national statistical offices. In many cases, civil

society may be well-positioned to encourage and participate in more holistic and integrated climate change policy responses.

With the NAP mandate to identify mediumand long-term adaptation needs, NAPs will be most effective when they include a thorough assessment of population dynamicsincluding trends in growth, urbanization, migration, age structure, fertility, and reproductive health needs. Assessing these trends at the outset of adaptation planning will inform the goals, objectives and strategies of adaptation action; and collecting data throughout the implementation process can be an important part of the **Monitoring**, **Reporting, and Verification** (MRV) that is required for most climate change finance (see Box 6.1). The following sections provide examples for how population dynamics can be better integrated into adaptation planning and programs such as NAPs, as well as in sector-specific planning that is sensitive to changes in climate.

#### Adaptation Planning and Programs

If adaptation programming is to be effective, successful and sustainable, population must play a key role in the assessment and planning process. As Dodman and Schensul (2010) state, without this understanding "adaptation plans based on, for instance, the current size of a city or the current age structure of a country will constantly be responding to yesterday's problems."

#### **VULNERABILITY ASSESSMENT**

Whether engaging in a national climate change adaptation planning process, or designing a program for disaster risk reduction for a small community (see Box 6.2), effective action to address climate change threats must begin with a valid and reliable assessment of vulnerability.

As prior parts of this manual demonstrate, population dynamics are critical in assessing vulnerability and adaptive capacity. Multiple tools exist for vulnerability assessment, and many include prompts for assessing population and other socioeconomic data. In considering population dynamics, it is critical to assess trends—understanding not only current vulnerabilities, but projecting the ways in which population factors are changing, and the ways in which such changes may affect vulnerability in the future.

The effects of water stress in urban areas offer a relevant example. Water stress may have the most profound impact on poorer populations, with current and future access to and infrastructure for drinking water being a key determining factor of vulnerability.<sup>62</sup> As demand grows, government responses to increasingly limited supply will play a significant role in managing risk and preventing disaster. Analyzing and planning for the increasing demands of growing populations on decreasing natural resource supplies allows for preventative action and proactive adaptation strategies, thereby reducing the risk of potential humanitarian disasters.

#### **BOX 6.2** Population, Adaptation, and Disaster Risk Reduction (DRR)

*Adaptation:* The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

*DRR:* The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

-UN International Strategy for Disaster Reduction, 2009

Climate change adaptation and DRR share many of the same goals, chief among them being to reduce people's vulnerabilities to the adverse effects of a changing climate. In fact, DRR is a key component of effective adaptation, and vice versa. As the UNISDR points out, there are many practical ways of linking adaptation and DRR, including in food security and water supply management, early warning systems and awareness-raising, and development planning and practices.

As with adaptation policy and programming, the use of population data and demographic forecasting is necessary to better target DRR efforts toward people most at-risk. Additionally, population projections allow for longer-term DRR planning, which tends to be more immediate and concentrated on specific events.

Urban hotspots would benefit greatly from streamlined adaptation and DRR efforts. Identifying where urban hotspots already exist as well as pinpointing other developing or potential hotspots will be crucial for building adaptive capacity and reducing risk for large numbers of the urban poor. To do this effectively requires analyzing a combination of population, socioeconomic and geospatial data and information.

Governance and inclusive urban planning are also key in reducing vulnerability, as the land, housing and infrastructure needs of low-income urban residents in developing countries must be proactively addressed in order to prevent urban hotspots from developing in the first place. Additional examples can be examined through assessments of exposure to climate risk. While population density in a lowelevation coastal zone may be relatively low in 2011, what does the trend data—or population projections—indicate for the future? In assessing future vulnerability related to socioeconomic trends, scenario planning—in

вох 6.3 which multiple potential storylines for the future are assessed—can help to identify strategies, policies or programs that are likely to affect socioeconomic trends and related vulnerability (see Box 6.3).

Incorporating population data into vulnerability assessments can also add human and social dimensions to a process

#### Characterizing Socio-economic Trends, Risks, and Opportunities

Excerpted from Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures, UNDP 2004, page 20

In order to design adaptation strategies for the unknown hazards of future climate change, it is useful to construct possible accounts of what the future might be like – i.e., in what kind of future world (or in what kind of priority system) will adaptation be taking place?

