Chapter 7

Environment

Key findings

- About half of population in developing regions lack access to improved drinking water on the premises; and the burden of water collection falls mostly on women.
- The number of deaths from diarrhoea due to inadequate water, sanitation and hygiene in developing regions was 0.8 million in 2012; the majority of such deaths in some parts of Asia were among women and girls.
- Slow progress in access to modern energy services, including electricity and non-solid fuels for cooking, delays improvements in health and hinders significant reductions in the workload burdens associated with household chores and firewood collection.
- Age, sex and differences in gender roles and norms are significant factors in mortality due to natural disasters, but their contribution varies by country and type of natural hazard.
- In some post-disaster settings, women's access to work and involvement in reconstruction efforts remain more limited than men's.
- More and more people are engaging in environmental protection activities, including recycling and cutting back on driving to reduce pollution; overall, women tend to be more involved than men in these day-to-day activities, linked to the gender division of labour.
- Women remain underrepresented in local and high-level environmental decision-making.

Introduction

Women and the environment is one of the 12 critical areas of concern for achieving gender equality identified in the Beijing Platform for Action.[1] The Platform for Action recognizes that environmental conditions have a different impact on the lives of women and men due to existing gender inequality. It also stresses that women's role in sustainable development is hampered by unequal access to economic resources, information and technology, and limited participation in policy formulation and decision-making in natural resources and environment management.

This chapter examines the links between gender and the environment in two parts. The first part looks at three aspects of the environment that have different effects on the lives of women and men:[2] access to water and sanitation, access to modern energy services, and exposure to natural hazards. It shows that the burden of work resulting from lack of access to clean water and energy falls mostly on the shoulders of women. In addition, exposure to inadequate water may result in higher mortality among women than men as a result of diarrhoea in contexts where access to health services remains unequal. Household air pollution resulting from the use of firewood and other solid fuels threatens the lives of women and men in many developing countries, but women are more exposed than men to indoor pollutants due to their role in cooking and caring for children and other family members. Gender roles may also worsen women's vulnerability during disasters and waste their potential as a source of resilience.

The second part of the chapter examines the participation of women and men in preserving the environment through everyday activities and environmental decision-making in local and high-level forums. Available data show that in everyday life, women tend to recycle and cut back on driving to reduce pollution more than men (linked to the gender division of domestic work), but remain underrepresented in local and national positions of decision-making related to the environment. As we approach global ecological limits that define a "safe operating space" for humanity[3], it is

1 United Nations, 1995.

2 Other aspects of the environment that may have a different impact on the lives of women and men could not be analysed due to lack of data (see box 7.1).

3 United Nations, 2012.

of utmost importance that both women and men step out of their traditional gender roles and participate actively to ensure environmental protection and sustainable development.

Box 7.1
Gaps in gender statistics related to the environment

Environment statistics is a relatively new statistical field[a] that describes the biophysical aspects of the environment—the natural environment (air/climate, water, land/soil), the living organisms within these media, and human settlements[b]—and those aspects of social and economic systems that directly influence and interact with the environment.[c] This field of statistics, considered gender-neutral, was initially developed without much consideration of the dimensions related to individuals. In this context, links between gender and environment have been assessed most often based on qualitative or small-scale quantitative studies. Such assessments are useful in highlighting the socially constructed vulnerabilities and challenges faced by women and men and in providing information on the importance of integrating a gender perspective in policymaking. The extrapolation of their results, however, to the level of a whole society or across countries may lead to misconceptions about the status of women relative to men in different settings.

The links between gender and the environment are increasingly recognized by statisticians, including in the recently revised UN Framework for the Development of Environment Statistics.[d] However, in many countries, gender statistics on environment are not yet part of the regular programmes of statistics in national statistical systems—a huge obstacle for gender analysis and policymaking.

For this report, in particular, the choice of issues examined and the structure of the chapter were constrained by the current availability of data. Topics related to housing characteristics or infrastructure, such as access to improved water, use of solid fuels for cooking and access to electricity, are covered more comprehensively because supporting statistics are available for a large number of countries. These statistics have agreed international concepts and definitions and are collected in surveys and censuses on a regular basis. For example, more than 200 countries and areas have available statistics on access to improved water and improved sanitation, for at least two data points between 1990 and 2014; and 180 countries have statistics on the use of solid fuels for cooking for at least two data points.[e]

However, more statistical information is needed on the links between gender and the environment in several areas. Time-use data are largely missing in countries from developing regions, where poor infrastructure and housing conditions, as well as natural hazards result in increased work burdens. For example, data on time spent for water or firewood collection was available for international compilation for only 14 developing countries, either from stand-alone time-use surveys or from modules on time use attached to other household surveys. Furthermore, time-use data on national and subnational trends, which are needed to assess changes in women's and men's work burdens as a consequence of improvements in infrastructure or deterioration due to droughts, deforestation or desertification, are generally missing.

Environmental health is one of the most complex and difficult areas of data collection and estimation. The burden of disease due to environmental causes is currently estimated by the World Health Organization (WHO) and other institutions based on three types of statistical information: exposure to environmental hazards; the effect of the exposure on morbidity and mortality; and mortality by cause of death in the presence versus the absence of environmental hazards. Complex modelling is used to produce global and regional estimates of morbidity and mortality, often based on partial information on exposure, a few case studies on the relationship between exposure and health effects, and cause of death information confined to a limited number of countries, mostly from developed regions. Gender is not consistently integrated at every step of the statistical modelling (mainly due to limited availability of statistical information disaggregated by sex) and the results obtained are not systematically assessed from a gender perspective.

Sex-disaggregated data on the effects of natural hazards on mortality and morbidity are available for a small number of cases, mostly from research literature, and are even more difficult to obtain on other dimensions, such as education, health, food and economic security.

Adequate monitoring of the impact of the environment and climate change on the lives of women and men may require that some data disaggregated by sex and age are recorded for smaller areas of a country. At most, the traditional system of social statistics has been focused on urban/rural areas and regions. However, the occurrence and impact of environmental phenomena are distributed across space without regard to administrative boundaries, and monitoring may need to take into account small areas that are particularly prone to specific weather conditions and the effects of climate change. Technologies such as Global Positioning Systems (GPS) and remote sensing need to be further explored as sources of geospatial information that can be layered upon the sex-disaggregated information on a population produced by household surveys and censuses to determine the exposure of women and men to various natural hazards or pollution factors.

Finally, statistics to assess the active participation of women and men in environmental protection and decision-making at all levels are scarce. For example, data on environmentally friendly behaviour are mostly limited to developed countries. Information on local decision-making on environmental resources and extreme event preparedness and post-disaster reconstruction efforts has remained largely a domain of qualitative and small case studies[f].

a United Nations Statistics Division, 2013.
b United Nations Environment Programme, 2012.
c United Nations Statistics Division, 2013.
d The revised Framework for the Development of Environment Statistics was endorsed by the United Nations Statistical Commission at its forty-fourth session in 2013.
e United Nations Statistics Division, 2014.
f One notable exception is data collection on local management of forests coordinated by the Poverty and Environment Network (Center for International Forestry Research, http://www1.cifor.org/pen, accessed March 2015).

A. The impact of environmental conditions on the lives of women and men

1. Access to improved drinking water and sanitation

The right to safe, clean drinking water and adequate sanitation is a human right, essential to the full enjoyment of life and all other human rights, as recognized by the UN General Assembly in July 2010 (resolution 64/292). Lack of access to clean drinking water and sanitation has a tremendous impact on the burden of disease and the workloads of both women and men in developing countries. However, women are more often charged with collecting water, cleaning and cooking and also with taking care of the sick, drastically limiting their time spent on paid work and leisure and, in the case of girls, reducing the time for educational pursuits.