The purpose of this task is to develop and describe prospective socio-economic conditions for the priority system. Characterising future socio-economic conditions involves building on an assessment of current conditions. There are two primary tasks involved.

The first is to develop alternative "storylines" of the future for an appropriate time period (e.g., between 20 and 50 years into the future). The second is to make projections about how certain socio-economic conditions will change in the future under these alternative storylines.

The output will be a series of qualitative and/or quantitative scenarios. When integrated with additional trends, this series can include baselines without new adaptation (i.e., the adaptation baseline or reference scenario), and two or three scenarios incorporating additional adaptation policies and measures.

These scenarios can then be used as input to projections of future vulnerability and climate risk. This can be done by applying various climate scenarios to each of the socio-economic scenarios and assessing future vulnerability and risk.

To develop socio-economic scenarios, users can build their own, or use/adapt existing ones. This can be a detailed, quantitative process, or a more qualitative one. Either way, the process will likely involve working with stakeholders to determine the most appropriate storylines and scenarios for the priority system(s).

# BOX Tips for Including Population Factors in Climate Change Vulnerability 6.4 Assessments<sup>65</sup>

Rapid population growth and lack of access to reproductive health and family planning services exacerbate climate change vulnerability. Investigating these factors in the context of vulnerability assessments can lead to more effective and sustainable adaptation responses. The following tips provide starting points for how to think about population trends and reproductive health needs in assessing climate change vulnerability at a national scale, a landscape scale, and a community scale.

### 1. Learn about population trends in your area of concern

- o Where are people living?
- o What is the total population?
- o How quickly has population grown over the past decade?
- o What are population growth projections for the future?
- o Is high fertility one of the factors driving population growth?
- o Is there significant unmet need for family planning in the area of concern?
- What areas (coastal, urban, flood plain) are absorbing most of the population growth? Are there specific needs that can be anticipated (e.g. the expansion of health posts, increased water storage capacity, etc.) to reduce vulnerability associated with rapid population growth in those areas?
- 2. Include stakeholders from the health/population sector in vulnerability assessment and adaptation planning processes. Surprisingly, representatives from the health sector—national or local, governmental or non-governmental organizations – are often left out in discussions of climate change vulnerability and adaptation.
- 3. When undertaking participatory approaches to vulnerability assessment and adaptation planning, seek community perspectives on how family size, access to health services, gender roles, and needs for family planning relate to the community's ability to cope with climate change impacts. How do population trends relate to observed or expected trends in water availability, food security, and the availability of other resources? How do gender roles contribute to vulnerability to current and expected climate change impacts? Conducting women-only and men-only focus groups can be useful when gathering this information.

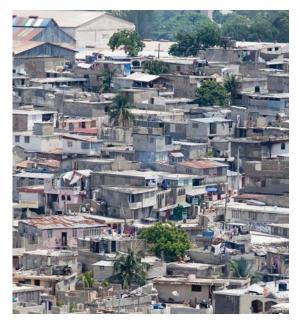
that tends to focus heavily on geography, built environment and physical infrastructure while lacking adequate consideration of the populations affected.<sup>63</sup> Integrating information regarding **where** and **how** people live in relation to potential physical hazards can do much in the way of identifying who is most vulnerable, thereby improving adaptation programming as well as disaster risk reduction and response.<sup>64</sup>

In areas of rapid population growth, vulnerability assessments that include investigations of gender and reproductive health needs could help to identify if and when rights-based programming that empowers women and increases access to reproductive health care could alleviate vulnerabilities related to population growth and high fertility. Box 6.4 is adapted from training materials used by the World Wildlife Fund, an international NGO with conservation and adaptation projects in many areas that are experiencing rapid population growth.

### **ADAPTATION PROGRAMS**

Vulnerability assessments that take stock of population dynamics can help to inform adaptation program design in ways that can reduce vulnerability and/or build adaptive capacity that is responsive to population dynamics. This can happen at multiple scales (community, regional, national) and in ways that address a range of population trends.

**Community-based adaptation** (CBA) approaches, for example, focus on locally specific solutions and target communities as the level of appropriate intervention.



CBA has arisen as a means of meaningfully engaging the poorest communities that are highly reliant on natural resources for their livelihoods and who live in countries most vulnerable to the effects of changing climate. The hallmarks of CBA are that it is a community-led process based on communities' priorities, needs, knowledge, and capabilities. CBA is a process that empowers people to plan for and cope with the impacts of climate change, and projects are developed based on climate science and local knowledge about weather changes. Integrating both local knowledge about population dynamics (using questions like the ones outlined above) as well as population data and projections from national statistical offices can help to inform and strengthen the design of CBA programs.

**Urban planning** in relation to climate change adaptation offers another example of the ways in which a thoughtful assessment of population dynamics can strengthen programming. For example, well-planned urban areas can, in general, better provide for the needs of aging populations. The scale and proximity of cities as well as the concentration of people allows for easier access to the kinds of social services that help ensure the well-being of older people. Urban planning and development will therefore need to address and integrate the needs of elderly people and, particularly in regards to climate change effects and impacts, make certain that housing can accommodate aging populations as needed, and that it is appropriately sited and easily accessible in order to reduce risk should disaster strike 66

## **BOX 6.5** Population Projections and Census Data

The *World Population Prospects* are issued by the UN's Population Division every two years, and are freely available online or on CD-ROM by request. Official UN population estimates and projections are provided for the world, 6 major areas, 21 regions and 228 countries, as well as for more developed regions, less developed regions, least developed regions and sub-Saharan Africa. Indicators include total population, fertility, migration and population aging. *WPP 2010 Revision:* http://esa.un.org/unpd/wpp/index.htm

*National censuses* typically provide population and housing data at regional, province, district, or county level. Useful indicators include household size, dwelling type, socioeconomic status, and migration/emigration. Many National Statistical Offices (NSOs) now feature data online.

NSO links: http://unstats.un.org/unsd/methods/inter-natlinks/sd\_natstat.asp UNFPA's Census Portal: http://www.unfpa.org/public/home/sitemap/pid/6734#

Holistic approaches will be needed to address the complexities of climate-induced migration, including policies that are supportive and accommodating of mobility and migration.<sup>67</sup> By integrating climate projections with population data, climate and adaptation planners can pinpoint the specific regions that are most likely to face increasingly variable or severe climactic changes and identify the populations who will be affected, analyze the mobility and likelihood of migration of these populations, and project the areas to which people are likely to migrate to. Pinpointing and analyzing likely migration patterns and "hotspots" will allow governments, development partners, humanitarian workers and others to better assess and proactively plan for future scenarios, resulting in better responses to the needs of both migrating populations and the communities that receive them.68

Addressing the specific needs of "climate migrants" will be crucial for many reasons. Migrants may face heightened vulnerability in non-native lands due to language or cultural barriers, and compromised access to resources and services.<sup>69</sup> In addition, those driven to migrate due to climate change are unlikely, under current legal frameworks, to be recognized officially as refugees. It will therefore be crucial to develop policies and programs that seek to reduce the marginalization, inequality and vulnerability of migratory populations, and to include them in decision-making processes.<sup>70</sup>

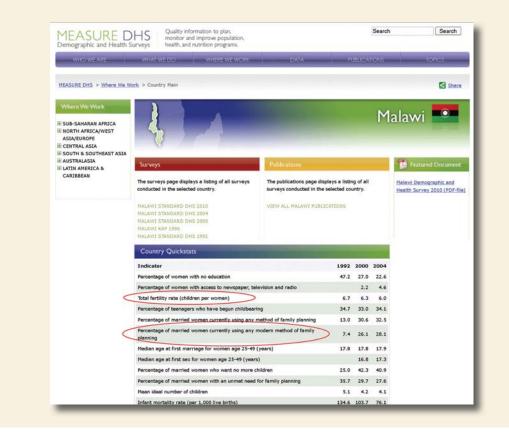
## Marshaling Data and Information for Panning

As the preceding sections demonstrate, data and information on population dynamics can provide critical inputs for adaptation planning and programs, as well as for