Steady progress has been made in access to improved drinking water and sanitation

The proportion of the global population with access to improved drinking water[4] increased from 76 per cent in 1990 to 91 per cent in 2015.[5] Currently, 663 million people are without access to improved drinking water. Most of them are poor and located in rural areas of developing regions. Access to improved drinking water is virtually universal in developed regions and increased in all developing regions. Some of the biggest improvements were in Eastern Asia, Southern Asia and South-Eastern Asia. Sub-Saharan Africa also recorded a substantial increase in access, but remains one of the regions with the lowest level of coverage (68 per cent), second only after Oceania (56 per cent). Currently, sub-Saharan Africa has the largest share of the global population without access to improved drinking water, and alone accounts for nearly half of global population living without improved water sources.[6]

Access to improved sanitation[7] also increased, from 54 per cent of the global population in 1990 to 68 per cent in 2015. Globally, 2.4 billion people live without improved sanitation facilities; among these, nearly 1 billion practise open defecation. Progress in sanitation has been uneven among regions. The biggest improvements were recorded in Eastern Asia, Southern Asia, and South-Eastern Asia. Progress has been slow in sub-Saharan Africa and non-existent in Oceania. The lowest level of improved sanitation use is in sub-Saharan Africa, at 30 per cent of the population.[8]

The health burden

The lack of adequate drinking water, sanitation and hygiene are important environmental health risk factors with a tremendous impact on morbidity and mortality for both women and men. As noted above, many people do not have access to drinking water sources that are considered improved. In addition, not all sources considered improved provide safe, good quality water. For example, some of the drinking water sources considered "improved" may not be adequately maintained and protected from outside contamination, including from naturally occurring elements such as arsenic, pollution from industry and agriculture and from poor sanitation.[9] Furthermore, when the source of water is far away, the quantity of safe water that gets collected is less likely to be sufficient for minimum drinking needs or for good hygiene practices.[10] It has been shown that the quantity of water that gets collected declines drastically if more than half an hour per trip is needed to collect the water.[11] This is often the case in sub-Saharan Africa where 29 per cent of the population (37 per cent in rural areas and 14 per cent in urban areas) are at 30 minutes or more away from an improved source of drinking water.[12]

The health burden related to water and sanitation remains substantial in developing regions

In 2012, an estimated 842,000 people died as a result of diarrhoea caused by inadequate drink-

4 Improved drinking water sources include piped water on premises; public taps or standpipes; tube wells or boreholes; protected dug wells, protected springs; and rainwater collection.

5 UNICEF and WHO, 2015.

6 *Ibid*.

7 Improved sanitation facilities are facilities likely to ensure hygienic separation of human excreta from human contact. They include: flush/pour flush to piped sewer system, septic tank, and pit latrine; ventilated improved pit latrine; and pit latrine with slab and composting toilet.

8 UNICEF and WHO, 2015.

9 UNICEF and WHO, 2012.

10 UNICEF and WHO, 2011.

11 *Ibid*.

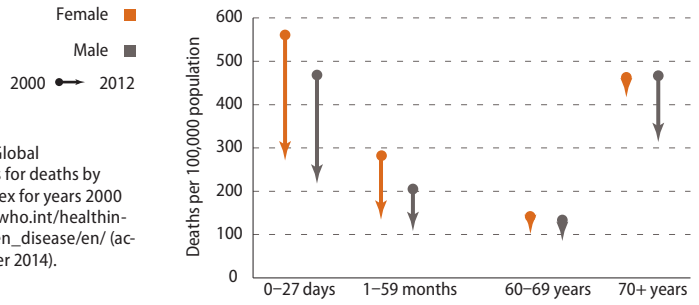
12 Unweighted averages calculated by the United Nations Statistics Division based on data for 36 countries provided by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2014a. Data refer to the latest available in the interval 2005–2013.

ing water,[13] sanitation[14] and hygiene in low- and middle-income countries.[15] This death toll represented 1.5 per cent of the total disease burden of that year and 58 per cent of deaths due to diarrhoeal diseases.[16] The two regions (as defined by WHO) with the highest number of deaths from diarrhoea due to inadequate drinking water, sanitation and hygiene are Africa (44 per cent of the global total) and South-East Asia (43 per cent of the global total).

The distribution of deaths due to inadequate drinking water, sanitation and hygiene by sex was different in each of the two regions. Female deaths represented 49 per cent of the total share in Africa and 59 per cent in South-East Asia (which includes India as the most populous country in that WHO region).[17] These differences could be explained by specific regional sex and age distributions of all deaths due to diarrhoeal diseases. In Africa, death rates were either similar for females and males or slightly higher for males because of the general higher biological vulnerability and mortality for boys and men (see Chapter 2 on Health). In South-East Asia, however, the female mortality rates were higher than the male rates, both in childhood and at older ages (figure 7.1). Although the mortality rate declined in the past decade for both females and males, sex differences persisted and increased even further among older persons (figure 7.1).

The sex differences in mortality due to diarrhoeal diseases observed in South-East Asia are likely related to gender differences in access to health services, which are to the disadvantage of girls and women. Deaths due to diarrhoeal disease are largely preventable if appropriate care is sought early. For children, studies in India, Bangladesh and Indonesia showed that the sex of a child influences care-seeking, including delayed hospitalization and lower rates of hospitalization among girls than boys.[18] In India, delays in seeking treatment are generally associated with longer travel distances to health facilities, poverty, lower levels of education and lack of a health card by the mother.[19] Gender bias in health care to the disadvantage of girls has been reported in other regions as well, although mortality rates for girls are not higher than those for boys. For example, in sub-Saharan Africa, in 17 of 23 countries with Demographic and Health Survey (DHS) data, the percentage of children with diarrhoea who did not receive medical advice was higher for girls than for boys, although in some countries only by a small margin.[20]

Figure 7.1
Mortality rates due to diarrhoeal diseases among children and older persons, by sex in South-East Asia (*as defined by WHO*)**, 2000 and 2012**



Source: WHO, Global health estimates for deaths by cause, age and sex for years 2000 and 2012, www.who.int/healthinfo/global_burden_disease/en/ (accessed November 2014).

The work burden

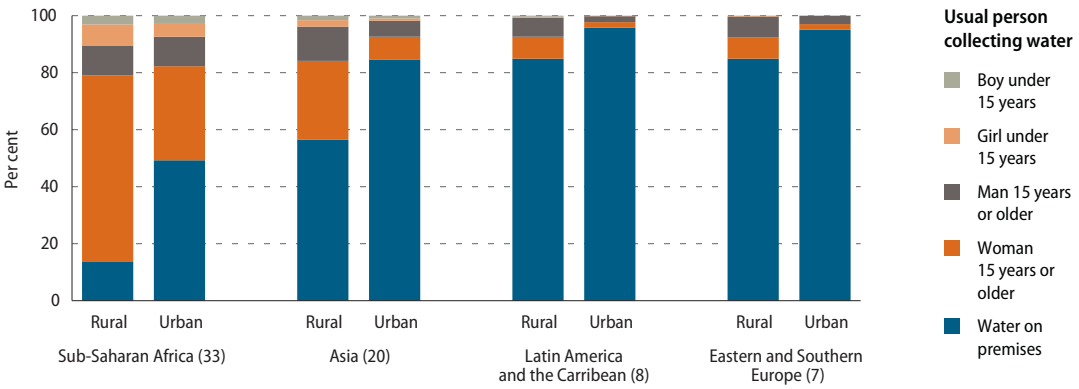
The lack of improved drinking water on the premises increases the workload of women and men. In 2015, 58 per cent of the global population enjoy the convenience and health benefits of having piped water on the premises, 14 percentage points more than in 1990. Despite steady improvements, the coverage of piped water in developing regions remains much lower than in developed regions—49 per cent compared to 96 per cent in 2015. The regions with the lowest coverage are sub-Saharan Africa, Oceania, Southern Asia and South-Eastern Asia.[21] Inequality in coverage between urban and rural areas declined only by a small margin and remains substantial. Globally, one third of the rural population has access to piped water on the premises compared to more than three quarters of the urban population.

13 Estimates of populations with access to adequate drinking water differ from populations with access to improved water sources. People living at a distance greater than a 30-minute round trip from their water source (whether improved or not) were assumed to have access to inadequate water source. In addition, household water filtering and boiling drinking water were used as a proxy for further improvement beyond currently available improved water sources. Source: Prüss-Ustün and others, 2014.
14 Inadequate sanitation refers to unimproved sanitation as defined by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.
15 Prüss-Ustün and others, 2014.
16 *Ibid.*
17 WHO, 2014c.
18 Geldsetzer and others, 2014; Khera and others, 2015.
19 Malhotra and Upadhyay, 2013.
20 Kanamori and Pullum, 2013.
21 UNICEF and WHO, 2015.

Women are more often responsible for water collection than men

Women have a higher burden of water collection than men in all regions with available data except Eastern and Southern Europe and Latin America and the Caribbean, where the role of water collection is nearly equally distributed between the sexes (figure 7.2). The gender disparities are apparent and are particularly higher in rural than in urban areas in sub-Saharan Africa and Asia. For example, in sub-Saharan Africa, the person usually collecting water is a woman in 65 per cent of rural households and a man in 10 per cent of households. In urban areas, the corresponding proportions are 33 and 10 per cent, respectively.

Figure 7.2
Distribution of households by person usually responsible for water collection, by region and by urban and rural areas, 2005–2013 (*latest available*)



Source: Computed by United Nations Statistics Division based on data prepared by WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, Data on distribution of households by sex and age group of person responsible for water collection, correspondence in September 2014 (2014b).

Note: Unweighted averages. The number in parentheses indicates the number of countries averaged. Data presented by Millennium Development Goal (MDG) regions.

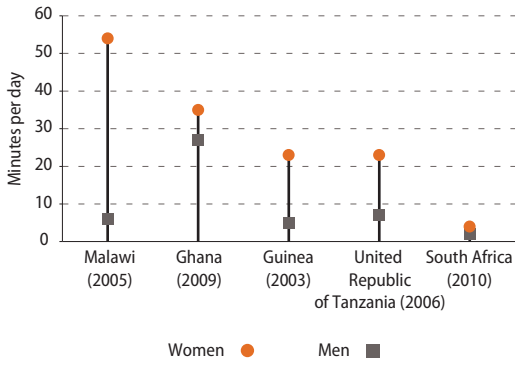
In developing countries, when water is not available on the premises, the time needed to get to a water source, collect the water, and return home averages 27 minutes in rural areas and 21 minutes in urban areas.[22] Typically, it takes more than one trip per day to cover the needs of a household. The time burden for water collection is highest in sub-Saharan Africa, where one round trip averages 33 minutes in rural areas and 25 minutes in urban areas. In Asia, it requires 21 minutes and 19 minutes, respectively. However, in many countries in these two regions the time burden is much greater, particularly in rural areas. In the rural areas of Mauritania, Somalia, Tunisia and Yemen, a single trip to collect water takes on average more than one hour.[23]

The data presented above, available for many countries in developing regions, are useful in providing an overview of the role of women and men in water collection and the distance to water sources. Still, they offer only a basic measure of women's and men's burden, because they do not take into account multiple trips to the water sources and the involvement of multiple household members in water collection. When available, further information from time use surveys can show the proportion of women and men actually involved in water collection and how much time they spend during a day on this activity. For example, time use data for selected countries in sub-Saharan Africa show that the total burden of water collection in a population is typically much higher for women than men (figure 7.3). For instance, in Malawi, daily water collection takes an average of 54 minutes of a woman's time and only 6 minutes of a man's time. In Guinea and the United Republic of Tanzania, women spend more than 20 minutes per day collecting water, while men spend less than 10 minutes. In Ghana and South Africa, the time spent on this activity is more equitably distributed between women and men.

22 Unweighted averages calculated by the United Nations Statistics Division based on data prepared by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2014a.

23 WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2014a.

Figure 7.3
Average time spent on water collection, by sex in selected sub-Saharan African countries



Source: Compiled by the United Nations Statistics Division from Fontana and Natali, Gendered Patterns of Time Use in Tanzania: Public Investment in Infrastructure Can Help (2008); Ghana Statistical Service, *How Ghanaian Women and Men Spend their Time. Ghana Time Use Survey 2009* (2012); Statistics South Africa, *A Survey on Time Use 2010* (2013); and World Bank, *Gender, Time Use and Poverty in Sub-Saharan Africa* (2006).

Note: Average time burden in the population is calculated by taking into account, in the denominator, those involved in water collection as well as those not involved. Data may not be comparable across countries since the data collection methods may differ.

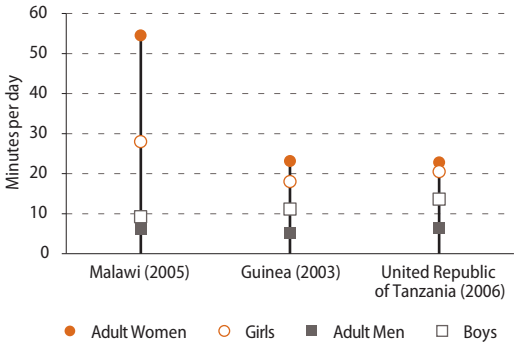
Children, especially girls, are heavily involved in water collection

The burden of water collection weighs heavily on children. The statistics on the usual person collecting water in the household, available from Multiple Indicator Cluster Surveys (MICS) and DHS, presented previously, provide only a partial picture. A girl under age 15 is the main person collecting water in 4 per cent of all households in developing regions, and a boy of the same age group is the main water collector in 2 per cent of households.[24] However, the participation of children in water collection is undoubtedly much higher. Time use data, although available for only a small number of countries, illustrate this point. In Ghana, for example, about 90 per cent of children aged 10 to 17 participate to some degree in water collection.[25] In Rwanda, over 70 per cent of children aged 6 to 9 years and over 80 per cent of children aged 10 to 14 years participate in water collection.[26]

The cases of Guinea, Malawi and the United Republic of Tanzania show that the average time spent by children on water collection is lower than the time spent on this activity by adult women but higher than that spent by men (figure 7.4). Girls spend more time than boys on water collection, but the gender gap is narrower among children than among adults.

Women's work associated with water collection, as well as firewood collection discussed in the next section, remains undervalued, both at the level of national economies and within the household. Very few countries include the value of water and firewood collection when computing their gross domestic product.[27] Within the household, because water and firewood collection is not an income-earning or profit-generating activity, this type of work is rendered invisible. As a result, women's contribution to the economy and to a household's well-being remains largely unrecognized and their economic independence and power of decision-making limited.