## **BOX 6.6** Using Demographic and Health Survey Data

In many developing countries, Demographic and Health Surveys (DHS) are carried out every four to six years, and results are easily accessible on the DHS website. "Quickstats" (shown below) can provide a snapshot of national averages of fertility, contraceptive use, and unmet need for family planning, among other factors. "Quickstats" can be accessed for all DHS country reports at http://www.measuredhs.com/Where-We-Work/

Summary country reports, also available on the website, will provide further breakdown of this data into regions or districts, rural and urban residence, wealth quartiles, and educational attainment levels. Such data can help to inform assessments of climate change vulnerability and strategies for strengthening adaptive capacity.



planning in climate-impacted sectors such as urban planning, agricultural development, water management, and health systems. Developing greater familiarity and comfort with population concepts and data sources can strengthen the ability of planners and program implementers in all sectors. Part 7 of this manual provides an annotated list of data sources and tools for quick and accessible reference. Boxes 6.5, 6.6, and 6.7 describe and demonstrate three vital tools that enable better integration of data and information on population dynamics.

## **BOX 6.7** UNFPA's Population Situation Analysis

Population Situation Analysis: A Conceptual and Methodological Guide is a comprehensive publication that provides the basis for an integrated appraisal of population and reproductive health dynamics and their impacts on poverty, inequality and development. By integrating a micro and macro analytical approach, the population situation analysis clarifies the interactions between individual behaviour and demographic dynamics.

The guide responds to demand by countries that international cooperation should promote national capacity-building and recognize national ownership and leadership as prerequisites for development, in accordance with the principles agreed at the International Conference on Population and Development and the Millennium Declaration.

The guide touches on population dynamics and climate change, but provides a complete multi-sectoral toolbox that contributes to more efficient evidence-based programming toward the achievement of development goals. Such programming relies on increased capacity for data generation, new databases, the consolidation of available evidence and the promotion of the use of hard data. The knowledge generated through the process will provide UNFPA country offices and others with the factual knowledge needed to integrate population dynamics and their interlinkages with gender equality, sexual and reproductive health, and HIV into policy-making and to mainstream UNFPA's mandate into policy dialogue with governments and other UN agencies.

Population Situation Analysis can be downloaded from UNFPA's website at http://www. unfpa.org/webdav/site/global/shared/documents/publications/2011/PSA\_Guide.pdf

## Building Relationships Across Sectors

Better integration of population dynamics into climate change policy, planning, and programs can be fostered through more frequent collaboration across sectors. Adaptation policy and planning teams can be strengthened through participation of individuals representing diverse backgrounds and expertise. Tools for climate change vulnerability assessment can benefit from the input of demographic experts and health practitioners. Inclusion of multiple sectors can uncover important synergies, causal relationships, and critical data sources that may be overlooked when analysis and planning is undertaken by a single sector.

Establishing relationships across sectors can be challenging, however, especially when culture, terminology, policy processes and practices may differ significantly in different fields. Engaging in cross-sectoral DRAFT

communication with awareness, patience, and willingness to accommodate differences can greatly aid collaboration. For example, because human rights issues are central to reproductive health, sensitivity to language used in describing population dynamics can be critical in fostering productive dialogue with the reproductive health community. Examples of "words to watch" are included in Box 6.8.

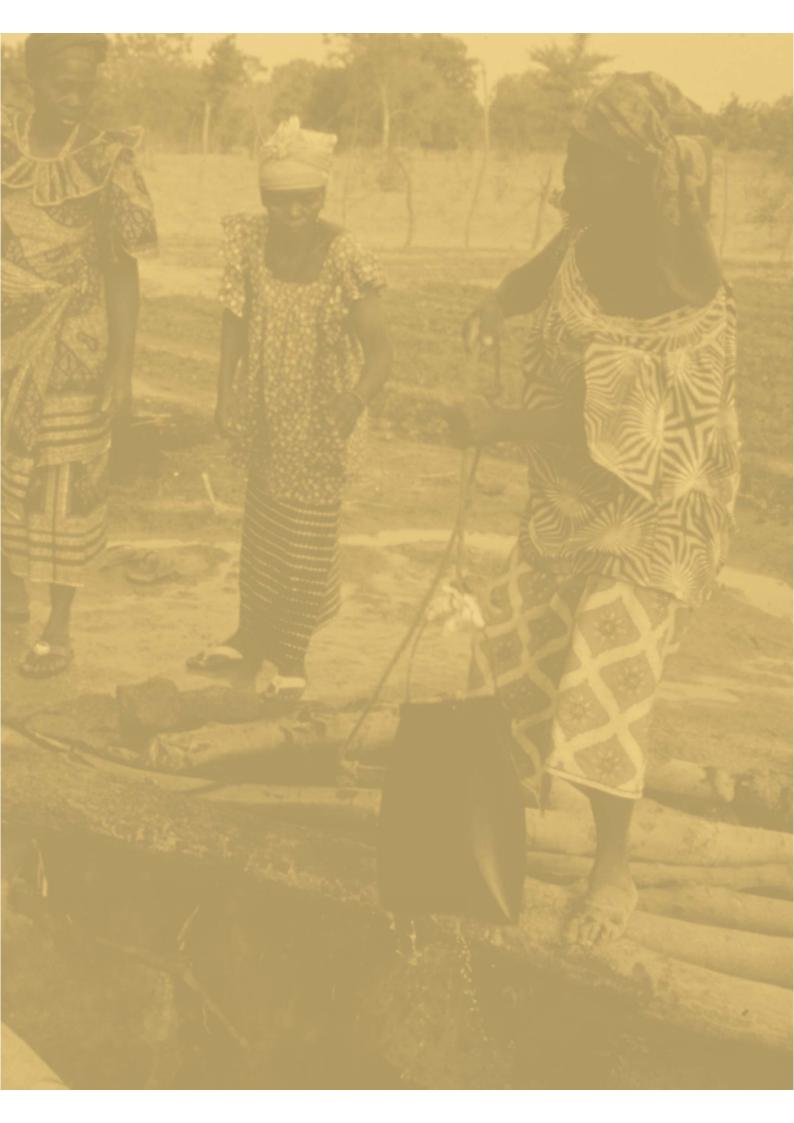
### BOX 6.8 Words to Watch

**Population control/stabilization:** This term can evoke images of top-down policies designed to control people rather than expand their options. In the past 50 years, enforced demographic targets sometimes resulted in human rights abuses that provoked powerful backlash. Today's framework empowers women to make their own choices about childbearing and has been highly successful. Improving access to family planning and educating girls, for example, result in smaller, healthier, more economically secure families.

**Overpopulation:** To say that the world is "overpopulated" misses the underlying issue of inequitable resource distribution, and suggests that some people are superfluous.

**Optimum population size:** Some who are concerned about population growth seek to determine the optimum number of people a nation or region can support. However, the "carrying capacity" of any given areas is based in part on distribution of resources among the existing population – and distribution is often characterized by inequities and waste. Such capacity is dependent on choices about technology, consumption levels, economics, and more.

Source: Adapted from Population and the Environment: Where We're Headed and What We Can Do, policy brief by Population Action International and Population Justice Project, 2010.





# Resources

#### POPULATION AND CLIMATE CHANGE RESOURCES

**Population Dynamics and Climate Change** http://www.unfpa.org/public/home/

publications/pid/4500 An edited volume compiled by UNFPA and the International Institute for Environment and Development in 2009, the papers in this volume provide a substantive and methodological guide to the current state of knowledge on issues such as population growth and size and emissions; population vulnerability and adaptation linked to health, gender disparities and children; migration and urbanization; and the data and analytical needs for the next stages of policy-relevant research.

#### State of World Population 2009: Facing a Changing World: Women, Population and Climate

http://www.unfpa.org/public/home/ publications/pid/4353

An annual publication produced by UNFPA, the 2009 volume focuses on the specific linkages between population dynamics, gender, and climate change, drawing attention to the ways in which issues such as migration and mobility, spatial distribution, and gender relate to climate vulnerability and resilience.