Figure 7.4
Average time spent on water collection among children and adults, by sex in selected sub-Saharan African countries



Source: Compiled by the United Nations Statistics Division from World Bank, *Gender, Time Use and Poverty in Sub-Saharan Africa* (2006) and Fontana and Natali, Gendered Patterns of Time Use in Tanzania: Public Investment in Infrastructure Can Help (2008).

Note: Data on children refer to the age group 5–14 years for Malawi and the United Republic of Tanzania and 6–14 years for Guinea. Average time burden in the population is calculated by taking into account, in the denominator, those involved in water collection as well as those not involved. Data may not be comparable across countries since the data collection methods may differ.

2. Access to modern energy services

Access to modern energy services, including electricity and clean, modern cooking solutions, is essential to the achievement of sustainable development in developing countries, including to the achievement of a range of social and economic goals relating to poverty, health, education, equality and environmental sustainability.[28]

Electricity

Electricity affects the quality of life in many ways—for both women and men. Electricity facilitates learning and access to information and technology, and can reduce workload burdens associated with cooking, cleaning, fuelwood collection and the need to make daily food purchases due to the lack of refrigeration.[29] These time-consuming tasks tend to be performed more often by women than men (see Chapter 4 on Work). Modern appliances powered by elec-

24 Unweighted averages calculated by the United Nations Statistics Division based on data for 66 developing countries provided by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2014b.

25 Ghana Statistical Service, 2012.

26 National Institute of Statistics of Rwanda, DFID and UN Rwanda, 2012.

27 Budlender and others, 2010.

28 International Energy Agency, 2014.

29 Köhlin and others, 2011.

tricity, such as stoves and microwave ovens, can also reduce the harmful effects of smoke, particularly on women and children, from burning solid fuels (see next section of this chapter).

Access to electricity increased in many developing regions

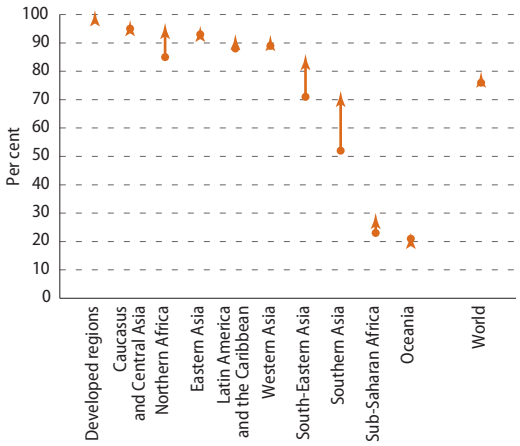
Between 1990 and 2010, the proportion of the global population with access to electricity increased from 76 to 83 per cent, with an additional 1.7 billion people gaining the benefits of electrification. Currently, the global access deficit stands at 1.2 billion people, with the biggest contributor being India, where 306.2 million people are without electricity. Access to electricity in urban areas globally was already high in 1990, at 94 per cent, and increased slowly to 95 per cent by 2010. By comparison, access in rural areas increased more steeply, from 61 to 70 per cent. Currently, 85 per cent of those without electricity are rural dwellers. [30]

Great improvements were noted in some developing regions (figure 7.5), including Northern Africa, South-Eastern Asia and Southern Asia. In stark contrast, access to electricity in Oceania and sub-Saharan Africa remains very low after two decades of slow progress. In 2010 in Oceania, only 25 per cent of the population had access to electricity (14 per cent in rural areas and 65 per cent in urban areas). In sub-Saharan Africa, 32 per cent of the population had electricity that year (14 per cent in rural areas and 63 per cent in urban areas).[31]

Solid fuels used for cooking

Solid fuels for cooking include coal, lignite, charcoal, wood, straw and dung. The dominant type of fuel used is wood, whether taken from dead trees and branches on the ground or from trees cut for fuelwood. Burning fuelwood causes smoke and solid particulate waste that contaminate the air and can cause respiratory problems if not vented outside the dwelling, such as through a chimney, window or by having the kitchen fire outside of living areas. In addition, the need for fuelwood increases the work burden of women and men and sometimes results in deforestation, thereby causing environmental harm.

Figure 7.5
Proportion of the population with access to electricity, 1990 and 2010



Source: Sustainable Energy for All Initiative, 2013. Global Tracking Framework, Data annex, www.se4all.org/tracking-progress/ (2013).

Note: Access to electricity is defined as the availability of an electrical connection at home or the use of electricity as the primary source for lighting.

Solid fuels continue to be used for cooking in many regions and countries

The global proportion of households using mainly solid fuels for cooking decreased from an estimated 53 per cent in 1990 to 41 per cent in 2010.[32] The number of people using solid fuels remained the same over that period, at around 2.8 billion. All WHO regions with the highest use of solid fuels—Africa, South-East Asia (which includes India as the most populous country in that region) and the Western Pacific (which includes China as the most populous country in that region)—showed declining trends in the proportion of households using such fuels, but mixed trends in the number of people exposed to their harmful effects. In Africa, the proportion of households using solid fuels declined from 82 per cent in 1990 to 77 per cent in 2010. The estimated number of persons using solid fuels in the region increased from 413 million in 1990 to 646 million in 2010 as a result of population growth that outpaced improvements in access to clean energy. South-East Asia showed a substantial decrease in the proportion of the population using solid fuels for cooking (from 83 per cent to 61 per cent), while the overall number of people exposed to their harmful effects remained at around 1.1 billion. The Western Pacific region showed a significant decline in both absolute and relative terms. The proportion of households using solid fuels declined from 66 to 46 per cent and the population exposed to the risk declined from 865 to 739 million.

30 Sustainable Energy for All Initiative, 2013.
31 *Ibid.*
32 Bonjour and others, 2013.

Within developing regions, the current use of solid fuels for cooking varies widely across countries and by urban and rural areas. Solid fuels are the main type of fuel used in rural areas in all countries with available data in sub-Saharan Africa, more than half of countries in Asia, and in some countries in Latin America and the Caribbean. By comparison, solid fuels are less used in urban areas. Yet, in sub-Saharan Africa, the majority of urban households in 22 out of 32 countries with data use solid fuels for cooking. In urban areas in other developing regions, solid fuels are seldom used as the main type of fuel. Some exceptions include Haiti (in Latin America and the Caribbean) and Timor-Leste (in Asia).[33]

The health burden

Exposure to household air pollution is a major health risk.[34] The level of household pollution varies by type of fuel used, from practically none when electricity is available, to medium for natural gas and liquid fuels such as kerosene and liquid petroleum gas, to a high level when solid fuels are used. Among the solid fuels, biomass fuels—such as animal dung, crop residues and wood—produce the highest levels of pollutants, followed by coal and charcoal. The use of solid fuels for cooking, particularly indoors on an open fire or on simple traditional stoves, increases the exposure of household members to substantial amounts of pollutants with health-damaging potential, including particulate matter, carbon monoxide, nitrogen oxide, sulphur oxide and benzene.[35] Household use of solid fuels also contributes to ambient (outdoor) air pollution, particularly in regions with high use.[36]

Household air pollution is a major cause of disease

Women and men exposed to smoke from solid fuels have an increased risk of developing acute lower respiratory infections, chronic obstructive pulmonary disease (COPD) and lung cancer. Air pollution has also been linked to increased risk for stroke and ischaemic heart disease. Household air pollution from using solid fuels is one of the main causes of disease globally, resulting in an estimated 4.3 million premature deaths[37] in 2012.[38] About a third (34 per cent) of these deaths were due to strokes, 26 per cent to ischaemic heart disease, 22 per cent to COPD, 12 per cent to acute lower respiratory disease, and 6 per cent to lung cancer.[39]