#### Mapping Population and Climate Change

http://www.populationaction.org/climatemap Population Action International's mapping website shows how climate change and population dynamics will change the world over time. Interactive maps illustrate how climate change impacts, demographic trends and the need for contraception are likely to affect countries' abilities to adapt to climate change. In addition to global maps, the site provides animated maps, images, video and additional resources for select countries in Africa, Asia, and Latin America.

#### Weathering Change: Stories about Climate and Family from Women Around the World

http://weatheringchange.org This 14-minute film by Population Action International follows women in Ethiopia, Nenal and Peru as they struggle to care fo

Nepal and Peru as they struggle to care for their families while enduring crop failures and water scarcity. The film calls for expanding access to contraception and empowering women to help families and communities adapt to the effects of climate change. Accompanying materials on the website provide further information and data about population, gender and climate change relationships. A useful resource for fostering discussion with individuals new to these topics.

#### State of World Population 2007: Unleashing the Potential of Urban Growth

http://www.unfpa.org/public/home/ publications/pid/408

This publication outlines the challenges and opportunities inherent in a rapidly urbanizing world, and features sections dedicated to highlighting the potential effects of urban density, addressing the needs of the urban poor, and the connections between urbanization, climate change and sustainability.

#### Urban Risk Assessments: An Approach for Assessing Disaster and Climate Risk in Cities

https://www.citiesalliance.org/ ca/sites/citiesalliance.org/files/ UnderstandingUrbanRisk8-4-2011web.pdf This volume, jointly published by UN-Habitat, UNEP, and the World Bank, presents a flexible approach that project and city managers can use to identify feasible measures to assess a city's risk. The methodology focuses on three reinforcing pillars that collectively contribute to the understanding of urban risk: a hazard impact assessment, an institutional assessment, and a socioeconomic assessment.

#### United Nations International Organization for Migration—Migration and Climate Change page

http://www.iom.int/jahia/Jahia/copenhagenand-beyond

The IOM's climate change page provides issue summaries, further research, and examples of policy and programming activities, including migration management tools. It also highlights the links between disaster risk reduction and migration through case study examples.

#### Climate Change Connections: A Resource Kit on Climate, Population and Gender

http://www.unfpa.org/public/site/global/lang/ en/pid/4028

A collection by UNFPA and the Women's Environment and Development Organization, this toolkit highlights a number of ways for integrating gender and population dynamics in climate change policy and programming, and vice versa, and also includes several useful case studies as well as tips for education and advocacy.

#### **DEMOGRAPHIC INFORMATION** General

#### Census Data

Links to National Statistical Offices: http://unstats.un.org/unsd/methods/internatlinks/sd\_natstat.asp UNFPA's Census Portal: http://www.unfpa.org/public/home/sitemap/ pid/6734# National censuses typically provide population and housing data at regional, province, district, or county level. Useful indicators include household size, dwelling type, socioeconomic status, and migration/ emigration. Many National Statistical Offices (NSOs) now feature data online, and users can search by country at the above websites.

#### World Population Prospects, 2010 Revision

http://esa.un.org/unpd/wpp/index.htm Country-level population projections and other data are published in *World Population Prospects*, issued by the United Nations Population Division every two years. Data are freely available online or on CD-ROM by request. Official population estimates and projections are provided for the world, 6 major areas, 21 regions and 228 countries, as well as for more developed regions, less developed regions, least developed regions and sub-Saharan Africa. Indicators include total population, fertility, migration and population age structure.

#### Demographic Yearbook

http://unstats.un.org/unsd/demographic/ products/dyb/dyb2.htm

International demographic data are collected and published by a number of groups or agencies. The *Demographic Yearbook* of the United Nations Statistics Division, produced annually since 1948, provides a wealth of information on population, birth and death rates, life expectancy, city populations, and a variety of census tabulations. The *Demographic Yearbook* also contains valuable technical notes that give definitions and indicators of data quality.

## World Population Datasheet http://www.prb.org/

The annual *World Population Data Sheet*, published by the Population Reference Bureau, contains latest population estimates, projections, and other key indicators for 200 countries.