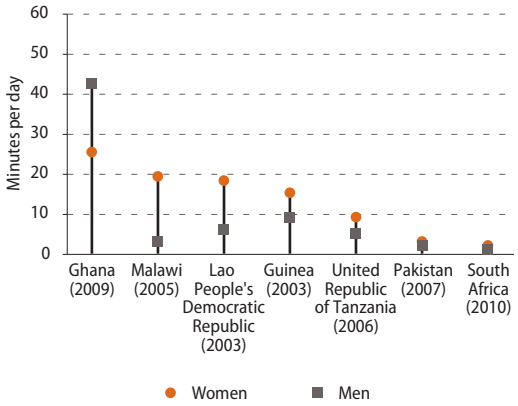
Women in developing countries are more exposed than men to smoke from solid fuels. Women spend more time than men cooking and thus they are more often exposed to episodes of high-intensity pollution;[40] women also spend more time than men indoors,[41] taking care of children and domestic chores (as discussed in Chapter 4 on Work). Consequently, women have a higher relative risk than men of developing adverse health outcomes due to exposure to smoke from solid fuels, including an estimated 21 per cent higher relative risk of COPD and lung cancer.[42] The relative risks for developing stroke and ischemic heart disease are similar for women and men.

The work burden

Dependency on firewood for cooking and heating creates a high work burden for women and men. Available time use data show that in some countries women spend more time than men collecting firewood, while in others men spend more time (figure 7.6). In Guinea, Lao People's Democratic Republic and Malawi, for example, women are disproportionately burdened. In Malawi, women spend an average of 19 minutes each day collecting firewood compared to only 3 minutes spent by men. By contrast, in Ghana, men spend 42 minutes per day compared to 25 minutes spent by women.

33 Data based on ICF International, DHS Program STAT Compiler, www.statcompiler.com/ (accessed March 2015). Data shown in Statistical Annex, http://unstats.un.org/unsd/gender/worldswomen.html.
34 WHO, 2006.
35 *Ibid*.
36 Bonjour and others, 2013.
37 WHO, 2014a. This figure is much higher than previous estimates, primarily due to the inclusion of new diseases, such as cardiovascular diseases.
38 Globally, 7 million deaths were attributable to the joint effects of household (HAP) and ambient air pollution (AAP) in 2012 (WHO, 2014a).
39 WHO, 2014a.
40 Ezzati and Kammen, 2002.
41 See for example Dasgupta and others, 2006.
42 WHO, 2014a.

Figure 7.6
Average time spent collecting firewood, by sex, selected developing countries



Source: Compiled by the United Nations Statistics Division from Fontana and Natali, Gendered Patterns of Time Use in Tanzania: Public Investment in Infrastructure Can Help (2008); Ghana Statistical Service, *How Ghanaian Women and Men Spend their Time. Ghana Time Use Survey 2009* (2012); Government of Pakistan, Federal Bureau of Statistics, *Time Use Survey 2007* (2009); National Statistical Centre of Lao People's Democratic Republic, *Social and Economic Indicators. Lao Expenditure and Consumption Survey 2002/03* (2004) Statistics South Africa, *A Survey on Time Use 2010* (2013); and World Bank, *Gender, Time Use and Poverty in Sub-Saharan Africa* (2006).

Note: Average time burden in the population is calculated by taking into account, in the denominator, those involved and not involved in firewood collection. Data may not be comparable across countries since data collection methods may vary.

3. Extreme climate events and disasters

Disasters caused by weather-, climate- and water-related hazards are on the rise worldwide.[43] The Fifth Assessment Report of the Intergovernmental Panel on Climate Change confirmed that rising atmospheric concentrations of greenhouse gases have already changed weather patterns and the global water cycle. Both developed and developing countries are bearing the burden of repeated floods, droughts, temperature extremes and storms, but developing countries and the poor remain most vulnerable. It is predicted that climate change will further impact human lives and well-being as these extreme weather events grow in frequency and intensity.[44]

Natural disasters have different effects on women, men, girls and boys. Limited evidence presented in the next sections suggests that age, sex and differences in gender roles all affect mortality rates due to natural disasters. Gender roles and norms also play an important role in the aftermath of disasters, including in terms of access to livelihoods and participation in reconstruction efforts. For example, gender roles and norms may limit the capacities and resources of women and girls to respond with resilience and to be in charge of their own futures, with consequential effects throughout entire families and communities. In addition, the likelihood of violence against women, an expression of the unequal power relationships between women and men, can increase as property and livelihoods are lost and as services and formal and informal protection mechanisms are disrupted.[45]

Yet, the systematic collection and compilation of statistics on gender and natural disasters that would indicate the scope and patterns of these specific impacts are lacking at the international level. Some of the constraints to such data collection include the complexity of post-disaster settings and the absence of standardized definitions and methodological tools for data collection.[46] Data and adequate gender analyses are also largely absent in research journals and publications of international agencies involved in providing humanitarian aid in crises related to natural disasters. A recent review[47] of these sources showed that data disaggregated by sex were available for only eight disasters or groups of disasters since 1988 in developing countries that were not members of the Organisation for Economic Co-operation and Development (OECD). The review also revealed a number of accounts of women being disproportionately affected relative to men during disasters, but these were based almost exclusively on qualitative data. Furthermore, some of the few data-based materials used were flawed by gender bias in reporting, methodological errors, and mixing of information based on different definitions and indicators. Thus, in a world that expects an increase in extreme weather events, the lack of adequate gender statistics and analyses continues to undermine efforts to reduce disaster risk and increase the effectiveness of humanitarian responses.[48]

Mortality

The lives of thousands of women and men are lost worldwide each year as a result of natural disasters. Between 1995 and 2014, an estimated 241,400 deaths occurred as a result of storms

43 United Nations Environment Programme, 2012.
44 Intergovernmental Panel on Climate Change, 2014.
45 United Nations Economic and Social Council, 2013.
46 Tschoegl, Below and Guha-Sapir, 2006; Guha-Sapir and Below, 2002.
47 Eklund and Tellier, 2012.
48 United Nations Economic and Social Council, 2013.

or tropical cyclones, 158,700 due to extreme temperatures, 154,000 to floods, and 22,500 to droughts. In addition, 746,800 lives were lost as a result of earthquakes.[49]

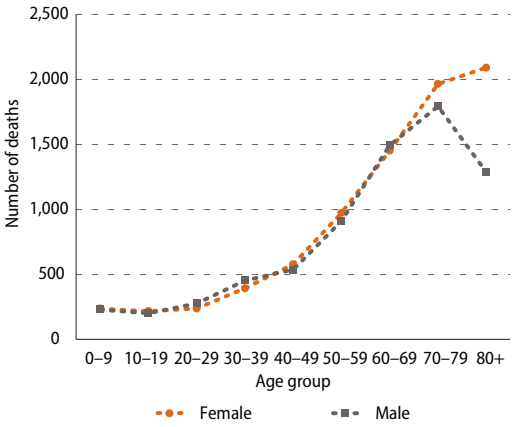
Age, sex and differences in gender roles and norms are significant factors in mortality due to natural disasters

Mortality differences by sex vary from one country to another and by type of hazard. For example, in Myanmar, women and girls represented 61 per cent of the 85,000 deaths and 53,000 people missing after the 2008 cyclone.[50] In Sri Lanka, women, children and older persons represented the majority of casualties in the 2004 tsunami. Out of the more than 13,000 dead and missing persons estimated by the post-tsunami census conducted in Sri Lanka, 65 per cent were women.[51] The share of female deaths was highest among those aged 19 to 29, at 79 per cent. Female deaths outnumbered male deaths in other countries hit hard by the 2004 tsunami, including several sites in Indonesia and India.[52] Another finding that cuts across affected countries is that children and older adults died in greater proportions than adults in their prime age.[53]

The explanations of the differences between female and male mortality during the 2004 tsunami have been formulated mainly in terms of gender. Women's and girls' higher vulnerability was associated with lower access to information, the lack of life skills such as swimming ability, constrained mobility outside their home, and the increased vulnerability of women staying home with children at the time of the sea-level rise.[54] Gender differences were not the only factor. The physiological attributes of females and males at different ages have a substantial impact on vulnerability during tsunamis. For example, a quantitative assessment of sex and age differences in mortality based on a longitudinal survey before and after the tsunami in Indonesia showed that some of the explanation lies in differences in physical strength, stamina and running and swimming ability.[55] Overall, prime-age males were the most likely to survive the tsunami because they were the strongest. Their presence in the household at the time of tsunami also had a protective effect on the survival of wives and children.[56]

A different sex and age pattern of mortality emerged in the 2011 earthquake and tsunami in Japan. In 2011, when the Great East Japan Earthquake and subsequent tsunami hit the northeast coast of Japan, 8,363 female deaths and 7,360 male deaths were recorded in the prefectures hardest hit.[57] The most affected were older persons (figure 7.7). The numbers of female and male casualties were similar among children and young adults. At age 70 and above, nearly 1,000 more women than men died. This was higher than expected based on the sex distribution in the older population.[58]

Figure 7.7
Deaths due to the 2011 East Japan Earthquake and tsunami by age and sex, Japan



Source: Government of Japan, Disaster prevention and reconstruction from a gender equal society perspective. Lessons from the Great East Japan Earthquake (2012).
Note: Data refer to the worst-affected prefectures, including Iwate, Miyagi and Fukushima.

49 Computed by the United Nations Statistics Division based on data from the Centre for Research on the Epidemiology of Disasters (CRED) and Université Catholique de Louvain, 2015.
50 Myanmar Government, Association of Southeast Asian Nations and United Nations, 2008.
51 Sri Lanka Department of Census and Statistics, 2005.
52 Oxfam International, 2005.
53 Frankenberg and others, 2011.
54 Oxfam International, 2005.
55 Frankenberg and others, 2011.
56 *Ibid.*
57 Iwate, Miyagi and Fukushima prefectures.
58 Government of Japan, 2012.

In the United States of America, however, more men than women have died as a result of natural hazards, suggesting that men are more inclined to risk-taking or more involved in activities that put them at risk. During 2004–2013, 3,777 males and 2,211 females died as a result of natural hazards.

The leading natural hazards in terms of fatality were heatwaves, tornados, hurricanes and floods.[59] Male deaths outnumbered female deaths in all major categories of natural hazards and at almost all age categories. The exceptions were persons over 80 years (figure 7.8).

Men also accounted for the majority of deaths due to meteorological disasters (storms, cold weather, floods, typhoons and lightning) in the Republic of Korea between 1990 and 2008. For men, most deaths occurred outdoors, whereas most women died in residential areas. Men accounted for more than half of deaths due to drowning in a river (61 per cent), sea (66 per cent) and in a sunken vessel (97 per cent). Women accounted for more than half of deaths due to structural collapse (52 per cent) and drowning in a submerged house (56 per cent).[60] Another example of where more adult men than adult women died as a result of natural disasters was the 1999 floods in Hunan province, China.[61]

Figure 7.8
Total number of deaths due to natural hazards, by sex and age group, United States of America, 2004–2013

Source: USA National Weather Service, Natural hazards statistics. National Oceanic and Atmospheric Administration (NOAA), http://www.nws.noaa.gov/om/hazstats.shtml (accessed March 2015).

Older persons, especially women in some settings, are most vulnerable to heatwaves

Older persons are among those most vulnerable to heatwaves,[62] an increasingly relevant issue since all countries show a rise in the proportion of older persons in the population (see Chapter 1 on Population and families). A review of research studies[63] showed that deaths due to cardiovascular and respiratory conditions were consistently reported as having increased, along with respiratory admissions to hospitals among older persons during hot days and heatwaves.[64] Both biological and social factors explain this susceptibility to high temperatures. Biologically, the body's responses to the environment deteriorate with ageing. In addition, both thermoregulation and risk perception can be altered by the use of medications or by dementia. Socially, living alone (as many older women in developed countries do) may also contribute to the susceptibility of older persons to heat, especially when confined to bed or not taking steps to avoid the heat and to increase cooling and hydration.[65]

Older women were significantly worse off during heatwaves in various sites, including during the 2003 summer heatwave in Europe, heatwaves that occurred between 1995 and 2006 in Australia and in 2003 in the city of Shanghai, in China.[66] For example, the excess mortality due to the 2003 summer heatwave in Europe was higher for older persons and women. In Rome and Milan, almost all excess mortality was among persons aged 75 and over.[67] Nearly three quarters of excess deaths were female, largely reflecting the higher share of women among the older population. In France, the mortality observed during the heatwave was 70 per cent higher than expected for women and 40 per cent for men.[68] Similarly, in India, a higher increase in the mortality of women than men was noted during the 2010 heatwave in Ahmedabad (in the western state of Gujarat). The average number of deaths per day the year before and after the heatwave was 63 for men and 42 for women. During the heatwave from 19 to 25 May, the mortality increased by an additional 53 male and 61 female deaths per day.[69]

59 USA National Weather Service, 2015.
60 Myung and Jang, 2011.
61 Eklund and Tellier, 2012.
62 Åström, Forsberg and Rocklöv, 2011.
63 Articles published in English in PubMed between 2008 and 2010.
64 Åström, Forsberg and Rocklöv, 2011.
65 *Ibid.*
66 *Ibid.*
67 Michelozzi and others, 2005.
68 Pirard and others, 2005.
69 Azhar and others, 2014.

Livelihoods and participation in reconstruction efforts

Relative to men, women's capacity to recover after natural disasters in some countries may be more limited due to their lower education levels. Women may also have specific skills that confine them to certain occupations that may put them at greater risk of unemployment during natural disasters or that are less in demand during post-disaster reconstruction efforts. For example, a study of urban flooding in 2011 in Lagos, Nigeria,[70] showed that women with low social and economic status, but not women in general, were most vulnerable. Another study, in Sumatra, Indonesia, showed that after the 2004 tsunami, better educated women and men were able to adjust to changes much faster than those with little education, perhaps reflecting not only differences in skills, but also a greater accumulation of economic and social resources.[71]

Women's access to work in post-disaster settings may be more difficult than men's

Women may face higher barriers than men in accessing work in post-disaster settings. These include the increased burden of caring for children and family members when public services are interrupted. Women may also experience more difficulties finding employment when job losses occur in those economic sectors and occupations where women dominate, and when newly created jobs are concentrated in sectors and occupations dominated by men.[72] For example, in the Canterbury region of New Zealand, women's employment fell by 10 per cent compared to 7 per cent for men after the 2010 and 2011 earthquakes and tsunami. The difference was mostly due to larger falls in employment in female-dominated industries, including retail, hotels and accommodation, health care and social assistance. In Chile, in regions suffering greater net job losses as a result of the 2010 earthquake and tsunami, around 46 per cent of jobs lost were held by women, but only 15 per cent of the jobs created went to them.[73]