#### Migration

#### World Population Prospects, 2010 Revision

http://esa.un.org/unpd/wpp/index.htm The United Nations Population Division's population projections (described in detail above) also include national data for all countries on net migration and migration rates.

#### Census Data

Links to National Statistical Offices: http://unstats.un.org/unsd/methods/internatlinks/sd\_natstat.asp

#### UNFPA's Census Portal:

http://www.unfpa.org/public/home/sitemap/ pid/6734#

Many national censuses include data on net migration and migration rates at the subnational level.

#### Urbanization

#### World Urbanization Prospects, 2009 Revision

http://esa.un.org/unpd/wup/index.htm Every two years the United Nations Population Division releases estimates and projections on the urban and rural populations of all countries in the world and of their major urban agglomerations. A report on trends and a user-friendly data-base is available online.

## UN-HABITAT's Global Urban Indicators database

http://www.unhabitat.org/stats/Default.aspx This database allows for users to obtain urban-specific data at national and regional levels. In addition to urban population and urban growth statistics, it features indicators that are specific to urban slums.

#### **REPRODUCTIVE HEALTH INFORMATION** Demographic and Health Surveys

http://www.measuredhs.com/

In many developing countries, Demographic and Health Surveys (DHS) are carried out every four to six years, and results are easily accessible on the DHS website. An online database and country reports provide national and subnational data on fertility, contraceptive use, and unmet need for family planning, among other factors.

#### World Population Prospects, 2010 Revision

http://esa.un.org/unpd/wpp/index.htm The United Nations Population Division's population projections (described in detail above) also include national data for all countries historic, current, and projected fertility rates.

### CLIMATE AND ENVIRONMENT INFORMATION

#### National Adaptation Programmes of Action (NAPAs)

http://unfccc.int/cooperation\_support/ least\_developed\_countries\_portal/submitted\_ napas/items/4585.php

As of September 2011, 46 Least Developed Countries and Small Island Developing States had submitted NAPAs to the UNFCCC. While each country's NAPA differs in format, detail, and length, most provide a summary of current and projected climate change impacts and vulnerabilities, as well as a sector-bysector review and identification of needs. All NAPAs are available in PDF format on the UNFCCC's website.

#### Center for International Earth Science Information Network

#### http://ciesin.org/

An information and data resource focused on links between people and environment. Features access to extensive data and information collections as well as geospatial mapping tools and applications.

#### Global Environmental Outlook

http://www.unep.org/geo/ These reports, published by the United Nations Environment Programme, contain data at a sub-regional level.

#### Intergovernmental Panel on Climate Change, Fourth Assessment Report

http://www.ipcc.ch/publications\_and\_data/ publications\_and\_data\_reports.shtml The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of scientists established in 1989 with a mandate to prepare regular, comprehensive reviews of 1) the state of the science of climate change, 2) the social and economic impacts of climate change, and 3) possible response strategies. The Fourth Assessment Report was published in 2007 and is available in several lengthy segments on the IPCC's website. The report of Working Group I is "The Physical Science Basis," Working Group II's report is on "Impacts, Adaptation, and Vulnerability," and Working Group III's report is on "Mitigation of Climate Change." A "Synthesis Report," along with a "Summary for Policymakers," is also available on the website. The IPCC's Fifth Assessment Report is scheduled for release in 2014.

#### Policy **Fext of th**

#### Text of the UN Framework Convention on Climate Change and Kyoto Protocol http://unfccc.int/essential\_background/

items/2877.php

The text of the original climate change convention, which was signed by 194 countries, establishes the framework for national responsibilities and international cooperation on climate change. The Kyoto Protocol (ratified by 192 countries) further elaborates the convention, and outlines legally binding commitments for industrialized countries to reduce greenhouse gas emissions.

## Cooperation and Support through the UN Framework Convention in Climate Change

http://unfccc.int/cooperation\_and\_support/ items/2664.php

In addition to the details of the convention and its Kyoto Protocol, the UNFCCC website hosts a range of information about the convention's finance mechanisms (including the Least Developed Country Fund and the Green Climate Fund), technology provisions, education and outreach initiatives, capacitybuilding, and more.

#### Planning and Programs

#### **PreventionWeb - Climate Change page** http://www.preventionweb.net/english/ themes/climate/

This online knowledge platform focuses on various elements of disaster risk reduction (DRR), including its links to climate change. Tools include educational materials, information on training and events, and links to organizations working on DRR. It also features multimedia, maps, and data and statistics.

#### **Eldis Community**

#### http://www.eldis.org/

A knowledge-sharing platform for development policy makers and practitioners. Features resources by topic, including aging populations, gender, disaster risk reduction, migration and poverty, as well as:

#### **Climate Change Adaptation**

http://www.eldis.org/go/topics/dossiers/ climate-change-adaptation Resources include summaries of current adaptation issues, a database of organizations working on adaption efforts, links to relevant literature, and regional-specific resources.

#### Climate Change Resource Guide

http://www.eldis.org/go/topics/resourceguides/climate-change Provides resources by sector, including gender, health, and poverty and vulnerability. Also features country-specific climate profiles.

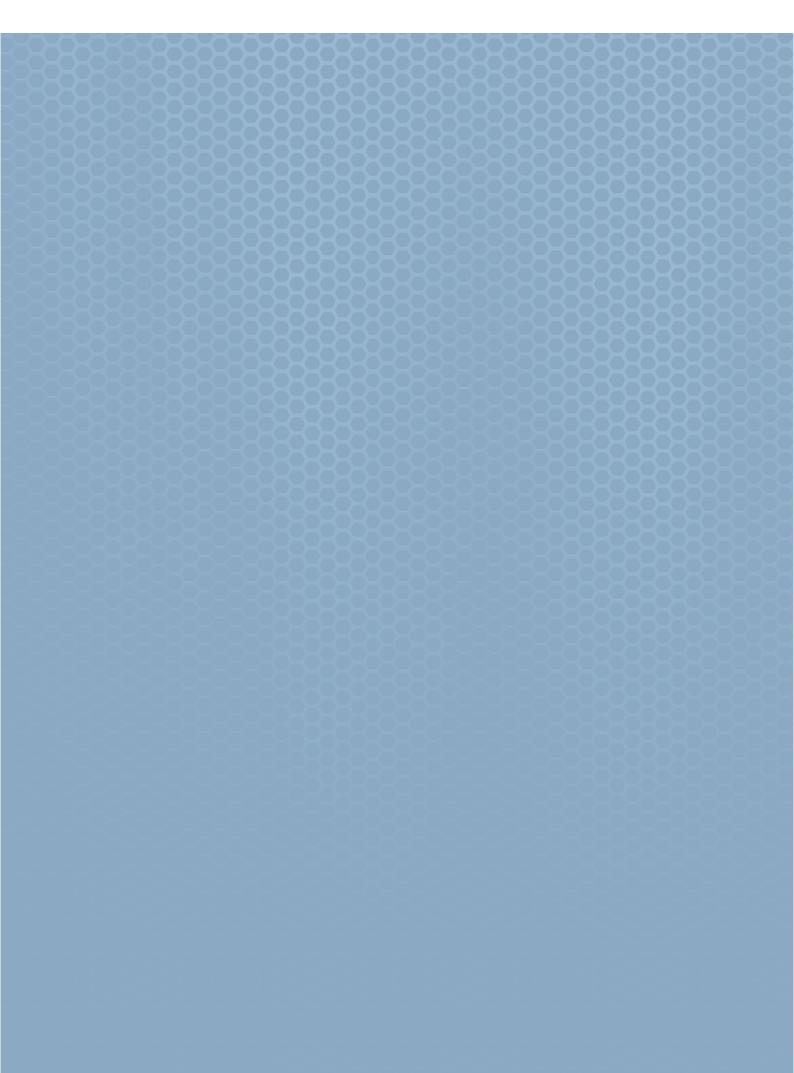
#### Adaptation Learning Mechanism

http://www.adaptationlearning.net/ This global, collaborative knowledge sharing platform provides a wealth of information and tools for policymakers and practitioners interested in developing effective adaptation plans and programs. Organized by the Global Environment Facility, UN Development Programme, World Bank, UNFCCC, UN Environment Programme, and the Food and Agriculture Organization.

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