In some instances, gender stereotypes were perpetuated in post-disaster temporary employment programmes. In Japan, after the 2011 earthquake and tsunami, men were given the role of clearing rubble while women prepared meals at evacuation sites, and while daily allowances were often provided for clearing rubble, no such compensation was provided for food preparation.[74] In Mexico, 70 per cent of the temporary jobs offered by federal and local governments after disasters in 2004–2005 were assigned to men because the work required involved tasks traditionally considered masculine, such as clearing rubble from roads and bridges and constructing houses.[75]

Nevertheless, issues of gender inequality in participation in reconstruction efforts are increasingly recognized. United Nations entities and donor and aid-receiving countries are committed to mainstreaming gender into humanitarian actions, including in post-disaster settings.[76] For example, nearly three quarters of the 2012 humanitarian funding from Germany and Sweden went to projects designed to advance gender equality.[77] These types of projects also received nearly three quarters of all aid supporting the Typhoon Haiyan Strategic Response Plan in the Philippines from November 2013 to October 2014.[78]

Participation in decision-making in post-disaster settings

Women are less involved than men in decision-making related to recovery efforts and risk reduction strategies in some settings

Women may participate less than men in bodies involved in post-disaster reconstruction efforts. After the 2011 earthquake and tsunami in Japan, very few women were involved in running communities, including in local aspects of temporary housing. Women represented only 11 per cent of the members of local committees working on recovery and reconstruction plans in 38 municipalities. A total of nine municipal committees had no female members. Women were also less involved than men in higher-level decision-mak-

70 Ajibade, McBean and Bezner-Kerr, 2013.
71 Frankenberg and others, 2013.
72 Venn, 2012.
73 *Ibid.*
74 Government of Japan, 2012.
75 Castro García and Reyes Zúñiga, 2009.
76 United Nations Economic and Social Council, 2013.
77 United Nations Economic and Social Council, 2013. Projects designed to advance gender equality include humanitarian aid projects coded 2a (the project has the potential to contribute significantly to gender equality) and 2b (projects with the principal purpose of advancing gender equality) on the gender marker scale.
78 United Nations Office for the Coordination of Humanitarian Affairs, 2014.

ing. For example, only 9 per cent of the members of the Regional Disaster Management Council were women. There was only 1 woman among the 15 expert members of the Reconstruction Design Council; 2 women among the 19 members of the Study Group of the Council; and 4 among the 15 members of the Reconstruction Promotion Committee. Women were severely underrepresented in the Central Disaster Management Council itself, which had only 2 women among its 27 members.[79]

Pre-disaster gender inequalities were also mirrored in some of the post-2004 tsunami recovery processes in Indonesia and Sri Lanka. In relief camps in Aceh, Indonesia, women and girls were in charge of organizing meals and taking care of children and older family members, but were not involved in the governance of the camps and were not represented in the negotiation processes with aid organizations and government institutions that provided supplies. In Sri Lanka, women's participation in recovery planning and management reached up to 40 per cent in some districts in the South, but was less than 10 per cent in districts in the East where sociocultural traditions are more conservative.[80]

Gender mainstreaming in national disaster risk reduction policies and strategies is ongoing in only a few countries. For example, in Latin America and the Caribbean, only 20 per cent of countries reported advances in incorporating gender into their disaster risk reduction policies and strategies; 23 per cent reported having adopted measures to incorporate a gender approach in recovery efforts; and 15 per cent had vulnerability and capacity evaluations broken down by sex. In terms of normative frameworks, only eight countries mentioned integrating gender as a cross-cutting dimension in their national policies on disaster risk management, including Bolivia, Costa Rica, Honduras, Mexico, Nicaragua, Panama, Paraguay and Peru. Women were severely underrepresented among decision-makers in top positions. In the entire region, only three women had leadership positions in entities in charge of risk management.[81]

B. Involvement of women and men in the management of the environment

Loss of natural resources and environmental degradation are a growing concern worldwide. According to *The Millennium Development Goals Report 2015*, the stress on renewable water resources is severe in some regions, particularly Northern Africa and the Arabian Peninsula in Western Asia. In 2014, only 15.2 per cent of terrestrial and inland water areas and 8.4 per cent of coastal marine areas (up to 200 nautical miles from shore) were protected. The annual net loss of forests declined from 8.3 million hectares worldwide in 1991–2000 to 5.2 million hectares in 2001–2010.[82] Nevertheless, the loss of these forests continues to threaten biodiversity, increase soil erosion and contribute to the high level of emissions of carbon into the atmosphere.[83]

Emissions of greenhouse gases due to human activity, of which carbon dioxide and methane are the most significant, are causing climate change.[84] The world has almost eliminated the use of ozone-depleting substances, but global emissions of carbon dioxide (CO2) have shown an overall upward trend in the past decades and are now more than 50 per cent higher than their 1990 level.[85]

Environmental protection, and consequently sustainable development, require that both women and men are actively involved, including through daily activities aimed at preserving natural resources and through participation in local and high-level environmental decision-making. Moreover, as emphasized in the 1995 Beijing Platform for Action, the involvement of women in environmental decision-making at all levels is a key step to ensuring that women's issues and gender perspectives on the environment are included in policymaking from the local to national and global levels.[86]

79 Government of Japan, 2012.
80 Ariyabandu, 2009.
81 UNDP and UNISDR AM, 2013.
82 United Nations, 2015.
83 *Ibid.*
84 Intergovernmental Panel on Climate Change, 2014.
85 United Nations, 2015.
86 United Nations, 1995.

1. Individual participation in environmental protection activities

Differences in women's and men's participation in environmental protection are rooted in gender roles and responsibilities

Women's and men's involvement in environmental protection varies widely across countries and by type of activity.[87] Recycling is one of the most widespread activity. Taking active steps to separate recyclables, such as paper, metal and glass from refuse is an easy and effective way to make a positive environmental contribution. More people are recycling than in the past. For example, in 19 developed countries with trend data, the average proportion of women recycling increased from 61 per cent in 2000 to 78 per cent in 2010,[88] while the proportion of men recycling rose from 58 to 74 per cent. Overall, women are slightly more involved than men, which is somewhat linked to the gender division of domestic labour (see Chapter 4 on Work). A few examples of countries in which women are more involved than men in recycling include Argentina, Austria, Croatia, the Czech Republic, Latvia, Mexico, the Republic of Korea, Sweden and the United Kingdom.[89]

Cutting back on driving to reduce pollution from automobile exhaust is another common contribution to environmental protection. Individual use of mass transit, consolidating errands into fewer trips, carpooling, and/or substituting biking or walking for driving can all be effective means for reducing pollution. In 19 developed countries with available trend data, the proportion of women driving less for the purpose of protecting the environment increased from 14 per cent in 2000 to 24 per cent in 2010. For men, the increase was from 14 to 20 per cent. In about half the countries with available data for 2010, the proportion of women cutting back on driving was higher than the proportion of men by 5 percentage points or more. Japan was the one notable exception; there, men cut back on driving more than women by 6 percentage points.[90]

By comparison, contributing financially to environmental causes is adopted in similar proportions by women and men in most countries. A notable exception is Finland, where 31 per cent of women and 21 per cent of men have contributed in the past 5 years to an environmental organization.[91]

Differences between women and men in attitudes towards paying higher taxes and paying higher prices in order to protect the environment vary dramatically from one country to another. For example, in Argentina, Germany, Israel, the Republic of Korea, the Russian Federation and the United Kingdom, the proportion of men willing to pay higher prices is higher than the proportion of women by 5 percentage points or more. However, in Denmark, Finland, New Zealand and Norway, the proportion of men is lower than the proportion of women by 5 percentage points or more. Willingness to pay higher taxes for environmental gains is more often reported by men than women in a number of countries (as in Argentina, Israel, France, Germany, the Republic of Korea, Spain, Turkey and the United Kingdom), perhaps mirroring men's greater access to income (see Chapter 8 on Poverty). In many other countries, women and men have similar attitudes, while Denmark and Norway are breaking the pattern; in those two countries, women's propensity to pay higher taxes in order to protect the environment is higher than men's by 4 and 7 percentage points, respectively.[92]

2. Local decision-making on natural resources

Women are often excluded from local decision-making with regard to natural resources. Low participation rates among women in the management of local natural resources may be linked to gender inequality in roles, responsibilities and power, including women's time constraints, unequal domestic work burdens, lack of information, lack of support from men, and threats of hostility or punishment.[93] Other factors may also play a role. For example, where membership in local management groups is restricted to one household member, male heads of household may become the default representative.[94] Moreover, even if women

87 Data on 31 countries based on the ISSP Research Group, 2012. Data shown in Statistical Annex, http://unstats.un.org/unsd/gender/worldswomen.html.

88 Unweighted averages computed by United Nations Statistics Division based on data from the ISSP Research Group: International Social Survey Programme.

89 Data for 31 countries based on the ISSP Research Group, 2012. Data shown in Statistical Annex, http://unstats.un.org/unsd/gender/worldswomen.html.

90 *Ibid.*

91 *Ibid.*

92 Data based on the ISSP Research Group, 2012. Data shown in Statistical Annex, http://unstats.un.org/unsd/gender/worldswomen.html.

93 See, for example, Mairena and others, 2012.

94 Agarwal, 2001.

are members of local management groups, their opinions may not be given the same weight as those of men, or may be discouraged altogether.[95]

In some cases, women in local management of natural resources are able to bring positive changes; in others, however, they continue to face challenges. For example, some case studies in India and Nepal showed that greater participation by women in forest governance can foster more equitable distribution practices for forest access and goods, greater influence over funding allocations for women, stronger efforts to overcome fuel shortages, and improved conservation practices and resource regeneration.[96] However, other studies, in Bolivia, Kenya, Mexico and Uganda showed that forest user groups with higher participation of women tended to be less effective due to women's lower access to technology, labour constraints and limited authority.[97]

Women are underrepresented in local management of forests

Women participate far less than men in formal forest user groups. Their low participation in forest management, illustrated previously in research literature analysing results from qualitative and small quantitative case studies in developing countries, has been confirmed by a comparative multi-country study[98] conducted in 2005–2008 in 24 developing countries covering the major tropical forest regions of Africa, Asia, and Latin America and the Caribbean.[99] Gender parity in local forest governance is far from being achieved in each of the three regions covered (figure 7.9). The study also showed that in about half the sites covered by the study, women were not involved at all in forest user groups.

While low participation of women is often considered in the context of developing countries, this is also an issue in developed countries such as Canada, where women have been shown to be underrepresented in forest governance. For example, a 2006 national survey of public advisory committees revealed that only 17 per cent of committee members were women.[100]

95 *Ibid.*

96 Agarwal, 2001; Agarwal, 2009a; Agarwal, 2009b; Agrawal and others, 2006; Agrawal and Chhatre, 2006.

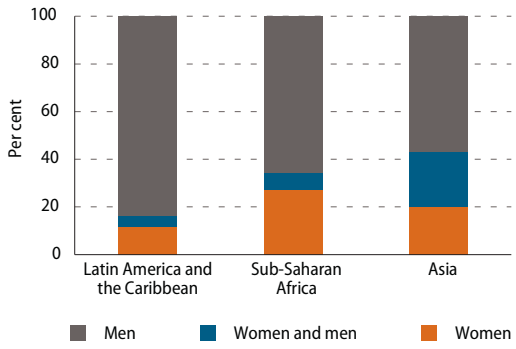
97 Mwangi, Meinzen-Dick and Sun, 2011.

98 The study was developed under the framework of the Poverty Environment Network, a project of the Center for International Forestry Research.

99 Sunderland and others, 2014.

100 Reed, 2010.

Figure 7.9
Distribution of households by sex of the household member participating in forest user groups, by region, 2005–2008



Source: Adapted from Sunderland and others. Challenging perceptions about men, women, and forest product use: a global comparative study, *World Development* (2014).

Note: Data based on 24 developing countries covering the major tropical forest regions in Africa, Asia, and Latin America and the Caribbean. Only households with at least one member in a forest user groups were taken into account.

3. High-level environmental decision-making

Women hold fewer positions of power and decision-making related to the environment than men

As shown in Chapter 5 on Power and decision-making, women still hold a minority of decision-making positions in most public and private institutions. This is also the case when it comes to environment-related institutions. Women are underrepresented in the workforce and management of environment-related institutions, as illustrated by a 2013 global survey[101] of National Meteorological and Hydrological Services (NMHS) of member countries of the World Meteorological Organization (WMO). Globally in 2013, women represented 33 per cent of the global workforce and 19 per cent of the senior management in NMHS. Gender parity was far from being achieved even among new staff. Women represented 39 per cent of the NMHS staff recruited in 2012.[102] This was the result of a small pool of women interested and educated in meteorological and hydrological services, as well as policies and practices in staff recruitment that perpetuate gender imbalances in the workforce and management. As at 2013, only 41 per cent of WMO members had implemented an action plan for gender mainstreaming in the NMHS, and 48 per cent had human resources policies that promoted gender equality and the empowerment of women.

Moreover, women hold only a few political and non-political decision-making positions in gov-

101 The survey covered 83 member countries of the World Meteorological Organization (WMO) (43 per cent of all WMO member countries).

102 World Meteorological Organization, 2013.

ernment ministries related to the environment. In Europe, for example, women are underrepresented among ministers of environment, climate change, transport and energy in ministries or departments of national governments.[103] As at December 2014, the average share of women was 28 per cent among senior ministers[104] and 27 per cent among junior ministers related to the environment.[105] Women were also underrepresented among senior non-political administrative positions within environment-related ministries; 30 per cent among level-1 administrators and 38 per cent among level-2 administrators.

Finally, less women than men represent their governments at the international level. For instance, the current composition by sex of delegations to meetings of parties to the United Nations Framework Convention on Climate Change (UNFCCC) [106] and its Kyoto Protocol, and of UNFCCC boards and bodies remains inequitable overall. In 2013, women represented 36 per cent of delegates to the nineteenth session of the Conference of the Parties, the highest political decision-making body of the Convention. The Bureau of the Conference included three women among its 11 members.[107] Women were also underrepresented (27 per cent) among the officers elected to the bodies established under the Convention and its Kyoto Protocol to provide scientific and technological advice and support to the Conference. In only three out of 12 bodies was women's representation higher than 40 per cent.[108]

103 European Commission, 2015.

104 Members of the government who have a seat on the cabinet or council of ministers.

105 Members of the government who do not have a seat on the cabinet.

106 The United Nations Framework Convention on Climate Change is an international treaty that provides a framework for the 195 parties to work together to consider what can be done to limit average global temperature increases resulting in climate change and to cope with its impact.

107 United Nations Framework Convention on Climate Change, 2014.

108 *Ibid*.